PROPOSED AMSTILITE (RF) PROPRIETARY LIMITED GOLDEN VALLEY WIND ENERGY PROJECT– PART/PROJECT 1

BLUE CRANE ROUTE LOCAL MUNICIPALITY, COOKHOUSE EASTERN CAPE PROVINCE OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT
VOLUME 3: ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Prepared for:	**Prepared by:**
BioTherm Energy	**EOH Coastal & Environmental Services**
Building 1 Design Quarter Fourways 2055	P.O. Box 934 Grahamstown, 6140
South Africa	South Africa

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REPORTS PRODUCED AS PART OF THIS EIA:

Volume 1: Scoping and Terms of Reference Report
Volume 2: Specialist Reports
Volume 3: Environmental Impact Assessment Report
Volume 4: Environmental Management Plan

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EXECUTIVE SUMMARY

Background

Terra Wind Energy Golden Valley (Pty) Ltd (the original project applicant) undertook an Environmental Impact Assessment (EIA) process, which was executed by Coastal and Environmental Services ("CES") (as the Environmental Assessment Practitioner) to determine the environmental feasibility of a proposed 500MW wind energy facility and associated infrastructure near Cookhouse, in the Eastern Cape Province (EIA Ref No: 12/12/20/1717). The Final Environmental Assessment Report (EIR) was submitted to the DEA and Terra Wind Energy Golden Valley (Pty) Ltd obtained an environmental authorisation (EA) on 05 April 2011 for the project which falls within the Blue Crane Route Local Municipality (BCRM) in the Eastern Cape Province. BioTherm Energy (Pty) Ltd ("the Developer") has subsequently acquired the project from Terra Power Solutions (Pty) Ltd and General Electric International (Benelux) B.V. and has secured preferred bidder status for the construction of the 120MW Part /Project 1. Following the issuance of the EA in April 2011, the following amendment applications pertaining to this project have been submitted and approved to date:

Nature of application/amendment	DEA response	Approval date
The rectification of the DEA's errors by replacing activities listed on page 3 of the EA dated 05 April 2011.	Amendment approved	02 February 2012
Minister of Water and Environmental Affairs issued an amendment of the EA to include condition 6.9 and 6.10 in paragraph 6 under the heading "Commencement of the Activity". The amendment was related to the inclusion of Socio-Economics conditions and submission of the final layout to the DEA for approval before commencement of construction.	No application was submitted. The amendment followed the dismissal of the appeals against the original EA.	29 November 2012
The extension of the EA validity period.	Amendment approved	28 March 2013
Amendment of the turbine size (turbine output and rotor diameter).	Amendment approved	18 June 2013
Amendment to further extend the validity of the Environmental Authorisation.	Amendment approved	03 October 2014
Amendment to change the holder of the Environmental Authorisation.	Amendment approved	16 January 2015

BioTherm Energy has appointed EOH Coastal and Environmental Services (with Mr Marc Hardy as the designated Environmental Assessment Practitioner - EAP) to apply for additional amendments to the EA – the "splitting" of the authorised project into two (2) separate projects or parts, as well as the fulfilment of various conditions of authorisation. The Developer (BioTherm) now requires an amendment to the issued authorisation to split the project into two development parts/projects. The split is required in order to comply with the Department of Energy's (DoE) competitive bidding process that places a maximum cap on an individual projects generating capacity. Based on the contractual and financial requirements in terms of the DoE's competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa (i.e. the REIPPP Programme), a separate environmental authorisation for each part of the project is required. The 214 turbines or 500MW authorised facility will therefore be split into the following two parts, namely:

- Golden Valley Wind Energy Facility Project 1: **48 turbines** (120 MW)
- Golden Valley Wind Energy Facility Project 2: up to **126 turbines** (380 MW)

The applicant for Part/Project 1 of the project is now "**Amstilite (RF) Proprietary Limited**".

Each of the two proposed parts should include authorisation for the components originally authorised to develop the wind energy facility. These will include:

- Concrete foundations to support the wind turbine towers;
- Internal access roads to each turbine – approximately 5 metres wide;
- Underground cables connecting the turbines;
- 132 kV overhead power lines;
- Possible upgrading of existing roads for the transportation of the turbines to the Wind Energy Facility;
- A project substation to receive the generated power;
- A building to house the control instrumentation and backup power support, as well as a store room for the maintenance equipment.

One substation will be constructed for Project 1 and another substation for Project 2.

This Final Environmental Impact Assessment Report is in support of the amendment application represents the findings and outcomes of the previously conducted EIA process for the complete project in 2010-2011. This report is effectively a "re-packaging" of the Final EIA report submitted to DEA in order to provide relevant and applicable information to the project parts in terms of the thresholds (i.e. project names, applicant names, properties, impact assessment, and mitigation for each project). The visual impacts for Project 1 have been updated based on the groundtruthed layout for Project 1.

The affected farm or property portions for Projects 1 and 2, and the necessary project infrastructure associated with each project and property portion is detailed in the table below.

Figure 1 that follows depicts the originally authorised 500MW project layout in comparison to the proposed project phasing splits pertinent to this amendment application, namely Part/ Project 1.

PROJECT 1			
Capacity	**Farm name**	**Farm portions**	**Required infrastructure**
120MW	Olive Woods 169	» Farm 169 Portion 2 (Olive Woods)	» The installation of 48 wind turbines with a nominal power output of 2.55MW (mounted on 80-100m masts and nacelle, 121m diameter rotor consisting of 3 blades; » Concrete foundations to support the wind turbine towers; » Internal access roads to each turbine – approximately 5 metres wide; » Underground cables connecting the turbines; » 132 kV overhead power line; » Possible upgrading of existing roads for the transportation of the turbines to the Wind Energy Facility; » A substation on the Wind Energy Facility to receive the generated power; » A building to house the control instrumentation and backup power support, as well as a store room for the maintenance equipment.
	Olive Fonteyn 166	» Farm 166/RE (Olive Fonteyn)	
	Klein Rietfontein167	» Farm 167/RE (Klein Riet Fontein)	
	Cregus Kraal 181	» Farm 181 Portion 1(Cregus Kraal)	
	Matjiesfontein 283	» Farm 283	
	Farm 284	» Farm 284	
	Mullerskraal 159	» A part of Farm 159/RE (Mullers Kraal)	
	Bosch Fonteyn 180	» Portion 1 of Bosch Fonteyn 180	
PROJECT 2			
380MW	Mullerskraal 159	» A part of Farm 159/RE (Mullers Kraal) » Farm 159 Portion 1 (Mullers Kraal)	» The installation of up to 126 wind turbines with a nominal power output of 3MW (mounted on 80-100m masts and nacelle, 130m diameter rotor consisting of 3 blades » Concrete foundations to support the wind turbine towers; » Internal access roads to each turbine – approximately 5 metres wide; » Underground cables connecting the turbines; » 132 kV overhead power line linking the site to either the Poseidon Substation and/or the overhead powerlines traversing the farms; » Possible upgrading of existing roads for the transportation of the turbines to the Wind Energy Facility; » A substation on the Wind Energy Facility to receive the generated power; » A building to house the control instrumentation and backup power support, as well as a store room for the maintenance equipment.
	Quaggas Kuyl 155	» Farm 155 (Quagas Kuyl)	
	Jagersfontein 154	» Farm 154 (Jagersfontein)	
	Gezhiret 161	» Farm 161 Portion 0 (Gezhiret) » Farm 161 Portion 10 (Gezhiret)	
	Smoor Drift 162	» Farm 162 Portion 14 » Farm 162 Portion 17 (Smoor Drfit)	
	Great Riet Fonteyn 160	» Farm 160 (Great Riet Fonteyn)	
	Oude Smoor Drift 164	» Farm 164 Portion 35 (Oude Smoor Drift) » Farm 164 Portion 40 (Oude Smoor Drift) » Farm 164 Portion 47 (Oude Smoor Drift) » Farm 164 Portion 48 (Oude Smoor Drift)	
	Leuwe Drift 153	» Farm 153 (Leuwe Drift)	
	Bavians Krantz 151	» Farm 151 Portion 1 (Bavians Krantz)	
	Varkens Kuyl 158	» Farm 158 Portion 1	
	Wagenaarse Drift	» Farm 172 Portion 2 (Wagenaarse Drift) » Farm 172/RE	
	Farm 304 (Smoor Drift)	» Farm 304 (Smoor Drift)	

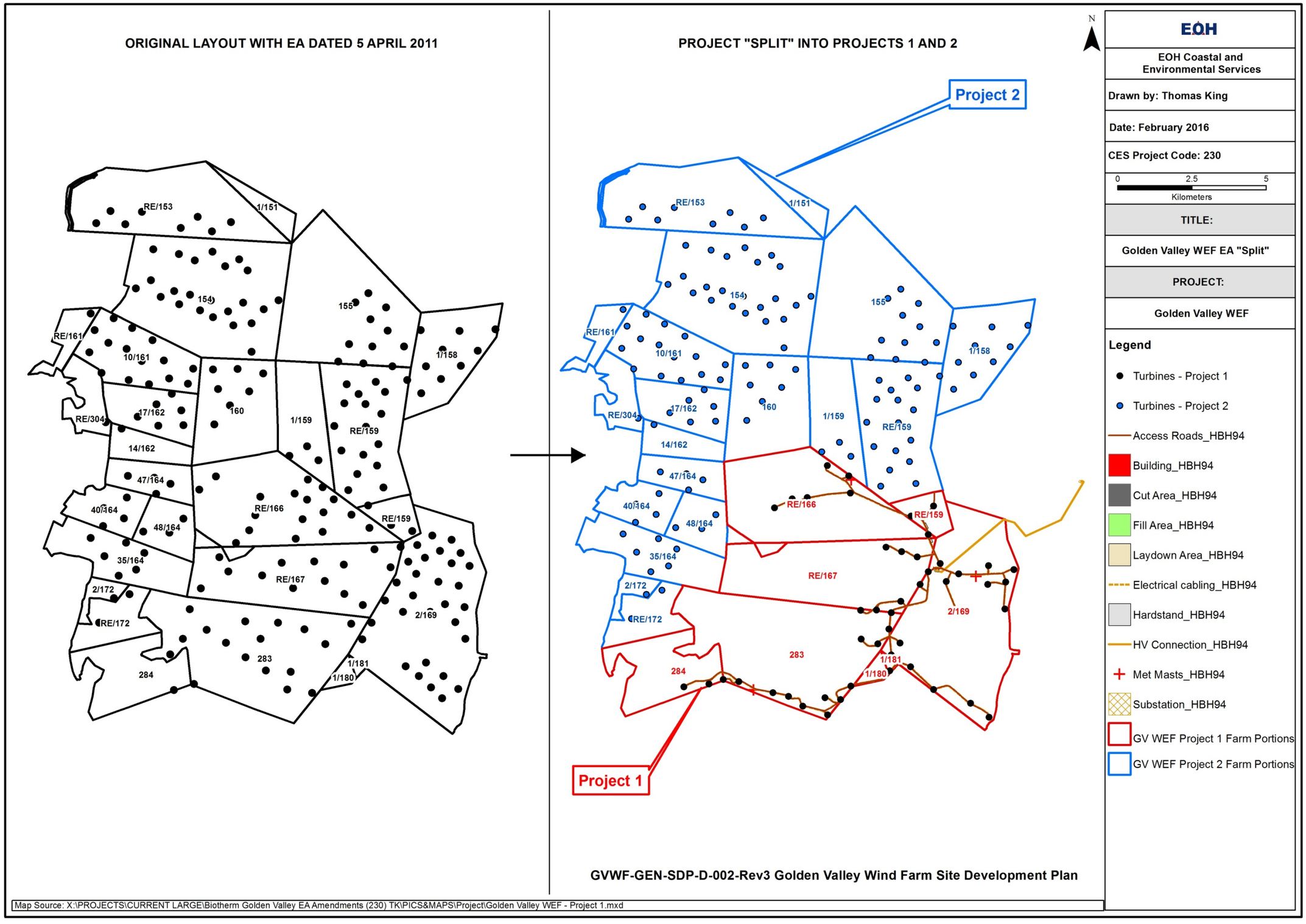

Figure 1 – Proposed "split" of the original EA dated 5 April 2011 into two separate projects

Need and desirability

According to Amstilite (RF) Proprietary Limited, the motivation for the proposed project in general terms arose from the following potential benefits:

- ***Climate change:*** Due to concerns such as climate change, and the ongoing exploitation of non-renewable resources, there is increasing international pressure on countries to increase their share of renewable energy generation. The South African Government has recognised the country's high level of renewable energy potential and has set a target of 10 000 GWh of renewable energy by 2013. In order to kick start the renewable energy sector in South Africa, a Feed-in Tariff for various renewable energy technologies was established. This Feed-in tariff guarantees the price of electricity supply from the renewable energy installation.
- ***Social upliftment:*** The Eastern Cape, and particularly the Cookhouse area, has large tracts of land which are very dry and the farmers do their best to earn a living from the land. The towns are small and socio-economic development activities are limited at best. The need to improve the quality of life for all, but especially the poor, is critical in South Africa. With the expected wind resources in the Cookhouse area, the proposed project will contribute directly to the upliftment of the individuals and the societies in which they live. Amstilite (RF) Proprietary Limited intends to identify community involvement, and projects will be implemented to the fundamental improvement in Cookhouse and the surrounding areas.
- ***Electricity supply:*** The establishment of Project 1 of the Golden Valley Wind Energy Project will contribute to strengthening the existing electricity grid for the area and will aid the government in achieving its goal of a 30% share of all new power generation being derived from Independent Power Producers (IPP).

In addition to the above-mentioned benefits, the proposed project site was selected due to:

- Good wind resources suitable for the installation of a large wind energy facility.
- Proximity to connectivity opportunities such as the Poseidon substation or the High Voltage (HV) overhead lines traversing the proposed development site.
- The surrounding area is not densely populated.
- There is potential and appetite within the Blue Crane Route Municipality (BCRM) to engage with new technologies and industries.

Legal Requirements

In accordance with the requirements of the National Environmental Management Act (Act No 107 of 1998) (NEMA), and relevant EIA regulations made in terms of this Act and promulgated in April 2006 (Government Notice No 385), and listed activities under (Government Notice Nos 386 and 387), the proposed project required a full Scoping and Environmental Impact Assessment (EIA). The project's EIAR was updated according to GNR 982 of 4 December 2014.

EOH Coastal & Environmental Services (CES), an established specialist environmental consulting firm with offices in the Eastern Cape, were appointed by BioTherm Energy as EAP to conduct the necessary amendment applications.

The Environmental Impact Assessment Process

The EIA process is divided into two main phases, which are the Scoping Phase and the Environmental Impact Assessment Phase. The overall aims of these phases are –

(a) ***Scoping*****:** To identify in broad terms the most important environmental issues and project alternatives that must be assessed in the subsequent EIA phase. Explicit provision is made in

the Scoping Phase for the involvement of interested and affected parties (I&APs) in the EIA process.

(b) ***Environmental Impact Assessment*:** To undertake a comprehensive study of the natural and social environment that may be impacted by the proposed development. During the EIA Phase the significance of these impacts is assessed, and recommendations made on how negative impacts may be mitigated and benefits enhanced.

The Scoping Phase for the proposed Golden Valley Project took place between September and December 2009. The Draft Scoping Report (DSR) was distributed to Interested and Affected Parties (I&APs) for comment for a period of just over four weeks between 30 October and 30 November 2009.

Comments and the appropriate responses were included into the Final Scoping Report (FSR) which was submitted together with a Plan of Study (PoS) for the detailed EIR phase to the National Department of Environmental Affairs (DEA), formerly the Department of Environmental Affairs and Tourism (DEAT), in respect of the activities listed in Table 1 for review and comment on 15 January 2010.

A detailed description of the scoping phase for the proposed Golden Valley Project and the outcomes thereof are included in **Volume 1: "*Final Scoping Report: Proposed Cookhouse Wind Energy Project , Blue Crane Route Local Municipality*" (CES, December 2009).**

Following review of the FSR, on 12 February 2010 DEA issued their approval of the FSR and PoS for EIA and instructed the EAP to proceed with the EIA Process as contemplated in the PoS for the EIA.

Table 1: Listed activities triggered by the proposed Golden Valley Project – Project 1

Number and date of the relevant notice	Activity No(s)	Description of listed activity
GN No R.387 21st April 2006	1 (a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for – (a) The generation of electricity where – (i) the electricity output is 20 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1 hectare.
	1 (l)	The transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more; (the need for above ground cables is uncertain at this stage but has been included for completeness)
	2	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more;
GN No R.386 21st April 2006	1(m)	any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including – (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs
	7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30m³ but less than 1 000m³ at any one location or site.

Number and date of the relevant notice	Activity No(s)	Description of listed activity
	12	The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004).
	14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a) masts of 15m and lower exclusively used (i) by radio amateurs; or (ii) for lighting purposes (b) flagpoles; and (c) lightning conductor poles
	15	The construction of a road that is wider than 4 metres or that has a road reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.

Table 2: The listed activities triggered in the 4 December 2014 regulations

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
Listing Notice 1 (GNR 983 of 4 December 2014)	
11	Construction of a 132 kV overhead line.
12	Roads with culverts will need to be constructed across drainage lines. The footprint of this infrastructure is likely to exceed 100 square metres per crossing.
14	During the construction phase it may be necessary for the contractor to keep fuel or other dangerous goods on site which will have a volume in excess of 80 cubic metres, but not more than 500 cubic metres.
19	More than 5 cubic metres of material is likely to be used in the construction of the roads and culverts across water courses mentioned above.
27	Indigenous vegetation in excess of 1 ha will need to be cleared for the construction of all project infrastructure.
Listing Notice 2 (GNR 984 of 4 December 2014)	
1	The facility will have an electrical output of up to 120 MW.
15	Indigenous vegetation in excess of 20 ha will need to be cleared for the construction of all project infrastructure.
27	A road catering for more than one lane of traffic in both directions. Access roads will need to be constructed connecting the turbines, substation and regional roads.
Listing Notice 3 (GNR 985 of 4 December 2014)	
None applicable	

Based on the review of the FSR and site inspection, DEA approved the PoS and advised the EAP in terms of Regulation 31(1) (a) to, "*proceed with the tasks contemplated in the PoS for environmental impact assessment*" i.e. the detailed EIA Phase.

DEA also requested that the EAP "*ensure that comments from all relevant authorities are submitted to the Department with the Final Environmental Impact Report. This includes but is not limited to the Eastern Cape Department of Economic Affairs, Environment and Tourism*." In order to fulfil this request,

the EAP submitted the Draft EIR to the Eastern Cape Department of Economic Development and Environmental Affairs for comment.

The Final EIR was produced in accordance with the requirements of the EIA Regulations (GNR 982), and presents the findings of the second phase – the detailed EIR Phase. The Draft EIR was made available to I&APs and relevant local authorities for review and comment and, after taking account of comments received during the review period, was finalised for submission to DEA for final decision making.

After environmental authorisation was issued on 5 April 2011, a number of applications for amendment of the EA were submitted and approved in the subsequent years. This report is a "repackage" of the final and approved Final EIR, and relates to Part/Project 1 of the project only, with the applicant being "Amstilite (RF) Proprietary Limited".

Project Description

The term "wind energy" describes the process by which wind turbines convert the kinetic energy in the wind into mechanical power, and a generator can then be used to convert this mechanical power into electricity. Typical turbine subsystems include:-

- A rotor or blades – the portion of the wind turbine that collects energy from the wind and converts this wind energy into rotational shaft energy to turn the generator.
- A nacelle (enclosure) containing a drive train, usually including a gearbox (some turbines do not require a gearbox) and a generator which converts the turning motion of a wind turbine's blades (mechanical energy) into electricity.
- A tower, to support the rotor and drive train - the tower on which a wind turbine is mounted is not only a support structure, but it also raises the wind turbine so that its blades safely clear the ground and so that it can reach the stronger winds at higher elevations.
- Electronic equipment such as controls, electrical cables, ground support equipment, and interconnection equipment. In the case of the proposed project, all electronic equipment will be housed inside the turbines and the 33kV inter-connection cables will run underground. As far as possible, the routing will follow that of the planned road infrastructure.

Part 1 of the project is planned to consist of the following:

- 48 wind turbines of 2.55MW each (mounted on 80-100m masts and nacelle; 121m diameter rotor – consisting of 3 blades).
- Concrete foundations to support the wind turbine towers.
- Internal access roads to each turbine - approximately 5 metres wide.
- Underground cables connecting the wind turbines and the on-site substation.
- An on-site substation.
- 132 kilovolt (KV) overhead power line.
- Possible upgrading of existing roads for the transportation of the turbines.
- A building to house the control instrumentation and backup power support. As well as a store room for the maintenance equipment.

The electricity will be fed into the national Eskom grid.

Typically, the development of the wind farm is divided into various phases:

- *Pre-feasibility*: The project developer conducts surveys to ensure obvious issues surrounding the project should not impact on the progress and the final acceptance of the project. This includes visits to local authorities, civil aviation authorities, identifying local bodies representing

the community, wind resources evaluation from existing data, general acceptance of wind energy, grid connectivity, environmental impact, logistical implications.

- *Feasibility*: The project developer firms up and carries out thorough investigations to establish the actual costs, and economic viability of the project by designing the financial model with financial institutions, verifying wind resources by onsite measurement, ensuring grid connection is economical and feasible in the timeframes of the project. Once the feasibility studies are complete the developer will identify which parts of the project will be constructed first. Then, in an organised fashion the project will be expanded according to the availability of grid capacity and turbines.
- *Wind Measurement*: Prior to the establishment of the full facility, it will be necessary to erect, a number of wind measurement masts to gather wind speed data and correlate these measurements with other meteorological data in order to produce a final wind model of the proposed project site. A measurement campaign of at least 12 months in duration is necessary to ensure verifiable data is used of the economics of the project and to finalise the positions of the wind turbines. The erection of such a mast is a listed activity under GNR 386 (requires a Basic Assessment), and is the subject of a separate application.

On 17 February 2010, the competent authority, who in this case was the Department of Environmental Affairs (DEA) – formerly the Department of Environmental Affairs and Tourism (DEAT) - granted the environmental authorisation (Authorisation Register Number: 12/12/20/1715) for Terra Wind Energy-Golden Valley (Pty) Limited to erect four temporary 80m measurement masts on the farms Quaggaskuil, Smoorsdrift, Varkenskuil and Olive Wood Estate to gather wind speed data and correlate these measurements with other meteorological data in order to produce a final wind model of the above-mentioned farms.

Implementation

Building a wind farm is divided into three phases namely:-

- Civil works: A temporary area of 35m x 25m needs to be established during the preliminary phase of the wind farm for access to the site during the construction phase by machines (bulldozers, trucks, cranes etc).
- Construction: This involves the laying of foundations, erecting the turbines, and electrical connections.
- Operational: During the operational phase when the turbines are up and running, on-site human activity drops to a minimum, and is limited to routine maintenance requiring only light vehicles to access the site. Only rare major breakdowns would necessitate the use of cranes and trucks.

Timing Estimation

- Preliminary phase = 16 weeks (including 8 weeks to let the foundation concrete dry)
- Wind turbines erection = 4 weeks (in good weather)
- Commissioning and electrical connection = 4 weeks

Refurbishment and rehabilitation of the site after operation

Current wind turbines are designed to last for over 25 years and this is the figure that has been used to plan the life span of a modern wind farm. If refurbishment is economical, the facility life span could be extended by a further 25 years. Decommissioning of the wind energy facility at the end of its useful life will be undertaken in agreement with the landowners and according to the land use agreement. The

intention of the project proponent is to ensure that the usable land and visible images would be removed and restored to their original condition.

The Affected Environment

Climate

Based on available data for climatic conditions in Somerset East, which is close to the study site, the annual mean rainfall is 570mm (ranging from 278mm to 994mm), with a March high of 84mm and a June low of 21mm. The mean annual daily temperature is 17.2ºC with a mean monthly daily temperature high in January of 22.2ºC and low in June and July of 12.6ºC.

Geology and Soils

Cookhouse and the surrounding areas (including Somerset East) occur over the Karoo Supergroup and comprise mainly the Beaufort Group with some Karoo Dolerite (Rust, 1998). The Beaufort group overlays the Ecca Group and was deposited on land through alluvial processes. It is characterised by reddish-purple and mottled, greenish, mudstone beds, interbedded with lenticular, creamy and buff coloured sandstone beds. The mudstone beds are a diagnostic feature of the Beaufort Group. A couple of long Dolerite outcrops occur in the area (Rust, 1998).

The Adelaide subgroup occurs as a subgroup of the Beaufort Group, and forms most of the geology of the area. The Adelaide subgroup comprises the Middleton Formation and the Balfour Formation which are made up of layers of a greenish-grey mudstone, shale and sandstone (Mucina and Rutherford, 2006).

V*egetation and Flora*

There are two main vegetation classifications for the area. These are Mucina and Rutherford (2006) and the Subtropical Thicket Ecosystem Project (STEP). There are five Mucina and Rutherford (2006), and four STEP Vegetation types for the general Cookhouse area (Table 2).

Table 2: Mucina & Rutherford and STEP vegetation types in the Cookhouse area

Mucina & Rutherford		STEP
Code	**Vegetation Type**	**Vegetation type**
AT11	Great Fish Thicket	Hartebeest Karroid Thicket
		Fish Speckboom Thicket
Gs18	Bedford Dry Grassland	-
AT13	Eastern Cape Escarpment Thicket	Escarpment Thicket
NK14	Albany Broken Veld	Saltaire Karroid Thicket
Azi6	Southern Karoo Riviere	

Cookhouse falls within the Albany Centre of Floristic Endemism; also known as the Albany Hotspot. This is an important centre for plant taxa, and, according to van Wyk and Smith (2001), contains approximately 4 000 vascular plant species with approximately 15% either endemic or near-endemic (Victor and Dold, 2003). This area was delimited as the, '*region bounded in the west by the upper reaches of the Sundays and Great Fish River basins, in the east by the Indian Ocean, in the south by the Gamtoos–Groot River basin, and in the north by the Kei River basin*' (Victor & Dold, 2003).

Mucina and Rutherford (2006) described the species endemic to the area. In addition to the endemic taxa found, there are also a number of species expected to be found in the study area, some of which are listed as protected by Victor and Dold (2003). Importantly, the list given by Victor and Dold is not

complete as little is known about many species. These taxa with many data deficient species include specifically the *Mesembranthemaceae* family, which Victor and Dold (2003) estimate would have 72 species that should, but do not, occur on the list. Thus, any members of the family are included as Species of Special Concern (SSC). Victor and Dold (2003) also list a number of other taxa as important including members of the *Amaryllidaceae* (Amaryllids), *Iridaceae* (Irises), *Orchidaceae* (Orchids) and *Apocynaceae* (Lianas), as well as members of the genus *Aloe*.

Alien species recorded from the study site included *Opuntia ficus-indica*, prickly pear, and *Opuntia lindheimeri*. These invaders are required to be removed by law, as they are each Category 1: declared weeds. Biological control agents are presently being utilised on the site on each of these species.

Fauna

Nine bird species are endemic to South Africa, but there are no Eastern Cape endemics. However, there are 62 threatened species within the Eastern Cape Province (Barnes, 2000). Most of these species occur in grasslands or are associated with wetlands, indicating a need to conserve what is left of these ecosystems (Barnes, 2000). A number of inland species are found from the Karoo region e.g. Acacia pied barbet, common Ostrich, Cape Penduline Tit, Southern Black Korhaan and Blue Cranes. The greatest abundance of birds is found in Valley Thickets and in the Aloe flowering season with Sunbirds being extremely conspicuous. Mountain ridges have the species of the fynbos biome e.g. Cape Sugarbirds. In the forests and on grassland slopes, Knysna Turaco, Narina Trogons, Dark-backed Weavers, Canaries and African Goshawks are some of the birds found. Many birds occur in the bushveld, savanna, bush clamps and thicket areas.

The Eastern Cape is also home to 133 reptile species including 21 snakes, 27 lizards and eight chelonians (tortoises and turtles). The majority of these are found in Mesic Succulent Thicket and riverine habitats. Knowledge of amphibian species diversity in the Cookhouse region is limited and based on collections housed in national and provincial museums. It is estimated that as many as 17 species may occur. However, none of these species are endemic or of conservation concern.

In farming areas, such as Cookhouse, the vast majority of mammals present are small or medium-sized. The antelope that are abundant in the thick bush (thicket or bushclump savanna) are bushbuck, duiker, steenbok and kudu (the most abundant antelope of the valley thicket). Blesbok, bontebok and gemsbok have been reintroduced on some farms. Of the cat species, the lynx (caracal) and black-footed cat are found. Jackal and bat-eared foxes are also found as is the aardwolf, but it is not abundant. Vervet monkeys are common and baboons are found in appropriate sites in kloofs and valleys. Rock dassies are common, but tree dassies are only found inland in forests along larger rivers. Genet and mongoose species are also common. Twenty-three rodent species are found in the area and include rats and mice, the cane rat, springhare and porcupine. A number of species of bat also occur.

Socio-economic profile

The project is to be developed in the Blue Crane Route Municipality (BCRM). It is likely that the development of the project will have indirect socio-economic impacts on the municipal area and its population. BCRM is situated in the Eastern Cape Province, the second largest province in South Africa, covering approximately 169 580 square kilometres, or 13.9% of South Africa's total land area. With more than six million people, the Eastern Cape has the third largest provincial population. Based on a household survey conducted by Cacadu District Municipality (the district municipality in which the BCRM falls) in 2005, the total population of the BCRM was estimated at 36 798 (constituting approximately 7.21% of the greater Cacadu District Municipality). The demographics of the BCRM also show a predominantly black population, with low incomes, and high levels of unemployment.

Approach to the EIA for the Proposed Golden Valley WEF Project – Project 1

Based on the Plan of Study (PoS) for the detailed EIR Phase that was submitted to and approved by DEA on 12 February 2010, and the main issues and concerns raised during the scoping phase of the proposed project (Table 2), the following specialist studies were undertaken: Noise; Visual; Ecological (primarily vegetation and fauna); Avifauna (birds and bats), and Heritage, including palaeontological. A palaeontological assessment was undertaken as an additional study due to the Karoo being rich in fossils. This needed to be investigated for the study area.

All of these studies were undertaken by independent and skilled specialists from universities and private consulting companies (see details in Section 1.3 of this report and Appendix B-1 in *Volume 2: Proposed Terra Wind Energy Golden Valley Project: Specialist Reports* (CES, October 2010)).

The specific Terms of Reference for each of the above-mentioned specialist studies, which outline the information required from each of the specialists, are outlined in Chapter 7 of this report. The exact methodology used in each of the specialist studies is also provided in detail in the relevant specialist chapters in *Volume 2: Specialist Reports* (CES, October 2010) of the suite of documents for the proposed project.

Table 2: The main issues and concerns raised during the scoping phase of the proposed Golden Valley WEF Project included but were not limited to:-

Issue	Question/statement
Electricity supply	How will we be getting the electricity?
	Will you be building a power line from the farms to Poseidon?
	Will the electricity always be coming from the wind farm for the local system?
Visual	What will the visual impact of the facility be, especially in terms of the effect on tourism development in the area?
Construction	Will a thorough assessment of the wind resources be conducted prior to construction of the facility to avoid the perceived problems associated with the facility at Darling Wind Farm, which we understand is not operational at the moment?
Site	The municipality has no problem with this wind farm, but is concerned that there are so many popping up in the area.
Financial	If the wind measurement data proves that there is enough wind for the wind farm, are you sure about finances to start the project?
	What is happening with Eskom Power Purchase Agreement and how will it affect this project?
Synergy	What are the options for people working together - will you be happy to work with the municipality?

It is important to note, however, that although specialists were given free reign on how they conducted their studies and obtained their information, they were required to provide the reports in a specific layout and structure, so that a uniform specialist report volume could be produced.

In addition to the above, in order to ensure that a direct comparison could be made between the various specialist studies, a set methodology based on the CES rating scale was used by all the specialists when evaluating the significance of impacts. This methodology is discussed in detail in Section 7.2 of this EIR. A summary of the key findings of each of the specialist studies follows – however, more details on these findings can be found in *Volume 2: Specialist Reports* (CES, October 2010).

Key Findings of the Specialist Studies

Avifauna Specialist Study

A site visit was conducted during the week of the 8th -12th February 2010 as well as a literature review and a desk-based mapping exercise to assess the impacts of the proposed development on the local avifauna in the area. The largest impacts on avifauna will be the impact of collision of birds with the turbine blades as well as habitat destruction and disturbance of shy and sensitive species. The mitigation for collisions includes siting the turbines away from sensitive areas and as such an avifaunal sensitivity map was produced to guide this process. The map will help to inform and guide the avifaunal specific EMPr, which is seen as a necessity for this project.

The EMPr will also expand on the mitigation for habitat destruction and disturbance and focus on any breeding sensitive species and how best to mitigate the impact on these species. Further mitigation measures for collisions include painting two of the three blades on each turbine as specified in this report, in order to mitigate the phenomenon of motion smear. Lighting of the turbines should also be avoided, or where this is not possible limited to a flashing red strobe light. Secondary impact of this development will include the impact of the associated power lines as these have the potential to negatively affect the avifauna in the area. The impact of these impacts has been rated as moderate but should the suggested mitigation be implemented, this can be decreased and viewed as a low impact.

The **cumulative impact** of this proposed wind energy facility with the facility that is proposed for the farms north of this study area has the potential to increase the impacts to a large degree. No provision has been made in each individual EIA for this cumulative impact and this is seen as a weakness of the EIA process. In conclusion, there are no fatal flaws from an avifaunal perspective but it is strongly recommended that an avifaunal specific EMPr be completed by a suitably qualified person to further refine the mitigation once all of the turbine positions have been finalised.

Heritage Specialist Study

The heritage study found that no archaeological sites occur within the area proposed for the Golden Valley Project. The study showed that impacts to archaeological heritage during the construction phase are likely to be of low significance, while long term changes to the appearance of the landscape and “sense of place” are likely to occur during the operational phase. The study area is characterised by archaeological sites spanning the Early, Middle and Late Stone Ages. The position of the finds is not anticipated to be impacted by the proposed development of the Golden Valley Project.

Early Stone Age material was located at a single locality; a scatter of early Early Stone age material situated on the lower slopes of the hilltop referred to “Onder Smoorsdrift” on the farm Bygevoegt 164. Middle Stone Age material was found thinly scattered throughout the study area; however, definable archaeological sites could not be easily identified. Late Stone Age material was limited to two recorded occurrences on Farm Great Drift 173 and Farm Bijgevoegd 164. A single occurrence of historical archaeology, a single disused set of farm buildings situated at Groot Rietfontein, was recorded. There was also no evidence of any graves, old settlements and/or old buildings within the proposed project area.

Visual Specialist Study

In terms of visual aspects, the landscape of the Golden Valley Project site is not pristine natural vegetation. The land has been heavily degraded due to the commercial agricultural character of the area, dominated by stock farming in areas outside the Great Fish River floodplain and irrigated cultivation in the floodplain. Most normal agricultural activities can usually continue after installation of wind turbines and levels of activity, after construction, will be very low on site. Landscape sensitivity to changes brought about by introducing a wind farm is therefore seen as low.

The landscape character has a low sensitivity to change as it has low to moderate scenic potential and a low population density. The visual absorption capacity for the development is low due to the size and height of the wind farm. The significance of a landscape impact due to the introduction of a wind farm is moderate since the landscape character has a low sensitivity to change and is expected to be only moderately altered by the wind farm.

Wind turbines are enormous structures. They are highly visible due to their height, siting on ridges and the movement of their rotating blades. The landscape impact that will potentially occur as a result of establishing the proposed Golden Valley Project in a rural landscape is expected to be of moderate significance due to the moderate landscape character sensitivity of the region. The visual impact on sensitive viewers and viewpoints due to the construction phase of the project is expected to be high due to the size of the project and the increase in highly visible activity in a rural/agricultural landscape.

Not all of the construction phase will necessarily have a negative visual impact since the construction of the turbines is an incredible engineering feat and may well be fascinating to observe. The visual impact on sensitive viewers and viewpoints due to the operational phase of the project is expected to be high due to the size of the wind farm and its highly visible components which will affect a few sensitive visual receptors in the area. It is not clear whether the wind farm will have a positive or negative impact as opinions on the aesthetic appeal of wind farms vary widely.

The clear positive aspect of wind farms is that they provide sustainable energy at minimal cost to the environment (especially when compared to coal-burning power stations). The proposed wind farm is very large and will affect a large area, but the landscape has been compromised by the large network of high voltage power lines that traverse the region as well as the effect that large commercial livestock farming had on the local vegetation. There is limited potential for scenic views and it is unlikely that tourism in the study area will depend on these.

The only areas currently recognised by STEP and IUCN as protected areas within 20km of the nearest wind turbine are the East Cape and Dorn Boom game farms. Visual exposure ratings are mostly low for these two. For areas in East Cape game farm within medium visual exposure levels, the topography is such that few areas will have a view of the wind farm (Not Visible category on the map).

Noise Specialist Study

The main noise sensitive receptors that could be impacted by noise pollution as a result of the proposed Golden Valley Project are the terrestrial fauna, avifauna and human receptors. The results of the modelling were found to be unacceptable at two noise sensitive areas as the impacts would result in a noise level exceeding 45 dB(A), which is regarded as the ambient noise limit.

- Matjesfontein Farm House (NSA 3) (**Project 1 of split**) – The wind turbine generator is too close to the dwelling. This is resulting in the noise exceeding the recommended limit from 9m/s. **FINAL LAYOUT MODELLING CONDUCTED IN OCTOBER 2015 FOUND THAT THIS WAS NO LONGER THE CASE AND THAT THE LAYOUT WAS ACCEPTABLE FROM A NOISE PERSPECTIVE.**
- Rietfontein Farm House (NSA 6) (**Project 1 of split**) – The wind turbine generator is too close to the dwelling. This is resulting in the noise exceeding the recommended limit from 5m/s. **FINAL LAYOUT MODELLING CONDUCTED IN OCTOBER 2015 FOUND THAT THIS WAS NO LONGER THE CASE AND THAT THE LAYOUT WAS ACCEPTABLE FROM A NOISE PERSPECTIVE.**

There will be a short-term increase in noise in the vicinity of the site during the construction phase as the ambient level will be exceeded. The impact during the construction phase will be difficult to mitigate. The impact of low frequency noise and infra-sound will be negligible as there is no evidence to suggest

that adverse health effects will occur as the sound power levels generated in the low frequency range are not high enough (i.e. are well below 90 dB) to cause physiological effects.

Ecological Specialist Study

The field assessment of the study site showed the existence of four different vegetation types. Most of the site was heavily degraded due to its primary use as a grazing area. As a result, no Southern Karoo Alluvia (STEP) or Southern Karoo Riviere (Mucina & Rutherford) remains within the study site but has been taken over by irrigated cultivation. Most of the study site is covered with low sensitivity scrub grassland with scattered rocky outcrops. This vegetation type is comprised mostly of the same grass species as the Bedford Dry Grassland but with scattered thicket elements and is thus determined to be degraded thicket.

Some patches of karroid thicket remain but these are also degraded. Bedford Dry Grassland (Mucina & Rutherford) or Aliwal North Dry Grassland (STEP) exists towards the east of the site and is more extensive than the vegetation maps suggest. This vegetation type has also been degraded by grazing. There are a few small patches of remnant thicket, also somewhat degraded. The proposed placement of turbines is throughout the site in the degraded vegetation. Most of the study site is degraded, despite the Eastern Cape Biodiversity Conservation Plan (ECBCP) categorising most of the site as near-natural landscape.

Most impacts in the construction phase with mitigation are low, with only the loss of plant species of special concern scoring a moderate negative overall significance. Impacts are higher for the operational phase of the development, with most scoring a moderate negative overall significance. Four of these moderate impacts relate to the effect of the wind turbines on bats and it is recommended that the impact on bats is carefully monitored during the operation phase of the development. It is also recommended that continuous monitoring and removal of alien plant species be done, as well as careful monitoring of the state of the landscape with the ECBCP land use planning principles in mind.

Based on a review of literature and knowledge of local species, bat fatalities as a result of the proposed project are likely to be moderate negative without implementation of appropriate mitigation. However, with appropriate mitigation, such as the introduction of a cut-in speed of more than 5 $m.s.^{-1}$, the significance of this impact remains moderate negative.

There are several reasons proposed for the number of bat fatalities, one is that the turbines attract insects, and thus foraging insect-eating bats (Ahlen 2003, Kunz *et al*. 2007). Alternatively, bats may mistake turbines for trees when they are looking for a roost, or be acoustically attracted to the wind turbines (Kunz *et al*. 2007). The cause of death is not entirely explained by collision with turbine blades, but instead is caused by internal haemorrhaging. Most bats are killed by barotrauma, which is “caused by rapid air-pressure reduction near many turbine blades” (Baerwald *et al*.). Barotrauma “involves tissue damage to air-containing structures caused by rapid or excessive pressure change” (Baerwald *et al*.). It is important to note, however, that there is currently no information available on bat fatalities and their causes at windfarms in South Africa, therefore this EIA assumed the worst-case scenario.

