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

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CHAPTER 1. INTRODUCTION

1.1 BACKGROUND AND PROJECT OVERVIEW

WKN Windcurrent SA (Pty) Ltd (referred to as "WKN Windcurrent") is proposing the construction of a 50 MW wind energy facility on the Broadlands and Saragossa Farms in the Kouga Municipal Area, approximately 3.5 km south of the town of Humansdorp. The proposed project is referred to as the Banna Ba Pifhu Wind Energy Project. WKN Windcurrent is a joint venture company between Windcurrent SA (Pty) Ltd and WKN AG (referred to as "WKN").

The Banna Ba Pifhu Wind Energy Project will be located on the following farms:

- Remainder of Farm 688;
- Portions 2 and 15 of Farm 689 and
- Portion 1 of Farm 868.

The locality maps provided in Figure 1.1 provide an overview of the erven included in this project as well as an overview of the area. The Banna Ba Pifhu Wind Energy Project will consist of 15 to 27 wind turbines pending the capacity of the turbine to be used, i.e. approximately 1.8 to 3.2 MW each. .

A new substation will be built on site to connect to the transmission system. It is proposed to connect the wind farm substation to the existing 66 kV Melkhout - St. Francis overhead power line which passes through the site, therefore no additional power lines will need to be constructed. The turbines will be connected via underground cabling.

A separate Basic Assessment (Department of Environmental Affairs Reference number: 12/12/20/1753) was undertaken from January to June 2010 for the establishment of a wind monitoring mast on Farm Broadlands prior to the development of the wind farm. This application was undertaken under the NEMA EIA Regulations published in GN R 385, 386 and 387 on 21 April 2006. Subsequently Amended NEMA EIA Regulations (Notices GN R. 543, 544, 545, and 546) were published in the Government Gazette No. 33306 of 18 June 2010, and came into effect from 2 August 2010 (referred to as the 2010 EIA Regulations). A wind monitoring mast is no longer a listed activity in terms of the 2010 EIA Regulations. WKN Windcurrent intends to erect a maximum of two wind monitoring masts on Farm Broadlands.