Palaeontological Specialist Study

According to the CES significance rating scheme the overall impact of the proposed Golden Valley wind farm on palaeontological heritage is assessed as low. This accords with “an acceptable impact for which mitigation is desirable but not essential”. Failure to mitigate will probably result in the loss of local fossil heritage, while mitigation will probably provide new palaeontological data that is of regional significance (a moderately beneficial outcome). The no-go option will have a low negative impact compared with construction of the wind farm accompanied by recommended specialist mitigation, since the opportunity to collect further palaeontological data will be lost for the time being.

The proposed Golden Valley wind farm study area is largely underlain by Late Permian continental sediments of the Middleton Formation (Lower Beaufort Group, Karoo Supergroup) that are potentially highly fossiliferous. However, field scoping and the accompanying desktop study have shown that (a) much of the Beaufort Group outcrop is mantled by relatively unfossiliferous superficial deposits – principally Late Caenozoic alluvium and colluvium; (b) the Beaufort Group is sparsely fossiliferous in this region; (c) the palaeontological sensitivity of these rocks may have been partially compromised by tectonism (*e.g.* folding, faulting) and thermal metamorphism. The likely impact of the proposed development on local palaeontological heritage is therefore inferred to be low (negative), if no mitigation takes place beforehand.

Focused specialist palaeontological mitigation to take place before construction starts is recommended in two small areas of Lower Beaufort outcrop on the farms Smoorsdrift 162 and Gheziret 161 because several scientifically useful fossil skulls have already been collected here or in the neighbourhood. This mitigation should involve the intensive recording and collection of fossil heritage within the two areas, as well as the recording of pertinent geological data. Should substantial fossil remains, such as vertebrate bones, teeth or petrified wood, be found or exposed here or anywhere else within the study area during construction of the Golden Valley Project, the responsible Environmental Control Officer (ECO) should safeguard these – *in situ*, if feasible – and alert South African Heritage Resources Agency (SAHRA) as soon as possible so that appropriate mitigation can be undertaken by a professional palaeontologist at the developer's expense.

Summary of the potential Impacts of the proposed Golden Valley Project

Table 3 provides a summary of the impacts associated with the proposed Golden Valley Project as a whole, with and without mitigation.

Construction Phase

The visual impact on sensitive viewers and viewpoints due to the construction phase of the Golden Valley Project is expected to be **high** due to the size of the project and the increase in highly visible activity in a rural/agricultural landscape. This is mainly because the height of the features that will be built and the siting will expose construction activities against the skyline. Additionally, an increase in activity, vehicles and workers in an otherwise quiet area will affect views. Traffic may be disrupted while large turbine components are moved along public roads. Activity at night is also probable since transport of large turbine components may occur after work hours to minimise disruption of traffic on main roads. Even with the incorporation of mitigation measures, this impact will remain **high**.

However, it is also worth noting that the visual impact of the construction phase is likely to be **positive**, especially during assembly of the turbine towers. The construction engineering feat of lifting and attaching components weighing more than 50 tons in a highly visible area is bound to be spectacular (see for example, Degraw 2009). Further, most of the sensitive viewers living in close proximity to the turbines have agreed to have turbines on their properties and are presumably informed on the effect of the construction phase on their views (*pers.comm.*CES). The noise specialist study revealed that there will be a short-term increase in noise in the vicinity of the site during the construction phase (rated as low) as the ambient level will be exceeded. The impact during the construction phase will be difficult to mitigate. The noise level at two noise sensitive areas during the operational phase for Project 1 will be unacceptable. These two areas are:

1. Matjesfontein Farm House (NSA 3) (**Project 1**) – The wind turbine generator is too close to the dwelling. This is resulting in the noise exceeding the recommended limit from 9m/s. **FINAL LAYOUT MODELLING CONDUCTED IN OCTOBER 2015 FOUND THAT THIS WAS NO LONGER THE CASE AND THAT THE LAYOUT WAS ACCEPTABLE FROM A NOISE PERSPECTIVE.**

2. Rietfontein Farm House (NSA 6) (**Project 1**) – The wind turbine generator is too close to the dwelling. **FINAL LAYOUT MODELLING CONDUCTED IN OCTOBER 2015 FOUND THAT THIS WAS NO LONGER THE CASE AND THAT THE LAYOUT WAS ACCEPTABLE FROM A NOISE PERSPECTIVE.**

The following recommendations are made for the construction phase: 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 construction staff receives "noise sensitivity" training.

In terms of ecological impacts, most impacts in the construction phase with mitigation are **low**, with only the loss of plant species of special concern scoring a moderate negative overall significance. Construction of the wind farm will result in a small amount of loss of the limited areas of Thicket, Bedford Dry Grassland, Karroid Thicket, Albany Broken Veld on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

The Loss of plant Species of Special Concern (SSC) including *Pachypodium bispinosum, Pelargonium sidoides, Crassula perfoliata, Euphorbia globosa, Euphorbia meloformis, Aloe tenuior, Anacampestros* sp, *Euphorbia meloformis, Tritonia* sp, *Watsonia* sp, *Drosanthemum* sp, *Psilocaulon* sp and *Trichodiadema* sp. during the construction phase of the proposed Golden Valley Project is of concern – this is discussed further in the Ecological Specialist Report and this report. The majority of the other impacts associated with the proposed project during the construction phase before mitigation are of moderate – low significance, and the significance of all of these impacts with the exception of the loss of ecological habitat and loss of plant SSC during the construction phase – after the incorporation of appropriate mitigation measures, can be reduced to Low.

In terms of noise, the no-go option of *not* proceeding with the project is not recommended for the following reasons:

- The impacts associated with the project can be mitigated by applying set back distances as well as relocating turbines, albeit in locations that may be less efficient for electricity generation.
- There are a number of the farm owners whose property the turbines are on and who are enthusiastic about contributing to the environment in a positive way.
- The economic and environmental benefits of the project outweigh the cost of mitigation measures that are needed to ensure that the sensitive noise receptors are not adversely affected.

The heritage specialist assessment states that not implementing the proposed project will result in no impacts to heritage, apart from those impacts caused by natural forces such as erosion. The Ecological Study lists mostly moderate and high impacts for the no-go option due to the introduction and infestation of alien plant species. After mitigation these impacts are reduced to low or N/A. Significant impacts on palaeontological heritage normally occur during the construction phase and not in the operational phase of any development. Excavations made during the course of installing the proposed turbines and associated developments (*e.g.* roads, powerlines) may well expose, damage, disturb or permanently seal-in scientifically valuable fossil heritage that is currently buried beneath the land surface or mantled by dense vegetation. The fossil record and inferred palaeontological sensitivity of the three main rock units represented in the study region are summarized in Table 9-1 (based on Almond *et al*., 2008).
Bedrock excavations made during construction of the proposed wind energy facility east of Cookhouse will primarily affect continental sediments of the Middleton Formations of the Late Permian Beaufort Group. These sediments underlie the great majority of the study area and are renowned for their rich fossil heritage of terrestrial vertebrates (most notably mammal-like reptiles or therapsids), as well as fish, amphibians, molluscs, trace fossils (*e.g.* trackways) and plants (*e.g.* petrified wood). Caenozoic surface sediments in the study area (*e.g.* alluvium, colluvium) are generally of low palaeontological

sensitivity, while the Karoo dolerite intrusions do not contain fossil remains at all. Although the direct impact of the proposed project will be local, fossils within the Beaufort Group are of importance to national as well as international research projects on the fossil biota of the ancient Karoo and the end-Permian mass extinction.

Table 3: Summary of the impacts associated with the proposed Golden Valley Project – Project 1

IMPACT	SIGNIFICANCE					
	DIRECT IMPACTS				CUMULATIVE IMPACT	
	WITHOUT MITIGATION		WITH MITIGATION		WITHOUT MITIGATION	WITH MITIGATION
		NO-GO		NO-GO		
CONSTRUCTION PHASE						
Intrusion of large and highly visible construction activity on sensitive views (**visual** impact)	HIGH -	N/A	MOD -	N/A	The cumulative impacts for the construction phase are **not considered** due to the fact that it is **highly unlikely** that all four wind energy facilities will be constructed at the same time.	
Impact of the construction **noise** on the surrounding environment	LOW -	N/A	LOW -	N/A		
Disturbance of **birds**	LOW -	N/A	LOW -	N/A		
Loss of **bird** habitat due to habitat destruction	MOD -	N/A	MOD -	N/A		
Loss of Thicket	LOW -	MOD +	LOW -	N/A		
Loss of Bedford Dry Grassland	MOD -	MOD +	LOW -	N/A		
Loss of Karroid Thicket	MOD -	MOD +	LOW -	N/A		
Loss of Scrub Grassland	MOD -	MOD +	LOW -	N/A		
Loss of **plant** species of special concern	MOD -	MOD +	MOD -	N/A		
Introduction of alien **plant** species	MOD -	HIGH -	LOW -	LOW -		
Loss of **faunal** biodiversity	MOD -	HIGH +	LOW -	N/A		
Loss of **faunal** species of special concern	LOW -	HIGH +	N/A	N/A		
Disturbance displacement of **bats**	LOW -	LOW +	LOW -	N/A		
Loss of **bat** habitat due to vegetation clearing	LOW -	MOD +	LOW -	N/A		
Construction of the wind farm and its impact on **heritage** aspects	MOD -	N/A	LOW -	N/A		
Palaeontological Impacts	LOW -	LOW -	MOD +	N/A		

IMPACT	SIGNIFICANCE					
	DIRECT IMPACTS				CUMULATIVE IMPACT	
	WITHOUT MITIGATION		WITH MITIGATION		WITHOUT MITIGATION	WITH MITIGATION
		NO-GO		NO-GO		
OPERATIONAL PHASE						
Impact of a change in the agricultural landscape as a result of establishing a wind farm (**visual** impact)	MOD -	N/A	MOD -	N/A	HIGH -	N/A
Intrusion of large wind turbines on the existing views of sensitive visual receptors (**visual** impact)	HIGH -	N/A	HIGH -	N/A	HIGH -	N/A
Impact of shadow flicker on residents in close proximity to wind turbines (**visual** impact)	MOD -	N/A	LOW -	N/A	HIGH -	N/A
Impact of the operational **noise** on the surrounding environment (NSA 1,5, 7,8,9,10,11,12 & 13)	LOW -	N/A	N/A	N/A	LOW -	LOW -
Impact of the operational **noise** on the surrounding environment (NSA 2,3,4 & 6)	HIGH -	N/A	LOW -	N/A	LOW -	LOW -
Disturbance of **birds**	MOD -	N/A	MOD -	N/A	HIGH -	HIGH -
Disruption in local **bird** movement patterns	MOD -	N/A	MOD -	N/A	HIGH -	MOD -
Bird mortalities from colliding with turbine blades, tower, and/or associated infrastructure	MOD -	N/A	MOD -	N/A	HIGH -	MOD -
Collisions and electrocutions of **birds** with power lines and substations	MOD -	N/A	MOD -	N/A	MOD -	MOD -
Loss of Thicket	MOD -	MOD +	LOW -	N/A	MOD -	MOD -
Loss of Bedford Dry Grassland	MOD -	MOD +	MOD -	N/A	HIGH -	MOD -
Loss of Karroid Thicket	MOD -	MOD +	MOD -	N/A	HIGH -	MOD -
Loss of Scrub Grassland	MOD -	MOD +	MOD -	N/A	HIGH -	MOD -
Introduction of alien **plant** species	HIGH -	HIGH -	LOW -	LOW -	HIGH -	MOD -
Disturbance of **bats**	MOD -	LOW -	MOD -	N/A	MOD -	MOD -
Loss of **bat** habitat due to vegetation clearing	MOD -	MOD +	MOD -	N/A	MOD -	MOD -
Bat mortalities from colliding with turbine blades, tower and/or associated infrastructure	MOD -	N/A	MOD -	N/A	MOD -	MOD -
Impacts of the operation of the wind farm on **heritage** aspects	HIGH -	N/A	HIGH -	N/A	HIGH -	HIGH -

Operational Phase

During the operational phase, the proposed Golden Valley Project will have a **high** visual impact. Most of the viewers/viewpoints identified by the visual specialist are highly sensitive to changes in their views. However, the region has a low population density and the proposed site is far removed from visually sensitive areas such as pristine wilderness sites and protected areas. A large network of high voltage power lines radiates across most of the study area and pylons are visible from most viewpoints. The wind farm will alter a number of views due to its size (spatial extent and the height of the turbines) and visibility (located on ridges). There are a few visual receptors (viewers and viewpoints) for which the visual intrusion will be **very high** (residents living on or close to the wind farm area), although many of these have agreed to have turbines on their properties. Regardless of the incorporation of mitigation measures, this impact will remain **high**.

As discussed above, bat fatalities as a result of the proposed project will be of moderate negative significance without mitigation and with the incorporation of appropriate mitigation measures, this impact remains moderate negative. It is important to note, however, that there is currently no information available on bat fatalities, and their causes at windfarms in South Africa, therefore this EIA assumed the worst-case scenario.

Ecological impacts are **higher** for the operation phase of the development, with most scoring a **moderate negative** overall significance. Four of these moderate ecological impacts relate to the effect of the wind turbines on bats and it is recommended that the impact on bats is carefully monitored during the operation phase of the development.

It is also recommended that continuous monitoring and removal of alien plant species be done, as well as careful monitoring of the state of the landscape with the ECBCP land use planning principles in mind.

The introduction of alien species will also be of **high** negative significance with the proposed project as well as the No-Go option. However, if alien invader species are consistently managed over the entire operation phase of the project, and an alien eradication program implemented (in terms of the No-Go option), the significance of this impact can be reduced to **low**.

There are no Noise Sensitive Areas adversely impacted by the final, ground-truthed 48 turbine layout presented in this EIR. The impact of low frequency noise and infra sound will be **negligible** as there is no evidence to suggest that adverse health effects will occur as the sound power levels generated in the low frequency range are not high enough (i.e. are well below 90 dB) to cause physiological effects.

The majority of the other impacts associated with the proposed project during the operational phase before mitigation were regarded as being of moderate significance, and the significance of all of these impacts with the exception of the following (whose significance remains moderate for all alternatives even after the incorporation of appropriate mitigation measures) can, after the incorporation of appropriate mitigation measures can be reduced to Low:-

- Change in the rural landscape.
- Intrusion of turbines on sensitive viewers
- Heritage impact
- Disturbance displacement of birds.
- Bird mortalities from colliding with turbine blades, tower, and/or associated infrastructure.
- Loss of bird habitat
- Loss of Bedford Grassland
- Loss of Karroid Thicket
- Loss of Scrub Grassland
- Disturbance and loss of bat habitat; and
- Bat mortalities.

The findings of the heritage study for the operational phase are **high**. Impacts to intangible heritage are expected to occur relating to changes to the feel, atmosphere and identity of a place or landscape. The point at which a wind turbine may be perceived as being "intrusive" from a given visual reference point is a subjective judgment. However, it can be anticipated that the presence of such facilities close to (for example) wilderness and heritage areas will destroy many of the intangible and aesthetic qualities for which an area is valued. Due to the sheer size of the turbines, shadow flicker, visual impact of road cuttings into the sides of slopes and residual impacts after the cessation of operations, e.g. the large concrete base will remain buried in the ground indefinitely; bankruptcy of or neglect by a wind energy company can result in turbines standing derelict for years creating a long-term eyesore.

Significant impacts on palaeontological heritage normally occur during the construction phase and not in the operational phase of any development.

EAP's Recommendation

The decision regarding whether to proceed with the proposed development should be based on weighing up of the positive and negative impacts as identified and assessed by the independent specialists. In addition to the findings of the specialist studies, it is also necessary to consider the following when making a decision:

- The majority of the impacts associated with the proposed project can be mitigated by applying set back distances as well relocating turbines, albeit in less efficient locations for electricity generation;
- Many of the sensitive receptors identified by the specialists are owners of the properties on which the turbines will be situated and who are enthusiastic about contributing to the environment in a positive way;
- The project proponent has taken the issues raised by interested and affected parties into consideration and provided alternative layout options, although some are less financially viable;
- The project has potential environmental and socio-economic benefits including the generation of clean energy for the surrounding area, and
- The project will contribute directly and significantly to social upliftment through an educational trust and skills transfer.

Based on the above, it is believed that, with appropriate mitigation, the benefits of the proposed Golden Valley Project will outweigh the negative impacts, and it is the opinion of the EAP that the No-Go option should not be considered any further and that the proposed Golden Valley Project should be granted authorisation.

The opinion of the EAP was also influenced by the fact that the proposed project will aid in:

- The reduction of greenhouse gases by the use of alternatives to fossil fuel - derived electricity will assist South Africa to begin demonstrating its commitment to meeting international obligations/legislative instruments such as the 1992 United Nations Framework Convention on Climate Change (FCCC) and the Kyoto Protocol (2002);
- Meeting the goals of the White Paper on the Energy Policy for South Africa (Energy White Paper) which aims to create energy security by diversifying energy supply and energy carriers and sets out the policy principles, goals and objectives to achieve, "*An energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout South Africa, thus contributing to sustainable development and environmental conservation*", and;
- The Department of Minerals and Energy (DME) (now the Department of Energy) Integrated Energy Plan (IEP) to develop the renewable energy resources, while taking safety, health and the environment into consideration setting a target of, "*10 000 GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro*".

- South Africa has also often experienced major power shortages largely as a result of demand outstripping supply. This, in many cases, has resulted in financial losses (many of the sectors contributing to the GDP are practically driven by electricity) and impacted on quality of life (hospitals and schools were among the affected, jobs were lost etc). The national power utility, Eskom, has indicated that South Africa is not past this crisis and that the possibility of further power cuts remains. This is particularly true for the Blue Crane Route Municipality where power outages continue to be a problem. With local generation, the networks can be freed up to supply power to other areas and the local community will have a much better chance of more consistent supply.

It is recommended that all project proponents for the respective wind farm proposals in the general Cookhouse area collaborate in the management, mitigation and monitoring of potential avifauna and bat impacts. To this end it is suggested that a consolidated and co-operative approach to this management issue is adopted by all role-players whereby management and monitoring strategies are developed by all parties in conjunction with a suitable avifauna specialist to ensure that these actions are as comprehensive and effective as possible for the respective projects' lifespan.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASGISA:	Accelerated Shared Growth Initiative for South Africa
BBBEE:	Broad Based Black Economic Empowerment
BID:	Background Information Document
BPEO:	Best Practice Environmental Option
CARA:	Conservation of Agricultural Resources Act
CES:	Coastal and Environmental Services
CITES:	Committee for International Trade in Endangered Species
DEA:	Department of Environmental Affairs
DEAT:	Department of Environmental Affairs and Tourism
DMS:	Degrees, Minutes, Seconds
DSR:	Draft Scoping Report
DWA:	Department of Water Affairs
DWAF:	Department of Water Affairs and Forestry
EAP:	Environmental Assessment Practitioner
EC:	Eastern Cape
ECDC:	Eastern Cape Development Corporation
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EIR:	Environmental Impact Report
EMPr:	Environmental Management Programme
FSR:	Final Scoping Report
GDP:	Gross Domestic Product
GNR:	Government Notice Regulation
ha:	Hectare
I&APs:	Interested and Affected Parties
IBA:	Important Bird Area
IDP:	Integrated Development Plan
IDZ:	Industrial Development Zone
IPP:	Independent Power Producer
IUCN:	International Union for Conservation of Nature
Kv:	Kilovolt
Ltd:	Limited
MW:	Megawatt
NEMA:	National Environmental Management Act 107 of 1998
NERSA:	National Energy Regulator of South Africa
PGDP:	Provincial Growth and Development Plan
PoS:	Plan of Study
PNCO:	Provincial Conservation Ordinance
PPA:	Power Purchase Agreement
PPP:	Public Participation Process
RDB:	Red Data Book
REFIT:	Renewable Feed In Tarriff
REPA:	Renewable Energy Purchasing Agency
SABAP2:	South African Bird Atlas Project 2
SSC:	Species of Special Concern
STEP:	Sub-tropical Thicket Ecosystem Planning
WfW:	Working for Water
WT:	Wind Turbine

1 INTRODUCTION

1.1 Background to the Study

Terra Power Solutions (Pty) Limited (TPS) - a renewable energy company and General Electric International (Benelux) B.V. the largest wind turbine manufacturer in the world, formed a joint development company – Terra Wind Energy-Golden Valley (Pty) Ltd, intended to develop a wind power generation facility (known as a 'wind farm') on the eleven farms: Olive Wood Estate, Olive Fonteyn, Quaggas Kuyl, Lushof, Kroonkop, Oude Smoor Drift, Maatjiefontein, Leuwe Drift, Gedagtenis, Varkens Kuyl and Wagenaarsdrift all found around Cookhouse, located in the Blue Crane Route Local Municipality (BCRM) in the Eastern Cape Province of South Africa. BioTherm Energy (Pty) Ltd has subsequently purchased the project from Terra Wind Energy and has secured preferred bidder status for the construction thereof. 214 turbines and associated infrastructure were approved on 5 April 2011. The EA was subsequently amended 6 times to date. This report has been prepared to support a further amendment. The project is being split into 2 parts, with part/project 1 being owned by Amstilite (RF) Proprietary Limited. Project 1 will involve the construction of up to 48 wind turbines on the following farm portions:

1. Farm 169 Portion 2 (Olive Woods)
2. Farm 166/RE (Olive Fonteyn)
3. Farm 167/RE (Klein Riet Fontein)
4. Farm 181 Portion 1(Cregus Kraal)
5. Farm 283
6. Farm 284
7. A part of Farm 159/RE (Mullers Kraal)
8. Portion 1 of Bosch Fonteyn 180

Project 2 will involve the construction of up to 126 wind turbines on the following farm portions:

1. A part of Farm 159/RE (Mullers Kraal)
2. Farm 159 Portion 1 (Mullers Kraal)
3. Farm 155 (Quagas Kuyl)
4. Farm 154 (Jagersfontein)
5. Farm 161 Portion 0 (Gezhiret)
6. Farm 161 Portion 10 (Gezhiret)
7. Farm 162 Portion 14
8. Farm 162 Portion 17 (Smoor Drift)
9. Farm 160 (Great Riet Fonteyn)
10. Farm 164 Portion 35 (Oude Smoor Drift)
11. Farm 164 Portion 40 (Oude Smoor Drift)
12. Farm 164 Portion 47 (Oude Smoor Drift)
13. Farm 164 Portion 48 (Oude Smoor Drift)
14. Farm 153 (Leuwe Drift)
15. Farm 151 Portion 1 (Bavians Krantz)
16. Farm 158 Portion 1
17. Farm 172 Portion 2 (Wagenaarse Drift)
18. Farm 172/RE
19. Farm 304 (Smoor Drift)

As described in the Background Information Document (BID) and Newspaper Advertisements, the proposed project had originally been planned to host between 150-200 turbines, each with a nominal power output ranging between 1.5 and 2.5 Megawatts (MW). The total potential output of the wind farm would have been 300MW with the wind farm covering an area of approximately 29 400 hectares (ha). Following the FSR, the proposed project was planned to host up to 214 turbines (as per the Final Scoping Report: Proposed Cookhouse Wind Energy Project, Blue Crane Route Local Municipality. CES, Grahamstown dated December 2009), each with a nominal power output of 2.5MW (now amended to a nominal output of 2.55MW per turbine). The total potential output of the

wind farm will not exceed 500 MW, with the wind farm still covering the same area of approximately 29 400 ha.

In accordance with the requirements of the National Environmental Management Act (Act No 107 of 1998) (NEMA), and relevant EIA regulations made in terms of this Act and promulgated in April 2006 (Government Notice No 385), and listed activities under (Government Notice Nos 386 and 387), the proposed project requires a full Scoping and Environmental Impact Assessment (EIA).

EOH Coastal & Environmental Services (CES) was appointed by Terra Wind Energy-Golden Valley (Pty) Limited to conduct the original EIA in 2010, with Mr Marc Hardy the designated Environmental Assessment Practitioner (EAP). CES is also conducting this manedment to environemntal authorisation (EA) process, on behalf of BioTherm Energy, as the original EA is being split into two parts/projects. Mr Hardy remains the designated EAP for this amendment application process. This EIAR was updated according to the requirementsGNR 982 of 4 December 2014 at DEAs request.

1.2 The Environmental Impact Assessment Process

The International Association for Impact Assessment (1999) defines an Environmental Impact Assessment (EIA) as, "*the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made*."

The activities triggered by the proposed Golden Valley Project – Project 1 are listed in Table 1-1 and 1-2. Because the proposed development triggers a number of listed activities from GNR.387 it will require a full Scoping and Environmental Impact Assessment. This process (Figure 1-1) is regulated by Chapter 3, Part 3 of the EIA regulations. The EIA process is divided into two main phases, which are the Scoping Phase and the Environmental Impact Assessment Phase. Provided in Sections 1.2.1 and 1.2.2 below is a description of the EIA process undertaken for the proposed project. However, a detailed description of the EIA process in general is provided in Appendix B of this report.

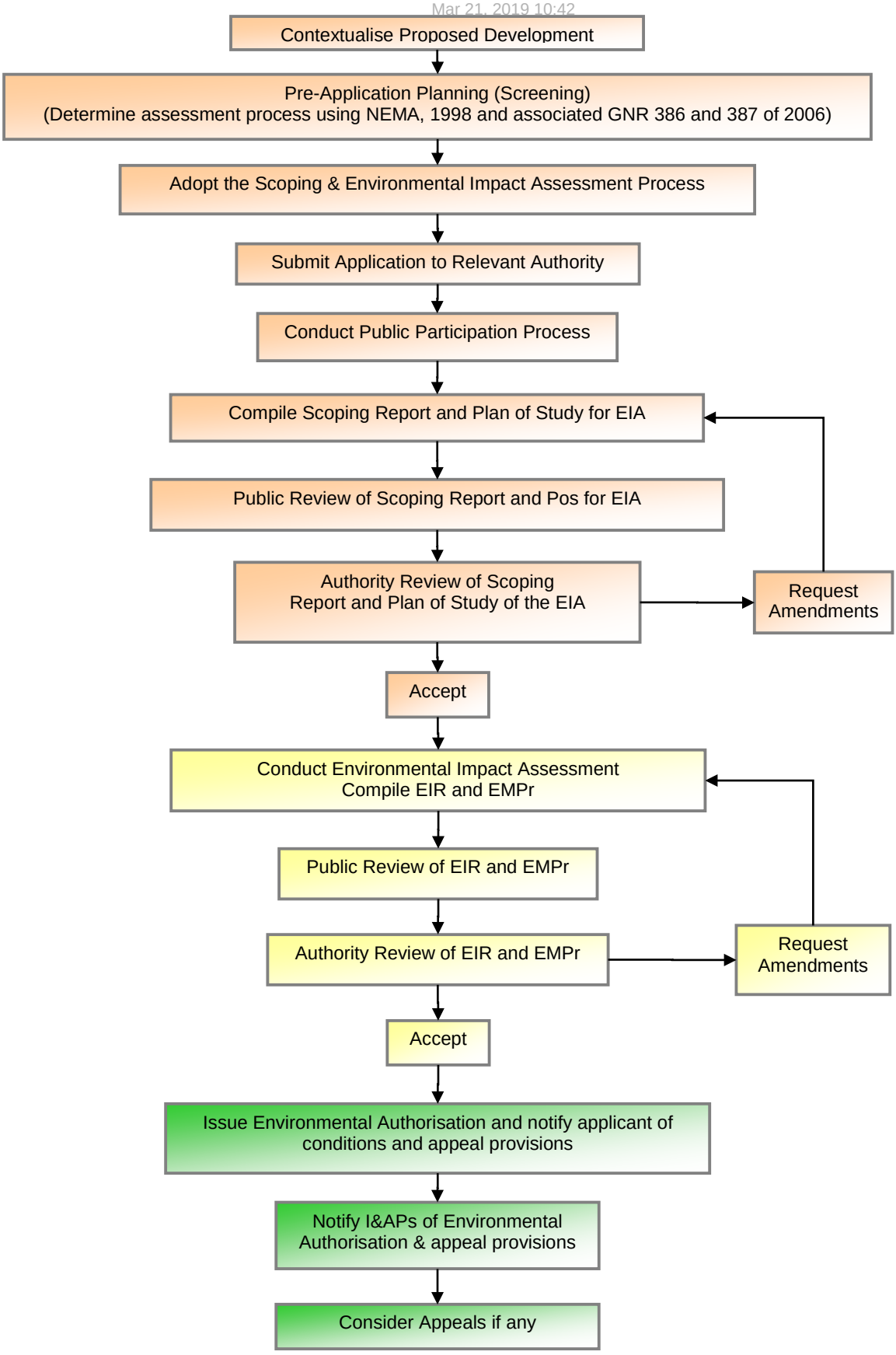

Figure 1-1: The EIA process under NEMA EIA Regulations, 1998

* Scoping Phase (orange), Environmental Impact Assessment Phase (yellow), and Environmental Authorisation Phase (green).

Table 1-1: Amended listed activities triggered by the proposed Golden Valley Project – Project 1 in terms of the 2006 EIA Regulations

Number and date of the relevant notice	Activity No(s)	Description of listed activity
GN No R.387 21st April 2006	1 (a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for – (b) The generation of electricity where – (i) the electricity output is 20 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1 hectare.
	1 (l)	The transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more; (the need for above ground cables is uncertain at this stage but has been included for completeness)
	2	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more;
GN No R.386 21st April 2006	1(m)	any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including – (vi) canals; (vii) channels; (viii) bridges; (ix) dams; and (x) weirs
	7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30m³ but less than 1 000m³ at any one location or site.
	12	The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004).
	14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (d) masts of 15m and lower exclusively used (i) by radio amateurs; or (ii) for lighting purposes (e) flagpoles; and (f) lightning conductor poles
	15	The construction of a road that is wider than 4 metres or that has a road reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.

Table 1-2: The listed activities triggered in the 4 December 2014 regulations

Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
Listing Notice 1 (GNR 983 of 4 December 2014)	
11	Construction of a 132 kV overhead line.
12	Roads with culverts will need to be constructed across drainage lines. The footprint of this infrastructure is likely to exceed 100 square metres per crossing.

14	During the construction phase it may be necessary for the contractor to keep fuel or other dangerous goods on site which will have a volume in excess of 80 cubic metres, but not more than 500 cubic metres.
19	More than 5 cubic metres of material is likely to be used in the construction of the roads and culverts across water courses mentioned above.
27	Indigenous vegetation in excess of 1 ha will need to be cleared for the construction of all project infrastructure.
Listing Notice 2 (GNR 984 of 4 December 2014)	
1	The facility will have an electrical output of up to 120 MW.
15	Indigenous vegetation in excess of 20 ha will need to be cleared for the construction of all project infrastructure.
27	A road catering for more than one lane of traffic in both directions. Access roads will need to be constructed connecting the turbines, substation and regional roads.
Listing Notice 3 (GNR 985 of 4 December 2014)	
None applicable	

1.2.1 Scoping Phase

The main aim of the Scoping phase of an EIA is to inform the public of the proposed project and EIA process as well as to identify issues and concerns that need to be addressed in the Environmental Impact Assessment (EIA) phase of the EIA process. The Scoping phase therefore has the following key objectives –

- To encourage and allow for the involvement of Interested and Affected Parties (I&APs) in the identification of issues;
- To identify reasonable alternatives;
- To ensure that all key issues and environmental impacts that will be generated by the proposed project are identified; and
- To identify any Fatal Flaws.

The full involvement of Interested and Affected Parties (I&APs) in the process ensures an open participatory approach to the study. It also ensures that all the impacts are identified and that planning and decision-making are done in an informed, transparent and accountable manner.

The Scoping Phase for the proposed project took place between September and December 2009. The Draft Scoping Report (DSR) was distributed to Interested and Affected Parties (I&APs) for comment for a period of just over four weeks between 30 October and 30 November 2009.

Comments and the appropriate responses were included into the Final Scoping Report (FSR) which was submitted together with a Plan of Study (PoS) for the detailed EIR phase to the competent authority that must consider and decide on the application for authorisation. More specifically, the FSR and PoS were submitted to the National Department of Environmental Affairs (DEA), formerly the Department of Environmental Affairs and Tourism (DEAT), for review and comment on 8 December 2010. DEAT acknowledged receipt of the FSR and PoS on 15 January 2010.

A detailed description of the scoping phase for the proposed Golden Valley Project and the outcomes thereof are included in **Volume 1: "*Final Scoping Report: Proposed Cookhouse Wind Energy-Project, Blue Crane Route Local Municipality*" (CES, December 2009).**
Following review of the FSR, DEA issued their approval of the FSR and PoS for EIA and instructed

the EAP to proceed with the EIA Process as contemplated in the PoS on 12 February 2010.

Please note that the EIR contains an amended list of activities for which authorisation is sought. The updated list of activities is presented in Table 1-1 above. In terms of R386 additional activities are: 1(m), 7, 12 and 14. The activities in terms of R387 remain the same as reported in the FSR.

Table 1-3: The main issues and concerns raised during the scoping phase of the proposed Golden Valley Project – Project 1 included but were not limited to:-

Issue	Question/statement
Electricity supply	How will we be getting the electricity?
	Will you be building a power line from the farms to Poseidon?
	Will the electricity always be coming from the wind farm for the local system?
Visual	What will the visual impact of the facility be, especially in terms of the effect on tourism development in the area?
Construction	Will a thorough assessment of the wind resources be conducted prior to construction of the facility to avoid the perceived problems associated with the facility at Darling Wind Farm which we understand is not operational at the moment?
Site	The municipality has no problem with this wind farm, but is concerned that there are so many popping up in the area.
Financial	If the wind measurement data proves that there is enough wind for the wind farm, are you sure about finances to start the project?
	What is happening with Eskom Power Purchase Agreement and how will it affect this project?
Synergy	What are the options for people working together - will you be happy to work with the municipality?

The competent authority that must consider and decide on the application for authorisation in respect of the activities listed in Table 1-1 above is the Department of Environmental Affairs (DEA), formerly the Department of Environmental Affairs and Tourism (DEAT), since the Department has recently reached agreement with all Provinces, except Gauteng, that all electricity-related projects, including generation, transmission and distribution, are to be submitted to DEA, irrespective of the nature of the applicant. This decision has been made in terms of Section 24(C)(3) of the National Environmental Management Act (Act No 107 of 1998) and is effective for all projects commencing from now until approximately 2015.

A detailed description of the Scoping phase for the proposed Golden Valley Project and the outcomes thereof are included in Volume 1: "*Final Scoping Report: Proposed Cookhouse Wind Energy Project*" (CES, December 2009) and are therefore not discussed further here.

1.2.1.2. Plan of Study

A Plan of Study (PoS) for the detailed EIR phase was also submitted together with the FSR. This included -

- A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;
- An indication of the stages at which the competent authority will be consulted;
- A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and
- Particulars of the public participation process that will be conducted during the environmental impact assessment process; and
- Any specific information required by the competent authority.

1.2.2 Environmental Impact Assessment Phase

The EIA phase follows directly from the Scoping Phase. The aim of the detailed EIA Phase is to undertake a comprehensive evaluation and study that addresses all the issues raised in the Scoping Phase, and produce a report that contains all the relevant information that is necessary for the competent authority to consider the application and to reach a decision. More specifically, the EIA Phase has seven key objectives:

- Describe the biophysical and socio-economic environment that is likely to be affected by the proposed development.
- Undertake specialist studies to address the key biophysical and socio-economic issues.
- Assess the significance of impacts that may occur from the proposed development.
- Assess the alternatives proposed during the Scoping Phase.
- Provide details of mitigation measures and management recommendations to reduce the significance of impacts.
- Provide a framework for the development of Environmental Management Programmes (EMPrs).
- Continue with the public participation process.

This EIR phase includes the following steps -

1. **Specialist Studies,** which include the specialist assessments identified in the Scoping Report and any additional studies required by the authorities. This requires the appointment of specialists to gather baseline information in their fields of expertise, and to assess the impacts and make recommendations to mitigate negative impacts and optimise benefits. The resulting information is synthesised into the Environmental Impact Assessment Report (EIR).
2. **Environmental Impact Assessment Report**. The main purpose of this report is to gather and evaluate environmental information, so as to provide sufficient supporting arguments to evaluate overall impacts, consider mitigation measures and alternative options, and make a value judgement in choosing the best development alternative. The EIR is made available for public and authority review. The availability of the report is advertised at least one Provincial newspaper and is situated at an easily accessible location.
3. **Comments Report,** which compiles comments, issues and concerns raised by I&APs and the authorities and the relevant responses to these comments.
4. **Environmental Management Programme** informs the client and the technical team of the guidelines which will need to be followed during construction and operation to ensure that there are no lasting or cumulative negative impacts of these processes on the environment.

1.3 Details and Expertise of the Consultancy and Environmental Assessment Practitioner

In terms of Appendix 3 of GNR 982, an EIAR must include:

(a) The details of -
(i) The EAP who compiled the report; and
(ii) The expertise of the EAP, including a curriculum vitae.

In fulfillment of the above-mentioned legislative requirement as well as Section 18 of the EIA Regulations (2006) which states that, "*an EAP must have expertise in conducting environmental impact assessments, including knowledge of the Act, these Regulations and any guidelines that have relevance to the proposed activity*", provided below are the details of the Environmental Assessment Practitioner (EAP) that prepared this Environmental Impact Assessment Report (EIR) as well as the expertise of the individual members of the study team.

1.3.1 Details of the EAP

Marc Richard Hardy
Physical Address: The Point, Suite 408, 4th Floor, 76 Regent Road, Sea Point, Cape Town, 8005
Postal Address: PO Box 934, Grahamstown, 6140
Telephone: 021 045 0900
Fax: +27 46 622 6564
Website: www.cesnet.co.za
Email: m.hardy@cesnet.co.za

1.3.2 Expertise of the EAP

Marc Hardy *(Environmental Assessment Practitioner)*
Marc holds an M. Phil (Environmental Management) from the University of Stellenbosch's School of Public Management and Planning. His professional interests include environmental impact reporting for linear, energy and bulk infrastructure projects, strategic environmental policy development and reporting – mostly relating to Environmental Management Frameworks (EMFs) - compliance monitoring and environmental auditing. Marc has been in the private consulting industry for 2 years prior to joining CES (previously with Bohlweki-SSI Environmental, Johannesburg) and has, amongst others, been project manager for the Dinokeng EMF (Gauteng), the Milnerton Refinery to Ankerlig Power Station Liquid Fuels Transportation Infrastructure Project (on behalf of Eskom Generation – Cape Town), numerous Eskom Transmission and Distribution power line and substation EIAs countrywide, mining EMPr compliance audits, the Return-To-Service compliance audits for Camden, Grootvlei and Komati Power Stations (Mpumalanga Province) and the new high hazard waste management facility for the Coega Development Corporation (Coega IDZ). Before entering the consulting field he gained extensive experience in the EIA regulatory field whilst in the employ of the Gauteng Department of Agriculture, Conservation and Environment being responsible for the review of infrastructure projects like the Gautrain Rapid Rail Link and representing the Department on various EMF, SDF and IDP project steering committees. He is currently managing the EIA processes for numerous wind energy developments. Marc was responsible for the review and management of all work relating to this project. Marc is registered with IAIASA, registration number: 2416.

Mr Thomas King *(Senior Environmental Consultant)***,**
Thomas holds a BSc degree with specialisation in Zoology from the University of Pretoria and an Honours degree in Biodiversity and Conservation from Rhodes University. As part of his Honours degree, Thomas was trained in Geographical Information Systems (GIS) and Community Based Natural Resource Management (CBNRM) in addition to the required biological sciences courses. His honours thesis investigated the rate at which Subtropical Thicket recovers naturally after heavy grazing by ostriches (*Struthio camelus).* At CES he has been involved in EIAs for numerous wind energy developments, a chicken rearing facility, numerous mining developments and has fulfilled the role of Environmental Control Officer (ECO) at the Kenmare Heavy Minerals mine in northern Mozambique. Thomas is primarily responsible for GIS related work at CES. Thomas is registered as a Candidate Natural Scientist, in the field of Environmental Science. Thomas was responsible for the compling of all documents relating to this project.

In addition, to the above EIA team members, provided in Table 1-4 are the details of the **specialist consultants** that conducted the specialist studies which provided information for inclusion in this final EIR.

In addition, to the above EIA team members, provided in Table 1-4 are the details of the **specialist consultants** that conducted the specialist studies which provided information for inclusion in this final EIR.