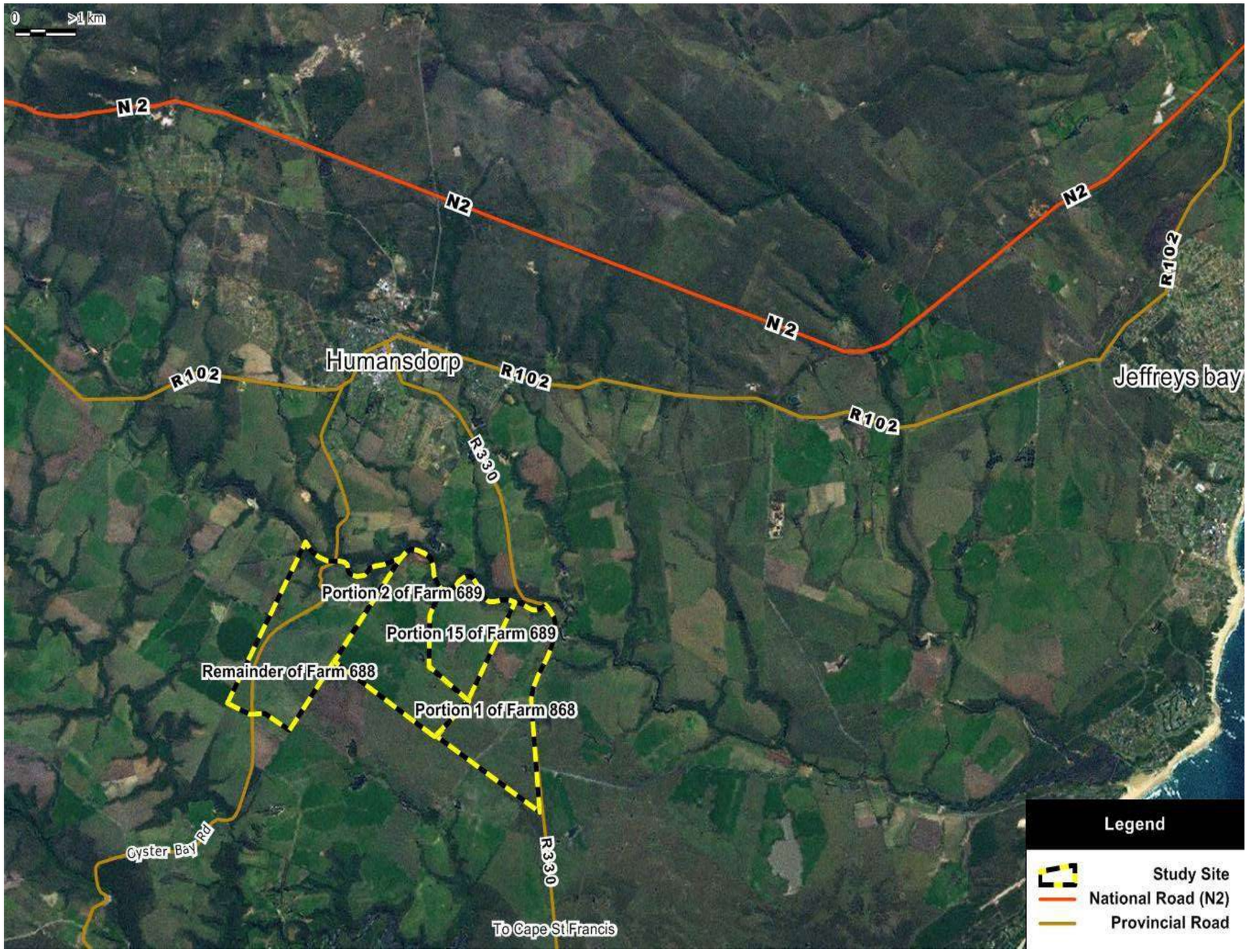

Figure 1.1(a): Locality map of the proposed Banna Ba Pifhu Wind Energy Project near Humansdorp in the Eastern Cape (satellite image).

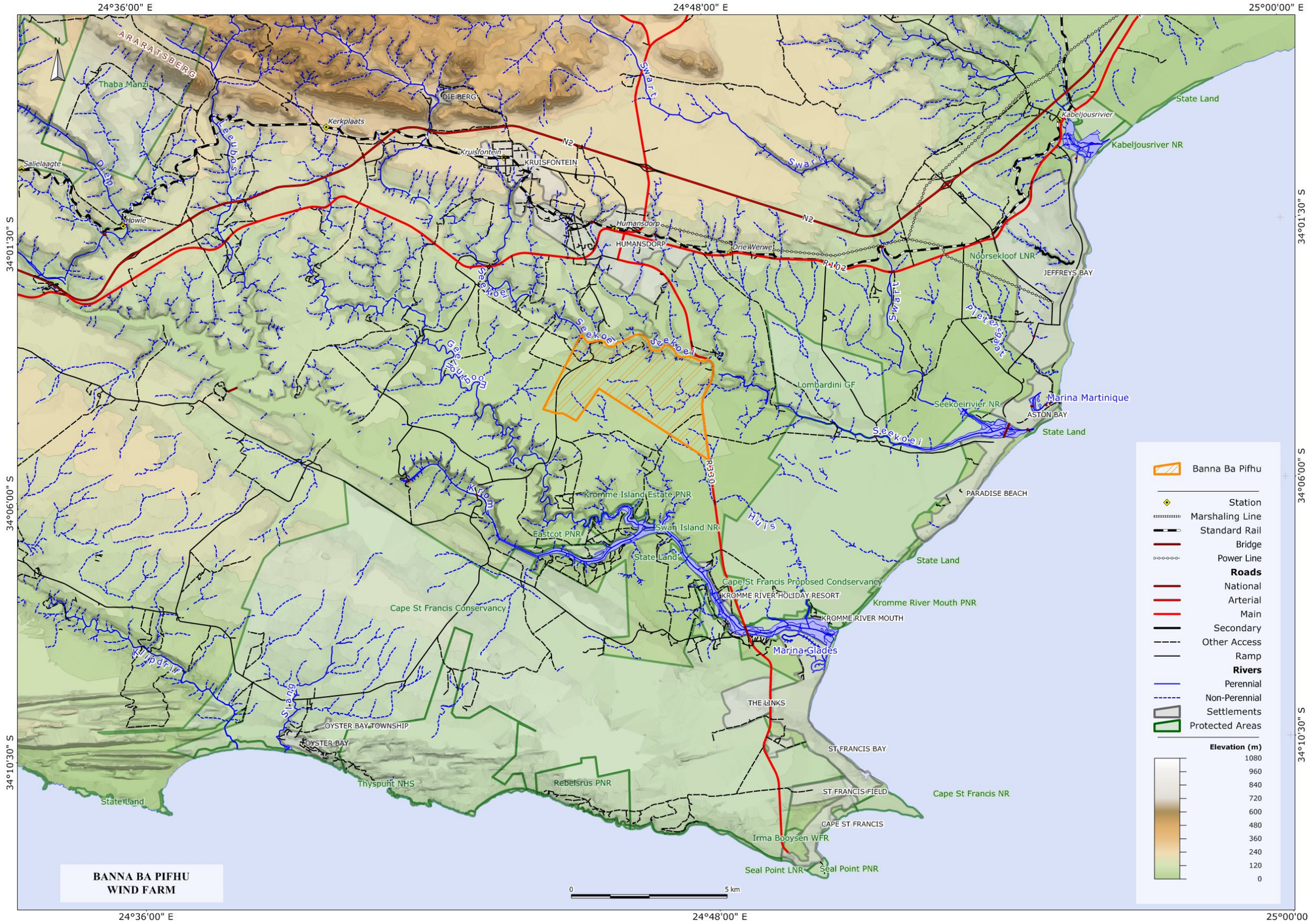

Figure 1.1(b): Locality map of the proposed Banna Ba Pifhu Wind Energy Project near Humansdorp in the Eastern Cape.

1.2 ABOUT THE PROJECT PROPONENT

WKN AG (WKN) was founded in 1990 and is one of the pioneers of the German wind energy market. WKN has international experience in development, financing, erection and operation of wind farms, and has, as of 2011, a realised capacity of 1077.2 MW wind power. Windcurrent SA (Pty) Ltd is a local company which has been developing renewable energy projects since 2009 in South Africa. The Joint Venture Company which was formed is a South African based renewable energy company that develops, builds and operates renewable energy projects.

1.3 NEED AND JUSTIFICATION FOR THE PROJECT

The aim of this project is to generate electricity that will be fed into the national or the provincial grid by erecting a wind farm of 50 MW. In mid-2011, the South African government indicated a change in pricing strategy for renewable energy. Instead of applying a predetermined renewable-energy feed-in tariff (Refit), as previously indicated, the government would conduct a selection process that would involve both price and non-price elements. This requires bidders to propose their price per MWh for the energy output to be generated, along with full or partial inflation indexation. The price indication would be for the first 20 years of operation, or for the duration of the power purchase agreement (PPA). On 3 August 2011, the Department of Energy (DoE) released the qualification and proposal documentation for South Africa's first renewable energy independent power producer (IPP) tender process, and announced that it has allocated a total of 3 725 MW capacity across various renewables technologies, with 1 850 MW set aside for onshore wind, 200 MW for concentrated solar thermal, a further 1 450 MW for solar photovoltaic solutions, 12.5 MW for both biomass and biogas, 25 MW for landfill gas capacity, 75 MW for small hydro, and a further 100 MW for small-scale IPP projects of less than 5 MW. This allocation to wind energy is an increase on the 1 025 MW set out for the first procurement round in the Integrated Resource Plan (IRP) 2010-2030 (Source: Engineering News, 4 & 5 August 2011).

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 power generation. Currently, approximately 93% of South Africa's power generation is derived from coal. The proposed WKN Windcurrent project of 50 MW could offset over 100 000 tonnes of CO_2 per year, or 2 000 000 tonnes of CO_2 over the lifetime (20 years) of the project. [1] [2]Wind farms have a relatively short construction lead time and could therefore be quickly developed to meet South Africa's power need. Coal fired power stations used approximately 292 million cubic metres of water, or 1.5% of national water consumption, for electricity generation during 2005. The future availability and treatment costs of water therefore present a serious challenge for the economic sustainability of South Africa's current (coal-based) electricity supply.

[1] http://www.iea.org/co2highlights/

[2] http://www.sunearthtools.com/dp/tools/CO2-emissions-calculator.php?lang=de#txtCO2_3

The Eastern Cape Province is reliant on electricity imports from other provinces yet houses significant industrial and rural development potential. Power from the national grid is largely generated from coal power stations, and transmitted considerable distances to the Eastern Cape (e.g. from Mpumalanga). This leads to significant transmission losses and local grid instabilities. Electricity supply to the Eastern Cape Province is further constrained by transmission infrastructure. Eskom currently supplies approximately 1 400 MW of electricity to the Eastern Cape Province.

Against the background of international commitments to generation of "green energy" with low or zero CO_2 emissions, the intention of this project is to generate additional electricity that will be fed into the national grid by installing a wind farm with a capacity of 50 MW. The objective of WKN Windcurrent project is to support the growing demand for electricity by means of renewable energy and to lower the emissions of carbon dioxide (CO_2) into the atmosphere. Electricity generated by wind energy, that replaces the use of fossil fuels, results in greenhouse gas emission reductions. Wind energy is a national imperative. A constrained national energy supply and South Africa's commitments to meeting its 2013 CO_2 reduction target and to the Kyoto Protocol require the rapid deployment of renewable energy, of which wind power has the greatest commercial potential.