Table 1-4: The specialists that formed part of the EIA project team

Specialist Study	Organisation	Name of Lead Specialist(s)	Contact Details
Noise	Safetech	Mr. Brett Williams	P.O. Box 27607, Greenacres, Port Elizabeth 6056
Heritage	ACO Associates cc: Archaeology and Heritage Specialists	Dr Tim Hart and Dr Lita Webley	8 Jacob's Ladder, St James, 7945, Cape Town
Avifauna	Endangered Wildlife Trust (EWT)	Mr. Luke Strugnell	Private bag X11, Parkview, 2122
Visual	MapThis	Mr. Henry Holland	8 Cathcart Street, Grahamstown 6139
Palaeontological	Natura Viva cc	Dr John Almond	PO Box 12410, Mill Street Cape Town
Ecological	EOH Coastal and Environmental Services	Prof. Roy Lubke and Ms. Leigh-Ann De Wet	67 African Street, Grahamstown 6139

1.4 The Environmental Impact Report

Appendix 3 of GNR 982 "Scope of assessment and content of environmental impact assessment reports" states that an EIAR must contain:

3. An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-
    a. details of-
        i. the EAP who prepared the report; and
        ii. the expertise of the EAP, including a curriculum vitae;

Section 1.3

    b. the location of the activity, including:
        i. the 21 digit Surveyor General code of each cadastral land parcel;
        ii. where available, the physical address and farm name; and
        iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

Chapter 2.

    c. a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-
        i. a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;
        ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

Figure 2.1 and 2.2.

    d. a description of the scope of the proposed activity, including-
        i. all listed and specified activities triggered and being applied for; and
        ii. a description of the associated structures and infrastructure related to the development;

Listed activities: Tables 1.1 and 1.2. Chapter 2: Project Description.

e. a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;

Chapter 10.

f. a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred location;

Chapter 5.

g. a motivation for the preferred development footprint within the approved site;

Chapter 5.

h. a full description of the process followed to reach the proposed development footprint within the approved site, including:
   i. details of the development footprint alternatives considered;

Chapter 6.

   ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

Chapter 4.

   iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;

Appendix D-7.

   iv. the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

Chapter 3.

   v. the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-
      A. can be reversed;
      B. may cause irreplaceable loss of resources; and
      C. can be avoided, managed or mitigated;

Chapter 9.

   vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

Section 7.2.

   vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and

cultural aspects;

Chapter 9.

viii. the possible mitigation measures that could be applied and level of residual risk;

Chapter 9.

ix. if no alternative development locations for the activity were investigated, the motivation for not considering such; and

Section 6.1.2.

x. a concluding statement indicating the preferred alternative development location within the approved site;

Section 11.2.

i. a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-
    i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and
    ii. an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;

Chapter 9.

j. an assessment of each identified potentially significant impact and risk, including-
    i. cumulative impacts;
    ii. the nature, significance and consequences of the impact and risk;
    iii. the extent and duration of the impact and risk;
    iv. the probability of the impact and risk occurring;
    v. the degree to which the impact and risk can be reversed;
    vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and
    vii. the degree to which the impact and risk can be mitigated;

Chapter 9.

k. where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;

Chapter 8.

l. an environmental impact statement which contains-
    i. a summary of the key findings of the environmental impact assessment:
    ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
    iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

Chapter 11.

m. based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

Section 11.2

n. the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;

Final site layout will be ground-truthed when Preferred Bidder status is realised.

o. any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;

Final site layout will be ground-truthed when Preferred Bidder status is realised.

p. a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

Section 1.4.

q. a reasoned opinion as to whether the proposed 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;

Section 11.2.

r. where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;

Not applicable.

s. an undertaking under oath or affirmation by the EAP in relation to:
   i. the correctness of the information provided in the reports;
   ii. the inclusion of comments and inputs from stakeholders and I&APs;
   iii. the inclusion of inputs and recommendations from the specialist reports where relevant; and
   iv. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;

EAP declaration submitted when original EIA undertaken.

t. where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;

Not applicable.

u. an indication of any deviation from the approved scoping report, including the plan of study, including-

i. any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and
ii. a motivation for the deviation;

None.

v. any specific information that may be required by the competent authority; and

None.

w. any other matters required in terms of section 24(4)(a) and (b) of the Act.

None.

1.4.1 Assumptions and Limitations

The following limitations and assumptions are implicit this report –

- The primary assumption underpinning this EIA and the individual specialist studies upon which this EIR is based is that all information received from Terra Power (Pty) Limited and other stakeholders including registered I&APs was correct and valid at the time of the study.
- To ensure that the significance of impacts was not under-estimated, the specialists assessed impacts under the worst-case scenario situation.

2 PROJECT DESCRIPTION

This Chapter of the EIR identifies the location and size of the site of the proposed Golden Valley Wind Energy Project – Project 1, and provides a description of its various components and arrangements on the site.

2.1 Location and Site Description of the Proposed Development

The proposed Golden Valley Project – Project 1 is to be constructed on 8,100 hectares (ha) (total area of the development and not the actual physical footprint of the turbines) in the Blue Crane Route Municipality (BCRM) in the Eastern Cape Province of South Africa (Figure 2-1). Table 2-1 provides the coordinates of the proposed project site including the revised location of each wind turbine.

The details of the eight (8) farm portions involved in Project 1 and their Surveyor General 21 digit codes are as follows:

1. Farm 169 Portion 2 (Olive Woods)
2. Farm 166/RE (Olive Fonteyn)
3. Farm 167/RE (Klein Riet Fontein)
4. Farm 181 Portion 1(Cregus Kraal)
5. Farm 283
6. Farm 284
7. A part of Farm 159/RE (Mullers Kraal)
8. Portion 1 of Bosch Fonteyn 180

21 Digit codes:

1.	C01000000000016900002
2.	C01000000000016600000
3.	C01000000000016700000
4.	C01000000000018100001
5.	C01000000000028300000
6.	C01000000000028400000
7.	C01000000000015900000
8.	C01000000000018000001

Table 2-1: Revised coordinates of the turbines for the proposed Golden Valley WEF - Project 1 given in Decimal Degrees)

Turbine Number	Latitude	Longitude
1	-32.9363	25.8545
2	-32.9355	25.8636
3	-32.9343	25.8687
4	-32.9349	25.8743
5	-32.9384	25.8865
6	-32.9396	25.8921
7	-32.9426	25.8972
8	-32.9453	25.9061
9	-32.9401	25.9052
10	-32.9407	25.9108
11	-32.9366	25.9146
12	-32.9465	25.9641
13	-32.9422	25.9576

14	-32.9379	25.9443
15	-32.9310	25.9361
16	-32.9321	25.9286
17	-32.9273	25.9292
18	-32.9239	25.9244
19	-32.9224	25.9184
20	-32.9237	25.9324
21	-32.9194	25.9285
22	-32.9137	25.9184
23	-32.9136	25.9240
24	-32.9145	25.9293
25	-32.9111	25.9328
26	-32.9060	25.9398
27	-32.9022	25.9428
28	-32.8997	25.9471
29	-32.9052	25.9492
30	-32.9140	25.9529
31	-32.9029	25.9538
32	-32.9005	25.9645
33	-32.9062	25.9642
34	-32.9017	25.9736
35	-32.9056	25.9706
36	-32.9137	25.9702
37	-32.8976	25.9389
38	-32.8960	25.9333
39	-32.8946	25.9277
40	-32.8909	25.9430
41	-32.8822	25.9450
42	-32.8852	25.9369
43	-32.8780	25.9151
44	-32.8728	25.9146
45	-32.8696	25.9069
46	-32.8792	25.8995
47	-32.8797	25.8942
48	-32.8823	25.8878

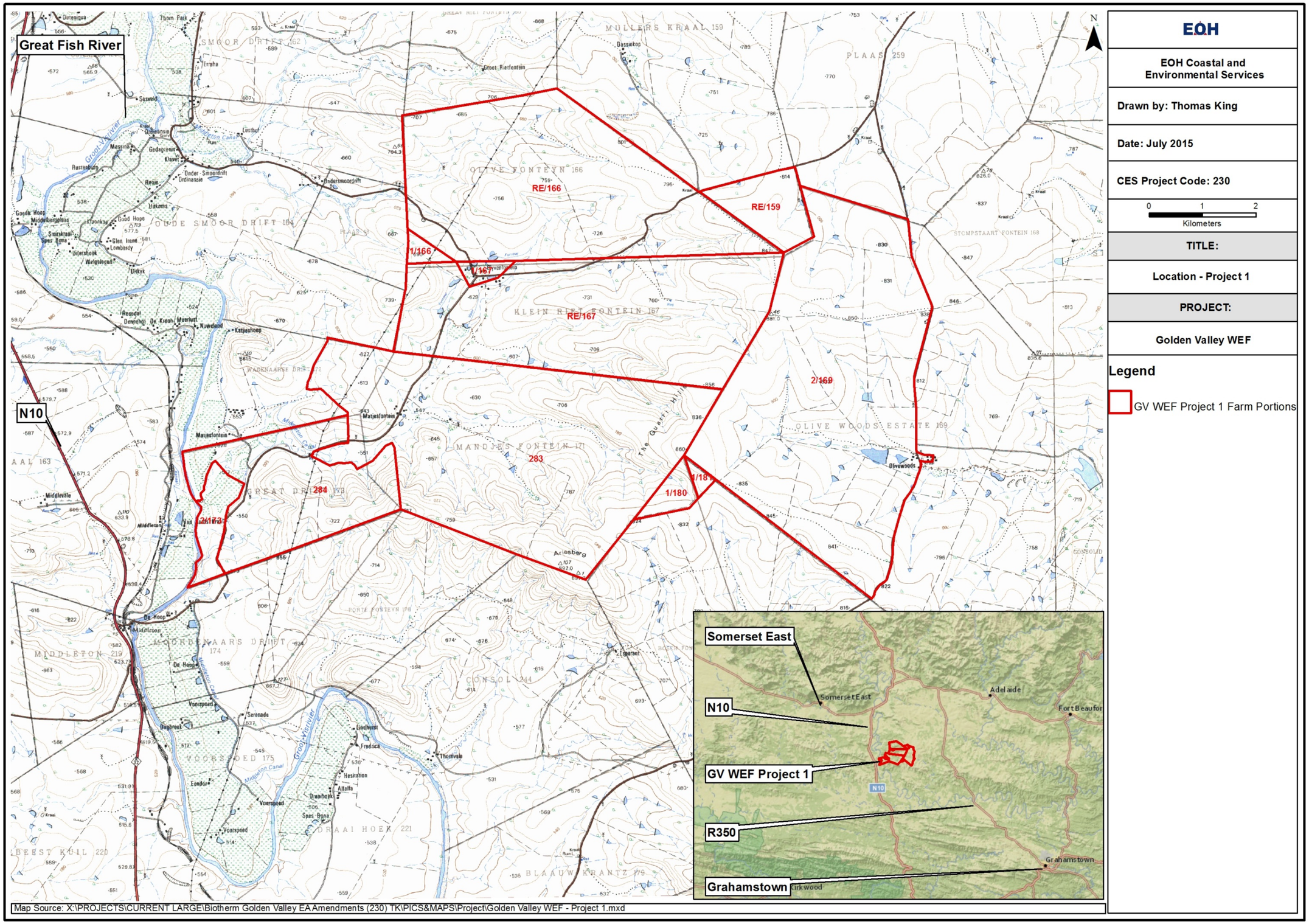

Figure 2-1: Locality map of Part/Project 1 of the Golden Valley Wind Energy Project

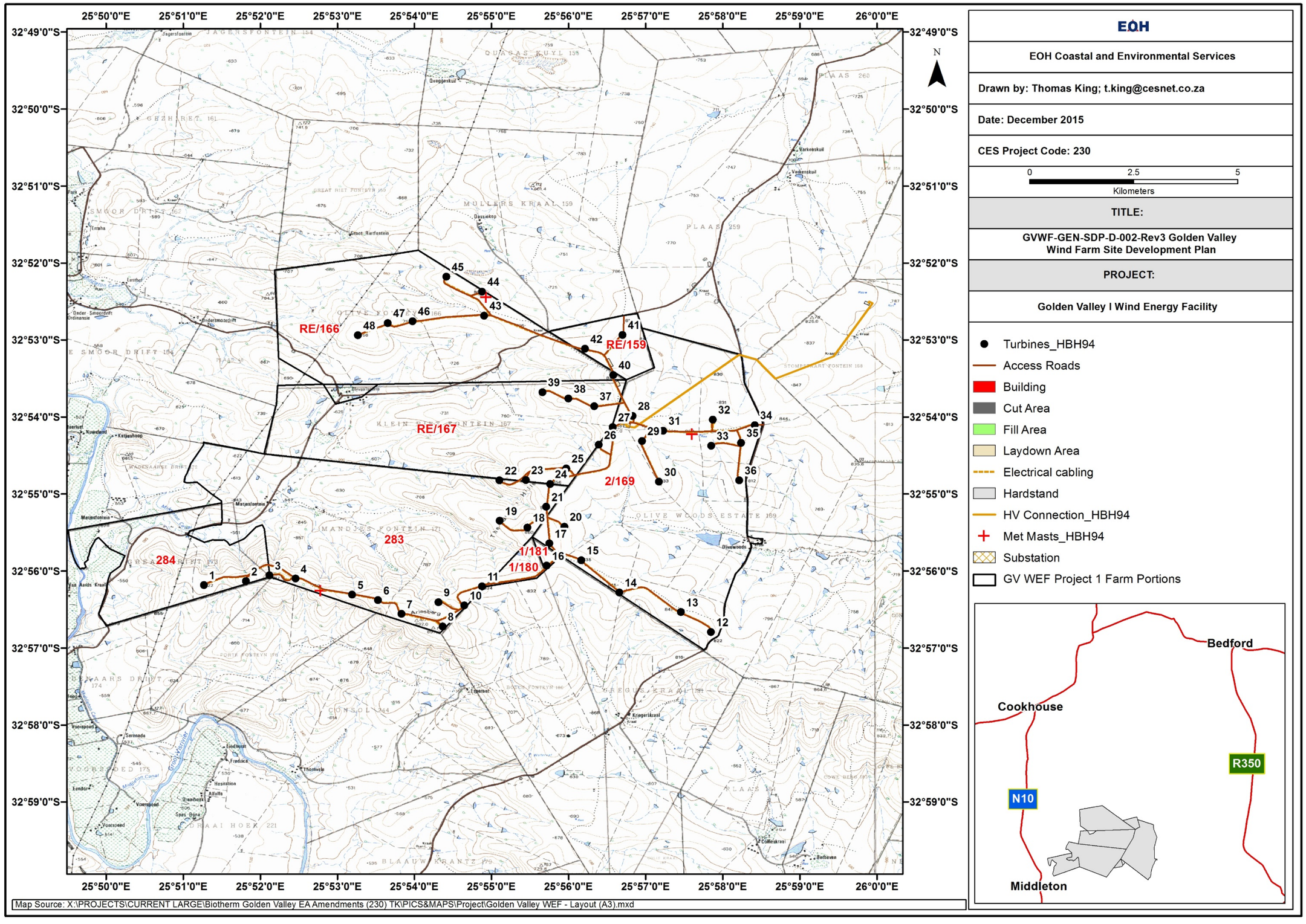

Figure 2-2: Golden Valley WEF – Project 1 turbine layout

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Figure 2-3: Proposed Golden Valley Project in relation to recognisable features in the landscape: N10, Great Fish River and Baviaanskrans Mountains in the background.

Plate 2.1: View south-east from Cookhouse with wind turbines super-imposed in the background. The closest wind turbine is 6km away.

Plate 2-2: View west from Olyvenfontein residence with turbine superimposed in the photo. The turbine is 500m away

Plate 2-3: A potential scenic view from the ridge north of the wind farm site.

The view is towards the south-west with the Baviaanskrans farmstead just below this site and to the left of the photograph. The farm house has a view down onto the wind farm, but the house faces west and is surrounded by high trees, particularly in the direction of this view. The turbines have been superimposed in the photo.

Plate 2-4: Current view north-east on the N10 with wind turbines superimposed in the background.

2.2 Detailed description of the Golden Valley Project – Project 1

2.2.1 Roads

During construction, it will be necessary to transport large turbine components (including blades each with a length of 59.5 metres) to the site and, as such, there are specific requirements for the roads. The project was originally authorised to install blades with a length of 50 metres. This was amended on 18 June 2013 to a rotor diameter of 130m i.e. blades each with a length of 65 metres. After final project engineering design, the blade length will be 59.5 metres. The general requirement is that all roads should have a width of approximately 5 metres with 8 metres horizontal clearance. However, BioTherm Energy predict that a road width of 5 metres will be sufficient.

2.2.2 Machinery and cables

Wind energy is a form of renewable energy. Winds are caused by the uneven heating of the atmosphere by the sun, the irregularities of the earth's surface, and rotation of the earth. Wind flow patterns are modified by the earth's terrain, bodies of water, and vegetation. This wind flow or motion energy (kinetic energy) can be used for generating electricity.

The term “wind energy” describes the process by which wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power and a generator can then be used to convert this mechanical power into electricity.
Typical wind turbine subsystems include (also refer to Figure 2-4):-

- A *rotor, or blades*, which are the portion of the wind turbine that collect energy from the wind and convert the wind's energy into rotational shaft energy to turn the generator. The speed of rotation of the blades is controlled by the nacelle, which can turn the blades to face into the wind ('yaw control), and change the angle of the blades ('pitch control') to make the most use of the available wind;
- A *nacelle* (enclosure) containing a drive train, usually including a gearbox (some turbines do not require a gearbox) and a generator. The generator is what converts the turning motion of a wind turbine's blades (mechanical energy) into electricity. Inside this component, coils of wire are rotated in a magnetic field to produce electricity. The nacelle is also fitted with brakes, so that the turbine can be switched off during very high winds, such as during storm events. This prevents the turbine from being damaged. All this information is recorded by computers and is transmitted to a control centre, which means that operators do not have to visit the turbine very often, but only occasionally for a mechanical check;
- A *tower*, to support the rotor and drive train; The tower on which a wind turbine is mounted is not only a support structure, but it also raises the wind turbine so that its blades safely clear the ground and so can reach the stronger winds at higher elevations. The tower must also be strong enough to support the wind turbine and to sustain vibration, wind loading, and the overall weather elements for the lifetime of the turbine, and;
- *Electronic equipment* such as controls, electrical cables, ground support equipment, and interconnection equipment.

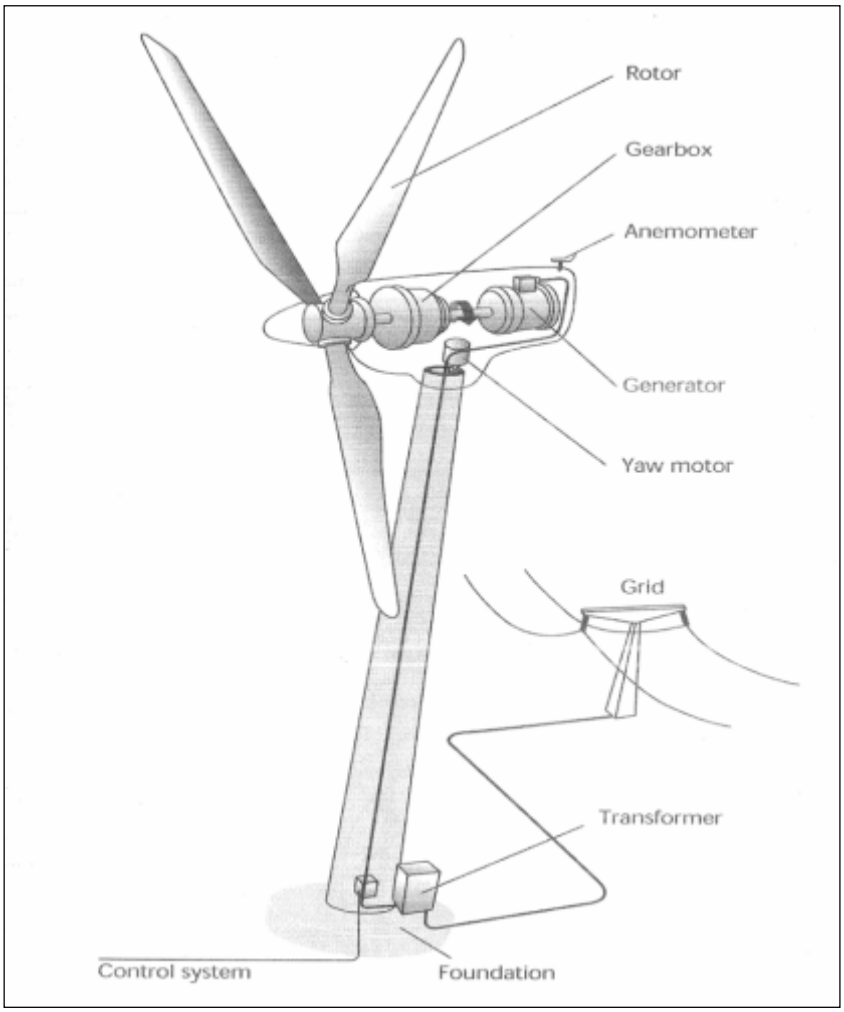

Figure 2-4: Illustration of the main components of a typical wind turbine
Note: The transformer in the figure above would normally be inside the tower (probably at the base).
Source: Terra Wind Energy-Golden Valley (Pty) Limited

A wind turbine obtains its power input by converting the force of the wind into torque (turning force)

acting on the rotor blades. The wind then turns the rotor blades, which spin a shaft, which connects to a generator and makes electricity. The amount of energy which the wind transfers to the rotor depends on the density of the air (the heavier the air, the more energy received by the turbine), the rotor area (the bigger the rotor diameter, the more energy received by the turbine), and the wind speed (the faster the wind, the more energy received by the turbine). Provided in the sections that follow is a detailed discussion on the various components of the Golden Valley Project.

2.2.3 Measurement mast

On 17 February 2010, the competent authority, who in this case was the Department of Environmental Affairs (DEA) – formerly the Department of Environmental Affairs and Tourism (DEAT) - granted the environmental authorisation (Authorisation Register Number: 12/12/20/1715) for Terra Wind Energy-Golden Valley (Pty) Limited to erect four temporary 80m measurement masts on the farms Quaggaskuil, Smoorsdrift, Varkenskuil and Olive Wood Estate to gather wind speed data and correlate these measurements with other meteorological data in order to produce a final wind model of the above-mentioned farms.

Please refer to Appendix A for a copy of the Environmental Authorisation from DEA. It is necessary to erect wind measurement masts to gather wind speed data and correlate these measurements with other meteorological data in order to produce a final wind model of the proposed project site. A measurement campaign of no less than 12 months duration is necessary to ensure that a bankable wind resource study can be produced as well as to validate the initial wind turbine mapping.

The four proposed 80-metre masts are a highly versatile meteorological tower designed specifically for wind resource measurements. It is ice-rated for extreme climates, and exceeds EIA-222-F Standards (http://www.nrgsystems.com/sitecore/content/Products/4042.aspx). Superior design and sturdy galvanized steel tube construction make the tower reliable and easy to transport to remote sites.

Tower tube sections slide together, and then tilt up from the ground using a ginpole and winch. No cranes or concrete foundations are required for installation. The tower will be supported with aircraft cable guy wires and anchored with standard screw-in anchors (although depending on soil conditions, another type of the anchor might be used). The mast will have to be ‘marked’ as per the requirements of the Civil Aviation Authority.

2.2.4 Construction of a typical wind farm

Typically, building a wind farm is divided into three phases namely:-

- Preliminary civil works
- Construction
- Operation

Each of the above-mentioned phases is described in detail in sections 2.2.4.1 – 2.2.4.6 that follow.

2.2.4.1. Preliminary civil works

A temporary area of 35mx25m needs to be established during the preliminary phase of the wind farm for access to the site during the construction phase by machines (bulldozers, trucks, cranes etc). The access roads need to have a minimum internal turning circle of 26-27m.

2.2.4.2. Construction Phase

This phase comprises of the following sub-phases:-

(a) Geotechnical studies and foundation works

A geotechnical study of the area must be undertaken for safety purposes. This comprises drilling, penetration and pressure assessments. For the purpose of the foundations, 500m^3 would need to be excavated for each turbine. These excavations are then filled with steel-reinforced concrete (typically 13 tons of steel rods per turbine). The foundations can vary according to the quality of the soil. The main dimensions for the foundation of a 3MW/100m high wind turbine are shown in Figure 2-6 with underground foundation, tower base, above ground foundation, and ground level.

(b) Foundation Works
The turbine foundations can vary according to the quality of the soil. The main dimensions for the foundation of a 3MW/100m high wind turbine are shown in the Figure 2-6.

(c) Electrical cabling
As discussed above, electrical and communication cables are run approximately 1m deep, under or immediately alongside the access roads.

(d) Turbine erection
The process is rapid (around three days per turbine) if the weather conditions permit. This phase is the most complex and costly.

2.2.4.3. Electrical connection

Each turbine is fitted with its own transformer that steps up the voltage usually to 22kv or 33kv. The entire wind farm is then connected through a series of connections to the “point of interconnection” which is the electrical boundary between the wind farm and the municipal or national grid. The national grid might need to be extended to accommodate and evacuate power from the wind energy facility. Most of the off-site grid works will be carried out by Eskom or its sub contractor (line upgrade, connection to the sub-station, burial of the cables etc.).

The electrical connections will be laid in trenches as far as possible and will be approximately 1 metre deep. Where the terrain does not allow for the electrical connections to be underground, sections will have to be placed as overhead connections. There will be numerous of instances where the electrical cables will cross the watercourses on the project site. As such, the EAP has consulted with Department of Water Affairs regarding the requirements in terms of the National Water Act, 1998 (Act 36 of 1998). A copy of the correspondence is attached to this report in Appendix E.

According to the National Water Act, 1998 (Act 36 of 1998), the natural channels are regarded as watercourses. Therefore, the electric duct crossings (each and every one of them) will constitute a water use in terms of this Act, for the following:

- Section 21 (c)- Impeding or diverting the flow of water in a watercourse (if there will be any) and
- Section 21 (i)-Altering the bed, banks, course or characteristics of a watercourse.

These crossings will have an impact on the watercourse (bed & banks) so an authorisation is needed. The Department of Water and Sanitation (DWS) has issued a general authorisation for 6 crossings on the site. One additonal crossing and two wetlands have been applied for.

2.2.4.4. Timing estimation

The implementation of a wind farm of these approximate dimensions would require:-

- Preliminary phase = 16 weeks (including 8 weeks to let the foundation concrete gain strength)
- Wind turbines erection = 4 weeks (in good low wind weather conditions)
- Commissioning and electrical connection = 4 weeks

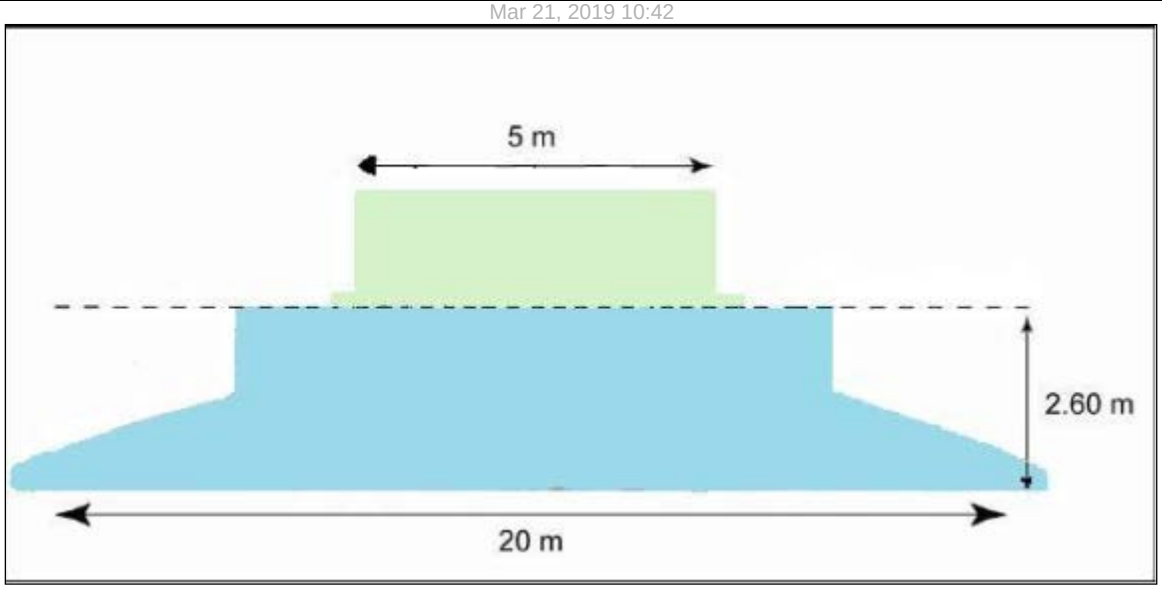

Figure 2-5: The main typical dimensions for the foundation of a 2.5MW/80-100m high wind turbine.
*** Note: Blue area is underground and green area is above ground**

2.2.4.5. Operational phase

During the period when the turbines are up and running, on-site human activity drops to a minimum, and includes routine maintenance requiring only light vehicles to access the site. Only major breakdowns would necessitate the use of cranes and trucks.

2.2.4.6. Refurbishment and rehabilitation of the site after operation

Current wind turbines are designed to last for over 25 years and this is the figure that has been used to plan the life span of a modern wind farm. If refurbishment is economical, the facility life span could be extended by a further 25 years.

Decommissioning of the wind energy facility at the end of its useful life will be undertaken in agreement with the landowners and according to the land use agreement. The intention of the project proponent is to ensure that the usable land and visible images would be removed and restored to their original condition.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

In terms of Appendix 3 of GNR 982, *an environmental impact assessment report must include:-*

(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;

In line with the above-mentioned legislative requirement, this Chapter of the EIR provides a description of the natural and socio-economic environments that could potentially be impacted by the proposed Golden Valley Wind Energy Project.

Descriptions of the physical, biological, social, economic and cultural aspects of the environment are based on a review of relevant literature sources as well as on-site investigations undertaken between February 2010 and June 2010 by the various specialists involved in this EIA.

3.1 The Bio-Physical Environment

3.1.1 Climate and Hydrology

Due to the location of the study area at the confluence of several climatic regimes, namely temperate and subtropical, the Eastern Cape Province of South Africa has a complex climate. There are wide variations in temperature, rainfall and wind patterns, mainly as a result of movements of air masses, altitude, mountain orientation and the proximity of the Indian Ocean.

Cookhouse mainly experiences dry warm summers and chilly winters. Most of the rainfall is received in summer months. There is data available for climatic conditions in Somerset East, which is close to the study site. The annual mean rainfall is 570mm (ranging from 278mm to 994mm), with a March high of 84mm and a June low of 21mm. The mean annual daily temperature is 17.2^{o}C with a mean monthly daily temperature high in January of 22.2^{o}C and low in June and July of 12.6^{o}C.

A number of rivers, drainage lines and canals bisect the affected farms. Most rivers in southern Africa are in the east and extreme south, in the higher rainfall areas. The Golden Valley Project is bordered by the Great Fish River in the west.

3.1.2 Topography

The Eastern Cape Province contains a wide variety of landscapes, from the stark Karoo (the semi-desert region of the central interior) to mountain ranges and gentle hills rolling down to the sea. The climate and topography give rise to the great diversity of vegetation types and habitats found in the region. The mountainous area on the northern border forms part of the Great Escarpment.

Another part of the escarpment lies just north of Bhisho, Somerset East and Graaff-Reinet. In the south of the province, the Cape Folded Mountains start between East London and Port Elizabeth and continue westward into the Western Cape. As is the situation in KwaZulu-Natal, the Eastern Cape is characterised by a large number of short, deeply incised rivers flowing parallel to each other. The topography of the study area is dominated by the Fish River floodplain and the Winterberg Mountains (and their extension to the east) north of Somerset East, Cookhouse and Bedford. The lowest points (approximately 450m AMSL) in the region are found in the Little and Great Fish River (Klein- and Groot-Vis) floodplains south of the site, while the highest are found in the mountains north of Somerset East (approximately 1 250m AMSL). The wind farm will therefore be located in on hills and ridges within a locally lower area within the regional landscape and will be almost completely surrounded by elevated land. Plates 3-1 to 3-3 provide an idea of the topography of the proposed Golden Valley Project site.

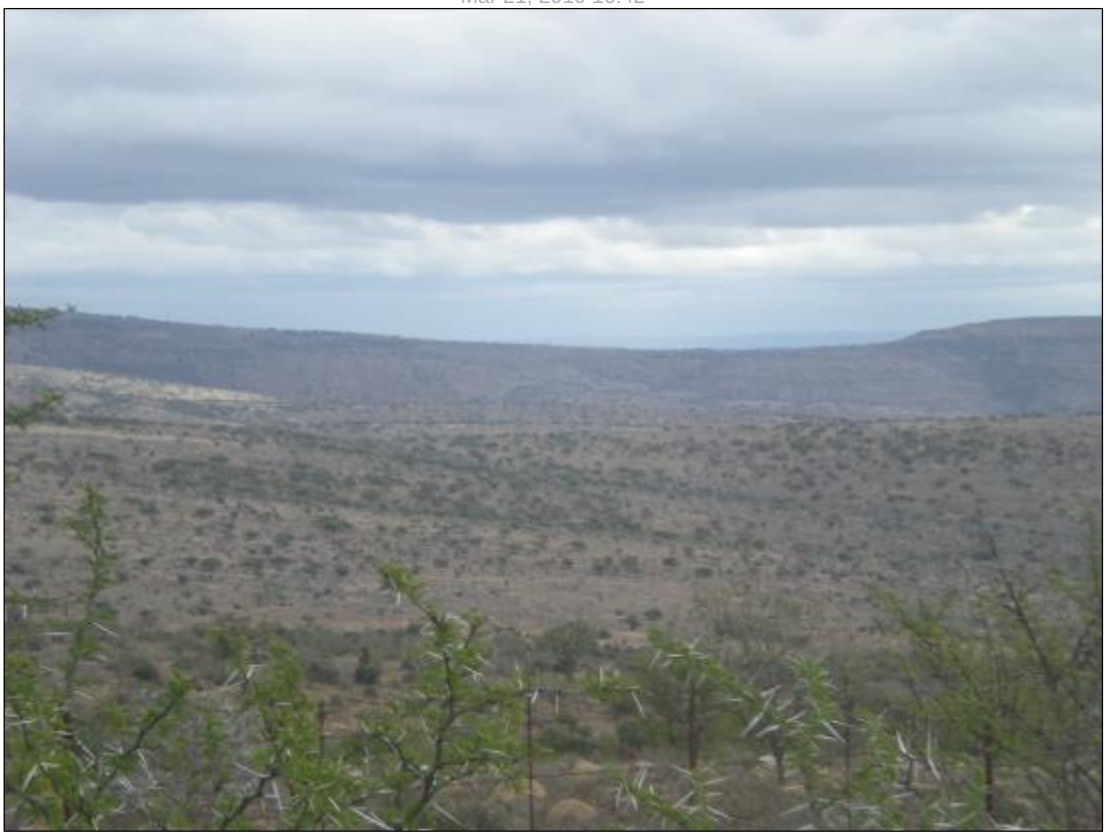

Plate 3-1: The undulating hills of the site proposed for the location of the Golden Valley Project

Plate 3-2: The undulating hills of the site proposed for the location of the Golden Valley Project. Note the escarpment in the distance

Plate 3-3: Some very flat areas found on the site proposed for the location of the Golden Valley Project. The escarpment can be seen in the background

3.1.3 Geology and Soils

Cookhouse and the surrounding areas (including Somerset East) occur in the Karoo Supergroup and comprise mainly the Beaufort Group (Koonap, Middleton and Balfour Formations) with some Karoo Dolerite (Rust, 1998). The Beaufort group overlays the Ecca Group and was deposited on land through alluvial processes. It is characterised by reddish-purple and mottled, greenish, mudstone beds, interbedded with lenticular, creamy and buff coloured sandstone beds. The mudstone beds are a diagnostic feature of the Beaufort Group.

A couple of long Dolerite outcrops occur in the area (Rust, 1998). The Adelaide subgroup occurs as a subgroup of the Beaufort Group, and forms most of the geology of the area. The Adelaide subgroup comprises the Middleton Formation and the Balfour Formation which are made up of layers of a greenish-grey mudstone, shale and sandstone (Mucina and Rutherford, 2006). Plate 3-4 provides a general indication of the rocks around the proposed development area.

The geomorphology of the region is a product of the erosive forces of the Great Fish River and its tributaries working on the underlying, almost horizontal, layers of shale and sandstone. Irregular plains with low to moderate hills dominate the landscape with ridges of high hills cutting across them in a roughly east-west direction.

North of the study area the relief is considerably more pronounced and low mountains form a constant background of views to the north.

Plate 3-4: The reddish mudstones of the Beaufort Group of Cookhouse and the surrounding areas.

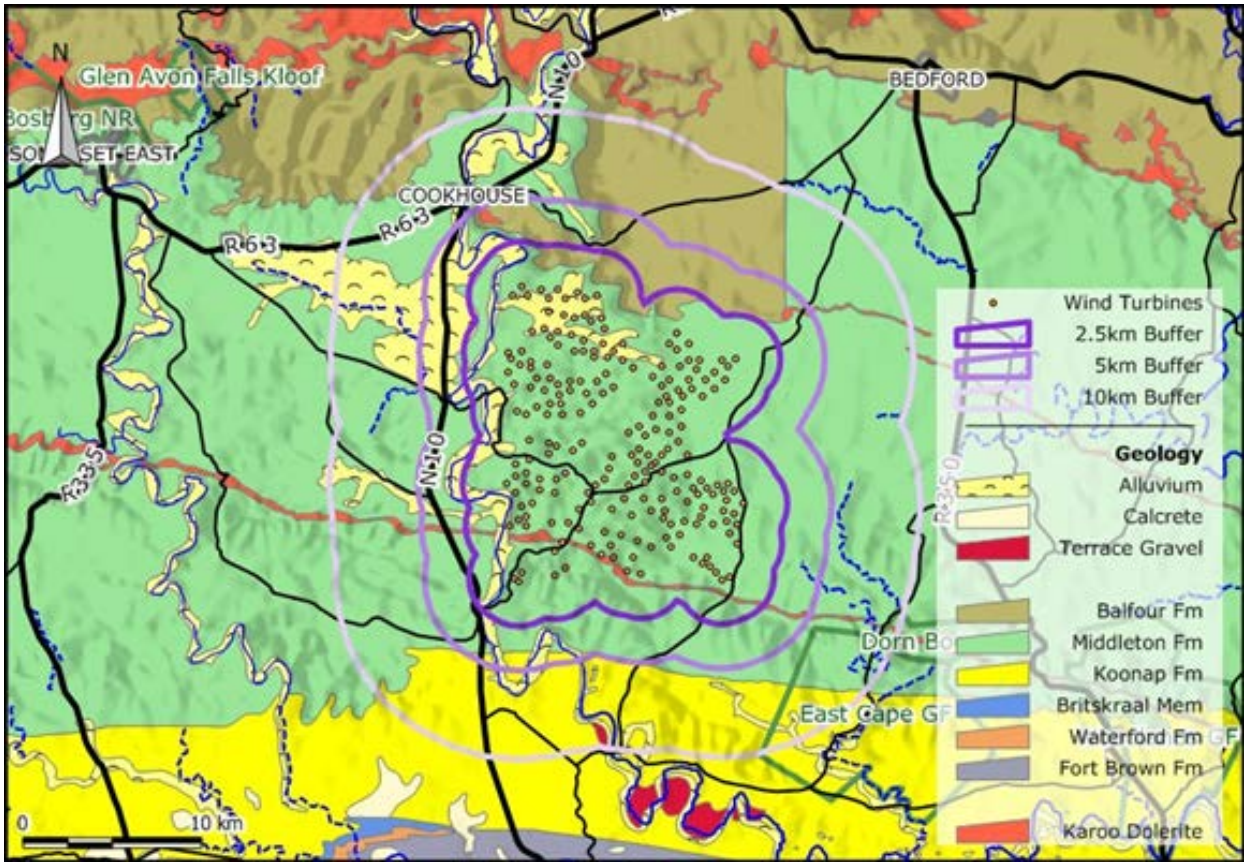

Figure 3-1: Simplified geological map of the area around Cookhouse.

Mucina and Rutherford (2006) describe the geology and soil for each of the vegetation types in the region (Table 3-1).

Table 3-1: Geology and soils of each of the vegetation types of the study area

Vegetation Type	Geology and Soils
Albany Broken Veld	Mainly shales and some sandstones of various stratigraphic units within the Witteberg Group of the Cape Supergroup and the Beaufort, Ecca and Dwyka Groups of the Karoo Supergroup. Mainly Glenrosa and/or Mispah soils (Fc land type) with some red-yellow, apedal, drained soils, with a high base status, generally <300 mm deep, typical of Ag land type.
Bedford Dry Grassland	Loam or clay-loam soils typical of Fc (most of the region) as well as Db and Fb land types on the mudstones and sandstones of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup).
Great Fish Thicket	Mostly on shallow (< 1 m) clay soils (Glenrosa and Mispah) derived from the Adelaide and Escourt Formations (Beaufort Group, Karoo Supergroup) mudstone and arenite. Half the area falls within the Fc land type, with Fb the only other one of some importance.
Eastern Cape Escarpment Thicket	Mudstones and arenite of the Adelaide Subgroup of the Karoo Supergroup as well as Jurassic dolerite intrusions. The soils derived from these rocks are fine-grained, nutrient-poor silts or more nutrient-rich red clays. Soils are often shallow, on moderate to steep slopes and the surface rock cover is high. The major land types are Fc as well as Ib and Fb.
Southern Karoo Riviere	Recent sandy-clayey alluvial deposits rich in salt occurring on mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup) that support soils typical of Ia land type.