The **Integrated Resource Plan for Electricity** (IRP)[3] for South Africa is a subset of the **Integrated Energy Plan** (IEP) for the Republic of South Africa which was published on 19 March 2003. Its Draft Executive Summary and **Medium Term Risk Mitigation Plan**[4] were published by the Department of Energy on 8 October 2010. The objective for the IRP is to develop a sustainable electricity investment strategy for generation and transmission of electricity in South Africa for the next 25 years.

At a provincial level, the project aims to assist the Eastern Cape in achieving improved energy stability and security. The local wind climate in the Humansdorp region creates the potential for a wind energy project to generate electricity, thereby contributing towards the provision of sustainable renewable energy.

Further information on **energy planning and strategic initiatives** in South Africa, and the consequent need for the development of wind energy projects, is provided in Section 1.7. Further information on the **objectives** of the proposed project is provided in Section 2.3.

1.4 REQUIREMENTS FOR AN ENVIRONMENTAL IMPACT ASSESSMENT

Amended NEMA EIA Regulations (Notices GN R. 543, 544, 545, and 546) were published in the Government Gazette No. 33306 of 18 June 2010, and came into effect from 2 August 2010 (referred to as the ***2010 EIA Regulations***). This EIA application by WKN Windcurrent is undertaken under the 2010 EIA Regulations. In terms of these regulations, Scoping and Environmental Impact Assessment are required as the project includes listed activities shown in Table 1.1 below.

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[3] *Executive Summary of the Draft Integrated Electricity Resource Plan for South Africa - 2010 to 2030*. Available online: http://www.doe-irp.co.za/content/Executive_Summary_Draft_IRP2010_8Oct2010.pdf. Department of Energy. Accessed 1 December 2010.

[4] *Medium Term Risk Mitigation Plan (MTRM) for Electricity in South Africa - 2010 to 2016*. http://www.doe-irp.co.za/content/Medium_Term_Risk_Mitigation_Project_Phase_1.pdf. Department of Energy. Accessed 1 December 2010.

Table 1.1: Listed activities in Government Gazette No. 33306 of 2010 (2010 EIA Regulations) that potentially form part of the proposed Banna Ba Pifhu Wind Energy Project near Humansdorp.

Listed activities in Government Notices 544, 545, and 546		
Government Notice	**Activity No(s)**	**Describe the relevant Scoping and EIA Activity in writing**
GN.R544, 18 June 2010	*10*	10. The construction of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;
	11 (xi)	11. The construction of (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
	18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a water course.
	23	The transformation of undeveloped, vacant or derelict land to - (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares; - except where such transformation takes place, or (i) for linear activities; or (ii) For the purposes of agriculture or afforestation, in which case Activity 16 of Notice No. R 545 applies.
	26	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
GN.R545, 18 June 2010	*1*	1. The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.
	15	15. Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;
	4(a)(ii)(ee)	4. The construction of a road wider than 4 metres with a reserve less than 13,5 metres. (a) In Eastern Cape...: (ii) Outside urban areas, in: (ee) Critical biodiversity areas (Type 1) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
GN.R546, 18 June 2010	*4*	The construction of a road wider than 4 metres with a reserve less than 13.5 metres a(ii) in the Eastern Cape (cc) Critical Biodiversity Areas as identified systematic Biodiversity plans adopted by the competent authority or in regional plans.

Listed activities in Government Notices 544, 545, and 546		
Government Notice	**Activity No(s)**	**Describe the relevant Scoping and EIA Activity in writing**
	12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (a) within an critically endangered or endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (b) within critically endangered areas identified in bioregional plans
	13	The clearance of an area of 1 hectare or more of vegetation where 75% of more of the vegetative cover constitutes indigenous vegetation (a) critically biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority
	14a (i)	14. The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for: (a) In Eastern Cape...: (i) All areas outside urban areas;
	16 (iii); (iv) and a (ii)(ff)	16. The construction of: (iii) buildings with a footprint exceeding 10 square metres in size; (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. (a) In Eastern Cape, ii. Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

1.5 EIA TEAM

The CSIR has been appointed by WKN Windcurrent to undertake the EIA required for this project.

The EIA team involved in this EIA is listed in Table 1.2. Most of the specialists are familiar with the area and have been involved in other specialist studies in the area.