Source: Mucina & Rutherford (2006)

3.1.4 Vegetation and Floristics

Flora

The vegetation of the Eastern Cape is complex and is transitional between the Cape and subtropical floras, and many taxa of diverse phytogeographical affinities reach the limits of their distribution in this region. The region is best described as a tension zone where four major biomes converge and overlap (Lubke et al. 1988). The dominant vegetation is Succulent Thicket (Spekboomveld or Valley Bushveld), a dense spiny vegetation type unique to this region. While species in the canopy are of subtropical affinities, and generally widespread species, the succulents and geophytes that comprise the understorey are of karroid affinities and are often localised endemics.

Cookhouse falls within the Albany Centre of Floristic Endemism; also known as the Albany Hotspot (Figure 3-2). This is an important centre for plant taxa, and, according to van Wyk and Smith (2001), contains approximately 4 000 vascular plant species with approximately 15% either endemic or near-endemic (Victor and Dold, 2003). This area was delimited as the '*region bounded in the west by the upper reaches of the Sundays and Great Fish River basins, in the south by the Indian Ocean, in the east by the Gamtoos–Groot River basin and in the north by the Kei River basin'* (Victor & Dold, 2003).

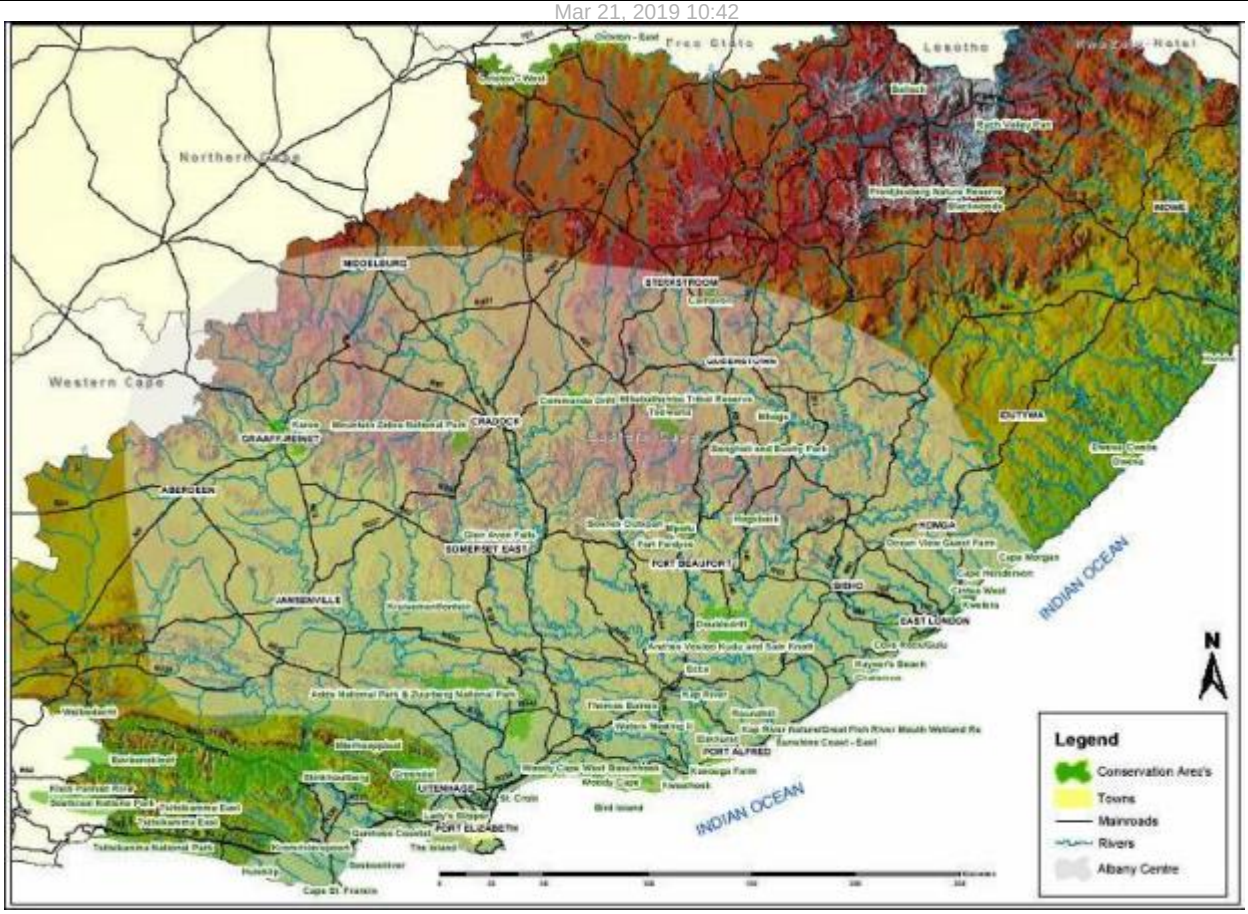

Figure 3-2: The Albany Centre of Endemism, also known as the 'Albany Hotspot', has long been recognised as an important centre of plant species diversity and endemism
Source: van Wyk and Smith (2001)

Mucina and Rutherford (2006) described the species endemic to the area (Table 3-2). In addition to the endemic taxa found in the study area, there are also a number of species which are listed as protected by Victor and Dold (2003) (Table 3-3) that are expected to be found in the study area.

Importantly, the list given by Victor and Dold is not complete as little is known about many species. These taxa with many data deficient species include specifically the *Mesembranthemaceae* family, which Victor and Dold (2003) estimate would have 72 species that should, but do not, occur on the list.

Thus any members of the family are included as Species of Special Concern (SSC). Victor and Dold (2003) also list a number of other taxa as important. These include members of the Amaryllidaceae (Amaryllids), Iridaceae (Irises), Orchidaceae (Orchids) and Apocynaceae (Lianas), as well as members of the genus *Aloe (*see Plate 3-5*)*.

Table 3-2: Species endemic to the vegetation types found in the study area and Cookhouse surrounds.

Vegetation Type	Species	Protection	Status
Bedford Dry Grassland	No endemics	-	-
Great Fish Thicket	*Euphorbia cumulate*	-	-
	Euryops gracilipes	IUCN	Vulnerable
	Haworthia aungustifolia var. *pauciflora*	PNCO 4	Protected
	Haworthia cummingii	PNCO 4	Protected
	Haworthia cymbiformis var. *incurvula*	PNCO 4	Protected
	Haworthia cymbiformis var. *ramose*	PNCO 4	Protected
	Zaluzianskya vallispiscis	-	-
Southern Karoo Riviere	*Isolepis expallescens*	-	-
Eastern Cape Escarpment thicket	No endemics	-	-
Albany Broken Veld	*Brachystelma huttonii*	-	-
	Ornithogalum britteniae	IUCN	Vulnerable
	Ornothogalum perdurans	IUCN	Vulnerable
	Haworthia cymbiformis var. *obtuse*	-	-
	Ceropegia fimbriata subsp. *fimbriata*	IUCN	Vulnerable
	Euphorbia inermis var. *huttoniae*	-	-
	Rhombophyllum albanense	-	-
	Rhombophyllum dyeri	-	-

Table 3-3: Species expected to be found in the study area and surrounds which are listed as protected (but are not endemic).

Vegetation Type	Species	Protection	Status
Bedford Dry Grassland	*Cotyledon orbiculata*	IUCN	Near Threatened
	Pelargonium sidoides	IUCN	Declining
Great Fish Thicket	*Delosperma ecklonii*	IUCN	Rare
	Tetradenia barberae	IUCN	Rare
	Boscia albitruscia	Protected Trees	Protected
	Aloe tenuior	PNCO	Protected
Albany Broken Veld	*Ceropegia fimbriata*	IUCN	Vulnerable
	Euphorbia meloformis	IUCN/ PNCO 4	Near Threatened/ Protected
	Faucaria tigrina	IUCN	Endangered
	Ornithogalum britteniae	IUCN	Vulnerable
	Ornithogalum perdurans	IUCN	Vulnerable
Eastern Cape Escarpment Thicket	*Crassula obovata*	IUCN	Vulnerable
Southern Karoo Riviere	*Amphiglossa callunoides*	IUCN	Near Threatened

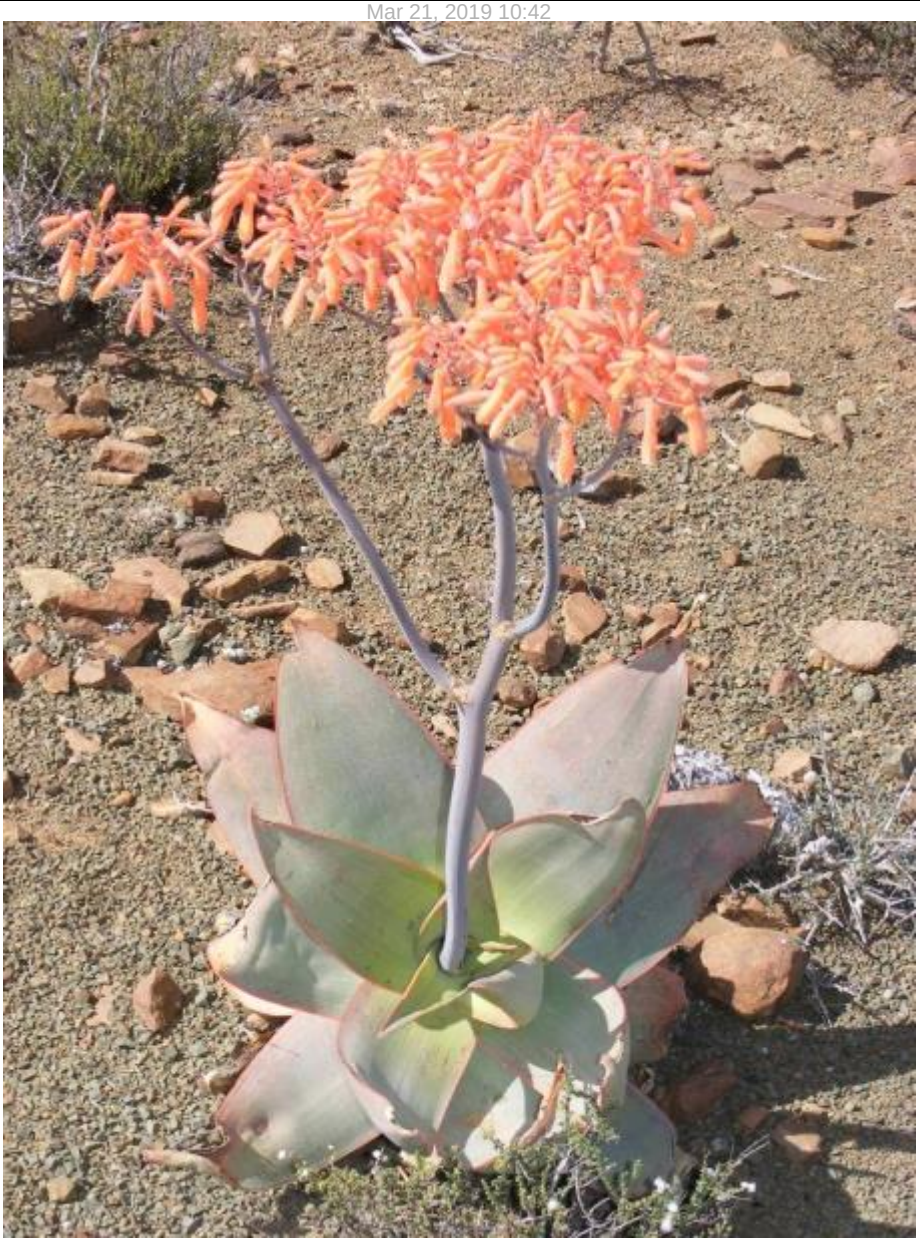

Plate 3-5: One of the many Aloe (*Aloe striatus*) plants found in the study area. All species of *Aloe* are protected by the PNCO Schedule 4.

Alien species

Alien species recorded from the study site included *Opuntia ficus-indica*, prickly pear (Plate 3-6), and *Opuntia lindheimeri* (Plate 3-7). These invaders are required to be removed by law, as they are each Category 1: declared weeds. Biological control agents are presently being utilised on the site on each of these species. The Conservation of Agricultural Resources Act, 1983 requires the following regarding category 1 plants:

Combating of category 1 plants (section 15A)

1) Category 1 plants may not occur on any land or inland water surface other than in biological control reserves.
2) A land user shall control any category 1 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.
3) No person shall, except in or for purposes of a biological control reserve –
    a. establish, plant, maintain, multiply or propagate category 1 plants;

b. import or sell propagating material of category 1 plants or any category 1 plants;
c. acquire propagating material of category 1 plants or any category 1 plants.

4) The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with the requirements of sub-regulation (1) on such conditions as the executive officer may determine in each case.

Plate 3-6: *Opuntia ficus-indica* recorded on the farm Quaggas Kuyl.

Plate 3-7: *Opuntia lindheimeri* recorded on the farm Smoorsdrift

Vegetation

There are two main vegetation classifications for the area. These are Mucina and Rutherford (2006) and the Subtropical Thicket Ecosystem Project (STEP). There are five Mucina and Rutherford (2006) and four STEP Vegetation types for the general Cookhouse area (Table 3-4). Plate 3-8, 3-9 and 3-10 show the vegetation in the study area. Much is degraded due to grazing by livestock and comprises sparse grassland with scattered low shrubs, *Acacia karroo* plants and alien invader species.

Table 3-4: Mucina & Rutherford and STEP vegetation types in the Cookhouse area

Mucina & Rutherford		STEP
Code	**Vegetation Type**	**Vegetation type**
AT11	Great Fish Thicket	Hartebeest Karroid Thicket
		Fish Speckboom Thicket
Gs18	Bedford Dry Grassland	-
AT13	Eastern Cape Escarpment Thicket	Escarpment Thicket
NK14	Albany Broken Veld	Saltaire Karroid Thicket
Azi6	Southern Karoo Riviere	

Plate 3-8: Sparse grassland with low shrubs and a few stunted trees

Plate 3-9: Sparse grassland with scattered *Acacia karroo* plants as well as a few *Opuntia ficus*-indica invaders

Plate 3-10: Grassland with a few *Opuntia lindheimeri* individuals

Vegetation types

Mucina and Rutherford (2006)

(a) Great Fish Thicket

Great Fish Thicket occurs in the Eastern Cape quite extensively in and around the lower Great Fish River and Keiskamma River Valleys. Succulent thicket occurs in steep slopes. Thicket is dominated by *Portulacaria afra* which becomes less dominant and is replaced by *Euphorbia bothae* with increasing aridity. With increasing moisture *P. afra* is replaced by *Euphorbia tetragona* and *E. triangularis.* The vegetation tends to be clumped. This vegetation type is classified as Least Threatened by Mucina and Rutherford (2006). The conservation target is 19%, with 6% conserved and 4% transformed (3% cultivation, 1% urbanization).

(b) Bedford Dry Grassland

This vegetation type occurs in the Eastern Cape. The vegetation type occurs on gently undulating plains and is open, dry grassland interspersed with *Acacia karroo* woodland vegetation. The grassland is dominated by *Digitaria argyrograpta, Tragus koelerioides, Eragrostis curvula* and *Cymbopogon caesius*. It is classified as Least Threatened by Mucina and Rutherford (2006), with a conservation target of 23%. No part of this vegetation type is statutorily conserved and only 1% privately conserved. 3% has been transformed for cultivation. Erosion is high in 25% of this vegetation type.

(c) Eastern Cape Escarpment Thicket

This vegetation type is restricted to the Eastern Cape Province (Mucina and Rutherford, 2006). It occurs along steeply sloping escarpment and mountain slopes, hills and lowlands of the region. It forms semi-open to closed thicket with dominant species *Olea europaeae* and *Acacia natalitia*. The conservation target for this vegetation type is 19%. 7% is conserved both privately and statutorily. This vegetation type has been permanently altered through various means including cultivation and urbanization (Mucina and Rutherford, 2006).

(d) Albany Broken Veld

This vegetation type occurs in the Eastern Cape Province and extends from the Zuurberg Mountains, around the confluence of the Great and Little Fish Rivers extending Eastwards (Mucina and Rutherford, 2006). It occurs on low mountain ridges and hills with an open grassy karroid dwarf shrubland with scattered low trees (*Boscia oleoides, Euclea undulate, Pappea capensis, Schotia afra*), dwarf shrubs (*Becium burchellianum, Chrysocoma ciliate*) and grasses (*Eragrostis obtusa*). This vegetation type is classified as Least Threatened by Mucina and Rutherford (2006) and has a conservation target of 16%, with 12% privately conserved. About 3% has been transformed for cultivation (Mucina and Rutherford, 2006).

(e) Southern Karoo Riviere

This vegetation type occurs in both the Eastern and Western Cape provinces, it is associated with rivers and is embedded in several vegetation types (Mucina and Rutherford, 2006). The vegetation type comprises riverine flats with a complex of *Acacia karoo* or *Tamarix usneoides* thickets and edged by *Salsola* dominated shrubland. This vegetation type is listed as Least Threatened by Mucina and Rutherford (2006), with a conservation target of 24%. Only 1.5% is statutorily and privately conserved, 12% has been transformed for cultivation and building of dams.

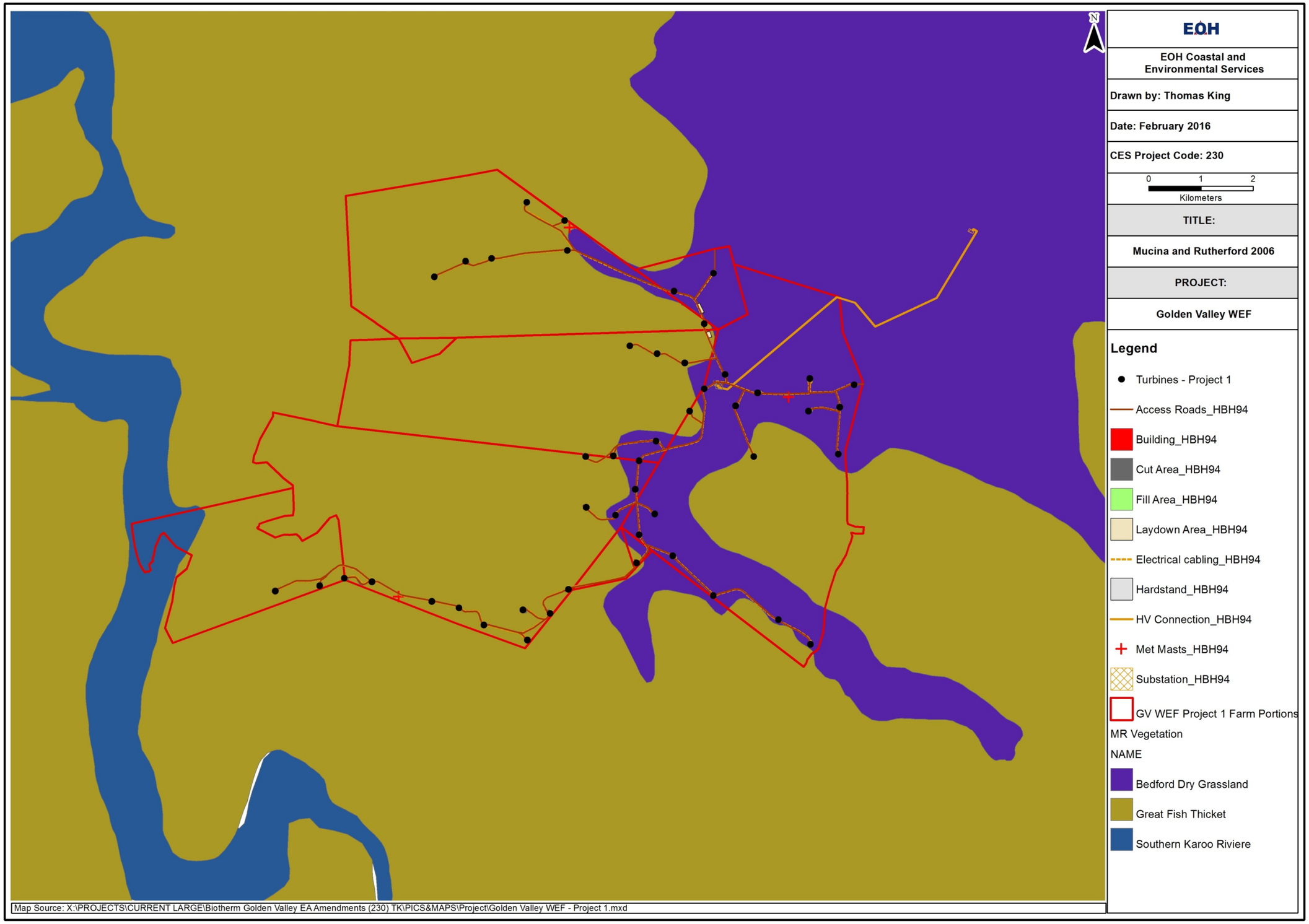

Figure 3-3: Mucina and Rutherford (2006) Vegetation map of the study area, with the location of the proposed turbines as red dots

Subtropical Thicket Ecosystem Planning (STEP) Project

(a) Hartebeeste Karroid Thicket

Hartebeeste Karroid Thicket is listed as Least Threatened by STEP. This vegetation type consists of fragmented thicket clumps comprising species typical of Fish Valley Thicket (Pierce & Mader 2006). Species typical of Fish Valley Thicket include woody trees such as doppruim (*Pappea capensis*) and gwarrie (*Euclea undulate*) as well as shrubs such as needlebush (*Azima tetracantha*). The Nama-karoo matrix is dominated by ankerkaroo (*Pentzia incana*) and *Becium burchellianum*is a characteristic species.

(b) Escarpment Thicket

Escarpment Thicket is classified as Vulnerable by STEP. The dominant species of this vegetation type include wild olive (*Olea europaeae* subsp. *africana*) and kruisbessie (*Grewia occidentalis*). Also abundant are saffron (*Elaeodendron croceum*) and buffalo-thorn (*Ziziphus mucronata*).

(c) Fish Spekboom Thicket

Fish Spekboom thicket is classified as Vulnerable by STEP. It forms part of the Thicket Biome and the Valley Thicket vegetation type. Valley Thicket grows in areas with relatively intermediate rainfall for Thicket (Pierce & Mader 2006). It can be impenetrable when in pristine condition but overgrazing results in a savanna-like vegetation with occasional trees. Ubiquitous thicket species include: *Pappea cappensis*, *Azima tetracantha* and *Rhus longispina*. There are also many succulent species of which species of *Crassula* and *Aloe* as well as *Portulacaria afra, Euphorbia grandidens* and *Euphorbia tetragonal* are the most common (Pierce & Mader 2006).

Fish Spekboom Thicket, specifically is a variable thicket type with tree euphorbias (*Euphorbia curvirama, Euphorbia grandidens* and *Euphorbia tetragonal*) as well as spekboom (*Portulacaria afra*). In addition, there are also woody shrub species present including: *Pappea capensis, Schotia afra* and *Rhigozum obobvatum*.

(d) Aliwal North Dry Grassland

Aliwal North Dry Grassland is classified as Least Threatened by STEP. It forms part of the Grassland Biome, which consists mainly of grasses, with very few trees or shrubs. If present, trees cover less than 10% (Pierce & Mader 2006). Aliwal North Dry Grassland is pure grassland of sweet grass: *Themeda triandra, Digitaria eriantha, Sporobolus fimbriatus* and *Eragrostis chloromelas* (Pierce & Mader 2006).

STEP vegetation classes

STEP provides management recommendations for each of the classes given to vegetation types. As the study area contains vegetation types listed as Least Threatened (Currently Not Vulnerable), and Vulnerable by STEP, recommendations for these classes are provided below and summarised in Table 3-5.

Currently Not Vulnerable (Class IV)

A vegetation type that has much more extant habitat than is needed to meet its conservation target, is considered Currently Not Vulnerable, or Least Threatened

For Currently Not Vulnerable vegetation, STEP recommends three Land use management procedures, these include:

1. Proposed disturbance or developments should preferably take place on portions which have already undergone disturbance or impacts rather than on portions that are undisturbed or unspoilt by impacts.

2. In response to an application for a non-listed activity which will have severe or large-scale disturbance on a relatively undisturbed site (unspoilt by impacts), the Municipality should first seek the opinion of the local conservation authority.
3. For a proposed "listed activity", EIA authorisation is required by law.

Table 3-5: Summary of the STEP Project conservation priorities, classifications and general rules (Pierce, 2003)

Conservation priority	Classification	Brief Description	General Rule
IV	Currently not vulnerable area	Ecosystems which cover most of their original extent and which are mostly intact, healthy and functioning	Depending on other factors, this land can withstand loss of natural area through disturbance or development
III	Vulnerable area	Ecosystems which cover much of their original extent but where further disturbance or destruction could harm their health and functioning	This land can withstand limited loss of area through disturbance or development
II	Endangered area	Ecosystems whose original extent has been severely reduced, and whose health, functioning and existence is endangered	This land can withstand minimal loss of natural area through disturbance or development
I Highest Priority	Critically endangered area	Ecosystems whose original extent has been so reduced that they are under threat of collapse or disappearance. Included here are special ecosystems such as wetlands and natural forests	This Class I land can NOT withstand loss of natural area through disturbance or development. Any further impacts on these areas must be avoided. Only biodiversity-friendly activities must be permitted.
High Priority	Network Area	A system of natural pathways e.g. for plants and animals, which if safeguarded, will ensure not only their existence, but also their future survival.	Land in Network can only withstand minimal loss of natural area through disturbance and developments
Highest Priority	Process Area	Area where selected natural processes function e.g. river courses, including their streams and riverbanks, interfaces between solid thicket and other vegetation types and sand corridors	Process area can NOT withstand loss of natural area through disturbance and developments
	Municipal reserve, nature reserve, national parks	Protected areas managed for nature conservation by local authorities, province or SA National Parks	No loss of natural areas and no further impacts allowed
Dependant on degree on existing impacts	Impacted Area	Areas severely disturbed or destroyed by human activities, including cultivation, urban development and rural settlements, mines and quarries, forestry plantations and severe overgrazing in solid thicket.	Ability for this land to endure further disturbance of loss of natural area will depend on the land's classification before impacts, and the position, type and severity of the impacts

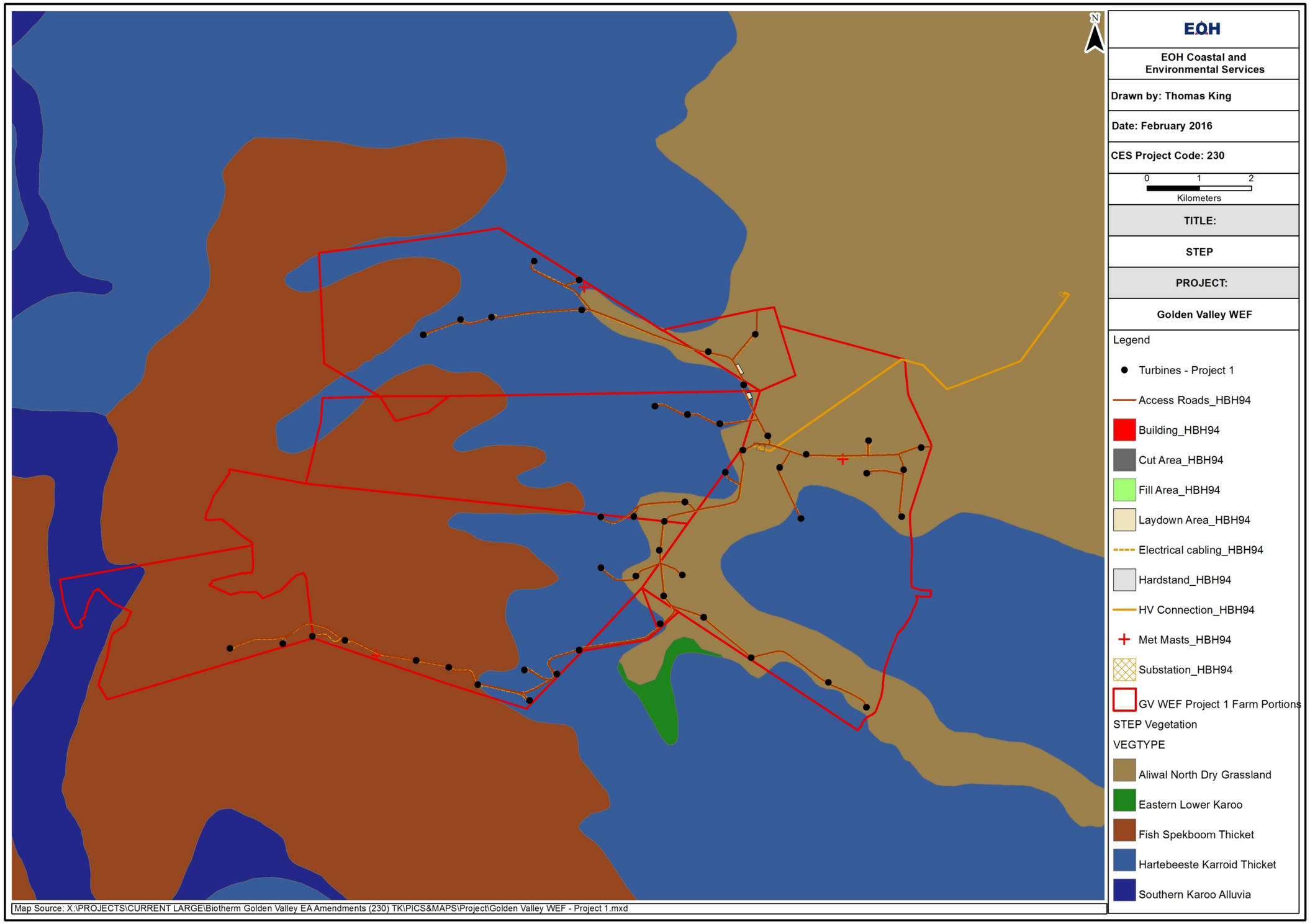

Figure 3-4: STEP vegetation map of the study area (from Pierce & Mader, 2006)

From a Spatial planning (Spatial Development Framework - SDF)) point of view, for Currently Not Vulnerable vegetation, STEP presents two restrictions and gives examples of opportunities. The two spatial planning restrictions are as follows:

1. Proposed disturbance or developments should preferably take place on portions which have already undergone disturbance or impacts rather than on portions that are undisturbed.
2. In general, Class IV land can withstand loss due to disturbance of natural areas through human activities and developments.

Opportunities depend on constraints (such as avoidance of spoiling scenery or wilderness, or infra-structure limitations) Class IV land can withstand loss of, or disturbance to, natural areas. Within the constraints, this class may be suitable for a wide range of activities (e.g. extensive urban development, cultivation, tourist accommodation, ecotourism and game faming).

Vulnerable (III)

Vulnerable ecosystems are those where further disturbance or destruction could harm their health and functioning.

For Vulnerable vegetation, STEP recommends four Land use management procedures, these include:

1. As a rule, developments with limited area or impacts should be allowed on Class III land.
2. In response to an application for a non-listed activity which will have severe or large-scale disturbance on a relatively undisturbed site (unspoilt by impacts), the Municipality should first seek the opinion of the local conservation authority.
3. Proposed disturbance or developments should preferably take place on sites which have undergone disturbance or impacts rather than on sites that are undisturbed.
4. For a proposed listed activity, EIA authorisation is required by law.

From a Spatial planning (Spatial Development Framework - SDF) point of view, for Vulnerable vegetation, STEP presents three restrictions and gives examples of opportunities. The three spatial planning restrictions are as follows:

1. In general, Class III land can withstand only limited loss of natural area or limited disturbance through human activities and developments.
2. Proposed disturbance or developments should preferably take place on sites which have undergone disturbance or impacts rather than on sites that are undisturbed.
3. In general, Class IV land should be developed in preference to Class III land.

Depending on constraints (such as avoidance of spoiling scenery or wilderness, or infra-structure limitations), Class III land can withstand a limited loss of, or disturbance to, natural areas. Within the constraints, this class may be suitable for a moderate range of activities that are either compatible with the natural environment (e.g. sustainable stock-farming, ecotourism, game farming and wilderness) or of limited extent (e.g. small-scale housing or urban development, small-scale cultivation).

3.1.5 Birds

Nine bird species are endemic to South Africa, but there are no Eastern Cape endemics. However, there are 62 threatened species within the Eastern Cape Province (Barnes, 2000). Most of these species occur in grasslands or are associated with wetlands, indicating a need to conserve what is left of these ecosystems (Barnes, 2000). A number of inland species are found from the Karoo region e.g. Acacia pied barbet, common Ostrich, Cape Penduline Tit, Southern Black Korhaan and Blue Cranes (Plate 3-11). The greatest abundance of birds is found in Valley Thickets and in the Aloe flowering season with Sunbirds being extremely conspicuous. Mountain ridges have the species of the fynbos biome e.g. Cape Sugarbirds. In the forests and on grassland slopes, Knysna Turaco,

Narina Trogons, Dark-backed Weavers, Canaries and African Goshawks are some of the birds found. Many birds occur in the bushveld, savanna, bush clamps and thicket areas. Table 3-6 lists threatened bird species likely to occur in the Cookhouse region.

Plate 3-11: A flock of Blue Cranes (*Anthropoides paraisea*) seen between Somerset East and Cookhouse. Blue Cranes are possibly the most important bird species of the region.

Table 3-6: Threatened bird species likely to be encountered in Cookhouse and surrounds.

Common name	Latin name	Conservation status
Bearded vulture	*Gypaetus barbatus*	Endangered
Black Harrier	*Circus Maurus*	Near-threatened
Black Stork	*Ciconia nigra*	Near-threatened
Blackwinged Plover	*Vanellus melanopterus*	Near-threatened
Blue Crane	*Anthropoides paraisea*	Vulnerable
Blue Korhaan	*Eupodotis caerulescens*	Near-threatened
Broadtailed Warbler	*Schoenicola brevirostris*	Near-threatened
Bush Blackcap	*Lioptilus nigricapillus*	Near-threatened
Cape Parrot	*Poicephalus robustus*	Endangered
Cape Vulture	*Gyps coprotheres*	Vulnerable
Corncrake	*Crex crex*	Vulnerable
Crowned Eagle	*Stephanoaetus coronatus*	Near-threatened
Delegorgue's Pigeon	*Columba delegorguei*	Vulnerable
African Grass Owl	*Tyto capensis*	Vulnerable
Greater Flamingo	*Phoenicopterus ruber*	Near-threatened
Ground Hornbill	*Bucorvus leadbeateri*	Vulnerable
Halfcollared Kingfisher	*Alcedo semitorquata*	Near-threatened

Common name	Latin name	Conservation status
Kori Bustard	*Ardeotis kori*	Vulnerable
Lanner Falcon	*Falco biarmicus*	Near-threatened
Lesser Flamingo	*Phoenicopterus minor*	Near-threatened
Lesser Kestrel	*Falco naumanni*	Vulnerable
Ludwig's Bustard	*Neotis ludwigii*	Vulnerable
African Marsh Harrier	*Circus ranivorus*	Vulnerable
Martial Eagle	*Polemaetus bellicosus*	Vulnerable
Pallid Harrier	*Circus macrourus*	Near-threatened
Peregrine Falcon	*Falco peregrinus*	Near-threatened
Secretary Bird	*Sagittarius serpentarius*	Near-threatened
Stanley's Bustard	*Neotis denhami*	Vulnerable
Stripes Flufftail	*Sarothrura affinis*	Vulnerable
Wattled Crane	*Burgeranus carunculatus*	Endangered
Whitebacked Night Heron	*Gorsachias leuconotus*	Vulnerable
Whitebellied korhaan	*Eupodotis cafra*	Vulnerable

Source: Barnes (2000)

3.1.6 Reptiles

The Eastern Cape is home to 133 reptile species including 21 snakes, 27 lizards and eight chelonians (tortoises and turtles). The majority of these are found in Mesic Succulent Thicket and riverine habitats. The list of reptiles of special concern is very significant since it includes five endemic species (two of which are endangered), eight Committee for International Trade in Endangered Species (CITES) listed species, one rare species and four species at the periphery of their range. More than a third of the species are described as relatively tolerant of disturbed environments, provided migration corridors of suitable habitat are maintained to link pristine habitats. The Eastern Cape is home to 133 reptile species including 21 snakes, 27 lizards and eight chelonians (tortoises and turtles) (Plate 3-12). The majority of these are found in Mesic Succulent Thicket and riverine habitats. Table 3-7 provides an indication of the threatened and endemic reptile species with distribution ranges that include the Cookhouse area.

Plate 3-12: An Agulate tortoise (*Chersina angulata*) found in the Cookhouse area.

Table 3-7: Threatened and endemic reptiles likely to occur in the Cookhouse region

Latin name	Common Name	Notes
Acontias meleagris orientalis	Golden legless skink	Eastern Cape endemic
Nucras taeniolata	Striped Scrub lizard	
Tropidosaura Montana subp. *rangeri*	Common mountain lizard	Eastern Cape Endemic
Bradypodion ventrali	Southern Dwarf Chameleon	Eastern Cape Endemic
Afroedura karroica	Inland rock gecko	Eastern Cape Endemic
Afroedura tembulica	Queenstown rock gecko	Eastern Cape Endemic
Goggia essexi	Essex's Dwarf Leaf-toed Gecko	Eastern Cape Endemic

Source: CSIR (2004)

3.1.7 Amphibians

Amphibians are well represented in sub-Saharan Africa, from which approximately 600 species have been recorded. A relatively rich amphibian fauna occurs in the Eastern Cape, where a total of 32 species and sub-species occur. This represents almost a third of the species known from South Africa.

Knowledge of amphibian species diversity in the Cookhouse region is limited and based on collections housed in national and provincial museums. It is estimated that as many as 17 species may occur. Table 3-8 lists species of frogs that are endemic or of conservation concern, and occur in the Cookhouse region.

Table 3-8: Threatened and endemic frogs likely to occur in the Cookhouse area

Latin name	Notes
Anhydrophryne rattrayi	Endangered (Eastern Cape endemic)
Bufo amatolicus	Endangered (Eastern Cape endemic)
Bufo pardalis	Eastern Cape endemic

Source: CSIR (2004)

3.1.8 Mammals

Large game makes up less than 15% of the mammal species in South Africa and a much smaller percentage in numbers and biomass. In developed and farming areas, such as Cookhouse, this percentage is greatly reduced, with the vast majority of mammals present being small or medium-sized. Except where reintroduced into protected areas, lions, black wildebeest, red hartebeest, buffalo, black rhinoceros, elephant, hippopotamus and reedbuck are extinct. Cheetah and hunting dog are no longer found in the area and hyenas, leopard, ratel and vaal ribbok are almost extinct (Skead, 1974b).

The antelope that are abundant in the thick bush (thicket or bushclump savanna) are bushbuck, duiker, steenbok and kudu (the most abundant antelope of the valley thicket). Blesbok (Plate 3-13), bontebok and gemsbok have been reintroduced on some farms.

Of the cat species, the lynx (caracal) and black-footed cat are found. Jackal and bat-eared foxes are also found as is the aardwolf, but it is not abundant. Vervet monkeys are common and baboons are found in appropriate sites in kloofs and valleys. Rock dassies are common, but tree dassies are only found inland in forests along larger rivers. Genet and mongoose species are also common. Aardvark also occur in the region (Plate 3-14) Twenty-three rodent species are found in the area and include rats and mice, the cane rat, springhare and porcupine. A number of species of bat also occur. Table 3-9 lists large and medium sized mammals on the IUCN Red Data List that occur in the Eastern Cape Province.

Plate 3-13: Blesbok (*Damaliscus pygarus phillipsi*), have been introduced into some of the farms in the Proposed Golden Valley Wind farm area

Plate 3-14: Typical excavations made by the Aardvark (*Orycteropus afer*), which, though rarely seen, occurs in the area

Table 3-9: Threatened large to medium-sized mammals in the Eastern Cape Province

Common name	Latin name	Conservation Status
Wild dog	*Lycaon pictus*	Endangered
Brown Hyaena	*Hyaena brunnea*	Rare
Aardwolf	*Proteles cristatus*	Rare
Balck-footed cat	*Felis nigripes*	Rare
Serval	*Felis serval*	Rare
Leopard	*Panthera pardus*	Rare
Blue Duiker	*Philantomba monticola*	Rare
Honey Badger	*Mellivora capensis*	Vulnerable
African Wild Cat	*Felis lybica*	Vulnerable
Aardvark	*Orcteropus afer*	Vulnerable
Cape Mountain Zebra	*Equus zebra*	Vulnerable
Black Rhinoceros	*Diceros bicornis*	Vulnerable
Oribi	*Ourebia ourebi*	Vulnerable
Pangolin	*Manis temminckii*	Vulnerable
Small-spotted cat	*Felis nigripes nigripes*	Rare

Source: Smithers (1986)

Of specific importance for wind farm developments are the presence of bats in the area; a confounding number of bat fatalities have been found at the bases of wind turbines throughout the world. Echolocating bats should be able to detect moving objects better than stationary ones, which begs the question, why are bats killed by wind turbines (Baerwald *et al*.).