Table 1.2: EIA Team for the proposed Banna Ba Pifhu wind energy project

EIA Management Team		
Paul Lochner	CSIR	*Project Leader (EAP-SA)*
Minnelise Levendal	CSIR	*Project Manager*
Specialist Team		
Jamie Pote	Private Consultant	*Ecology (Flora and Fauna)*
Chris van Rooyen	Chris van Rooyen Consultants	*Avifauna (birds)*
Stephanie Dippenaar	Private Consultant	*Bats*
Henry Holland	Mapthis	*Visual impacts*
Brett Williams	SafeTech	*Noise Impacts*
Dr Hugo van Zyl	Independent Economic Researchers	*Socio-economic impacts*
Dr Johan Binneman	Albany Museum	*Archaeology*
Dr John Almond	NaturaViva	*Palaeontology*
Mr Johann Lanz	Private Consultant	*Soil Agricultural potential*
Dr Brian Colloty	Scherman Colloty & Associates	*Aquatic (Wetland) specialist*
Public Participation Process		
Sandy Wren	Public Process Consultants	*Public Participation Process*

1.6 DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

The EIA Project Team is being led by Paul Lochner, who has 17 years experience in environmental assessment and management studies, primarily in the leadership and integration functions (refer to Appendix A for his CV). This has included Strategic Environmental Assessments (SEAs), Environmental Impact Assessments (EIAs) and Environmental Management Plans (EMPs). He has been a certified Environmental Assessment Practitioner for South Africa (EAPSA) since July 2003; and has conducted several EIA processes both in South Africa and internationally. Examples of EIAs include the EIA for the 180 MW Jeffrey's Bay Wind Project proposed by Mainstream, EIA for the BioTherm wind energy project near Swellendam, EIA for the InnoWind wind energy projects in the Western Cape, EIA for the Electrawinds wind energy project at Coega in the Eastern Cape, Coega Aluminium Smelter EIA, EIA for the expansion of the container terminal and construction of an administration craft harbour at the Port of Ngqura, Thesen Island EIA at Knysna, Century City Wetlands EIA in Cape Town, and ESIA for a proposed alumina refinery at Sosnogorsk in the Komi Republic of Russia. He has also prepared various EMPs, such as the EMP for the Rietvlei Wetland

Reserve (Cape Town), EMP for Century City wetlands in Cape Town, EMP for Eskom Wind Energy Project (Klipheuwel near Stellenbosch in the Western Cape) and the EMP for the Coega Aluminium Smelter. He has authored several Guidelines, such as the "Overview of Integrated Environmental Management" information document for DEAT in 2004; and the "Guideline for EMPs" published in 2005 by the Western Cape government.

Paul will be supported by a CSIR Project Manager, Minnelise Levendal (refer to Appendix A for her CV). Minnelise was also the project manager for the WKN Windcurrent Ubuntu wind energy project near Jeffrey's Bay. Minnelise managed the BioTherm wind energy project near Swellendam. This project received authorization from DEA in September 2010. Minnelise is currently managing the EIA for the Swartand wind farm near Moorreesburg in the Western Cape for Electrawinds.. Minnelise managed the Basic Assessment Process for the national Department of Energy for the erection of 10 wind monitoring masts as part of the national wind atlas project. She has also conducted a number of Basic Assessments for the erection of wind monitoring masts. She was part of the Project Implementation Team for South Africa's Second National Communication (SNC) in terms of climate change from 2009 until 2010. SA needs to report on meeting its obligations specified in the Kyoto Protocol. This process was led by the South African Botanical Institute (SANBI), and the CSIR was appointed by SANBI to manage the process.

1.7 OBJECTIVES FOR THIS EIA REPORT

This EIA Report was preceded by a comprehensive scoping process that led to the submission of a Final Scoping Report (and Plan of study for the EIA) to the Department of Environmental Affairs (DEA) for approval. Approval was received on 22 February 2012 which marked the end of the Scoping phase, after which the EIA process moved into the impact assessment and reporting phase. For background on the scoping process, the reader is referred to the Final Scoping Report (CSIR, 2011)[5].

The primary objective of this Draft EIA Report is to present the competent authority (i.e. DEA) and interested and affected parties (I&APs), with an overview of the predicted impacts and associated management actions required to avoid or mitigate the negative impacts; or to enhance the benefits of the proposed project.

In terms of legal requirements, a crucial objective of the EIA Report is to satisfy the requirements of Regulations 31, 32 and 33 of the NEMA EIA Regulations of 18 June 2010 which came into effect on 2 August 2010. These regulations regulate and prescribe the content of the EIA Report and specify the type of supporting information that must accompany the submission of the report to the authorities. An overview of where the requirements are addressed in this report is presented in Table 1.3.

Furthermore, this process is designed to satisfy the requirements of Regulations 55, 56 and 57 of the NEMA 2010 EIA Regulations relating to the public participation process and, specifically, the

[5] CSIR, 2011. Environmental Impact Assessment for the proposed WKN Windcurrent Banna Ba Pifhu Wind energy project near Humansdorp in the Eastern Cape: Final Scoping Report. CSIR Report Number: GWDS Stel general: 10106. Stellenbosch.

registration of I&APs and recording their submissions. All I&APs on the current database for this EIA (Appendix D) have been informed of the release of the draft EIA Report for a 40-day commenting period. All comments on the Final Scoping Report received after the closure of the allowed commenting period are recorded and addressed in this Draft EIA Report. Comments received on this Draft EIA Report will be recorded and addressed in the Final EIA Report.

The draft Environmental Management Plan (EMP) that is required as part of the EIA process (Regulation 33) is provided in Section B of this EIA Report.

Table 1.3: Summary of where requirements of an Environmental Impact Assessment Report (in terms of Regulations 31(2), 32 and 33 of the NEMA 2010 EIA Regulations) are provided in this EIA Report

SECTION	REQUIREMENT FOR EIA REPORT	WHERE THIS IS PROVIDED IN THIS EIA REPORT
(2) (a) (i)	The EAP who compiled the report	**Chapter 1, Appendix A**
(2) (a) (ii)	The expertise of the EAP to carry out an environmental impact assessment	**Appendix A**
(2) (b)	A detailed description of the proposed activity	**Chapter 2**
(2) (c)	A description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is:	**Chapter 3, and Chapters 5 to 14**
(2) (c) (i)	A linear activity, a description of the route of the activity	**N/A**
(2) (c) (ii)	An ocean-based activity, the coordinates where the activity is to be undertaken	**N/A**
(2) (d)	A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity	**Chapters 5 to 14**
(2) (e)	Details of the public participation process conducted in terms of sub-regulation (1), including:	**Chapter 4**
(2) (e) (i)	Steps undertaken in accordance with the plan of study	**Chapter 4**
(2) (e) (ii)	A list of persons, organisations and organs of state that were registered as interested and affected parties	**Appendix C**
(2) (e) (iii)	A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments	**Appendix E**
(2) (e) (iv)	Copies of any representation, objections and comments received from registered interested and affected parties	**Appendix E**
(2) (f)	A description of the need and desirability of the proposed activity	**Chapters 1 and 2**
(2) (g)	A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity	**Chapter 4 and Chapters 5to 14**
(2) (h)	An indication of the methodology used in determining the significance of potential environmental impacts	**Chapter 4**
(2) (i)	A description and comparative assessment of all alternatives identified during the environmental impact assessment process	**Chapter 4 and Chapters 5to 14**
(2) (j)	A summary of the findings and recommendations of any specialist report or report on a specialised process	**Chapter 15 and in the summary**
(2) (k)	A description of all environmental issues that were identified during the	**Chapters 5 to 14**

SECTION	REQUIREMENT FOR EIA REPORT	WHERE THIS IS PROVIDED IN THIS EIA REPORT
	environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures	
(2) (l)	An assessment of each identified potentially significant impact, including:	**Chapters 5 to 14**
(2) (l) (i)	Cumulative impacts	**Chapters 5 to 15**
(2) (l) (ii)	The nature of the impact	**Chapters 5 to 14**
(2) (l) (iii)	The extent and duration of the impact	**Chapters 5to 14**
(2) (l) (iv)	The probability of the impact occurring	**Chapters 5 to 14**
(2) (l) (v)	The degree to which the impact can be reversed	**Chapters 5 to 14**
(2) (l) (vi)	The degree to which the impact may cause irreplaceable loss of resources	**Chapters 5 to 14**
(2) (l) (vii)	The degree to which the impact can be mitigated	**Chapters 5to 14**
(2) (m)	A description of any assumptions, uncertainties and gaps in knowledge	**Chapters 5to 14**
(2) (n)	A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	**Chapter 15 and Summary**
(2) (o)	An environmental impact statement which contains	**Chapter 15 and Summary**
(2) (o) (i)	A summary of the key findings of the environmental impact assessment	**Chapter 15 and Summary**
(2) (o) (ii)	A comparative assessment of the positive and negative implications of the proposed activity	**Chapters 5 to 14 and 15**
(2) (p)	A draft environmental management programme containing the aspects contemplated in regulation 33	**Section B**
(2) (q)	Copies of any specialist reports and reports on specialised processes complying with regulation 32	**Chapters 5 to 14**
(2) (r)	Any specific information that may be required by the competent authority	**N/A**
(2) (s)	Any other matters required in terms of sections 24 (4) (a) and (b) of the Act	**N/A**