Table 3-10: Bat species that occur in the Cookhouse area which are likely to be affected by the wind turbines.

Order: Chiroptera		
Common Name	Species Name	SSC
Straw-coloured fruit bat	*Eidolon helvum*	Near Threatened
Egyptian fruit bat	*Rousettus aegypticus*	
Geoffrey's horseshoe bat	*Rhinolophus clivosus*	Least Concern
Cape horseshoe bat	*Rhinolophus capensis*	Least Concern
Temminck's hairy bat	*Myotis tricolor*	Least Concern
Cape serotine bat	*Eptesicus capensis*	Least Concern
Common slit-faced bat	*Nycteris thebaica*	Least Concern
Giant yellow house bat	*Scotophilus nigrita*	Least Concern
Schreiber's long-fingered bat	*Miniopterus schreibersi*	Near Threatened
Tomb bat	*Taphozous mauritianus*	Least Concern
Angola free-tailed bat	*Tadarida condylura*	Least Concern
Wahlberg's epaulated bat	*Epomophorus wahlbergi*	Least concern
Banana bat	*Pipistrellus nanus*	Least Concern
Egyptian free-tailed bat	*Tadarida aegyptiaca*	Least Concern
Lesser woolly bat	*Kerivoula lanosa*	Least Concern

Bat fatalities at wind power facilities are highly variable throughout the year, but there are many more bat fatalities than bird fatalities at wind farms (Brinkman *et al*. 2006). Importantly, bat studies have been done in Europe and the United Sates of America, but none in South Africa. These studies have found that even a few deaths can be seriously detrimental to bat populations, and is thus cause for concern (Hotker *et al*. 2006). Most bats are struck during periods of migration or dispersal (Hotker *et al*. 2006, Johnson *et al* 2003).

Horn *et al*. (2008) conducted a study on the behavioural responses of bats to wind turbines and discovered the following:

- Bats actively forage near operating turbines
- Bats approach both rotating and non rotating blades
- Bats followed or were trapped in blade-tip vortices
- Bats investigated the various parts of the turbine with repeated fly-bys
- Bats were struck directly by rotating blades

These behavioural responses of bats to wind turbines explains why many of them are killed, however, there are additional explanations for this behaviour. There are several reasons proposed for the number of bat fatalities, one is that the turbines attract insects, and thus foraging insect-eating bats (Ahlen 2003, Kunz *et al*. 2007). Alternatively, bats may mistake turbines for trees when they are looking for a roost, or be acoustically attracted to the wind turbines (Kunz *et al*. 2007). The cause of death is not entirely explained by collision with turbine blades, but instead is caused by internal haemorrhaging. Most bats are killed by barotrauma, which is "caused by rapid air-pressure reduction near many turbine blades" (Baerwald *et al*.). Barotrauma "involves tissue damage to air-containing structures caused by rapid or excessive pressure change" (Baerwald *et al*.). In a study conducted to determine the effects of turbine size on bat fatalities, Barclay *et al*. (2007) discovered that the diameter of the rotor had no effect on bat fatalities. Height of the turbines, however, though having no effect on bird fatalities, bat fatalities increased exponentially with an increase in turbine height (Barclay *et al*. 2007). There are, as a result, a few mitigation measures that have been suggested to reduce bat fatalities, these are:

- Ultrasound broadcast can deter bats from flying into wind turbines. (Szewczak and Arnett 2007)
- Minimizing turbine height will help to reduce bat fatalities (Barclay *et al*. 2007).
- Turbine sites on ridges should be avoided (Brinkman *et al*. 2006).
- Wind turbine operating times should be restricted during times when bat activity is high (Brinkman *et al*. 2006). Bats are at higher risk of fatality on nights with low wind speeds (Horn *et al*. 2008).

3.1.9 Terrestrial Invertebrates

Of nearly 650 butterfly species recorded within the borders of South Africa, 102 are considered of conservation concern and are listed in the South African Red Data Book (RDB) for Butterflies. Two have become extinct, whilst three rare butterflies are known from a number of scattered localities in the Coega region. According to the most recent IUCN red data list there are no members of the Athropoda (insects arachnids and crustaceans) Phylum in the area that can be defined as SSC. One of the most important insects of the study area is the dung beetle (Plate 3-15), there are over 780 species in Southern Africa.

Plate 3-15: Perhaps one of the most important invertebrates of the region is the family Scarabaeidea, which contains the dung beetles (Picker et al. 2002).

3.2 Socio-Economic Profile

The proposed Golden Valley Wind Energy Project is to be developed in the BCRM. It is likely that the development of the Golden Valley Project will have indirect socio-economic impacts on the municipal area and its population. Accordingly the discussion that follows provides a brief socio-economic profile of the municipal area.

The BCRM is situated in the Eastern Cape Province, the second largest province in South Africa, covering approximately 169 580 square kilometres, or 13.9% of South Africa's total land area. With more than six million people, the Eastern Cape has the third largest provincial population. The demographics of the BCRM according to StatsSA (Census, 2001) are outlined in Tables 3-11 to 3-13. These statistics show a predominantly black population, with low incomes, and high levels of unemployment.

Based on a household survey conducted by Cacadu District Municipality (the greater district municipality in which the BCRM falls) in 2005, the total population of the BCRM was estimated at 36 798 (constituting approximately 7.21% of the greater Cacadu District Municipality). The three major urban nodes of the BCRM are Cookhouse, Somerset East and Pearston.

The largest group of the population is the economically active group (between the ages of 15-64) constituting approximately 64.2% of the BCRM population. Employment and income levels are low within the municipality. However, according to the StatsSA (Census, 2001) data, 35.92% of the population of BCRM is economically inactive. This data also reflected that the majority of the population receive no income and the majority of those whom earn an income earn within the R400 – R800 per month bracket. This reflects the level of poverty within the municipality. The dominant economic activity or land use in the area is farming.

The economy of the Eastern Cape has grown faster than the national economy over the past few years. Economic growth has been led by the manufacturing sector, which accounts for over 16 percent of the total value of the province's production of goods and services, and 20 percent of employment (Eastern Cape Economy – CDC, 2004). According to the Eastern Cape Development Corporation (ECDC), the manufacturing sector grew by 21 percent in real terms from 1998 to 2001, compared to 9 percent for South Africa as a whole. The province's manufacturing sector is well integrated into the world economy. Table 3-14 indicates the sectoral production and employment in the Eastern Cape. These sectors have been identified as areas of opportunity by the ECDC. The other important areas of the Eastern Cape's economy are agriculture, textiles, clothing and leather, wool processing, timber and transport, and tourism. It is clear from Table 3-14, that the manufacturing sector is the largest contributor and employer in the Eastern Cape Province. This sector is also highly reliant on electricity and will therefore be affected by electricity availability.

Table 3-11: Representative population groups in the BCRM

Population Group	Number
Black African	20 868
Coloured	11 517
Indian or Asian	20
White	2 603

Source: Census (2001)

Table 3-12: Employment status in the BCRM

Employment Status	Percentage
Employed	34.28
Unemployed	29.80
Not Economically Active	35.92

Source: Census (2001)

Table 3-13: Income groups in the BCRM

Income group	Number
No income	21 445
R1 - R400	4 361
R401 – R800	5 903
R801 - R1 600	1 210
R1 601 - R3 200	974
R3 201 - R6 400	682
R6 401 - R12 800	273
R12 801 - R25 600	71
R25 601 - R51 200	33
R51 201 - R102 400	36
R102401-R204800	20
R204 801 or more	0

Source: Census (2001)

Table 3-14: Sectoral production and employment in the Eastern Cape economy

Production sector (source: StatsSA)	Value of output (Rm)	% of total EC output	No. of Employees	% of total
Agriculture, hunting, forestry, fishing	2 063	3.6	70 470	13.2
Mining & quarrying	57	0.1	7 154	1.4
Manufacturing	14 783	25.8	97 035	18.1
Electricity, gas & water supply	874	1.7	5 598	1.0
Construction	1 892	3.3	43,635	8.1
Wholesale, retail trade & accommodation	9 339	16.3	83 818	15.7
Transport, storage & communication	5,501	9.6	32 851	6.1
Financial, insurance, real estate & business services	7 048	12.3	35 181	6.6
Community, social & personal services	15 643	27.3	159 453	29.8
Total:	**57 300**	**100.0**	**535 195**	**100.0**

4 PUBLIC PARTICIPATION PROCESS

This chapter of the EIR provides the details of the public participation process conducted for the Golden Valley WEF Project. There are four key steps within the overall public participation process. These include -

- Notifying I&APs of the Draft EIA report;
- Holding public meeting(s);
- Making provision for I&APs to review and comment on all reports before they are finalised and submitted to the competent authority;
- Making a record of responses to comments and concerns available to I&APs; and
- Informing the I&APs of the competent authority's decision on the EIR.

Each of the above-mentioned steps, which comprised the public participation process of the proposed development, are discussed in detail in Sections 4.1-4.4 following. All supporting documentation related to the public participation process for the Golden Valley WEF Project is contained in Appendix D of this report.

Please refer to Section 5 of **Volume 1: "*Final Scoping Report: Proposed Terra Wind Energy-Golden Valley Project, Blue Crane Route Local Municipality*" (CES, December 2009)** for the first phase of the public participation process conducted for the EIA for the Golden Valley Project. Section 5 of this report outlines the following:

- Notifying interested and affected parties
  - Background information document
  - Written notices
  - Advertisements
  - Site notices
- Public Meetings
- Public review of the DSR
- Registration of I&APs and comments database

4.1 Notifying Interested and Affected parties of the Draft EIAR

4.1.1 Written notices

Written notices, in the form of e-mails and registered letters, were sent to the landowners, adjacent landowners, registered IA&Ps, governmental departments etc. Copies of these letters are included in Appendix D-1.

Letters were also sent to:

- Blue Crane Development Agency (BCDA)
- Blue Crane Route Municipality (BCRM)
- Cacadu District Municipality
- Wildlife and Environment Society of Southern Africa (WESSA) Eastern Cape Branch
- Eastern Cape Department of Agriculture
- Eastern Cape Department of Economic Development and Environmental Affairs (DEDEA)
- National Department of Environmental Affairs (DEA)
- National Department of Energy
- Eskom Holdings Limited
- Eskom Land Development Manager Southern Region
- Civil Aviation Authority
- EP Herald - Assistant Editor

Copies of these letters are provided in Appendix D-1 and slips proving that these letters were sent are included in Appendix D-2.

4.1.2 Advertisements

An advertisement was placed in one Provincial and one Local newspaper namely, the Eastern Province (EP) Herald and the Somerset Budget on 30 July 2010 and 29 July 2010 respectively in order to:-

- Advise readers of the intention to undertake an EIA for the proposed Golden Valley Project;
- Informing the public of the availability of the draft EIR and its placement at the Cookhouse Library for convenient access;
- Inform the public of the date, time and venue for the public meeting (see section 4.2 below), and;
- Invite the public to register as I&APs.

A period of four weeks (2 August 2010 – 2 September 2010) was allowed for registration of any new I&APs, and for I&APs to submit comments after the advertisement(s) appeared. A copy of the advertisement(s) is included in Appendix D-3 and proof of newspaper advertisement placement is attached in Appendix D-4.

4.2 Public Meetings

A public meeting was held at the Golden Valley Country Inn just outside Cookhouse on 23 August 2010 at 13:00. Appendix D-5 provides the attendance registers from this public meeting.

4.3 Public Review of the Draft Environmental Impact Report

In line with the letters of notification and advertisements mentioned in section 4.1 above, a hard copy of the Draft EIR was placed at a strategic location that was easily accessible by the public. The Draft EIR was placed at the Cookhouse Library (6 Main Road, Cookhouse) for a period of four week from 2 August 2010 to– 2 September 2010.

Appendix D-6 provides a signed delivery letter from Cookhouse Library confirming that a hard copy of the Draft Scoping Report was received at the establishment.

An electronic copy of the Draft Scoping Report was also displayed on the EAP's website - www.cesnet.co.za - via the Public Documents link.

No comments were received during the four week public review period. The outcomes from the public meeting held on 23 August 2010 were included in the Issues and Response Trail in Appendix D-7.

4.4 Registration of Interested and Affected Parties and Comments Database

A detailed record of all comments and observations made at the public meeting or via written correspondence during the EIR phase has been recorded in Issues and Response Trail (Appendix D-7). This document also provides a record of the response to each issue. Where issues were raised at the public meeting, the verbal response given at the time has been noted. The document also contains responses prepared by the EAP to issues or questions raised after review of the draft documents.

A register of I&APs has been compiled, including all available contact details of those who responded to the advertisement(s), registered as I&APs, or attended the public meeting (Appendix D-8).

5 NEED AND DESIRABILITY ASSESSMENT

This Chapter of the report identifies the need and desirability of the proposed Golden Valley WEF Project.

5.1 Climate change

Due to concerns such as climate change, and the ongoing exploitation of non-renewable resources, there is increasing international pressure on countries to increase their share of renewable energy generation. The South African Government has recognised the country's high level of renewable energy potential and has placed targets of 10 000 GWh of renewable energy by 2013. In order to kick start the renewable energy sector in South Africa, a Feed-in Tariff for various renewable energy technologies was established. This Feed-in tariff guarantees the price for electricity supply from the renewable energy installation. In relation to the above, the following facts are relevant:

- For every 1 MWh of "green" electricity used instead of traditional coal powered stations, one can:-
  - Save 1 290 litres of water
  - Avoid 8.22 kg of Sulphur Dioxide (SO_2)emissions
  - Avoid 1 000 kg of Carbon Dioxide (CO_2) emissions including transmission losses, and;
  - Avoid 142 kg of ash production

5.2 Social upliftment

The Eastern Cape, and particularly the Cookhouse area, has large tracts of land that are very dry and the farmers do their best to earn a living from the land. The towns are small and socio-economic development activities and potential is limited. The need to improve the quality of life for all, but especially the poor, is critical in South Africa. With the expected wind resources in the Cookhouse area, the proposed project will contribute directly to the upliftment of the individuals and the societies in which they live. Amstilite (RF) Proprietary Limited intends to identify community involvement, and projects will be implemented for the fundamental improvement in Cookhouse and the surrounding areas.

5.3 Electricity supply

The establishment of the proposed Golden Valley Wind Energy Installation will contribute to strengthening the existing electricity grid for the area and will aid the government in achieving its goal of a 30% share of all new power generation being derived from Independent Power Producers (IPP).

In addition to the above-mentioned benefits, the proposed project site was selected due to:-

- Global enthusiasm towards clean energy projects.
- Good wind resources suitable for the installation of a large wind energy facility.
- The proposed project site has localised wind intensified by a funnelling effect caused by surrounding topographical features.
- Proximity to connectivity opportunities such as the Poseidon substation (8km away) or the High Voltage (HV) overhead lines traversing the proposed development site.
- The site is easily accessible from the N10 road, which will assist in the transportation of wind turbines to the site.
- The surrounding area is not densely populated.
- There is potential and appetite within the Blue Crane Route Municipality (BCRM) to engage with new technologies and industries.

5.4 Reduction in CO2 emissions

The current project will contribute towards the growth of the South African renewable energy sector and, more specifically, the country's wind energy portfolio. Once a number of wind energy facilities are in operation around the country, it's is highly probable that at least some will be spinning at any given time. As such, collectively they will provide a reliable "green" input to the national grid (although less than their theoretical maximum combined generating capacity). Initial modelling has been performed and shows a likely 30% capacity base-load from installed wind capacity in SA, thanks to its geographically dispersed different wind regimes. As such, each MW generated from a wind farm will equate to a MW not being produced by a conventional source (coal), and thus avoiding the emission of approximately 1 ton of CO_2 into the atmosphere.

6 ALTERNATIVES

One of the objectives of an EIA is to investigate alternatives to the proposed project. There are two types of alternatives - Fundamental Alternatives and Incremental Alternatives. The EIA regulations define 'alternatives' as, "*different means of meeting the general purpose and requirements of the activity"* which includes alternatives to:

(a) The property on which or location where it is proposed to undertake the activity;
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity; and
(e) The operational aspects of the activity.

6.1 Fundamental alternatives

Fundamental alternatives are developments that are totally different from the proposed project and usually involve a different type of development on the proposed site, or a different location for the proposed development.

6.1.1 A different type of development

Since the core business area of the project proponent, Amstilite (RF) Proprietary Limited, is wind farming for electricity production, the Fundamental Alternative of a development other than to construct and operate a wind powered generation facility is therefore not viable in this case, and was not considered further in the EIA.

6.1.2 A different location

The main determinants in selecting the proposed location were:-

- Good wind resources suitable for the installation of a large wind energy facility.
- Proximity to connectivity opportunities such as the Poseidon substation or the High Voltage (HV) overhead lines traversing the proposed development site.
- The surrounding area is not densely populated.
- There is potential and appetite within the Blue Crane Route Municipality (BCRM) to engage with new technologies and industries.

Preliminary investigations have identified that the proposed project site meets these criteria and so different locations for the current project will not be considered. It must be reiterated, however, that the applicant is undertaking various feasibility studies for numerous potential sites countrywide. As such, various alternative locations for wind farm projects are by virtue of this being investigated and are in various phases of their respective EIA processes

The EIR examines the impact of doing nothing (i.e. the "No Go" option) as it relates to the specialist studies and the project as a whole. In essence, the No-Go option would imply a continued overall reliance on fossil fuel fired electricity generation plants, which will not aid in achieving the various renewable energy strategy targets determined by various government agencies.

6.2 Incremental alternatives

Incremental alternatives are modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts. There are several incremental alternatives that can be considered, including –

- The design or layout of the activity
- The technology to be used in the activity

- The operational aspects of the activity

6.2.1 Design/Layout Alternatives

The layout/design alternatives for the proposed Golden Valley WEF Project have been discussed extensively in Section 2.1 in Chapter 2 above and will therefore not be repeated here.

6.2.2 Technology Alternatives

The nature of the proponent's business is to develop wind energy projects. As such, no alternative power-generating technologies were considered as part of this study. Contemporary wind turbines have over the last 20 years become significantly more technologically advanced in terms of their generating output capacity, and design interventions to reduce their noise impacts. As such, the only technology alternatives available would be utilising the different size and generating capacity turbines as is suited to an individual project basis.

6.2.3 Scheduling Alternatives

It is intended that construction will commence as soon as possible after all relevant approvals have been obtained. Alternative timeframes for development cannot be considered.

6.3 The 'No-Go' Alternative

According to the EIA Regulations, the option of doing nothing i.e. not proceeding with the proposed development (i.e. the No Go Option) must be assessed during the EIA. In addition to the No-Go Alternative, all the above-mentioned incremental alternatives (design/layout) with the exception of scheduling alternatives have been examined in the EIA.

7 APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

This chapter of the EIR details the approach to the EIA phase of the proposed Golden Valley Wind Energy Project with a particular focus on the methodology that was used when determining the significance of potential environmental impacts.

7.1 Specialist Studies

Based largely on the issues raised during the Scoping phase (refer to Chapter 4 above) as well as legislation relevant/applicable to the proposed project (refer to Chapter 3 of **Volume 1: Final Scoping Report: Proposed Terra Wind Energy-Golden Valley Project, Blue Crane Route Local Municipality (CES, December 2009)**), a series of specialist studies were conducted during the EIA (see Table 1-3 in Chapter 1 above), the results of which are summarised in this EIR.

The team of specialists that conducted the specialist studies (see Table 1-3 in Chapter 1 above) was drawn from many sources, including universities and private consulting companies. Specialists were required to address the issues raised by I&APs (refer to Table 1-2 in Chapter 1) in their reports by gathering baseline information and identifying the possible impacts related to the proposed project. Mitigation measures for impacts were also provided.

The detailed specialist studies have been compiled into a separate Specialist Studies Volume (***Volume 2: Proposed Terra Wind Energy-Golden Valley Project: Specialist Reports*** **(CES, July 2010**)) for the proposed project. The details and expertise of each of the specialists as well as signed declarations of their independence are also included in the Specialist Studies Volume (refer to Appendices B-1 and B-3 respectively of Volume 2) and are therefore not repeated here.

The Terms of Reference (ToR) for each of the specialist studies were defined in the Final Scoping Report (**Volume 1: Final Scoping Report: Proposed Cookhouse Wind Energy Project, Blue Crane Route Local Municipality (CES, December 2009)**) and the Plan of Study document for the EIR and approved by DEA (refer to Appendix C). Table 7-1 below details the ToR for each of the specialist studies undertaken in the detailed EIA Phase for the proposed Golden Valley Project.

Although the specialists were given free reign on how they conducted their research and obtained their information, they were required to provide the reports in a specific layout and structure, so that a uniform report could be produced. Consequently, the specialists were given details on how their reports should be laid out, and considerable time was spent ensuring that the reports are of the highest standard possible.

In addition to the above, in order to ensure that a direct comparison could be made between the various specialist studies, a set methodology was used by all the specialists when evaluating the significance of impacts. This methodology is discussed in detail in Section 7.2 that follows.

Table 7-1: Terms of Reference for the Specialist Studies undertaken in the detailed EIA Phase of the Proposed Golden Valley Project

Specialist Study	Terms of Reference
VISUAL	1. Conduct a site reconnaissance visit and photographic survey of the proposed project site. 2. Conduct a desk top mapping exercise to establish visual sensitivity:- • Describe and rate the scenic character and sense of place of the area and site. • Establish extent of visibility by mapping the view-sheds and zones of visual influence • Establish visual exposure to viewpoints • Establish the inherent visual sensitivity of the site by mapping slope grades, landforms, vegetation, special features and land use and overlaying all relevant above map layers to assimilate a visual sensitivity map. 3. Review relevant legislation, policies, guidelines and standards. 4. Preparation of a draft Visual Baseline/Sensitivity report • Assessing visual sensitivity criteria such as extent of visibility, the sites inherent sensitivity, visual sensitivity of the receptor's, visual absorption capacity of the area and visual intrusion on the character of the area • Prepare photomontages of the proposed development • Conduct shadow flickering modelling • Assess the proposed project against the visual impact criteria (visibility, visual exposure, sensitivity of site and receptor, visual absorption capacity and visual intrusion) for the site. • Assess impacts based on a synthesis of criteria for each site (criteria = nature of impact, extent, duration, intensity, probability and significance) • Establish mitigation measures/recommendations with regards to minimizing visual risk areas
ECOLOGICAL	The assessment will follow on from the initial study, which included a site visit conducted during the scoping phase, and will address any key issues raised by interested and affected parties. A considerable body of information on the flora and fauna of the Cookhouse area and its environs has been assembled in the reports on previous studies of the area in general. Accordingly the study will comprise a desktop study of all available relevant literature. However, a detailed survey of the site will be undertaken to determine the possibility of there being listed threatened or protected ecosystems and species on the proposed project site. If any of these are found, the Environmental Management Plan will include recommended measures to remove or otherwise protect plant species found on the site that are afforded protection under the National Environmental Management: Biodiversity Act during construction. This specialist study will therefore include but will not be limited to – • A detailed description of the ecological (fauna and flora) environment within and immediately surrounding the footprint of the proposed development and will consider terrestrial fauna and flora. Fauna include mammals, reptiles, amphibians, and insects but not avifauna as these will be the subject of a separate specialist study (refer to Section 8.1.1.5 below). This aspect of the report will specifically include the identification of - – Areas of high biodiversity; – The presence of species of special concern, including sensitive, endemic and protected species; – Habitat associations and conservation status of the identified fauna and flora;

	– The presence of areas sensitive to invasion by alien species; and – The presence of conservation areas and sensitive habitats where disturbance should be avoided or minimised. • Review relevant legislation, policies, guidelines and standards. • An assessment of the potential direct and indirect impacts resulting from the proposed development (including the wind turbines, associated infrastructure e.g. access road), both on the footprint and the immediate surrounding area during construction and operation; • A detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project, where required; and • Checklists of faunal groups identified in the region to date, highlighting sensitive species and their possible areas of distribution.
HERITAGE	The National Heritage Resources Act 25 of 1999 (NHR) requires that "*…any development or other activity which will change the character of a site exceeding 5 000m², or the rezoning or change of land use of a site exceeding 10 000 m², requires an archaeological impact assessment*" An archaeological impact assessment will therefore be conducted, the primary objective of which is to determine whether there are any indications that the proposed site is of archaeological significance. This will be a phase 1 assessment and will be largely desk-top although a site visit will be required to enable the specialist the opportunity to look for significant artefacts on the surface of the site. It is not expected that a more detailed Phase 2 assessment will be required but this remains to be confirmed. The terms of reference for the Phase 1 archaeological study will be to: • Determine the likelihood of archaeological remains of significance in the proposed site; • Identify and map (where applicable) the location of any significant archaeological remains; • Assess the sensitivity and significance of archaeological remains in the site; and • Identify mitigatory measures to protect and maintain any valuable archaeological sites and remains that may exist within the proposed site.
AVIFAUNA	An avifauna specialist study will be conducted. The assessment will include: • A desk-top review of existing literature The literature will seek: 1. Previous means of predicting bird mortality (and other impacts) of wind turbines affecting birds in groups similar to those in the study area. 2. Accounts of mortality at wind turbines 3. Information on the status, in the Grahamstown, Eastern Cape, South Africa and globally, of bird groups most likely to be affected • A site visit to identify species of special concern and assess the likely impacts of the construction and operational phases on the avifauna of the site.

	Surveys will be conducted on at least two days at sites at either end, and in the middle of the proposed turbine corridor and, as a control against the post construction situation, one-day surveys at two similar sites outside the turbine affected area. Survey sites will be selected to reflect variation in local habitat and terrain. At each site, a camp will be established in the early afternoon. Two hours of observations will be undertaken before dusk and two during the first hours of darkness (when night-migrating birds are likely to be flying at lower altitude). Observations will begin again at first light and continue for 3-4 hours (depending on bird activity levels and especially the use of thermals by soaring birds). During daylight in each survey hour 2 x 15 minutes for visual scans of birds crossing the proposed turbine corridor (with appraisal of flight height above the ground) 2 x 10 minutes circular point surveys After dark in each hour scans by night vision binoculars 2 x 10 minutes focused on bird activity • Conduct a review of international literature and experience relating to operational wind farms; including state of the art plants around the world • Contextualize the literature and experience and relate it to the Eastern Cape scenario and local avifauna; • Map sensitive areas in and around the proposed project site(s); • Describe the affected environment and determine the status quo in terms of avifauna; • Indicate how an avifaunal resource or community will be affected by the proposed project; • Discuss gaps in the baseline data with respect to avifauna and relevant habitats; • List and describe the expected impacts; • Assess and evaluate the anticipated impacts, and; • Make recommendations for relevant mitigation measures which will allow the reduction of negative impacts and the maximization of the benefits associated with any identified positive impacts. Although the avifauna specialist will assess avian collision risk and provide detailed explanations and ratings of the likelihood of collisions of various species, ***detailed avian collision modelling*** i.e. quantitatively assessing the collision risk potential (i.e. birds directly colliding with rotor blades and turbine towers) of the proposed wind farm cannot be undertaken. This is because the extent to which this can formally be modelled and quantified to arrive at predicted numbers of collisions, would depend largely on the primary data collection related to flight frequencies and species, but it is unlikely that even the best possible data collection between now and mid 2010 would provide much confidence in such a model, as it would require more representative data collection across a range of conditions/seasons etc. In addition, very often the worst bird collision 'events' at wind farms around the world have been found to have occurred in extreme weather conditions, when flight behaviour etc is abnormal.
NOISE	1. Determine the land use zoning and identify all potential noise sensitive sites that could be impacted upon by activities relating to the construction and operation of the proposed wind energy facility. 2. Identify all noise sources relating to the activities of the facility during the construction and operation phases that could potentially result in a noise impact at the identified noise sensitive sites.

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	3. Determine the sound emission, operating cycle and nature of the sound emission from each of the identified noise sources. 4. Calculate the combined sound power level due to the sound emissions of the individual noise sources. 5. Calculate the expected rating level of sound at the identified noise sensitive sites from the combined sound power level emanating from identified noise sources. 6. Display the rating level of sound emitted by the noise sources in the form of noise contours superimposed on the map of the study area. 7. Determine the existing ambient levels of noise at identified noise sensitive sites by conducting representative sound measurements. 8. Determine the acceptable rating level for noise at the identified noise sensitive sites. 9. Calculate the noise impact at identified noise sensitive sites. 10. Assess the noise impact at identified noise sensitive sites in terms of:- • SANS 101 SANS 10103 for "The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication". • Noise Control Regulations. • World Health Organsation - Guidelines for Community Noise. • World Bank - Environmental Guidelines. 11. Investigate alternative noise mitigation procedures, if required, in collaboration with the design engineers of the facility and estimate the impact of noise upon implementation of such procedures. 12. Prepare and submit a full environmental noise impact report containing detailed procedures and findings of the investigation including recommended noise mitigation procedures, if relevant.
PALAEONTOLOGICAL	The terms of reference for the Phase 1 palaeontological impact study are to: • Provide a summary of the relevant legislation; • Conduct a site inspection as required by national legislation; • Determine the likelihood of palaeontological remains of significance in the proposed site; • Identify and map (where applicable) the location of any significant palaeontological remains; • Assess the sensitivity and significance of palaeontological remains in the site; • Assess the significance of direct and cumulative impacts of the proposed development and viable alternatives on palaeontological resources; • Identify mitigatory measures to protect and maintain any valuable palaeontological sites and remains that may exist within the proposed site; • Prepare and submit any permit applications to relative authorities; • Preparation of a draft and final specialist report.

7.2 Methodology

7.2.1 Evaluating the significance of impacts

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

- Relationship of the impact to **temporal** scales - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.

- Relationship of the impact to **spatial** scales - the spatial scale defines the physical extent of the impact.

- The severity of the impact - the **severity/beneficial** scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.

  The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.

- The **likelihood** of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

Each criterion is ranked with scores assigned as presented in Table 7-2 to determine the overall **significance** of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 7-3, to determine the overall significance of the impact. The overall significance is either negative or positive.

The significance scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.

Cumulative Impacts
Cumulative Impacts affect the significance ranking of an impact because it considers the impact in terms of both on-site and off-site sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both on-site and off-site activities take place simultaneously, the total pollution level at may exceed the standards. For this reason it is important to consider impacts in terms of their cumulative nature.

Seasonality
Although seasonality is not considered in the ranking of the significance, if may influence the evaluation during various times of year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

Table 7-2: Ranking of Evaluation Criteria

EFFECT	**Temporal scale**			**Score**
	Short term	Less than 5 years		**1**
	Medium term	Between 5 and 20 years		**2**
	Long term	Between 20 and 40 years (a generation) and from a human perspective almost permanent.		**3**
	Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there		**4**
	Spatial Scale			
	Localised	At localised scale and a few hectares in extent		**1**
	Study area	The proposed site and its immediate environs		**2**
	Regional	District and Provincial level		**3**
	National	Country		**3**
	International	Internationally		**4**
	Severity		**Benefit**	
	Slight / Slightly Beneficial	Slight impacts on the affected system(s) or party(ies)	Slightly beneficial to the affected system(s) or party(ies)	**1**
	Moderate / Moderately Beneficial	Moderate impacts on the affected system(s) or party(ies)	An impact of real benefit to the affected system(s) or party(ies)	**2**
	Severe / Beneficial	Severe impacts on the affected system(s) or party(ies)	A substantial benefit to the affected system(s) or party(ies)	**4**
	Very Severe / Very Beneficial	Very severe change to the affected system(s) or party(ies)	A very substantial benefit to the affected system(s) or party(ies)	**8**
LIKELIHOOD	**Likelihood**			
	Unlikely	The likelihood of these impacts occurring is slight		**1**
	May Occur	The likelihood of these impacts occurring is possible		**2**
	Probable	The likelihood of these impacts occurring is probable		**3**
	Definite	The likelihood is that this impact will definitely occur		**4**

** In certain cases it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know*

Table 7-3: Ranking matrix to provide an Environmental Significance

Environmental Significance		Positive	Negative
LOW	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent development. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment	**4-7**	**4-7**
MODERATE	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which, in conjunction with other impacts may prevent its implementation. These impacts will usually result in either positive or negative medium to long term effect on the social and/or natural environment.	**8-11**	**8-11**
HIGH	A serious impact which, if not mitigated, may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually long term change to the natural and/or social environment and result in severe negative or beneficial effects.	**12-15**	**12-15**
VERY HIGH	A very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.	**16-20**	**16-20**

7.2.2 Example of an environmental significance statement

Impact 1: Impact of noise on human health

Cause and Comment
The noise associated with Heavy Goods Vehicles (HGVs) has the potential to impact on human health. A recommendation for the movement of large vehicles at night may impact on the sleep patterns of local communities.

Mitigation and Management
There are standard mitigation measures to ensure that vehicle noise is kept within acceptable limits. Vehicles should be kept in good repair; they should use standard exhaust and silencing equipment. Drivers should stick to designated speed limits. Roads should be kept in good condition.

Significance Statement

RATING		Temporal Scale		Spatial Scale		Severity of Impact		Risk or Likelihood		Total
	Without Mitigation	Short term	1	Localised	1	Moderate	2	Definite	4	8
	With Mitigation	Short term	1	Localised	1	Slight	1	Unlikely	1	4
Overall Significance without mitigation										**MODERATE**
Overall Significance with mitigation										**LOW**

8 KEY FINDINGS OF THE SPECIALIST STUDIES

8.1 Avifauna Impact Assessment

The key findings of the Avifauna Impact Assessment are presented below. The study was informed by the following data sources and reports, which presented limitations and assumptions.

The following data sources and reports were used in varying levels of detail for this study:

- The South African Bird Atlas Project (SABAP) data (Harrison *et al*. 1997) for the quarter degree square covering the sites
- The Important Bird Areas report (Barnes, 1998) was consulted for data on the area
- Conservation status of species occurring in the study areas was determined using Barnes (2000)
- The bird specialist report for the original Klipheuwel demonstration facility (van Rooyen 2001)
- The report to Eskom Peaking Generation on the monitoring of bird mortalities at the demonstration facility at Klipheuwel (Kuyler 2004 – obtained from Eskom Peaking Generation)
- International literature on avian interactions with wind energy facilities
- Co-ordinated Avifaunal Road (CAR) counts were used to supplement the SABAP data

Any inaccuracies in the above sources of information could limit this study. In particular, the Bird Atlas data is now thirteen years old (Harrison *et al* 1997), but no reliable more recent data on bird species presence and abundance in the study area exists.

8.1.1 Avifauna of proposed Golden Valley WEF Project

The vegetation classification shows that the area is comprised mainly of shrubs and “grassland” and that few large trees are present. We would thus expect more terrestrial species in the area. The Atlas of Southern African Birds suggests that the following sensitive species that may be collision sensitive would be expected to be found in this area:

- Blue Crane
- Secretary bird
- Denhams Bustard
- White Stork

The vegetation data is also useful in predicting the likelihood of occurrence of certain species presented in the SABAP data below (Table 8-2). The vegetation characteristics help us to assess what the predominant habitat type is and, when correlated to each species preferred habitat, its likelihood of occurrence.

The study area is predominantly shrubland and low fynbos, as well as some thicket and bushland, forest and woodland, unimproved grassland and commercially irrigated cultivated land.

The commercially irrigated cultivated land is found on the western side of the site following the Fish River. Irrigated land is generally attractive to a wide variety of avifauna and this is one of the sensitive micro-habitats discussed further below.

Table 8-1 lists the Red Data bird species recorded in the quarter degree square covering the study area by the Southern African Bird Atlas Project (Harrison *et al,* 1997), i.e.3225DD. The total number of all species recorded and the number of cards (counts) submitted per square is also shown. In total 6 Red Data species were recorded across the square, comprising 2 Vulnerable and 3 Near-threatened species. In addition, the White Stork was included here as it is afforded protection internationally under the Bonn Convention on Migratory Species. Report rates are essentially percentages of the number of times a species was recorded in the square, divided by the number of

times that square was counted. It is important to note that these species were recorded in the entire quarter degree square in each case, and may not actually have been recorded on the proposed site for this study.

Table 8-1- Sensitive bird species in the effected quarter degree square

Total Cards		35		
Total Species		156		
Total Breeding Species		19		
Name	**Conservation status**	**3225DD**	**Habitat**	**Likelihood of occurrence**
Blue Crane	VU	20	Midland and highland grassveld, edge of karoo, cultivated land, edges of vleis	Likely
Denham's (Stanley's) Bustard	VU	9	Montane and highland grassveld, savanna, karoo scrub	Likely
Black Stork	NT	3	Feeds in or around marshes, dams, rivers and estuaries; breeds in mountainous regions	Possible
Secretarybird	NT	14	Semidesert, grassland, savanna, open woodland, farmland, mountain slopes	Likely
Melodious (Latakoo) Lark	NT	6	Open climax grassland, especially Red Grass (Rooigras) *Themeda triandra* and species of *Eragrostis* and Russet Grass *Loudetia simplex* , sometimes with rocky outcrops, termite mounds or sparse bushes; also cultivated fields of Teff *Eragrostis tef* ; in KwaZulu-Natal at 550-1750 m elevation, rainfall 400-800 mm/year; moves into e Karoo after good rains.	Possible
White Stork	Bonn	20	Highveld grasslands, mountain meadows, cultivated lands, marshes, karoo	Likely

VU = Vulnerable

NT = Near-threatened

Bonn = Protected under the Bonn Convention on migratory species

Table 8-2- CAR data for the EG02 route, data is numbers of birds per 100km. (Young, D.J, et al, 2003)

Species	**Summer**	**Winter**
Blue Crane	7.63	15.97
Kori Bustard	-	0.7
Ludwigs Bustard	-	2.1
White Stork	18.03	-
Secretarybird	5.6	6.97
Black Korhaan	9.03	4.2
Whitebellied Korhaan	-	2.1
Spurwinged Goose	0.7	1.4
Blackheaded Heron	7	2.8
Total	48	36.23

As can be seen in the two tables above, large terrestrial birds are present in the study area. These larger species are the species of particular concern for us as they are known to be more collision sensitive with power lines (EWT central incident register) and as such we suspect that they will also be more collision sensitive with wind turbines. A lack of data on avifaunal interactions with wind turbines in South Africa is of concern and as such the precautionary principle has been applied to this assessment due to the lack of knowledge and experience on wind energy in South Africa.

As well as the above two datasets, surveys were conducted at 4 locations. At each site the following was done:

- Surveys were conducted on at least two days at sites at either end, and in the middle of the proposed turbine corridor and Survey sites will be selected to reflect variation in local habitat and terrain.

- During daylight in each survey 2 x 15 minutes of visual scans of birds crossing the proposed turbine corridor (with appraisal of flight height above the ground) as well as 2 x 10 minutes circular point surveys were conducted.
- Flight height was recorded as either: Below Turbine Height; Turbine Height; or Above Turbine Height.

The data that was collected can be seen below in the tables (Table 8-3 – 8-6).

Table 8-3- First Bird survey conducted at 17:05 on the 8/2/2010

Species	Flight Height
Barn Swallow	Below Turbine Height
Red-faced Mousebird	Below Turbine Height
Southern Glossy Starling	Below Turbine Height
Southern clapper Lark	Below Turbine Height

Table 8-4- Second Bird survey conducted at 05:48 on the 9/2/2010

Species	Flight Height
Red-eyed Dove	Below Turbine Height
Barn Swallow	Below Turbine Height
Turtle Dove	Below Turbine Height
Deidricks Cuckoo	Below Turbine Height

Table 8-5- Third Bird Survey conducted at 16:18 on the 9/2/2010

Species	Flight Height
Pied Starling	Below Turbine Height
Deidricks Cuckoo	Below Turbine Height
Turtle Dove	Below Turbine Height
Southern Glossy Starling	Below Turbine Height
Southern Clapper Lark	Below Turbine Height
Barn Swallow	Turbine Height
White Storks	Below Turbine Height

Table 8-6- Fourth Bird Survey conducted at 05:35 on the 10/2/2010

Species	Flight Height
Egyptian Goose	Below Turbine Height
Barn Swallow	Below Turbine Height
Southern Glossy Starling	Below Turbine Height
Red-eyed Dove	Below Turbine Height
Fork-tailed Drongo	Below Turbine Height
Cape Sparrow	Below Turbine Height
Sacred Ibis	Below Turbine Height

As can be seen above the bird surveys did not really add much in terms of sensitive species but it was a worthwhile exercise to assess the height the birds are flying at, at various locations within the study area. As can be seen in the four tables above only one incident of birds flying at turbine height was recorded and these were Barn swallows. Having said this, however, the scope for first hand data collection within the current EIA process in South Africa is severely lacking. It would be far better to have 1 year's worth of data from many more localities within this site to have a real idea of bird flight paths and to be able to model this with any degree of accuracy. Unfortunately this is not feasible in the current EIA process and as such second hand sources are relied on far more heavily than the limited first hand observation data that was collected.