1.8 ENERGY PLANNING CONTEXT AND STRATEGIC INITIATIVES FOR SOUTH AFRICA

1.8.1 Current energy context: coal-based power generation

South Africa has an energy intensive economy, highly reliant on fossil fuels, and regards economic growth based on energy intensive industries as a key means to development. Eskom plays a central role in energy generation in South Africa, producing 95% of its total power. Currently Eskom has a total installed generating capacity of some 42 000 MW (net 36 200 MW, peak 34 200 MW) with new peak capacity in demand since 2007. Approximately 93% of its power production capacity is coal-based, 5% nuclear and 2% hydro-electric. Several small power stations and back-up gas-turbines represent less than 1% of the national output, and another 3% is used for own consumption by independent power producers.

Coal, though currently appearing to be cheaper per kWh than renewable energy sources, introduces a host of so-called externality costs which are not factored into its monetary value. These costs arise across the lifecycle of coal consumption, from extraction to disposal (also known as the chain of custody) and can cause irreparable environmental damage, such as deforestation, land erosion and the emission of greenhouse gasses due to underground coal fires. One of the most insidious impacts of coal mining is acid mine drainage containing carcinogens such as benzene and toluene, which drain from mines into surface and ground water sources. Coal burning releases oxides of sulphur and nitrogen as well as mercury into the atmosphere, which cause adverse impacts on the natural environment (e.g. acid rain).

A wind energy project, such as the proposed Banna Ba Pifhu wind energy project aims to generate, at full capacity 50 MW of electricity with zero atmospheric emissions.

1.8.2 Policy context for promotion of renewable energy

A substantive body of policy and legislation (at international, national and provincial levels) supports the development of renewable energy in South Africa, for example:

- Kyoto Protocol
- The Constitution of the Republic of South Africa (Act 108 of 1996)
- White Paper on the Energy Policy of South Africa (December 1998)
- National Integrated Energy Plan for the RSA (March 2003)
- White Paper on Renewable Energy (November 2003)
- DME Energy Efficiency Strategy (March 2005)
- National Environmental Management Act (No. 107 of 1998) (NEMA)
- National Environmental Management: Air Quality Act
- National Strategy for Sustainable Development (DEAT, 2006)
- The Long term mitigation scenarios of the Department of Environmental Affairs (2008)
- Electricity Regulations Amendments (August, 2009)
- Renewable Energy Feed in Tariff Guidelines (NERSA, March 2009).

1.8.3 Integrated Strategic Energy Planning for South Africa

Integrated Strategic Electricity Planning is the way in which Eskom assesses by how much the demand for electricity is likely to grow and how best to meet and manage that demand. The most likely future, based on long-term southern African economic scenarios, is forecasted and provides the framework for Eskom to investigate a wide range of new supply-side and demand-side technologies and options. Nationally the Department of Energy is embarking on an Integrated Resource Planning process to develop a country energy plan for the next 20 years of which renewable energy will form part of the proposed energy mix. The demand for electricity is growing continuously and is projected to continue growing in the foreseeable future (as shown in Figure 1.2, which includes three growth scenarios).

Considering the economic development of South Africa an additional 40 000 MW production capacity has been planned by Eskom over the next 20 years due mainly to upcoming large mining and metal industry. Therefore by 2020, South Africa will need several new sources of power to provide for the growing demand (see Figure 1.2). In order to meet this future demand, Eskom is actively investigating and installing new energy-generating facilities.