8.1.2 Recommendations

Overall, this specialist study found that the proposed Golden Valley WEF Project should not pose any significant environmental threat to the surrounding avifaunal environment if all the mitigation measures and recommendations are undertaken. The impact of collision is expected to be the greatest and this can be mitigated by the correct placing of turbines, painting the turbine blades as specified in this report and the use of no or red strobe lights on the turbines. As mentioned in the report, there is a lack of experience and knowledge on wind energy in South Africa and as such, this report has been dealt with using our best scientific knowledge and experience from other fields and from international studies that are available. We have applied the precautionary principle throughout, and this may mean that some impacts have been rated higher and some areas have been identified as more sensitive than they really are.

It must be noted here that there is some concern regarding the cumulative impact of multiple wind energy facilities on avifauna. This facilities site is located just south of another proposed wind energy facility. This means that in this particular area, there is the possibility of approximately 700 wind turbines and the associated infrastructure. This will obviously have a much larger effect on avifauna and no study has been done on this cumulative impact. While both facilities have been subject to EIA studies, there has been little thought for the cumulative impact. This should not be seen as the fault of the developer but rather a gap in the environmental process that needs to be filled with a more strategic assessment of wind energy in South Africa.

A site specific avifaunal EMPr is seen as a critical next step to refine the sensitivity map and to strengthen the mitigation measures in order to have the least impact possible on avifauna in the area.

8.2 Heritage Impact Assessment

The following limitations and assumptions were experienced during the Heritage Impact Assessment study. The physical survey of the study area proved difficult. Much time was spent finding landowners and negotiating access to property. Organised hunting had been scheduled on certain land portions which meant that less time was spent in certain areas than was desirable. The proposal is for some 214 wind turbines. While ideally each turbine site should have been inspected, this was not possible due to the considerable amount of time it took to reach many of the localities which were very remote (if one hour was dedicated to each locality, the study would require 3 weeks of survey time). Locked gates, jackal and kudu fences all contributed to the physical difficulty of the work.

The proposed turbine localities will each require an access road. Given the rugged topography of the study area, this will involve considerable road works to create gradient suitable for transportation of abnormal loads. No information with respect to proposed roads was provided by the proponent, which meant that a potential source of significant impact in heritage terms could not be fully assessed for the purposes of this EIA.

Given the low level of detail at this stage of the project, the ACO team focussed on carrying out a general survey of the study area focussing on determining the general density of heritage/archaeological occurrences and the relative sensitivity of the range of topography

8.2.1 Heritage aspects of the proposed Golden Valley WEF Project

The heritage survey revealed that the heritage of the study area is characterised by archaeological sites spanning the Early, Middle and Late stone ages.

Middle Stone Age (MSA) material was found thinly scattered throughout the study area, however definable archaeological sites could not be easily identified. The material may be described as “ancient litter” containing occasional flakes and blades. Like the Late Stone Age material it is more common on alluvial fans around dongas, sandy flat areas, and is even occasionally seen on remote hilltops and steep slopes. Relatively dense scatters were identified as an eroded scatter of MSA

material, mostly informal flakes, blades and large cores made from hornfels on a valley bottom cut through by a deep donga (Site 2 in Figure 8-1); an eroded scatter of mostly MSA material found along the banks of a shallow stream bed (Site 3 in Figure 8-1); and MSA material thinly associated with a dammed donga on the farm Olivewoods (Site 4 in Figure 8-1).

Late Stone Age material was limited to one recorded occurrence:

1) A scatter of ceramics strewn over along the edges of an erosion gully which has cut into an alluvial fan (Farm Great Drift 173) (**Project 1 of split**). The site is unusual as only ceramics in the style of Cape Coastal Pottery and a stone cairn were noted. Pottery of this kind is associated with the period after 2 000 years ago when pre-historic pastoralists entered the Cape bringing with them domestic stock and the knowledge of working clay into pottery. Suggested grade locally significant 3b (Site 5 in Figure 8-1)

No historical artefactual material greater than 100 years of age was noted.

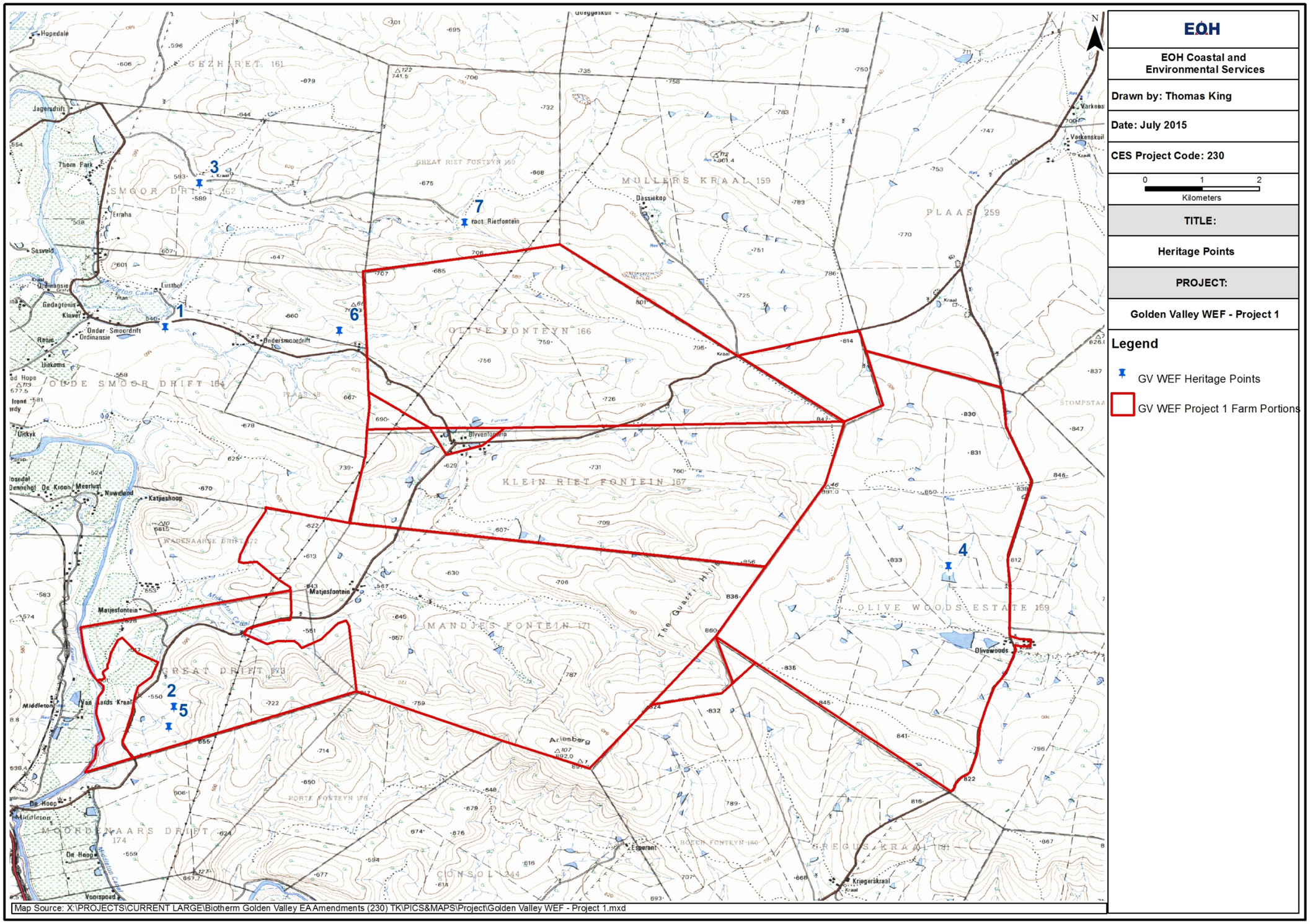

Figure 8-1: Locations of archaeological sites identified in the study area.

Sites of significance are deemed to be:

1) S32.94039 E25.83906. A scatter of early Early Stone age material situated on the lower slopes of the hilltop referred to “Onder Smoorsdrift” on the farm Bygevoegt 164. The site which contains fine examples of Achaeulian bifaces, regular and irregular cores is (moderately) scattered over a wide but definable area on a gentle gradient above a river. The site is significant in that it is the only example of its kind found in the study area so far. Suggested grade: Locally significant 3b **(Project 2)**.
2) S32.93721 E25.83998. An eroded scatter of MSA material, mostly informal flakes, blades and large cores made from *hornfels* on a valley bottom cut through by a deep donga. This is one of very few instances where MSA material is noticeably denser than anywhere else. Suggested grade: low local significance grade 3c **(Project 1)**.
3) S32.85439 E25.84399. An eroded scatter of mostly MSA material found along the banks of a shallow stream bed. Low significance grade 3c **(Project 2)**.
4) S32.91494 E25.96231. MSA material thinly associated with a dam and donga on the farm Olivewoods. Low local significance grade 3c **(Project 1)**.
5) S32.94035 E25.83911. A scatter of ceramics strewn over along the edges of an erosion gully which has cut into an alluvial fan (Farm Great Drift 173). The site is unusual as only ceramics in the style of Cape Coastal Pottery were noted. Pottery of this kind is associated with the period after 2000 years ago when pre-historic pastoralists entered the Cape bringing with them domestic stock and the knowledge o f working clay into pottery. Suggested grade locally significant 3b **(Project 1)**.
6) S32.87769 E25.86610. A large assortment of informal artefacts scattered widely over a large alluvial fan area on the farm Bijgevoegd 164. The site which lies on sandy land is cut through by a very large erosion gulley. The presence of up to 20 upper and lower grinding stones is a possible indication that there may be prehistoric graves here as such artefacts were used as grave markers or ornaments. No human remains were noted at the time of inspection. The raw material used was *Hornfels* and *Siltstone*. Suggested grade: moderately locally significant 3b **(Project 2)**.
7) S32.86062 E25.88585. There is a single disused set of farm buildings situated at Groot Rietfontein. The farm house which was originally a rectangular cottage built from home-made bricks and mud mortar. Apart from one end-wall, it has collapsed completely. Indications are that the structure is of late 19th century origin judging by the proportions of the last remaining window opening. Other features of the site are a corrugated outbuilding, stone wire kraal as well as various enclosures. There is a wind pump and a corrugated iron out-building. No historical artefactual material greater than 100 years of age was noted. Low local significance grade 3c **(Project 2)**.

8.2.2 Recommendations

Given that this study has taken place prior to the development of a draft layout for the wind farm infrastructure, the impacts that we have identified are of a general nature, which means that it will be necessary to review further information as it becomes available so that where necessary, archaeological sites can be mitigated. The following recommendations are offered.

- Turbines must be positioned in such a way that they are at least 500m away from farm complexes, most of which have a moderate degree of heritage significance.
- Turbines must be positioned in such a way that shadow flicker does not affect any farm complexes.
- Guarantees for demolition of turbines after their useful life must be in place as a condition of approval.
- Road alignments must be planned in such a way that the minimum of cut and fill operations are required.
- Existing farm tracks must be re-used or upgraded to minimise the amount of change to un-transformed landscape.
- In general terms, construction of turbines and roads in valley bottoms should be kept to a minimum.

- During the detailed planning phase, drawings of proposed road alignments, infrastructure and near-final turbine positions should be submitted to an archaeologist for review and field-proofing. Micro-adjustment of alignments and turbine positions is likely to be sufficient to achieve adequate mitigation.

8.3 Visual Impact Assessment

The following key findings were made from the Visual Impact Assessment which had the following limitations and assumptions:

- *Spatial Data Accuracy*: Spatial data used for visibility analysis originated from various sources and scales. Inaccuracy and errors are therefore inevitable. Where relevant, these are highlighted in the specialist report (refer to Chapter 6 in **Volume 2: Proposed Terra Wind Energy-Golden Valley Project: Specialist Reports (CES, July 2010**). Every effort was made to minimize their effect.
- *Viewshed Calculations*: Calculation of the viewsheds did not take into account the potential screening effect of vegetation and buildings. Due to the size and height of the wind turbines, and the relatively low thicket cover in the region, the screening potential of vegetation is likely to be minimal over most distances.
- *Simulated views and Photomontages*: In the specialist study, a *simulated view* was defined as a view generated by using 3D computer software using an elevation model and aerial photography. A *photomontage*, for the purposes of the specialist study, is a landscape photograph onto which images of the wind turbines are placed using software which maintains the accurate spatial positions of the turbines and their scale in relation to their distance from the point at which the photograph was taken. The photomontage images used in this report were done using landscape photographs taken specifically for this purpose. Simulated views were produced using 3D modelling software (Visual Nature Studio 3 from 3D Nature - http://3dnature.com/), and a digital elevation model (DEM) interpolated from 1:50 000 contours
- *Shadow flicker modelling*: The following standard assumptions are made when modelling shadow flicker:
    - The sky is 100% clear with no allowance for mist, fog or cloud.
    - Turbines are always rotating;
    - The rotor of the turbine is always orientated such that it is facing the receptor;
    - There is a 2 km limit to the human perception of shadow flicker;
    - The sun can be represented as a point light source;
    - With exception to the consideration of terrain there exists a clear line of site between sun, turbine and receptor. No allowance is made for any obstructions such as vegetation or buildings;
    - The sun must be 3 degrees above the horizon.

  This model is conservative and the impact from shadow flicker is normally lower than predicted by current models (Nielsen 2003).

8.3.1 Identification of Landscape Character Areas

The landscape character of the region is one of commercial agriculture dominated by stock farming in areas outside the Great Fish River floodplain and irrigated cultivation in the floodplain. The natural thicket and grassland have been transformed by grazing and most of the floodplain vegetation has been replaced with cultivated lands. The settlements in the region developed as service centres for the agricultural concerns. Several large roads dissect the region with the N10 a particularly busy route connecting Port Elizabeth with Gauteng. A network of high voltage power lines with large pylons radiate from the Poseidon Substation just north of the site and across the region. A wind farm of this magnitude will alter the landscape character, but the fact that large structures related to electricity (power lines and pylons) already exist in the landscape (and has had a considerable influence on the aesthetic value of the landscape) makes it less sensitive to this change. It is also expected that current agricultural practices (i.e. stock farming) will be able to continue as before.
The area has a low sensitivity to change in its character for this development type. The following

sensitive viewers or viewpoints were identified:

(a) Residents of Cookhouse
Residents are seen as highly sensitive to changes in their views since they have an interest in the landscape that surrounds them. The wind farm is more than 5km away from the town, though, and although there are residents who will potentially have views of many turbines it is unlikely that their views will be significantly altered.

(b) Residents on surrounding farms
Residents on farms surrounding the site (including those farms on which the wind turbines will be built) will be highly sensitive to changes in their views. Many existing views will be altered by introduction of the wind farm into the landscape, especially those of residents in close proximity to the wind farms.

(c) Scenic viewpoints
There are few viewpoints in the region with views on the wind farm which will not also include power lines and major roads. The Glen Avon Falls Natural Heritage Site is approximately 20km north-west of the nearest wind turbine and it's unlikely that any viewpoints will have views of the wind farm.

(d) Protected areas
There are no protected areas of Type 1 or 2 as defined by STEP, and only two game farms (Type 3) within 20km of the wind farm area. The two game farms, Dorn Boom and East Cape, are further than 5km away and show only low visibility.

(e) Motorists
Views from the N10 towards the wind farm will be affected and some views (especially close to Cookhouse) will include many turbines. The other major roads in the area will be much less affected.

8.3.2 Conclusions

The potential visual impacts of the proposed Golden Valley Project were assessed using a number of criteria providing a measure of magnitude to determine the potential significance of the impact (Oberholzer 2005).The **visibility** of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed size only and is an indication of how much of a region will potentially be affected visually by the development.

A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors; **Viewer (or visual receptor) sensitivity** - a measure of how sensitive potential viewers of the development are to changes in their views. Visual receptors are identified by looking at the development viewshed, and include scenic viewpoints, residents, motorists and recreational users of facilities within the viewshed.

A large number of highly sensitive visual receptors can be a predictor of a high **intensity/magnitude** visual impact although their distance from the development (measured as **visual exposure**) and the current composition of their views (measured as **visual intrusion**) will have an influence on the significance of the impact yielded the results encompassed in Table 8-7 below.

Table 8-7: Summary of the Visual Assessment Criteria for the Proposed Golden Valley WEF Project

Criteria	*Impact*
Viewer Sensitivity	Residents of Cookhouse – Highly sensitive to changes in their views. Residents on surrounding farms – Highly sensitive Scenic viewpoints and protected areas – Highly sensitive Motorists – Low sensitivity due to short exposure time and the fact that their focus on landscape is reduced.
Visibility of Development	High
Visual Exposure	Residents of Cookhouse – Medium to low (more than 5km away). Residents of surrounding farms – High for residents in the wind farm area and a couple of residents just outside since they live within 2km of the nearest wind turbine. Scenic viewpoints – high on ridges near turbines (e.g. ridges on northern and southern boundary of wind farm area). Protected areas – low due to their distance from the wind farm. Motorists – medium for N10 and parts of R63, low for other major roads.
Visual Intrusion	Residents of Cookhouse – Low due to their distance from the wind farm. Residents on surrounding farms – High for some due to their proximity to the wind farm. Scenic viewpoints – low due to their distances from the wind farm. Protected areas – Low due to their distances from the wind farm. Motorists – Moderate for motorists on the N10 and low for motorists on other major roads.

The landscape impact which will potentially occur as a result of establishing a wind farm in a rural landscape is expected to be of low significance due to the moderate landscape character sensitivity of the region. It is expected that stock farming will not be altered by introduction of wind turbines in the area. However, this is a large wind farm and the landscape will be affected, especially initially when the wind farm is still a new feature in the landscape.

The visual impact on sensitive viewers and viewpoints due to the construction phase of the proposed project is expected to be high due to the high intensity of the impact on sensitive viewers. However, this impact is not necessarily negative as the assembly of turbines will most likely be a fascinating spectacle due to the size of the components being assembled.

The visual impact on sensitive viewers and viewpoints due to the operational phase of the proposed project is expected to be high due to the dimensions of the turbines and their potential visibility in the region. It is not clear whether the change in the views of sensitive viewers will be perceived as positive or negative since opinions on the aesthetics of wind farms differ radically.

The wind farm will alter a number of views due to its size (spatial extent and the height of the turbines) and visibility (located on ridges). There are a few visual receptors (viewers and viewpoints) for which the visual intrusion will be very high (residents living on or close to the wind farm area), although many of these have agreed to have turbines on their properties. The impact of shadow flicker caused by wind turbines appears to be a minor issue in most countries where wind farms are common.

There is no official set of regulations governing the levels of exposure to shadow flicker, and it is unclear what the health risks are. Most reports on shadow flicker suggest that the threshold for a significant impact is 30 hours per year or more and many countries have adopted this as an informal regulation.

8.4 Noise Impact Assessment

Seven ambient monitoring points were chosen based on their proximity to noise sensitive receptors as well as the location of the proposed wind turbines. The access to some of the proposed locations was hampered as there are no access roads at present. This also influenced where the ambient monitoring occurred. A number of measurements were taken by placing the noise meter on a tripod and ensuring that it was at least 1.2 m from floor level and 3.5 m from any large flat reflecting surface. The noise emissions were modelled for various wind speeds. The direction of the wind was not taken into consideration as the wind could blow from any direction at the speeds that were modelled. It must be noted that the GE turbines proposed for use in this project are quieter than the turbine specifications used for the modelling exercise. As such the findings of the study are reflective of a worst case scenario with the proposed turbines falling below the modelled nose output levels.

8.4.1 Sensitive Receptors

8.4.1.1. Human Sensitive Receptors

The proposed Golden Valley WEF Project site is situated in a farming community. Several homesteads are located on the properties where the turbines will be erected as well as on neighbouring farms. It should be noted the certain of the sensitive receptors identified in this report are also owners of the properties on which the turbines are to be located and, as such, are fully supportive of the development. Table 8-9 below indicates the recorded sensitive noise receptors and Figure 8-2 that follows provides a map indicating the locations of the various human sensitive receptors in relation to the wind turbine locations for the proposed project.

Table 8-9: Sensitive noise receptors at the Golden Valley WEF Project site

Label	Location Description	Position	Project
NSA 3	Matjesfontein Farm House	32°55.0333'S 25°52.0978'E	Project 1
NSA 5	Olive Woods Farm House	32°55.600'S 25°58.4941'E	Project 1
NSA 6	Rietfontein Farm House	32°53.6918'S 25°53.0703'E	Project 1
NSA 7	School	32°56.995'S 25°49.580'E	Project 1

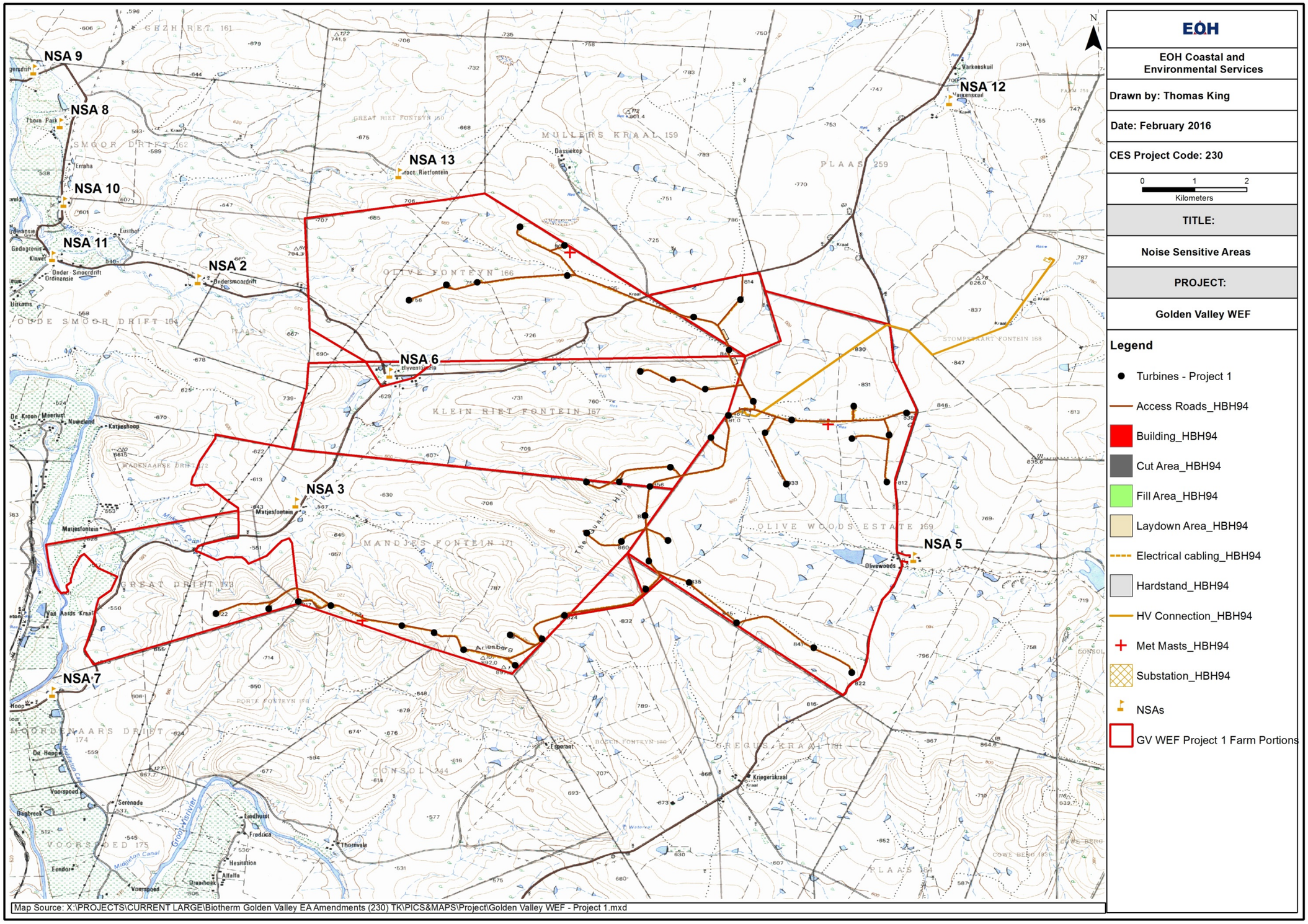

Figure 8-2: Nearby sensitive human receptors in relations to the wind turbines for the proposed Golden Valley WEF Project

8.4.1.2 Natural Environment Receptors

The vegetation around the site is characterised by thicket and grasslands. The fauna includes bats, birds, commercial livestock and a variety of buck. The impacts on the fauna and avifauna are dealt with in separate studies (refer to sections 8.1 and 8.5 respectively).

8.4.2 Predicted Noise Levels

8.4.2.1. Construction Phase

Construction Equipment

If the ambient noise level is at 45dB(A), the construction noise will be similar to the ambient level at approximately 1 300m from the noise source, if the noise characteristics are similar. Beyond this distance, the noise level will be below the ambient noise and will therefore have little impact. The above only applies to the construction noise and light wind conditions.

In all likelihood, the construction noise will have little impact on the surrounding community as it will most likely occur during the day when the ambient noise is louder and there are unstable atmospheric conditions. The construction noise will be transient in nature and in all likelihood not constant for extended periods as the construction team will move from site to site.

8.4.2.2. Operational Phase

During the Scoping Phase, concerns were raised over infrasound and possible impacts to health. Infrasound was a characteristic of some wind turbine models that has been attributed to early designs in which turbine blades were downwind of the main tower. The effect was generated as the blades cut through the turbulence generated around the downwind side of the tower. Modern designs generally have the blades upwind of the tower. Wind conditions around the blades and improved blade design minimise the generation of the effect.

Low frequency pressure vibrations are typically categorized as low frequency sound when they can be heard near the bottom of human perception (10-200 Hz), and infrasound when they are below the common limit of human perception. Sound below 20 Hz is generally considered infrasound, even though there may be some human perception in that range. Because these ranges overlap in these ranges, it is important to understand how the terms are intended in a given context.

The typical range of sound power level for wind turbine generators is in the range of 100 to 105dBA – a much lower sound power level (10dB or more) than the majority of construction machinery such as dozers. In order for infrasound to be audible even to a person with the most sensitive hearing at a distance of, say, 300m would require a sound power level of at least 140dB at 10Hz and even higher emission levels than this at lower frequencies and at greater distances. There is no information available to indicate that wind turbine generators emit infrasound anywhere near this intensity.

Several studies have confirmed that there are no physiological effects below 90dB from low frequency or infrasound from wind turbines. The results of the field study in France by the specialist showed that at no time did the sound level below 20 hertz exceed 25 decibels. This correlates well with the literature review as there are no health effects from infrasound below 90dB.

The effects of low frequency noise could include sleep disturbance, nausea, vertigo etc. These effects are unlikely to impact upon residents due to the distance between the turbines and the nearest communities. Sources of low frequency noise also include wind, train movements and vehicular traffic, which are all sources that are closer to the residential areas.

Table 8-10 provides a summary of the noise impacts during the operational phase on the various sensitive receptors identified in Table 8-9 above.

The results of the modelling in Table 8-10 indicate that noise is be unacceptable at two noise sensitive areas as the impacts would result in a noise level exceeding 45 dB(A), which is regarded as the ambient noise limit. The affected areas are:

- Matjesfontein Farm House (NSA 3) (Project 1) – The wind turbine generator is too close to the dwelling. This is resulting in the noise exceeding the recommended limit from 9m/s. **THE FINAL SITE LAYOUT HAS BEEN REMODELLED BY THE SPECIALIST AND IT HAS BEEN CONFIRMED THAT NO NSAS ARE NEGATIVELY IMPACTED.**
- Rietfontein Farm House (NSA 6) (Project 1) – The wind turbine generator is too close to the dwelling. This is resulting in the noise exceeding the recommended limit from 5m/s. **THE FINAL SITE LAYOUT HAS BEEN REMODELLED BY THE SPECIALIST AND IT HAS BEEN CONFIRMED THAT NO NSAS ARE NEGATIVELY IMPACTED.**

Table 8-10: Summary of noise impacts on various receptors as a result of the proposed Golden Valley WEF Project

Wind Speed	NSA 3*	NSA 5	NSA 6*	NSA 7
4m/s	✓	✓	✓	✓
5m/s	✓	✓	X	✓
6m/s	✓	✓	X	✓
7m/s	✓	✓	X	✓
8m/s	✓	✓	X	✓
9m/s	X	✓	X	✓
10m/s	X	✓	X	✓
12m/s	X	✓	X	✓
12m/s	X	✓	X	✓

8.4.3 Conclusions

The results of the study indicate that the following conclusions can be drawn:

- There will be a short term increase in noise in the vicinity of the proposed Golden Valley WEF Project site during the construction phase as the ambient level will be exceeded. The impact during the construction phase will be difficult to mitigate.
- 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 not high enough (i.e. are well below 90 dB) to cause physiological effects.

8.4.4 Recommendations

The following is recommended:

8.4.4.1 Construction Activities

- All construction operations should only occur during daylight hours if possible.
- The area surrounding the construction site will be affected for a short periods of time in all directions, should several pieces of construction equipment be used simultaneously.
- There will be an impact on the immediate surrounding environment from the construction activities, especially if pile driving is to be done. This however will only occur if the underlying geological structure requires this.
- 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.

- Ensuring that construction staff is given “noise sensitivity” training.

8.4.4.2 Operational Activities

The following recommendations are made for the operational phase:

- All wind turbines should be located at a setback distance of 500m from any homestead and a noise criteria level at the nearest residents of 45 dB(A) should be used to locate the turbines.

8.5 Ecological Assessment

The following key findings were made from the Ecological Impact Assessment which had the following limitations and assumptions:

- Limitations of the study included the timing of the field study, which occurred in February 2010, which, though included much of the summer-flowering plants, could have missed some that could be flowering at other times of the year.

8.5.1 Vegetation and Floristics

8.5.1.1. General Floristics of the proposed project site

During the on-site investigation conducted in February 2010, one hundred and nineteen (119) species were identified on the proposed Golden Valley Project site. There were high numbers of species from:

- Daisy family (Asteraceae – 11 species) was well represented throughout the site form of shrubs and herbs. This family is typically prevalent within all the communities found on site.
- Grass family (Poaceae – 15 species), had a strong presence within the grassland communities.
- The high number of grass (Poaceae) species is typical of the Bedford Dry Grassland. In addition, the large numbers of shrubs form an essential part of the thicket.

A breakdown of the life forms is given in Table 8-11 and Table 8-12. Of the 119 species that were recorded in the area, many of these were woody plants (33% trees and shrubs). Small shrubs tend to occur within the Bedford Dry Grassland as well as degraded thicket sites whilst most of the tree species were also found in thicket. Graminoids and geophytes are well-represented within the site 16 and 4 % respectively and herbs form the second largest group, forming 30% of the vegetation.

Table 8-11: Summary of the flora of the study area and the number of species in each taxon.

Taxon (Higher Group or Family)	Species Recorded
Dicotyledons	81
Monocotyledons	38
Total	**119**
Major Families	**Species**
Asteraceae	11
Asphodelaceae	6
Poaceae	15
Major Genera	**Species**
Euphorbia	5
Lycium	5

Table 8-12: Life Forms of the species found in the study area

Life Form	No of Species	Percentage of Total
Trees	3	2.5
Shrubs	36	30
Graminoids	19	16
Succulents	21	18
Geophytes	4	3.5
Herbs	36	30
TOTAL	**119**	100

8.5.1.2 Plant species of special concern (SSC)

From the site visit, several plant species of special concern were recorded. These include *Aloe striatus* and *Aloe teniour*, among others listed in Table 8-13. All species of the genus *Aloe* excluding *Aloe ferox* are protected by the Provincial Nature Conservation Ordinance 4. It is recommended that no *Aloe striatus* plants be removed during the construction of the turbines. If this is impossible, they should be relocated to ensure their survival.

Table 8-13: Plant species of special concern for the proposed Golden Valley Project

Species	Protection	Status
Pachypodium bispinosum	PNCO	Protected
Pelargonium sidoides	IUCN	Declining
Crassula perfoliata	PNCO	Protected
Euphorbia globosa	IUCN/PNCO	Endangered/ Protected
Euphorbia meloformis	IUCN/PNCO	Vulnerable/ Protected
Aloe tenuior	PNCO	Protected
Anacampseros sp.	PNCO	Protected
Euphorbia meloformis	IUCN/ PNCO 4	Near Threatened/ Protected
Tritonia sp.	PNCO	Protected
Watsonia sp.	PNCO	Protected
Drosanthemum sp.	PNCO	Protected
Psilocaulon sp.	PNCO	Protected
Trichodiadema sp.	PNCO	Protected

Field Assessment

The field assessment of the study site showed the existence of four different vegetation types. Most of the site was heavily degraded due to its primary use as a grazing area. As a result, no Southern Karoo Alluvia (STEP) or Southern Karoo Riviere (Mucina & Rutherford) remains within the study site, but has been taken over by irrigated cultivation. Most of the study site is covered with low sensitivity scrub grassland with scattered rocky outcrops. This vegetation type is comprised mostly of the same grass species as the Bedford Dry Grassland but with scattered thicket elements and is thus determined to be degraded thicket. Some patches of karroid thicket remain but these are also degraded. Bedford Dry Grassland (Mucina & Rutherford) or Aliwal North Dry Grassland (STEP) exists towards the east of the site and is more extensive than the vegetation maps suggest. This vegetation type has also been degraded by grazing. There are a few small patches of remnant thicket, also somewhat degraded. The proposed placement of turbines is throughout the site in the degraded vegetation.

Reptiles

The list of reptiles of special concern is very significant since it includes five endemic species (two

of which are endangered), eight CITES (Committee for International Trade in Endangered Species) listed species, one rare species and four species at the periphery of their range. More than a third of the species are described as relatively tolerant of disturbed environments, provided migration corridors of suitable habitat are maintained to link pristine habitats.

Table 8-14: Threatened and endemic reptiles likely to occur in the Cookhouse region (Source: CSIR, 2004)

Latin name	Notes
Acontias meleagris orientalis	Eastern Cape endemic
Nucras taeniolata	
Tropidosaura Montana subp. *rangeri*	Eastern Cape Endemic
Bradypodion ventrali	Eastern Cape Endemic
Afroedura karroica	Eastern Cape Endemic
Afroedura tembulica	Eastern Cape Endemic
Goggia essexi	Eastern Cape Endemic

Amphibians

Amphibians are well represented in sub-Saharan Africa, from which approximately 600 species have been recorded. A relatively rich amphibian fauna occurs in the Eastern Cape, where a total of 32 species and sub-species occur. This represents almost a third of the species known from South Africa. Knowledge of amphibian species diversity in the Cookhouse region is limited and based on collections housed in national and provincial museums. It is estimated that as many as 17 species may occur.

Table 8-15 lists species of frogs that are endemic or of conservation concern, and occur in the Cookhouse region.

Table 8-15: Threatened and endemic frogs likely to occur in the Cookhouse area (Source: CSIR, 2004)

Latin name	Notes
Anhydrophryne rattrayi	Endangered (Eastern Cape endemic)
Bufo amatolicus	Endangered (Eastern Cape endemic)
Bufo pardalis	Eastern Cape endemic

Mammals

Large game makes up less than 15% of the mammal species in South Africa and a much smaller percentage in numbers and biomass. In developed and farming areas, such as Cookhouse, this percentage is greatly reduced, with the vast majority of mammals present being small or medium-sized. Except where reintroduced into protected areas, lions, black wildebeest, red hartebeest, buffalo, black rhinoceros, elephant, hippopotamus and reedbuck are extinct. Cheetah and hunting dog are no longer found in the area and hyenas, leopard, ratel and vaal ribbok are almost extinct (Skead, 1974b). The antelope that are abundant in the thick bush (thicket or bushclump savanna) are bushbuck, duiker, steenbok and kudu (the most abundant antelope of the valley thicket). Blesbok, bontebok and gemsbok have been reintroduced on some farms.Of the cat species, the lynx (caracal) and black-footed cat are found. Jackal and bat-eared foxes are also found as is the aardwolf, but it is not abundant.

Vervet monkeys are common and baboons are found in appropriate sites in kloofs and valleys. Rock dassies are common, but tree dassies are only found inland in forests along larger rivers. Genet and mongoose species are also common. Aardvarks also occur in the region. Twenty-three rodent species are found in the area and include rats and mice, the cane rat, springhare and porcupine. A number of species of bat also occur. Table 8-16 lists large and medium sized mammals on the IUCN Red Data List that occur in the Eastern Cape Province.

Table 8-16: Threatened large to medium-sized mammals in the Eastern Cape Province (Source: Smithers, 1986)

Common name	Latin name	Conservation Status
Wild dog	*Lycaon pictus*	Endangered
Brown Hyaena	*Hyaena brunnea*	Rare
Aardwolf	*Proteles cristatus*	Rare
Black-footed cat	*Felis nigripes*	Rare
Serval	*Felis serval*	Rare
Leopard	*Panthera pardus*	Rare
Blue Duiker	*Philantomba monticola*	Rare
Honey Badger	*Mellivora capensis*	Vulnerable
African Wild Cat	*Felis lybica*	Vulnerable
Aardvark	*Orcteropus afer*	Vulnerable
Cape Mountain Zebra	*Equus zebra*	Vulnerable
Black Rhinoceros	*Diceros bicornis*	Vulnerable
Oribi	*Ourebia ourebi*	Vulnerable
Pangolin	*Manis temminckii*	Vulnerable
Small-spotted cat	*Felis nigripes nigripes*	Rare

Of specific importance for wind farm developments are the presence of bats in the area; a confounding number of bat fatalities have been found at the bases of wind turbines throughout the world. Echolocating bats should be able to detect moving objects better than stationary ones, which begs the question, why are bats killed by wind turbines (Baerwald *et al*.).

Table 8-17 lists the species of bats likely to occur in Cookhouse and surrounds, and thus will be affected by the proposed development.

Table 8-17: Bat species that occur in the Cookhouse area which are likely to be affected by the wind turbines.

Order: Chiroptera		
Common Name	Species Name	SSC
Straw-coloured fruit bat	*Eidolon helvum*	Near Threatened
Egyptian fruit bat	*Rousettus aegypticus*	
Geoffrey's horseshoe bat	*Rhinolophus clivosus*	Least Concern
Cape horseshoe bat	*Rhinolophus capensis*	Least Concern
Temminck's hairy bat	*Myotis tricolor*	Least Concern
Cape serotine bat	*Eptesicus capensis*	Least Concern
Common slit-faced bat	*Nycteris thebaica*	Least Concern
Giant yellow house bat	*Scotophilus nigrita*	Least Concern
Schreiber's long-fingered bat	*Miniopterus schreibersi*	Near Threatened
Tomb bat	*Taphozous mauritianus*	Least Concern
Angola free-tailed bat	*Tadarida condylura*	Least Concern
Wahlberg's epaulated bat	*Epomophorus wahlbergi*	Least concern
Banana bat	*Pipistrellus nanus*	Least Concern
Egyptian free-tailed bat	*Tadarida aegyptiaca*	Least Concern
Lesser woolly bat	*Kerivoula lanosa*	Least Concern

Bat fatalities at wind power facilities are highly variable throughout the year, but there are many more bat fatalities than bird fatalities at wind farms (Brinkman *et al*. 2006). Importantly, bat studies have been done in Europe and the United Sates of America, but none in South Africa. These studies have found that even a few deaths can be seriously detrimental to bat populations, and is thus cause for concern (Hotker *et al*. 2006). Most bats are struck during periods of migration or dispersal (Hotker *et al*. 2006, Johnson *et al* 2003).

Possible mitigation measures for bat fatalities

In a study conducted to determine the effects of turbine size on bat fatalities, Barclay *et al*. (2007) discovered that the diameter of the rotor had no effect on bat fatalities. Height of the turbines, however, though having no effect on bird fatalities, bat fatalities increased exponentially with an increase in turbine height (Barclay *et al*. 2007). There are, as a result, a few mitigation measures that have been suggested to reduce bat fatalities, these are:

- Ultrasound broadcast can deter bats from flying into wind turbines. (Szewczak and Arnett 2007)
- Minimizing turbine height will help to reduce bat fatalities (Barclay *et al*. 2007).
- Turbine sites on ridges should be avoided (Brinkman *et al*. 2006). However the layout for Project 1 was assessed by the bat specialist and considered to be adequate.
- Wind turbine operating times should be restricted during times when bat activity is high (Brinkman *et al*. 2006). Bats are at higher risk of fatality on nights with low wind speeds (Horn *et al*. 2008).

8.5.2 Ecological Sensitivity Assessment

Sensitivity of the site is primarily low, with most of the vegetation quite degraded due to alien invasion as well as sheep and cattle grazing. Sensitivity of the entire site is thus low, with only a couple of isolated instances where the vegetation is of a medium sensitivity. These are shown in Figure 8-3.

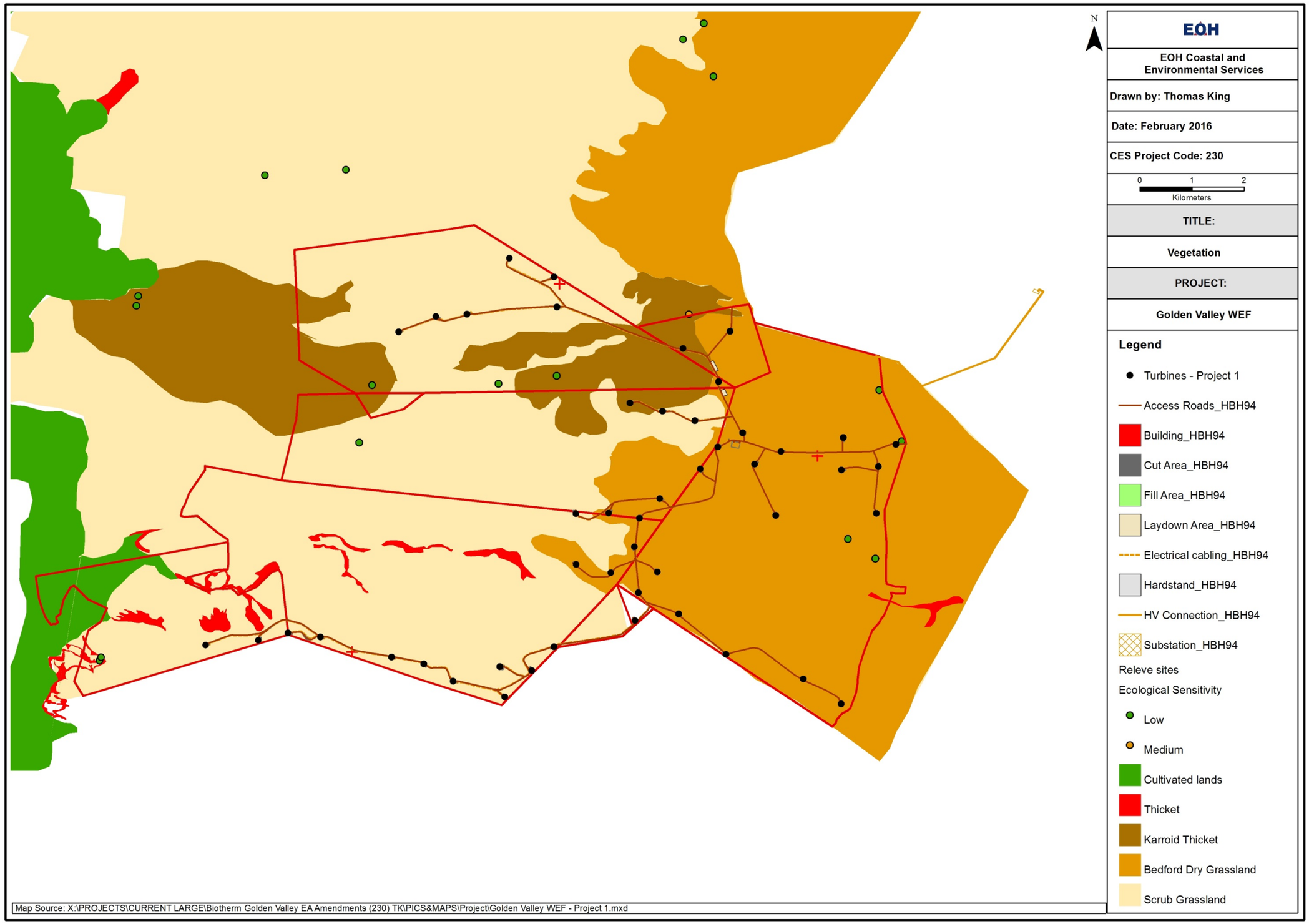

Figure 8-3: Vegetation map of the study area showing the location of each of the study releves and the sensitivity of these sites. There are two isolated areas with a medium sensitivity (orange), while the rest of the study sites had a low sensitivity (green).

Eastern Cape Biodiversity Conservation Plan (ECBCP)

The Eastern Cape Biodiversity Conservation Plan (ECBCP) is responsible for mapping areas that are priorities for conservation in the province, as well as assigning land use categories to the existing land depending on the state that it is in (Berliner et al. 2007).

As can be seen from Figure 8-4, the majority of the study site occurs in a corridor area. Importantly, wind farms, if managed properly, have a low impact on the vegetation and these corridor areas are unlikely to be negatively affected by the construction and operation of the wind farm, thus leaving them intact.

Figure 8-5 shows the Critical Biodiversity Areas (CBAs) in and around the study area. The majority of the study area is CBA T2. CBA T2 areas were mapped based on the following:

- Endangered vegetation types identified through the ECBCP systematic conservation assessment
- Endangered vegetation types from STEP
- Endangered forest patches in terms of the National Forest Assessment
- All expert-mapped areas less than 25 000ha in size (includes expert data from this project, STEP birds, SKEP, Wild Coast, Pondoland and marine studies)
- All other forest clusters (includes 500m buffers)
- 1km coastal buffer strip

This rest of the study site comprises CBA T3, which are areas already transformed. Ground assessments of the area show most of the study site to be transformed as it is used as grazing land and is thus somewhat degraded. As CBA T2 ideally should comprise corridors as it is semi-natural landscape, the proposed development poses no threat to this functionality as the wind turbines will not result in any habitat fragmentation and minimal impacts on the existing flora and fauna of the study site. The ten principles of land use planning for biodiversity are reproduced here:

- Avoid land use that results in vegetation loss in critical biodiversity areas.
- Maintain large intact natural patches – try to minimise habitat fragmentation in critical biodiversity areas.
- Maintain landscape connections (ecological corridors) that connect critical biodiversity areas.
- Maintain ecological processes at all scales, and avoid or compensate for any effects of land uses on ecological processes.
- Plan for long-term change and unexpected events, in particular those predicted for global climate change.
- Plan for cumulative impacts and knock-on effects.
- Minimise the introduction and spread of non-native species.
- Minimize land use types that reduce ecological resilience (ability to adapt to change), particularly at the level of water catchments.
- Implement land use and land management practices that are compatible with the natural potential of the area.
- Balance opportunity for human and economic development with the requirements for biodiversity persistence.

The proposed development, if managed properly, subscribes to these guidelines. As can be seen by the more detailed figure 8-5, much of the site is transformed; the rest of the site is formed by natural landscapes. However, as previously mentioned these natural areas are heavily impacted by current land uses and thus are not valuable as conservation areas unless a great deal of rehabilitation is undertaken. The land use will remain the same, fragmentation kept to a minimum and impacts to the existing near-natural landscape including both flora and fauna will be limited.

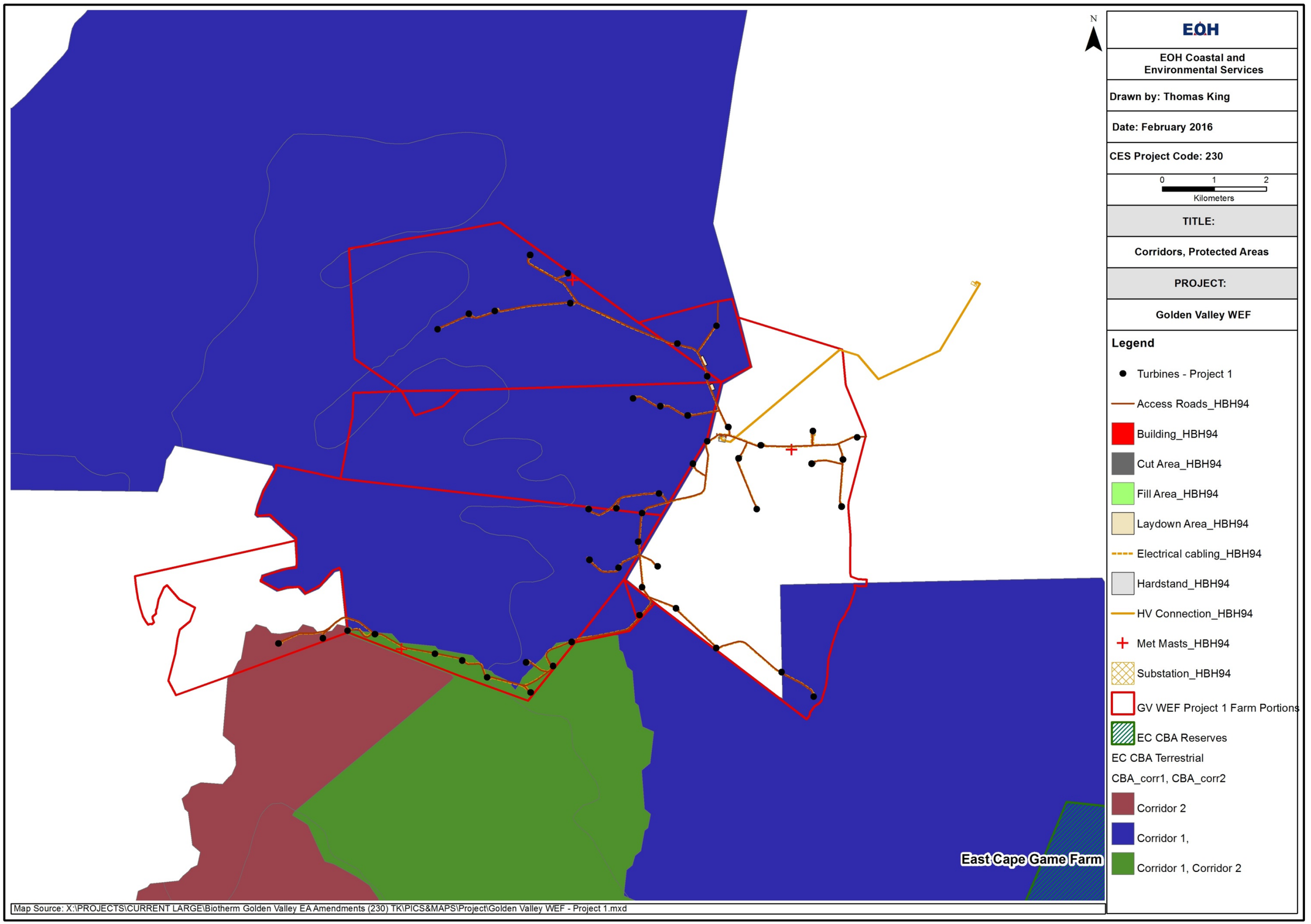

Figure 8-4: Map of the study area in relation to corridors and protected areas as described by the ECBCP.

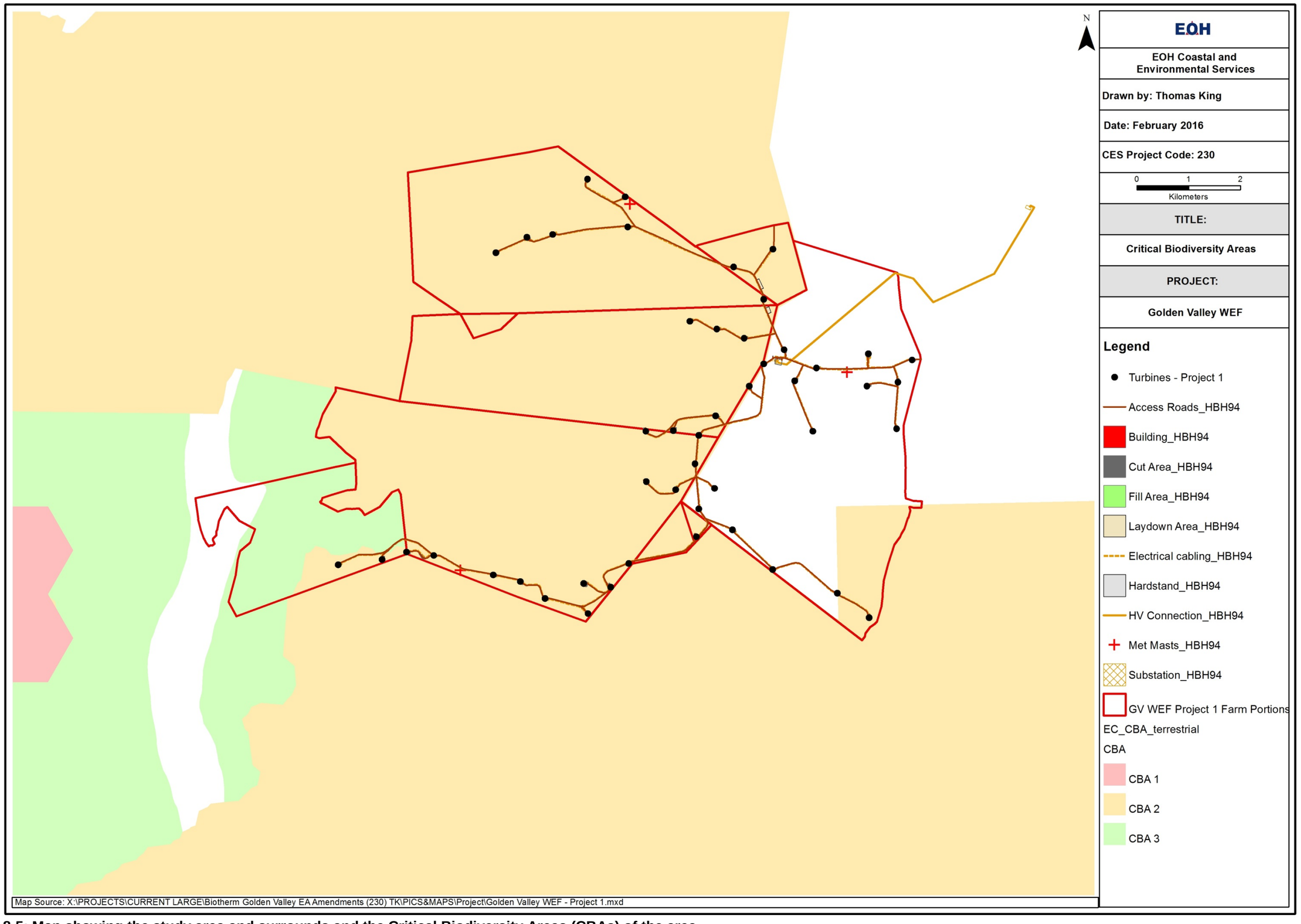

Figure 8-5: Map showing the study area and surrounds and the Critical Biodiversity Areas (CBAs) of the area.

8.5.3 Conclusions and Recommendations

8.5.3.1 Current status

The vegetation on the study site is mostly in a poor condition due to heavy grazing as well as alien plant infestation. There are many invader species along with some degraded grassland and thicket sites, both of which could potentially result in further degradation of the site in the future. Where possible it is recommended that areas within the study site be set aside for conservation allowing the vegetation to reach its natural state free from grazing pressure and alien infestation. The most important and long term impact is likely to be the introduction and infestation of alien plant species. This should be managed effectively to prevent huge impacts on the study area

8.5.3.2 Comparison of impacts

Because of the very nature of a wind farm, it is suspected that many of the impacts will be reduced with effective management of the site as well as the utilization of rehabilitation after construction. For the plant species of special concern, it is recommended that any of these species are identified and rescued before building commences. In addition to this, any extra land needed for the construction phase of the development that will not be used during the operation phase of the development should be rehabilitated after construction is completed.

It is recommended that a botanist/ecologist is on site to determine if any of the species of special concern or protected species occur where the turbines and associated infrastructure are positioned. Before the clearing of the site is authorised, the appropriate permission must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) for plants listed in the National Forests Act, and from the Department of Economic Development and Environmental Affairs (DEDEA) for the destruction of species protected in terms of Provincial Nature Conservation Ordinance (PNCO) Schedule 4.

In order to acquire a permit to destroy or remove plant species that fall under the National Forest Act an application form will need to be submitted to DAFF. A letter needs to be drafted and sent to DEDEA prior to the destruction\removal of any PNCO Schedule 4 species: This letter must list the species that will be removed or destroyed and the reason for their removal or destruction.

These permits may be subject to certain conditions, for example allowing various nurseries to collect plants before vegetation clearance commences; the removal of certain species for rehabilitation purposes, etc.

The plants can also be removed and placed in a nursery for use for rehabilitation purposes. If a species is identified for relocation, individuals of the species will need to be located within the proposed site, before vegetation clearing commences, and carefully uprooted and removed by a skilled horticulturist. Prior to removal, however, suitable relocation areas need to be identified, either within the site or in other disturbed areas on the property. Individual plants that cannot be relocated at the time of removal should be moved to the nursery.

It should be noted that many critical SSC are plants that will not be able to be successfully uprooted and replanted at all (Phillipson, 2002), or at best may have a low survival rate. In all cases the species will require very careful treatment to give them the best chances of survival, and specialist horticultural knowledge will be needed.

8.5.3.3 Invasion of alien species

Any form of disturbance to the natural vegetation provides a gateway for alien species to invade the site of disturbance. In this regard, it is recommended that a strict monitoring plan be implemented to prevent the additional spread and the continued removal of alien species such as those of *Opuntia* and *Agave* species, which are already present on site. Sterilization of vehicles entering the

construction site should be considered as this would reduce alien infestation in the long term as well as dramatically decreasing future control costs.

8.5.3.4 Impacts on bats

As there is little bat research applicable to South Africa, and, more specifically, the Eastern Cape the impacts on bats should be very carefully monitored and any available mitigation measures employed, and their success or failure also monitored.

8.5.3.5 Operational phase recommendations

- Continued monitoring of the site for potential alien invasion, especially of plant species already present on the site.
- Careful monitoring of the effects of the wind turbines on bat populations, especially mortality as a direct result of the turbines and associated infrastructure. Recent research, especially that applicable to wind farms in South Africa and the Eastern Cape should be regularly consulted and every effort should be made to use recommended mitigation measures.
- Maintenance of areas set aside within the site for conservation to make sure these are not being impacted further in any way.

8.6 Palaeontological Assessment

The following key findings were made from the Palaeontological Impact Assessment which had the following limitations and assumptions:

Published geological maps of the study area are used to determine which geological units (e.g. sedimentary formations) are represented both at the surface and below the surface within the study area. The preparation of these maps usually involves extensive extrapolation from limited areas of bedrock exposure (e.g. natural rocky outcrops, artificial road and railway cuttings, quarries and pits) since a high fraction of the outcrop area of any formation is generally obscured by surface deposits (e.g. soil, alluvium) and vegetation cover. For the purposes of palaeontological impact studies the maps are taken to be substantially correct. Later fieldwork, such as the examination of recent excavations during the impact study, may suggest necessary corrections to the geological maps, but these changes are generally small.

Most fossil heritage is buried below the surface of the ground and can only be sampled and assessed from occasional sites where bedrock is well exposed, as listed above. Extrapolation from the palaeontological record at these recorded sites is used to infer the nature and density of fossil remains that may well be exposed in the study area during development, mainly through new excavations in the construction phase. It is often assumed for practical purposes that the palaeontological heritage within a given formation is fairly evenly distributed within the entire outcrop area of the sedimentary unit, although experience shows that this is in fact often not the case. A more accurate picture of the variety and distribution of fossil heritage within the study area can only be obtained through intensive field collection as well as monitoring of excavations during construction.

8.6.1 Description of the Geological and Palaeontological Environment

8.6.1.1 Geological Environment

As shown on the relevant 1: 250 000 geological map, Sheet 3224 Graaff-Reinet published by the Council for Geoscience, the study area is largely underlain by Late Permian continental sediments of the Lower Beaufort Group (Adelaide Subgroup, Karoo Supergroup). In particular the Karoo sediments belong to the Middleton Formation (Pm) (Hill 1993, Cole et al. 2004, Johnson et al., 2006).

In the southern part of the study area the Middleton Formation is intruded by a major, narrow, WNW-ESE trending intrusion of the Karoo Dolerite Suite (Jd) of Early Jurassic age (c. 183 Ma). Dips of the

Beaufort Group sediments recorded on the geological map in the study region are generally shallow (5 to 10°), with small-scale E-W fold axes to the south and east of Cookhouse, so low levels of tectonic deformation and cleavage development are expected. However, as outlined below, frequent small-scale faults, including low-angle thrusts and normal faults, are very evident where outcrop is good. These structural features are most clearly seen where they affect sandstone bodies in roadcuts. They can be related to both the Permo-Triassic Cape Orogeny (mountain-building event) as well as later stretching of the continental crust prior to the break-up of Western Gondwana during the Cretaceous Period.

8.6.1.2 Palaeontological heritage within the study area

In the section of the report the known fossil heritage within each of the major rock units represented within the study area is summarized and new palaeontological data from the scoping fieldwork is briefly outlined.

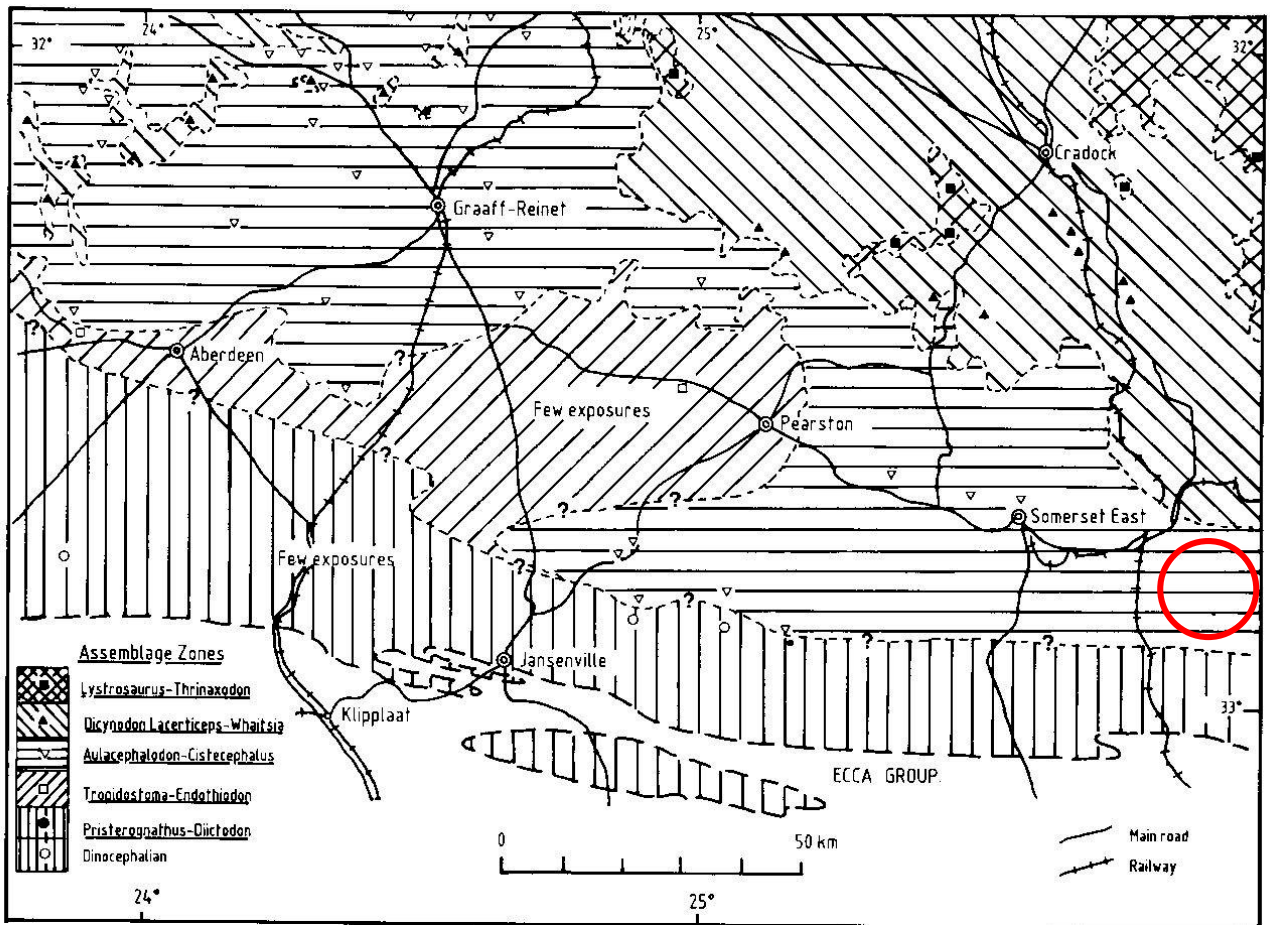

Figure 8-6: Distribution of Beaufort Group fossil assemblage zones in the Graaff-Reinet sheet area (After Keyser & Smith 1977-78). The location of study area near Cookhouse within the *Cistecephalus* Assemblage Zone (previously known as the *Aulacephalodon – Cistecephalus* Zone) is indicated by the red circle. Note the comparative paucity of fossil records from this particular area of the eastern Great Karoo.

The overall palaeontological sensitivity of the Beaufort Group sediments is high (Rubidge 1995, Almond *et al*. 2008). These continental sediments have yielded one of the richest fossil records of land-dwelling plants and animals of Permo-Triassic age anywhere in the world. A chronological series of mappable fossil biozones or assemblage zones (AZ), defined mainly on their characteristic tetrapod faunas, has been established for the Main Karoo Basin of South Africa (Rubidge 1995). Maps showing the distribution of the Beaufort assemblage zones within the Main Karoo Basin have been provided by Keyser and Smith (1979) and Rubidge (1995), and for the Graaff-Reinet sheet

area they are available in Hill (1993). The Middleton Formation comprises portions of three successive Beaufort Group fossil assemblage zones (AZ) that are largely based on the occurrence of specific genera and species of fossil therapsids. These are, in order of decreasing age, the *Pristerognathus*, *Tropidostoma* and *Cistecephalus* Assemblage Zones (Rubidge 1995). The three biozones have been assigned to the Wuchiapingian Stage of the Late Permian Period, with an approximate age range of 260-254 million years (Rubidge 2005). According to published maps showing the distribution of the Beaufort assemblage zones within the Main Karoo Basin (Keyser & Smith 1977-78, Hill 1993, Rubidge 1995), the Middleton Formation succession to the southeast of Cookhouse lies within the ***Cistecephalus* Assemblage Zone** (= upper *Cistecephalus* Biozone or *Aulacephalodon-Cistecephalus* Assemblage Zone of earlier authors; see Figure 8-6 above).

- isolated petrified bones as well as rare articulated skeletons of **terrestrial vertebrates** such as true **reptiles** (notably large herbivorous pareiasaurs, small insectivorous owenettids) and **therapsids** or "mammal-like reptiles" (*e.g.* diverse herbivorous dicynodonts, flesh-eating gorgonopsians, and insectivorous therocephalians)
- aquatic vertebrates such as large **temnospondyl amphibians** (*Rhinesuchus*, usually disarticulated), and **palaeoniscoid bony fish** (*Atherstonia*, *Namaichthys*; these are often represented by scattered scales rather than intact fish)
- freshwater **bivalves** (*Palaeomutela*)
- **trace fossils** such as worm, arthropod and tetrapod burrows and trackways, coprolites (fossil droppings), plant roots
- **vascular plant remains** including leaves, twigs, roots and silicified woods ("*Dadoxylon*") of the *Glossopteris* Flora, especially glossopterid trees and arthrophytes (horsetails). Plant remains are usually sparse and fragmentary.

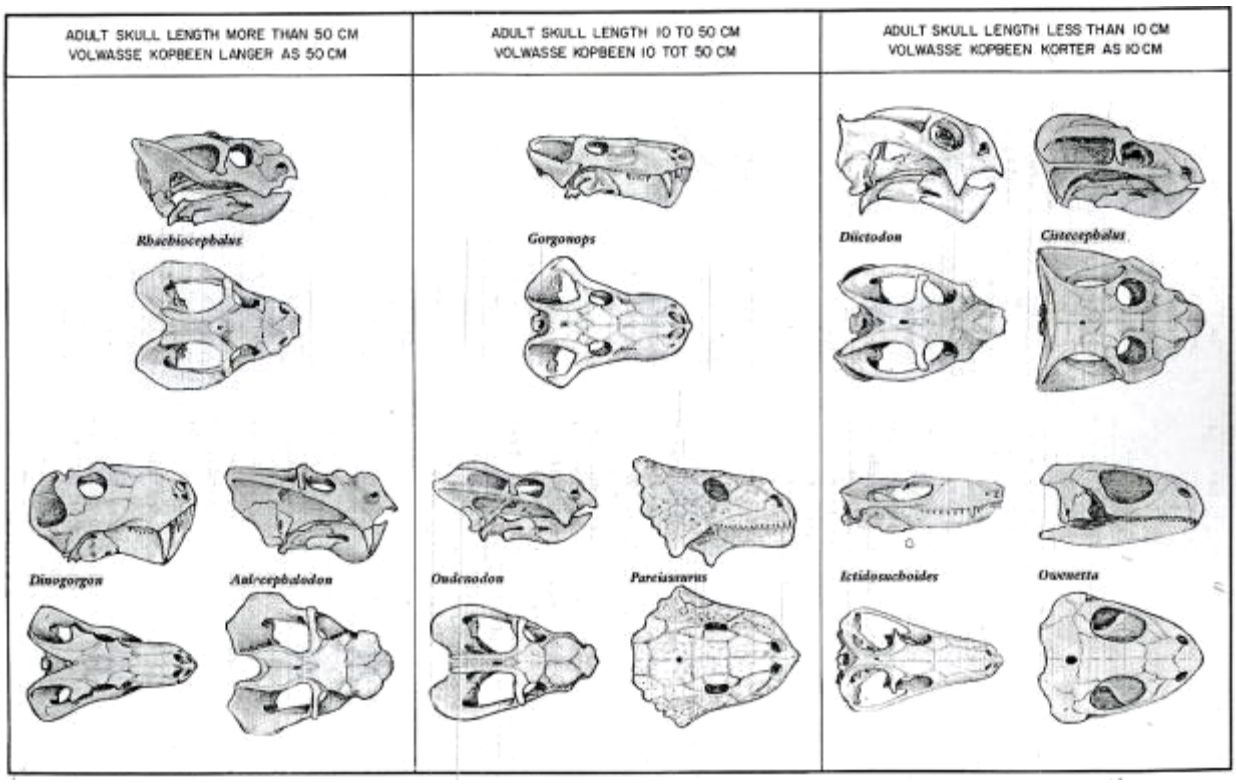

Figure 8-7: Skulls of characteristic fossil vertebrates from the *Cistecephalus* Assemblage Zone (From Keyser & Smith 1977-78). *Pareiasaurus,* a large herbivore, and *Owenetta*, a small insectivore, are true reptiles. The remainder are therapsids or "mammal-like reptiles".

Authoritative lists of vertebrate genera and species recorded so far from the Cistecephalus Assemblage Zone are given by Smith and Keyser (1995). As far as the biostratigraphically important tetrapod remains are concerned, the best fossil material is generally found within overbank mudrocks. In contrast, fossils preserved within channel sandstones (e.g. channel lag breccio-conglomerates of reworked mudflakes and calcrete nodules) tend to be fragmentary and water-worn (Smith & Keyser 1995, Smith 1993).

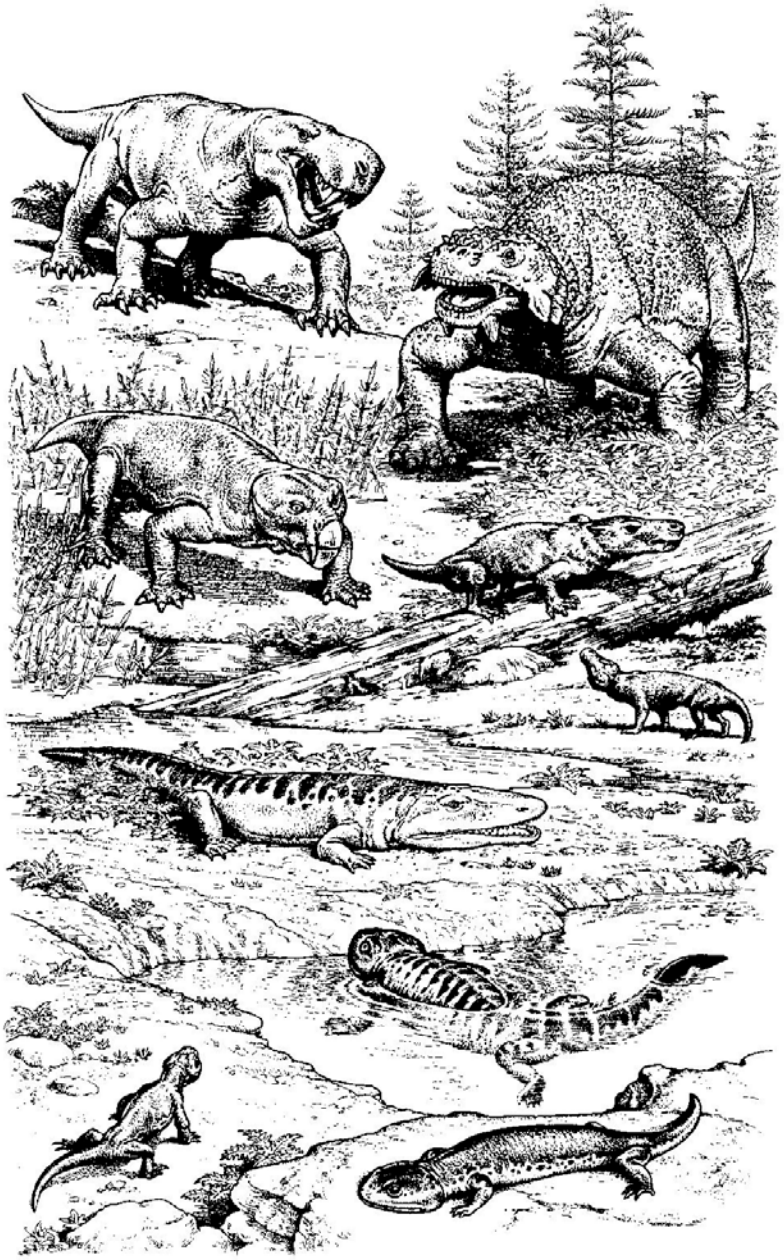

Figure 8-8: Reconstruction of a typical Late Permian continental biota (From Benton 2003). TOP: predatory gorgonopsian (left), rhino-sized herbivorous pareiasaur (right). MIDDLE: herbivorous, two-tusked dicynodont (left), carnivorous therapsids, including a therocephalian and small cynodont (right, below).

Many fossils are found in association with ancient soils (palaeosol horizons) that can usually be recognised by bedding-parallel concentrations of calcrete nodules. The fossil bones are isolated and disarticulated for the most part, and are typically permineralised and encrusted in a mantle of calcrete (often brown-weathering). Fossil bone embedded in mudrocks adjacent to major dolerite intrusions may be modified by thermal metamorphism; for example, bones in the Graaff-Reinet District may

acquire a smooth, white “porcellanite” pallor, while bones recorded near Bedford, just east of the study area, may be black (Smith & Keyser 1995). Fossil vertebrate remains appear to be surprisingly rare in the Lower Beaufort Group outcrop near Cookhouse compared to similar-aged deposits further west within the Great Karoo (Apparently, a team of experienced palaeontologists working in this area several years ago for about a week failed to find any substantial fossil remains). The important compendium of Karoo fossil faunas by Kitching (1977) lists numerous finds from the Cistecephalus Assemblage Zone near Pearston, some 75km to the WNW of the study area. A few therapsid genera - the dicynodonts Emydops and Cistecephalus plus the therocephalian Ictidosuchoides – are reported from Bruintjieshoogte, between Pearston and Somerset East, although fossils are recorded as rare even here, despite the excellent level of exposure. The very few fossil specimens recorded during the present scoping study southeast of Cookhouse were, as expected, found where extensive, gentle hillside exposures of overbank mudrocks with numerous calcretized palaeosol horizons are present.

The reason for the comparative scarcity of fossil material within the Beaufort beds near Cookhouse is unknown. It might be related to the area’s southern, high palaeolatitudinal position within the N-S orientated Main Karoo Basin. The comparative scarcity of calcretized pedogenic horizons and maroon mudrocks may suggest colder, wetter climates here. The paucity of coarse clastic material, the rarity of deeply erosive channel bases within the river systems, the soft-sediment deformation seen at some channel sandstone bases, and the high proportion of ferruginous and pyritic calcrete nodules possibly suggest distal, swampy environments that may have been less conducive to terrestrial wildlife. This is all highly speculative, however. The most palaeontologically productive sites in the study area were gentler slopes of well-exposed mudrocks with numerous palaeosols rich in calcrete nodules that were examined on Smoorsdrift 162 (Loc. 338) and Farm 283 (Locs. 321). Small bone fragments embedded within blue-grey mudrock or as surface float were found at Loc. 324 (Oudesmoorsdrif 164), Loc. 332 (Farm 283, Matjesfontein) and Loc. 336-338 (Smoorsdrift 162). In most cases the disarticulated bone fragments were encrusted with a thick mantle of micritic calcrete. The Matjesfontein bones occur in association with pedogenic calcrete and are often tinged pink or lilac (The discoloration may be related to the nearby dolerite intrusion). They belong to the post-cranial skeleton of a medium-sized animal that is still partially embedded in mudrock (Plate 8-1).

Plate 8-1: Fragments of fossil bone float together with an embedded rib of a medium-sized tetrapod (probably therapsid), Loc. 332, Farm 283 (Matjesfontein) (Rib fragment seen here is 8cm long, for scale).

The important Smoorsdrift 162 vertebrate fossils were found on an extensive N-facing exposure of Middleton Formation mudrocks just south and north of the farm track to Groot Rietfontein. The mudrocks here contain thin crevasse splay sandstones, wave-rippled playa lake sediments, and an extensive horizon of large, irregular, isolated to confluent ferruginous calcrete nodules. The disarticulated bones are embedded in calcrete or indurated grey mudrock and include two moderately well-preserved therapsid skulls as well as fragments of a couple of other skulls plus fragmentary postcranial remains. According to palaeontologist Dr Roger Smith (Iziko: South African Museums, Cape Town) the medium-sized (c. 18cm long), tusk-bearing dicynodont skull shown in Plate 8-2 bears a broad resemblance to the genus Robertia which is only recorded, however, from the significantly older Tapinocephalus Assemblage Zone of the Lower Beaufort Group (Rubidge 1995).

The second dicynodont skull shown in Plate 8-3 is tuskless and may be a female specimen of the long-ranging small dicynodont Diictodon. It should be emphasized that these identifications are provisional, based on an examination of photos rather than the original material, and that further preparation of the specimens – especially in the palatal region – is necessary before firm conclusions can be drawn. These skulls are, to the author's knowledge, among the first identifiable fossil vertebrate remains recorded so far from the Cookhouse area and are therefore of considerable scientific importance for biostratigraphic purposes. The Smoorsdrift site may well yield further valuable vertebrate remains when intensively searched, so further mitigation before construction of the proposed wind farm is suggested here.

Plate 8-2: Dorsal view of fossil skull of a medium-sized dicynodont preserved within a ferruginous calcrete nodule (Scale = 16cm) (Smoorsdrift 162, Loc. 338).

Plate 8-3: Dorsal view of second fossil skull of a small dicynodont preserved within a calcrete nodule (Scale = 16cm) (Smoorsdrift 162, Loc. 338). The skull apparently lacks canine tusks.

Plate 8-4: Extensive zone of large ferruginous calcrete nodules marking an ancient soil horizon at Loc. 338. The skulls found at this locality may have weathered out from the same or a similar horizon (Hammer = 30cm).

Plate 8-5: Overbank mudrocks penetrated by vague, cross-cutting horizontal burrows (Loc.346, Olive Woods Estate) (Hammer = 30cm).

Trace fossils found within or close to the study area include the vaguely striated or annulated horizontal burrows seen at Loc. 346 (Plate 8-5). These are attributable to an unknown invertebrate and may have been generated subaquesously or in wet shoreline sediments associated with a shallow playa lake system. Other vague epichnial furrows and wash-out sole traces (possibly including the arthropod burrow *Scoyenia*) were recorded in association with thin sandstone beds at Loc. 326. The only plant fossils recorded during this study were locally abundant, transported stem fragments of sphenophytes or "horsetails" (Plate 8-6) that are preserved as internal casts within scraped up blocks of mudrock *c*. 2km east of Middleton (Loc. 334). These reed-like plants probably belong to the common fern genus *Phyllotheca* that characterized boggy riverine and lakeside habitats of the Late Permian in Gondwana (*Glossopteris* Flora; Anderson & Anderson 1985).

Plate 8-6: Internal cast of longitudinally-ribbed, "segmented" stem of a sphenophyte ("horsetail" fern). The stem fragment shown is 10cm long. Rubbish-filled borrow pit west of Middleton (Loc. 334).

Fossil heritage within the Karoo Dolerite Suite

The dolerite outcrops in the northern part of the study area are in themselves of no palaeontological significance since these are high temperature igneous rocks emplaced at depth within the Earth's crust. However, as a consequence of their proximity to large dolerite intrusions in the Great Escarpment zone, the Beaufort Group sediments nearby may well have been thermally metamorphosed or "baked" (*i.*e. recrystallised, impregnated with secondary minerals).