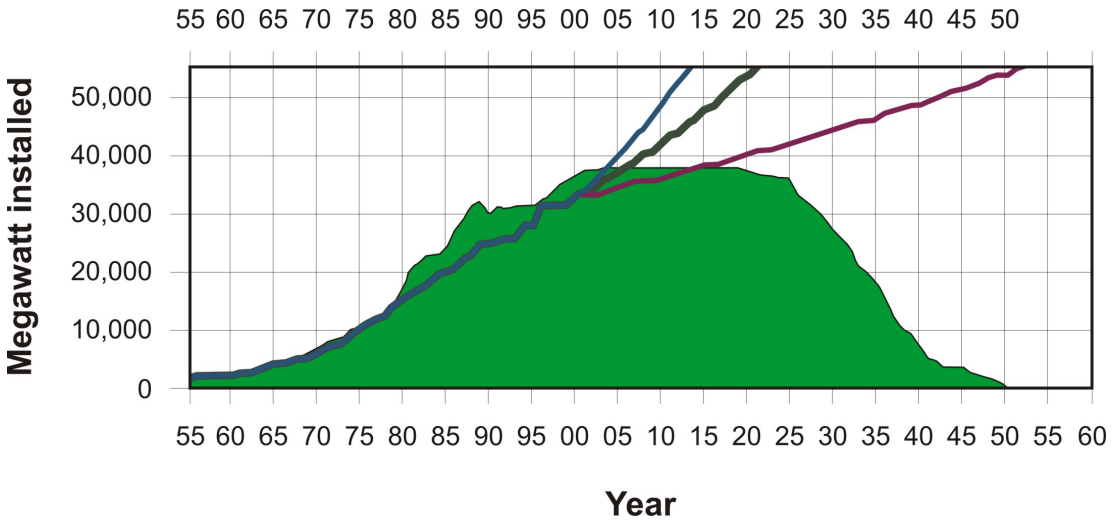

Figure 1.2: Eskom's installed generating capacity profile from 1955 to 2060.

The green shaded area shows Eskom's energy-generating capacity, which grows as new power stations are built. If no new power stations are built, the generating capacity will begin to decline from 2020 as existing power stations are decommissioned. The three lines show how energy consumption could grow in future via low, medium and high-growth scenarios.

All countries rely on a range of energy sources and generation technologies. In all probability the future energy needs of southern Africa will be supplied from a wide variety of sources, such as coal,

gas, nuclear, hydro (electric), oil and renewable sources, as suggested in Figure 1.3. This figure incorporates Eskom's forecasting scenario whereby the current generating capacity of coal-fired power stations will decline from 2020. Electricity generating capacity from renewable sources will increase. Among the renewable sources which are being explored, wind energy has been identified to contribute to the energy mix.

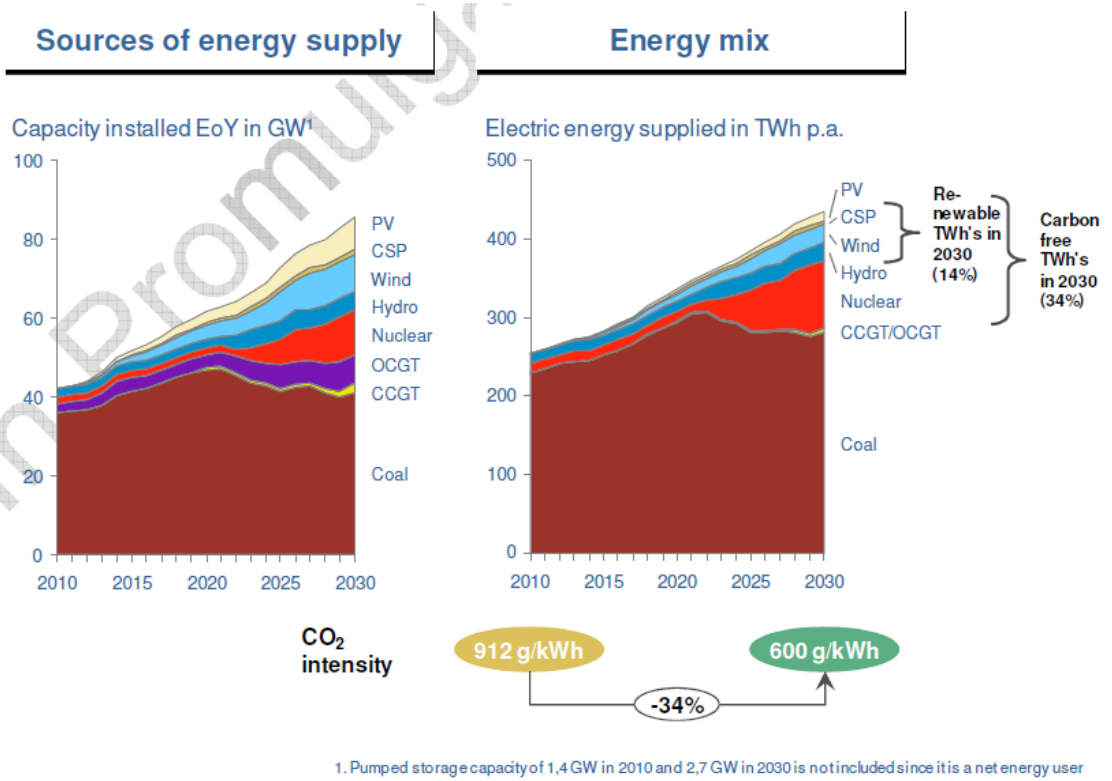

Figure 1.3: Predicted future regional electricity mix for southern Africa (IRP 2010-2030 Rev2 Final Report)