Embedded fossil material of phosphatic composition, such as bones and teeth, is frequently altered by baking – bones may become blackened, for example (as seen near Bedford to the east of the study area) - and can be very difficult to extract from the hard matrix by mechanical preparation (Smith & Keyser, p. 23 *in* Rubidge 1995). Thermal metamorphism by dolerite intrusions therefore tends to reduce the palaeontological heritage potential of adjacent Beaufort Group sediments.

Fossil heritage within the superficial deposits ('drift')

Karoo drift deposits have been comparatively neglected in palaeontological terms for the most part. However, they may occasionally contain important fossil biotas, notably the bones, teeth and horn cores of mammals (e.g. Skead 1980, Klein 1984, MacRae 1999, Partridge & Scott 2000). Other late Caenozoic fossil biotas from these superficial deposits include non-marine molluscs (bivalves, gastropods, rhizoliths), ostrich egg shells, trace fossils (e.g. calcretised termitaria, coprolites), and plant remains such as peats or palynomorphs (pollens) in organic-rich alluvial horizons.

Drift deposits including silty alluvium along the banks of the Fish River, near-surface calcretes, and various colluvial (slope) deposits were briefly examined for Caenozoic fossil remains, but without success. Calcretized termitaria may be present in some thicker drift successions in the eastern sector of the study region.

8.6.2 Conclusions and Recommendations

The proposed Golden Valley wind farm study area is largely underlain by Late Permian continental sediments of the Middleton Formation (Lower Beaufort Group, Karoo Supergroup) that are potentially highly fossiliferous. However, field scoping and the accompanying desktop study have shown that (a) much of the Beaufort Group outcrop is mantled by relatively unfossiliferous superficial deposits – principally Late Caenozoic alluvium and colluvium; (b) the Beaufort Group is sparsely fossiliferous in this region; (c) the palaeontological sensitivity of these rocks may have been partially compromised by tectonism (*e.g.* folding, faulting) and thermal metamorphism. The likely impact of the proposed development on local palaeontological heritage is therefore inferred to be low (negative), if no mitigation takes place beforehand.

Focused specialist palaeontological mitigation to take place before construction starts is recommended in two small areas of Lower Beaufort outcrop on the farms Smoorsdrift 162 (Project 2) and Gheziret 161 (Project 2) because several scientifically useful fossil skulls have already been collected here (including during the current scoping study), or in the neighbourhood. This mitigation should involve the intensive recording and collection of fossil heritage within the two areas, as well as the recording of pertinent geological data.

Should substantial fossil remains, such as vertebrate bones, teeth or petrified wood, be found or exposed here or anywhere else within the study area during construction of the Cookhouse wind farm, the responsible ECO should safeguard these – *in situ*, if feasible – and alert SAHRA as soon as possible so that appropriate mitigation can be undertaken by a professional palaeontologist at the developer's expense.

8.7 Socio-Economic Impact Assessment

8.7.1 Background

During the review period for the Draft EIR an interested and affected party raised concerns about the potential impact of the proposed wind energy facility on tourism in the area. As this issue was not raised during the Scoping Phase, a specialist socio-economic assessment was not incorporated into the main EIA. It has therefore been decided to discuss the potential impacts in this report.

In addition, and as discussed below, even if such an assessment was conducted for the proposed Golden Valley Wind Energy Facility, evidence from existing literature suggests that the findings, whether positive or negative, would be inconclusive. It is important to note that the focus of this EIA is the proposed Golden Valley Wind Energy Facility rather than the impact of other potential wind farm developments in the area.

8.7.2 Socio-Economic Concerns

The primary concerns, as captured in the Issues and Response Trail (Appendix D of this report), are firstly that the proposed development will negatively impact the tourism of the area and, secondly, that the tourism of another area will thus be boosted. There are two game farms in the area, namely East Cape and Dorn Boom game farms. Further afield are Double Drift Game Reserve and Andries Vosloo Kudu Nature Reserve south of Fort Beaufort and Shamwari Game Reserve near to Addo Elephant National Park.

8.7.3 Impacts on land value

It is unlikely that anyone will be able to provide a reliable estimate as to the significance of any value changes (positive or negative) due to the establishment of the proposed Golden Valley Wind Energy Facility. The primary reason for this is that there are currently no wind farms in the Eastern Cape and so it is not possible to accurately assess the extent to which the value of local private properties have been affected historically.

While estate agents may be able to offer a subjective opinion on the matter, the only really reliable source of information is from studies that have reviewed actual property price trends over a number of years.

The most comprehensive study on the impact of wind farms on nearby property values was produced by the Berkeley Laboratory in 2009 (http://eetd.lbl.gov/ea/ems/re-pubs.html). It included a detailed statistical analysis of property transactions for 7 500 home sales for the period 1996 – 2007 in the USA and concluded that the view of wind farm facilities did not demonstrably impact sales prices. A similar study for Cornwall in the UK concluded that although house prices initially appeared to be impacted negatively, this was not due to the proximity to turbines. While the development of the proposed wind farm at Cookhouse may result in a reduction in the value of surrounding properties, it may also be argued that local property prices may benefit through either the expectation of potential income from similar developments in the area or the perception held by some that wind farms are a symbol of a more sustainable future.

8.7.4 Impacts on the private game reserve industry

A viewshed analysis was included in the visual impact specialist report (see Volume 2) while the viewshed analysis shows the areas from where the facility will *theoretically* be visible, it does not provide information on the expected visual intrusion. This is assessed by means of the visual exposure which takes into account the distance from the proposed development.

As can be seen from Figure 4.8 in the Visual Specialist report (Volume 2), visual exposure ratings are mostly **low** for the two game farms, East Cape and Dorn Boom. For areas in East Cape game farm within medium visual exposure levels, the topography is such that few areas will have a view of the wind farm (Not Visible category on the map). No buildings, as traced from 2007 SPOT imagery, showed higher than low levels of exposure, if at all.

There are areas along the ridge just north of the wind farm site where the potential for scenic views are high in terms of topography. The visual exposure along this ridge is **moderate** to **high**. Similarly, any potential scenic views along the ridge bordering the wind farm site to the south will also have a moderate to high visual exposure rating for the wind farm due to its proximity. The visual specialist report asserts that the views from the farmstead Baviaanskrans are marred somewhat by high voltage power lines and large pylons. However, if one were to apply the precautionary principle (i.e. in the absence of reliable data, assume a worst case scenario) then the potential *visual* impact would be rated as **moderate** to **high**.

It is unlikely that any study at this stage would be able to provide an accurate assessment of the extent to which the visibility of the proposed facility would translate into a negative impact on the economy of the local private game sector or broader eco-tourism operations. A review of available literature on the subject revealed a scarcity of verifiable data from Africa, but a number of studies have been conducted in Europe. Some of the findings of these are presented below.

A 2008 report prepared by the Glasgow Caledonian University for the Scottish Government (www.scotland.gov.uk/publications/2008/03/07113554/0) included a review of almost 50 studies and interviews with 380 tourists. 98% said that the visibility of wind farms would not affect future visits to the area. 48% of interviewees said that they liked to see wind farms, 24% were neutral and the remaining 28% felt that presence of wind turbines would affect future visits. A weakness of this report was that the actual visual exposure was not incorporated into the questions i.e. respondents were simply asked their opinion on the presence or absence of turbines rather than their proximity or level of intrusion on the landscape. The report concluded that although there is some foundation to the belief that wind farms will have an effect on tourism, the effects are small.

In a separate study conducted for the Wales Tourist Board (NFO WorldGroup, 2003), an attempt was made to determine the impact of wind turbines on the Welsh tourism industry which, like the Eastern Cape, relies on scenery, wild landscapes and an unspoilt environment. Stakeholders agreed that wind farms should be sited in locations where their environmental and visual impacts would be minimised but there was considerable division over the definition of a “no-go area”. Although most of the findings were not based on hard data, both positive and negative impacts were expected. Interviews with 266 tourists revealed that 37% of the respondents said that cellphone masts detracted from their experience while 23% said that wind farms and turbines would have a similar negative effect. This figure is similar to that derived from the Scottish survey discussed above.

The report also refers to case studies from Spain where the wind farm sector has seen rapid growth. Interestingly, several independent studies from that country have shown that despite this growth, there has been no negative impact on the local tourism industry. Mention is also made of positive impacts including “green tourism” when an area is promoted by sustainable energy sources.

8.7.5 Conclusions

Although it is acknowledged that case studies from the European context do not make a perfect comparison to the local Eastern Cape context, the findings of the abovementioned studies are nonetheless useful. They serve to provide some insights into the expected reaction of tourists to the presence of wind farms until such time as local case studies, based on reliable data, are available. Based on these European case studies, it appears that while there may be a negative impact on tourism, the actual significance may not be as high as initially expected by the tourism sector. In addition, examples from Spain suggest that the application of new marketing strategies could leverage a competitive advantage for the local eco-tourism sector by promoting the access of local establishments to clean energy.

9 IMPACT ASSESSMENT

Please note when reviewing these impacts that some of the assumptions, uncertainties and gaps in knowledge have been included in Chapter 8 above before presenting the key findings of each of the specialist studies. Those included in this Chapter have therefore been limited to those relating to the identification and/or assessment of impacts.

9.1 Construction Phase Impacts

9.1.1 Introduction

In addition to the construction impacts presented below, the EAP also investigated cumulative impacts of establishing four wind farms in the area of Cookhouse, Bedford and Middleton in the Eastern Cape Province. The numerous wind farms proposed for the area compound the significance of the impacts expected and predicted for the individual wind energy projects. In light of this, the EAP has undertaken to further explore these cumulative impacts; however this exercise does NOT negate the need for a strategic environmental assessment to be undertaken for wind farms across South Africa. This cumulative impact assessment is undertaken as a desktop study and is a preliminary assessment of the potential impacts foreseeable with developing many wind energy facilities in a specified area. These cumulative impacts are assessed according to the same impact criteria detailed in Section 7.2 – Methodology of this report.

There are currently four wind energy facilities proposed for this area – please refer to Figure 9-1 below:

1. Cookhouse Wind Energy Facility
   Applicant: African Clean Energy Developments
   EAP: Savannah Environmental
   Area of Project: Approx. 9 100ha
   Number of Turbines: 200 turbines/400MW

2. Golden Valley WEF Project – Projects 1 and 2
   Applicant: Terra Wind Energy-Golden Valley (Pty) Ltd
   EAP: EOH Coastal & Environmental Services
   Area of Project: Approx. 29 400ha
   Number of Turbines: Project 1 – 48 turbines/120MW
   Project 2 – 126 turbines/380MW

3. Middleton Wind Energy Project
   Applicant: Terra Wind Energy-Middleton (Pty) Ltd
   EAP: EOH Coastal & Environmental Services
   Area of Project: Approx. 27 000ha
   Number of Turbines: 685 turbines/1712.5MW

4. Amakhala Emoyeni Wind Energy Facility
   Applicant: Windlab Developments South Africa (Pty) Ltd
   EAP: Savannah Environmental
   Area of Project: Approx. 27 300ha
   Number of Turbines: 350 turbines/875 MW

The cumulative figures for the four proposed wind energy facilities are as follows:

- Cumulative Footprint Area of the Study: 92 800ha
- Cumulative Number of Turbines: 1 449 turbines
- Cumulative Estimated MW: 3,487,5MW

The cumulative impacts for the construction phase are **not considered** due to the fact that it is highly unlikely that all four wind energy facilities will be constructed at the same time.

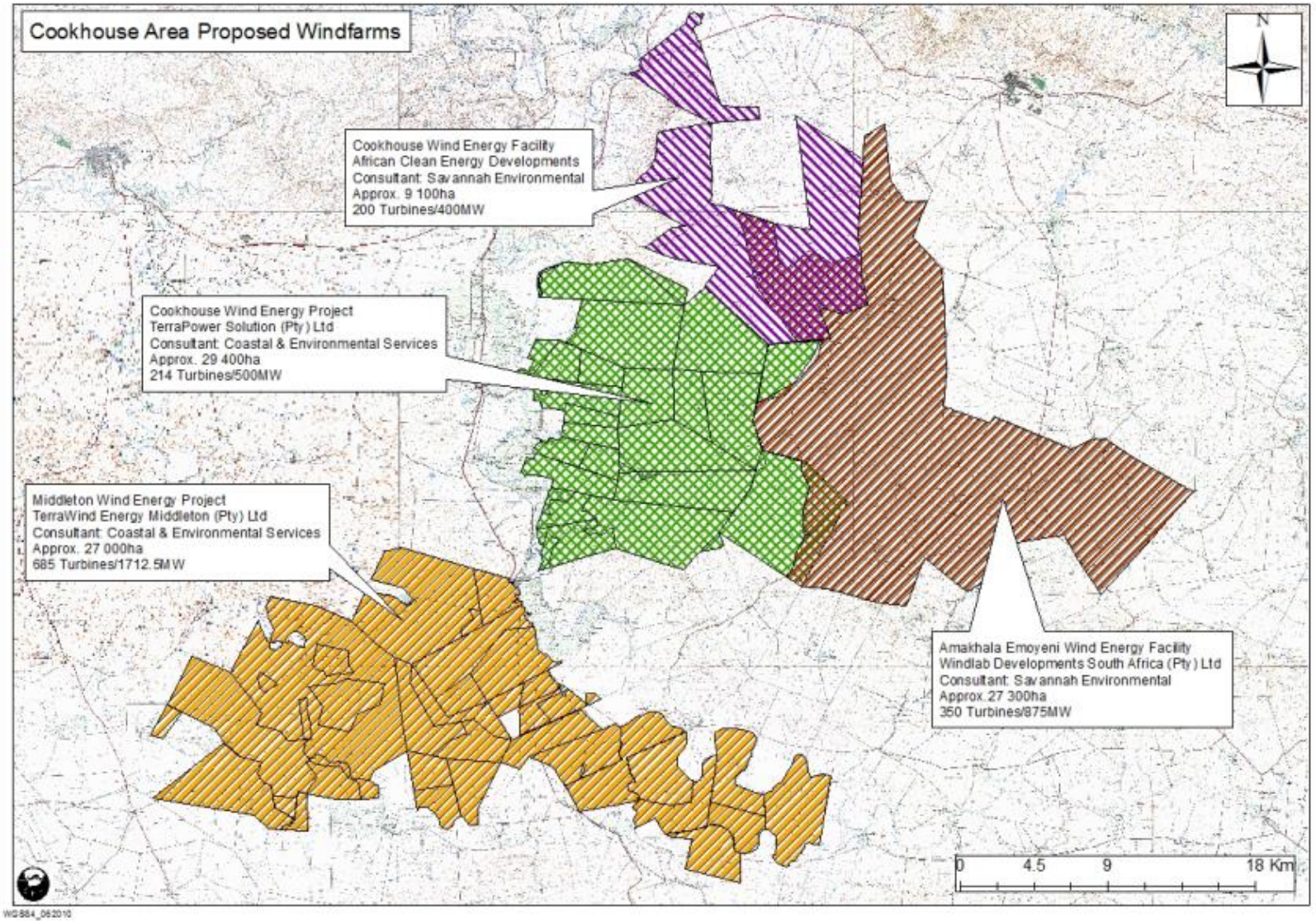

Figure 9.1: Cumulative geographical area covered by the proposed wind energy facilities for the area of Cookhouse, Bedford and Middleton in the Eastern Cape Province

9.1.2 Impact 1: Intrusion of large and highly visible construction activity on sensitive viewers

Cause and Comment

The height of the features being built and the siting on ridges is likely to expose construction activities against the skyline. Large construction vehicles and equipment will be highly visible. An increase in activity, vehicles and workers in an otherwise quiet area will affect views. Traffic will be disrupted while large turbine components are moved along public roads. Activity at night is also probable since transport of large turbine components may occur after work hours to minimise disruption of traffic on main roads. Construction of power lines and pylons in the region was observed during the photographic survey and, considering the number of power lines in the region, this is probably a common sight.

Mitigation and Management

The most obvious causes of this impact cannot be mitigated since the turbines are so tall and they are to be installed on the top of ridges. The duration of the impact is short, though, and there are a number of mitigation measures that will curtail the intensity to some extent:-

- New road construction should be minimised and existing roads should be used where possible.
- The contractor should maintain good housekeeping on site to avoid litter and minimise waste.
- Clearance of indigenous vegetation should be minimised and rehabilitation of cleared areas should start as soon as possible.
- Erosion risks should be assessed and minimised as erosion scarring can create areas of strong contrast which can be seen from long distances.
- Laydown areas and stockyards should be located in low visibility areas (e.g. valley between the ridges) and existing vegetation should be used to screen them from view.
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency. See section on lighting for more specific measures.
- Fires and fire hazards need to be managed appropriately.

Significance Statement

Without mitigation

The duration of the impact is short term (while construction lasts). The extent is *regional* due to the nature of the development (height of towers and siting on ridges) and construction activities will be visible over long distances. The visual impact will be moderate to severe due to the high visual exposure that highly sensitive viewers (residents in or close to the wind farm area, and others in close proximity to the site) will experience during the construction phase. The high voltage power line network which traverses the study area is somewhat similar in scale to the wind farm and construction activity is often exposed against the skyline. However, the individual components of the wind turbines are very large and heavy compared with that of the power line pylons. Laydown areas, access roads, transport vehicles and construction equipment will be much larger and more visible.

With mitigation

The mitigation measures are there to contain the severity of the impact and if adhered to are likely to keep it at moderate. The significance of the impact remains **high** in terms of the suggested rating methodology, although the short duration of the impact should perhaps have more of an effect on the significance rating. Construction will last approximately 16 weeks (including 8 weeks to let the foundation concrete dry, 4 weeks to erect the turbines and a further 4 weeks for final commissioning and electrical connection). Erecting the turbines is potentially the most visible activity as it will most probably be exposed against the skyline. It is also worth noting that the visual impact of at least some of the construction phase is likely to be positive, especially during assembly of the turbine towers. The construction engineering feat of lifting and attaching components weighing more than 50 tons a piece in a highly visible area is bound to be spectacular (see for example, (Degraw 2009)). Further, most of the sensitive viewers living in close proximity to the turbines have agreed to have turbines on their properties and are presumably informed on the effect of the construction phase on their

views (*pers.comm.*CES).

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without Mitigation	Short Term	1	Regional	3	Severe	4	Definite	4	**12**	**HIGH -**
With Mitigation	Short Term	1	Regional	3	Moderate	2	Definite	4	**10**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.3 Impact 2: Noise during the Construction Phase

Cause and Comment
The impact of the noise pollution that can be expected from the proposed Golden Valley WEF Project site during the construction phase will largely depend on the climatic conditions at the site. There will be a short-term increase in noise in the vicinity of the proposed project site during the construction phase as the ambient level will be exceeded. Noise during the construction phase could result from the following:-

- There will be an impact on the immediate surrounding environment from the construction activities, especially if pile driving is to be done. This, however, will only occur if the underlying geological structure requires this.
- The area surrounding the construction site will be affected for short periods of time in all directions, should a number of main pieces of equipment be used simultaneously.
- The number of construction vehicles that will be used in the project will add to the existing ambient levels and will most likely cause a disturbing noise.

Mitigation and Management

The impact during the construction phase will be difficult to mitigate. However, the following can be done:-

- 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.
- Ensuring that construction staff is given “noise sensitivity” training.

It should be noted that, while an effort should be made to time the piling so as to reduce noise impacts (see above), the construction team will also need to ensure that this activity is undertaken before the wind reaches a speed where safety of the construction team would be compromised.

Significance Statement
Without mitigation
The impact of noise during the construction phase would **probably** have ***moderate*** short term negative impacts. This would affect the *local area* and would be of LOW negative significance.

With mitigation
The impact of noise during the construction phase would **probably** have ***moderate*** short term negative impacts. This would affect the *local area* and would be of LOW negative significance.

Impact	Effect			

	Temporal Scale		Spatial Scale		Severity of Impact		Risk or Likelihood		Total Score	Overall Significance
CONSTRUCTION PHASE										
Without Mitigation	Short Term	1	Local	1	Moderate	2	Probable	3	**7**	**LOW -**
With Mitigation	Short Term	1	Local	1	Moderate	2	Probable	3	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.4 Impact 3: Disturbance of birds

Cause and Comment
During construction disturbance of avifauna during all of the construction activities has the ability to negatively affect avifauna. This is especially true during breeding of sensitive species. The impact can cause sensitive species to abandon their nest or chicks and as such these species can lose these important additions to many endangered, vulnerable or near threatened populations.

Mitigation and Management
Mitigation for disturbance is much the same as for habitat destruction. In general terms all construction activities should result in the minimum amount of disturbance as possible. This will be detailed in the site specific EMPr and will be enforced and overseen by the ECO for the project. During the EMPr the avifaunal specialist must identify any breeding sensitive bird species in close proximity to specified turbine and associated infrastructure positions. Specific recommendations must be provided for each case and these must be strictly enforced and followed.

Significance statement
Without mitigation
The impact of disturbance displacement of birds during the construction phase ***may occur*** and wil**l** have ***moderate*** short term negative impacts. This would affect the *study area* and would be of LOW negative significance. Although disturbance is rated as low significance, mitigation must however still be implemented to keep it this way and make sure that sensitive bird species are not affected.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without Mitigation	Short term	1	Study Area	2	Moderate	2	May occur	2	**7**	**LOW -**
With Mitigation	Short term	1	Study Area	2	Slight	1	May occur	2	**6**	**LOW -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.5 Impact 4: Loss of bird habitat through vegetation clearing/habitat destruction

Cause and Comment
During construction a large amount of habitat destruction will take place. This will be from the actual footprint of each turbine as well as associated infrastructure such as roads, batching plants, labour camps, power lines, substations and machinery and equipment storage. From an avifaunal perspective this habitat destruction will result in a loss in habitat for many bird species. Of particular concern is the river and any natural habitat surrounding the river. This is, however, mostly

transformed and used for large scale commercial agriculture. As mentioned above, in the micro-habitats section, agricultural lands can be an important habitat for birds and as such should not be discounted simply because the natural vegetation does no longer exist. Of particular concern would be breeding bird species and all care should be taken to avoid habitat destruction and disturbance in the vicinity of any breeding sensitive species.

Mitigation and Management

On a project such as this the possibility for mitigating the impact of habitat destruction is very low. The scale of the project means that it is inevitable that large amounts of habitat destruction will take place. The mitigation for this impact will be to only affect the minimum amount of habitat possible. This means that, where possible, existing roads must be used and batching plants, labour camps, equipment storage, etc should be situated in areas that are already disturbed. A full site specific EMPr must also be prepared to specify all of the impacts and mitigation measures and provide a step by step programme to follow for the ECO on site. Specialist avifaunal input must be included into the EMPr and this will focus on breeding sensitive species and their locations and the mitigation for this impact.

Significance statement

Without mitigation

The impact of loss of bird habitat through vegetation clearing on the construction site would **probably** have ***moderate*** permanent negative impacts. This would affect the *study area* and would be of MODERATE negative significance.

With mitigation

The impact of loss of bird habitat through vegetation clearing on the construction site **may** have ***moderate*** permanent negative impacts. This would affect the *study area* and would be of MODERATE negative significance.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without Mitigation	Permanent	4	Study area	2	Moderate	2	Probable	3	**11**	**MODERATE -**
With Mitigation	Permanent	4	Study area	2	Moderate	2	May occur	2	**10**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.6 Impact 5: Loss of Thicket

Cause and Comment

Construction of the wind farm will result in a small amount of loss of the limited areas of Thicket on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

If nothing were built on the site, the overall significance would be positive.

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.
- Do not remove vegetation in areas set aside for conservation within the site.
- Proposed turbine sites are not situated within the few remaining patches of thicket. If any turbines are located in or nearby thicket, they should be moved.

Significance statement
Without mitigation
In the construction phase of this development, the impact will be long term, localised, may occur and will be a slight severity. The overall Significance of the impact will thus be a slight negative.

With mitigation
With mitigation, in the construction phase of the development, with mitigation the impact is not reduced and remains an overall significance of low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Long Term	3	Localised	1	Slight	1	May Occur	2	**7**	**LOW -**
With mitigation	Medium term	2	Localised	1	Slight	1	May Occur	2	**6**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Localised	1	Beneficial	4	May	2	**8**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.7 Impact 6: Loss of Bedford Dry Grassland

Cause and comment
Construction of the wind farm will result in loss of Bedford Dry Grassland on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

If nothing were built on the site, the overall significance would be positive

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.
- Do not remove vegetation in areas set aside for conservation within the site.

Significance Statement
Without mitigation:
In the construction phase of this development, the impact will be long term, occurring within the study area, probably and will be a slight impact. The overall Significance of the impact will thus be a moderate negative.

With mitigation:
With mitigation, the loss of Bedford Dry Grassland due to trampling and other construction impacts can be reduced. In the construction phase of the development, with mitigation the impact is reduced to medium term, with a low severity and an overall significance of low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Long term	3	Study Area	2	Slight	1	Probable	3	**9**	**MODERATE -**
With mitigation	Medium term	2	Study Area	2	Slight	1	May occur	2	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Beneficial	1	Definite	4	**11**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.8 Impact 7: Loss of Karroid Thicket

Cause and comment
Construction of the wind farm will result in loss of Karroid Thicket on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively. If nothing were built on the site, the overall significance would be a positive.

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.
- Do not remove vegetation in areas set aside for conservation within the site.

Significance Statement
Without mitigation:
In the construction phase of this development, the impact will be long term, occurring within the study area, probably and will be a moderate impact. The overall Significance of the impact will thus be a moderate negative.

With mitigation:
With mitigation, in the construction phase of the development, with mitigation the impact is reduced to medium term, with a low severity and an overall significance of low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Long term	3	Study Area	2	Moderate	2	Probable	3	**10**	**MODERATE -**
With mitigation	Medium term	2	Study Area	2	Low	1	May occur	2	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Beneficial	1	Definite	4	**11**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.9 Impact 8: Loss of Scrub Grassland

Cause and comment
Construction of the wind farm will result in loss of Scrub Grassland on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively. If nothing were built on the site, the overall significance would be positive.

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.
- Do not remove vegetation in areas set aside for conservation within the site.

Significance Statement
Without mitigation:
In the construction phase of this development, the impact will be long term, occurring within the study area, probably and will be a moderate impact. The overall Significance of the impact will thus be a moderate negative.

With mitigation:
With mitigation, in the construction phase of the development, with mitigation the impact is reduced to medium term, with a low severity and an overall significance of low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Long term	3	Study Area	2	Moderate	2	Probable	3	**10**	**MODERATE -**
With mitigation	Medium term	2	Study Area	2	Low	1	May occur	2	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Beneficial	1	Definite	4	**11**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.10 Impact 9: Loss of plant species of special concern

Cause and Comment
There are thirteen species of special concern on the study site. These are *Pachypodium bispinosum, Pelargonium sidoides, Crassula perfoliata, Euphorbia globosa, Euphorbia meloformis, Aloe tenuior, Anacampestros* sp, *Euphorbia meloformis, Tritonia* sp, *Watsonia* sp, *Drosanthemum* sp, *Psilocaulon* sp and *Trichodiadema* sp. There may be many additional species of special concern that will be found on site during construction that were not found during this study. These should be relocated of they need to be removed, and the required permits obtained in order to do so. If nothing was built on the site the overall impact would be a moderate positive, assuming the area is well-managed, and grazing kept to a minimum.

Mitigation and management
It is recommended that areas containing species of special concern be noted and every effort made to reduce the impacts of construction on these sections of vegetation. SSC in any area to be cleared should be identified and rescued. Some SSC will not transplant. These individuals should, as far as possible, be left untouched.

Significance statement
Without mitigation
Without mitigation in the construction phase of the project the impact will be restricted to the study area, long term and definite with a moderate impact, resulting in an overall significance of moderate negative. This impact was assessed with a high level of confidence.

With mitigation
With mitigation the severity of the impact is decreased from moderate to slight, but the overall significance of the impact remains moderate negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Long term	3	Study area	2	Moderate	2	Definite	4	**11**	**MODERATE-**
With mitigation	Long term	3	Study area	2	Slight	1	Definite	4	**10**	**MODERATE-**
NO-GO OPTION										
Without mitigation	Long term	3	Study area	2	Moderately Beneficial	2	Probable	3	**10**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.11 Impact 10: Introduction of alien plant species

Cause and Comment

As with all building operations, the introduction of alien and invader species is inevitable; with disturbance comes the influx of aliens.

Mitigation and management

Mitigation measures to reduce the impact of the introduction of alien invaders, as well as mitigation against alien invaders that have already been recorded on the site should be actively maintained throughout both the construction and operation phases. Removal of existing alien species should be consistently done. Also, rehabilitation of disturbed areas after the construction of the wind energy facility should be done as soon as possible after construction is completed. Invasive plant species are most likely to enter the site carried in the form of seeds by construction vehicles and staff, and these should be cleaned before entering the site to prevent alien infestation

Significance Statement

Without mitigation

In the construction phase of the development, the impact will be short term, restricted to the study area and definite, and severe. The impact will have an overall significance of moderate negative. Should the proposed development not go ahead (the No-Go option), the impact would be permanent, definite and restricted to the study area with a severity of moderate and an overall significance of high negative. This impact was assessed with a high level of confidence.

With mitigation

In the construction phase of development, mitigation measures will reduce both the likelihood and severity of the impact to 'may occur' and slight respectively. Overall significance of the impact is thus reduced from moderate negative to low negative. Alien invasion is just as likely to occur if no development takes place and mitigation measures for the No-Go option will reduce temporal scale, severity and likelihood as well, giving an overall significance of low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Short-term	1	Study area	2	Severe	4	Definite	4	**11**	**MODERATE -**
With mitigation	Short-term	1	Study area	2	Slight	1	May Occur	2	**6**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Moderate	2	Definite	4	**12**	**HIGH -**
With mitigation	Medium-term	2	Study area	2	Slight	1	May Occur	2	**7**	**LOW -**

9.1.12 Impact 11: Loss of faunal biodiversity

Cause and Comment
Loss of faunal diversity will occur mainly as a result of habitat destruction and resultant restriction in animal movement will reduce the fauna on the site. In addition, workers trapping animals will have an effect on the faunal populations.

If nothing was built on the site the overall impact would be a high positive.

Mitigation and management
Loss of faunal diversity will occur mainly as a result of habitat destruction and resultant restriction in animal movement will reduce the fauna on the site. In addition, workers trapping animals will have an effect on the faunal populations.

If nothing was built on the site the overall impact would be a high positive.

Significance Statement
Without mitigation
Without mitigation in the construction phase of the development, the impact will be long-term, restricted to the study area and probably will occur. Severity of the impact is moderate with an overall significance of moderate negative. This impact was assessed with a medium level of confidence.

With mitigation
With mitigation likelihood is decreased to unlikely and severity of impact is reduced to slight. The overall significance is thus a low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Long-term	3	Study area	2	Moderate	2	Probable	3	**10**	**MODERATE -**
With mitigation	Long-term	3	Study area	2	Slight	1	Unlikely	1	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Localised	1	Beneficial	4	Definite	4	**13**	**HIGH +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.13 Impact 12: Loss of faunal species of special concern

Cause and Comment
There are a number of species of special concern that occur within the study site. This development is unlikely to affect any of these as few are restricted to the site specifically.

Mitigation and management
Mitigation measures include those described for loss of faunal biodiversity. The impact is likely to be low, however and thus these mitigation measures not required for this impact.

Significance Statement
Without mitigation
Without mitigation in the construction phase of the development, the impact will be permanent, localised and unlikely with a severity of slight and an overall significance of low negative. This impact was assessed with a high level of confidence.

With mitigation

Mitigation measures for this impact are unnecessary as the impact is low negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Permanent	4	Localised	1	Slight	1	Unlikely	1	**7**	**LOW -**
With mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
NO-GO OPTION										
Without mitigation	Permanent	4	Localised	1	Beneficial	4	Definite	4	**13**	**HIGH +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.14 Impact 13: Disturbance / Displacement of Bats

Cause and Comment
Disturbance / displacement from around the turbines may result in reduced breeding productivity or reduced survival if bats are displaced from preferred habitat and are unable to find suitable alternatives. Disturbance may be caused by the presence of turbines, and/or by maintenance vehicles and people, as well as during the construction of the turbines.

Mitigation and management
Not a great deal can be done to minimise the effects of disturbance displacement from construction activities. However, within reason noise must be kept to a minimum when constructing the wind energy facility.

Significance statement
Without mitigation
In the construction phase without mitigation the impact will occur over the short term, be restricted to the study area and probable with a slight severity. Overall significance is Low Negative.

With mitigation
With mitigation, the severity is still slight, resulting in an overall significance of Low Negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Short term	1	Study area	2	Slight	1	Probable	3	**7**	**LOW -**
With mitigation	Short term	1	Study area	2	Slight	1	Probable	3	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	Long term	3	Localised	1	Slight	1	May occur	2	**7**	**LOW +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.15 Impact 14: Loss of bat habitat due to vegetation clearing

Cause and comment
Change to or loss of habitat due to wind turbines and associated infrastructure. A relatively small area of habitat for bats will be completely destroyed in the construction process.

Mitigation and management

The following mitigation measures can be used to minimise the effects of loss of habitat:

- The wind turbines should not be placed on the tops of ridges.
- Every effort should be made to rehabilitate the damaged vegetation to minimise the habitat losses to resident bat species.

Significance Statement

Without mitigation
For the construction phase without mitigation the impact will occur in the short term, will be restricted to the study area and is probable with a severity of slight and an overall significance of Low Negative.

With mitigation
With mitigation the risk is slight and the overall significance is a Low Negative

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without mitigation	Short term	1	Study area	2	Slight	1	Probable	3	**7**	**LOW -**
With mitigation	Short term	1	Study area	2	Slight	1	May occur	2	**6**	**LOW -**
NO-GO OPTION										
Without mitigation	Long term	3	Study area	2	Slight	1	May occur	2	**8**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.1.16 Impact 15: Heritage Impact

Cause and Comment
Wind energy facilities are big developments that can produce a wide range of impacts that will affect the heritage qualities of an area. Typically each turbine can be up to 100m high with blades/rotors up to 60m in radius. Each turbine site needs road access that can be negotiated by a heavy lift crane(s) which means that in undulating topography (such as in the study area) deep cuttings and contoured roads will have to be cut into the landscape to create workable gradients. During the construction phase each of the turbine sites will have to be leveled off to create a solid platform for cranes as well as a lay-down area for materials. This will involve earthmoving and road construction, followed by the bringing in of materials and plant. The actual construction of the turbines will involve excavation into the land surface to a depth of 3m and over an area of 400m^2 for the concrete base. The pre-fabricated steel tower is bolted on to the base and erected in segments. The nacelle containing the generator is finally attached followed by the rotors. The turbines are connected to a mixture of underground cables and overhead power lines to sub-station where after the generated current will be fed to an existing substation via a 132/400 kV transmission line. During the construction phase the following physical impacts to the landscape and any heritage that lies on it can be expected:

- Bulldozing of roads to turbines sites with a possibility of cut and fill operations in places.
- Upgrading of existing farm tracks
- Creation of working and lay-down areas close to each turbine site
- Excavation of foundations for each tower
- Excavation of many kilometres of linear trenches for cables
- Erection of a 132/400 kV power line
- Construction of electrical infra-structure in the form of one or more sub-stations.

In terms of impacts to heritage, archaeological sites which are highly context sensitive are most vulnerable to the alteration of the land surface. The survey undertaken to inform this assessment has revealed that archaeological sites are very sparse on the landscape which is consistent with earlier work carried out on another proposed wind farm in the area (Halkett and Webley 2009). This means that generally the impacts to archaeological heritage are likely to be of low significance. The clear patterning of archaeological sites in valley bottoms and alluvial plains contrasts with the requirement to erect wind turbines in windy exposed areas such as ridge tops and hill slopes which is in itself a factor that is likely to mitigate damage.

Mitigation and management

The best way to manage impacts to archaeological material is to avoid impacting them. This means micro-adjusting turbine positions where feasible, or routing access roads around sensitive areas. If primary avoidance of the heritage resource is not possible some degree of mitigation can be achieved by systematically removing the archaeological material form the landscape. This is generally considered a second-best approach as the process that has to be used is exacting and time-consuming, and therefore expensive. Furthermore the NHRA requires that archaeological material is stored indefinitely, which has cost implications and places an undue burden on the limited museum storage space available in the province. Although indications are that impacts to archaeological material are likely to be of low significance, it must be noted that it has not been possible to assess the potential impacts of road construction on archaeological sites. Furthermore, turbine positions provided are preliminary. It is recommended that the following mitigation measures are implemented.

- Existing farm tracks must be re-used or upgraded to minimise the amount of change to un-transformed landscape.
- In general terms, construction of turbines and roads in valley bottoms should be kept to a minimum.
- During the detailed planning phase, drawings of proposed road alignments, infrastructure and near-final turbine positions should be submitted to an archaeologist for review and field-proofing. Micro-adjustment of alignments and turbine positions is likely to be sufficient to achieve adequate mitigation.

Significance statement

The significance of impacts during the construction phase to physical heritage such as archaeological material and built environment is likely to be low..

Without mitigation

The impact on heritage in the construction phase **may occur** and have ***moderate*** permanent negative impacts. This would affect the *local area* and would be of MODERATE significance.

With mitigation

The impact on heritage in the construction phase is **slight** and will have ***slight*** short-term negative impacts. This would affect the *local area* and would be of LOW negative significance.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
CONSTRUCTION PHASE										
Without Mitigation	Permanent	4	Localised	1	Moderate	2	May Occur	2	**9**	**MODERATE -**
With Mitigation	Short	1	Localised	1	Slight	1	Slight	1	**4**	**LOW -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

The no-go alternative. Not implementing the proposal will result in no impacts to heritage, apart from those impacts caused by natural forces such as erosion**.**

9.1.17 Impact 16: Palaeontological Impacts

Cause and comment
Significant impacts on palaeontological heritage normally occur during the construction phase and not in the operational phase of any development. Excavations made during the course of installing the proposed wind farm turbines and associated developments (*e.g.* roads, powerlines) may well expose, damage, disturb or permanently seal-in scientifically valuable fossil heritage that is currently buried beneath the land surface or mantled by dense vegetation.

The fossil record and inferred palaeontological sensitivity of the three main rock units represented in the study region are summarized in Table 9-1 (Based on Almond *et al*., 2008). Bedrock excavations made during construction of the proposed wind energy facility east of Cookhouse will primarily affect continental sediments of the Middleton Formations of the Late Permian Beaufort Group.

These sediments underlie the great majority of the study area and are renowned for their rich fossil heritage of terrestrial vertebrates (most notably mammal-like reptiles or therapsids), as well as fish, amphibians, molluscs, trace fossils (*e.g.* trackways) and plants (*e.g.* petrified wood). Caenozoic surface sediments in the study area (*e.g.* alluvium, colluvium) are generally of low palaeontological sensitivity, while the Karoo dolerite intrusions do not contain fossil remains at all.Although the direct impact of the proposed project will be local, fossils within the Beaufort Group are of importance to national as well as international research projects on the fossil biota of the ancient Karoo and the end-Permian mass extinction.

Table 9-1: Sensitivity of Fossil Heritage of Rock Units represented within Cookhouse study area

FORMATION & AGE	FOSSIL HERITAGE	PALAEON-TOLOGICAL SENSITIVITY	RECOMMENDED MITIGATION FOR NEW DEVELOPMENTS
Superficial deposits (colluvium, alluvium *etc*) **Late Caenozoic**	Sparse remains of vertebrates (*e.g.* mammalian bones, teeth), trace fossils (calcretized termitaria, rhizoliths), freshwater molluscs, microfossils (*e.g.* palynomorphs)	LOW	None
Karoo Dolerite Suite **Early Jurassic**	None (igneous intrusions)	ZERO	None
Middleton Formation (Lower Beaufort Group) **Late Permian**	Rich continental biota of reptiles, therapsids, amphibians, fish, molluscs, petrified wood and plant debris & trace fossils	HIGH TO LOCALLY VERY HIGH	Intensive recording and collection of fossil material within designated high sensitivity areas demarcated on map (Fig. ** below)

Mitigation and management
Where rich or unusual fossil remains are likely to be present within the Beaufort Group rocks, study and judicious sampling of the sediments and their enclosed fossils by a qualified palaeontologist *before* construction starts is usually recommended. However, the greater part of the proposed wind farm development at Cookhouse is not considered as posing a serious risk to local fossil heritage because:

- deep or voluminous bedrock excavations are unlikely to be required for the installation of wind turbines, electricity powerlines and ancillary developments, with the possible exception of any borrow pits;
- an extensive, and often thick, mantle of comparatively unfossiliferous drift deposits (alluvium, colluvium) covers the more sensitive Beaufort Group rocks over much of the region;
- fossil remains are apparently much scarcer within the Beaufort Group succession in the study area compared with similar-aged outcrops further west within the Great Karoo (as borne out by this and a previous, independent palaeontological field study).
- the Beaufort Group in the study region has been extensively affected by Permotriassic tectonism (folding, faulting, some cleavage development) and locally by thermal metamorphism due to Jurassic dolerite intrusion, perhaps reducing the palaeontological sensitivity of these rocks (*N.B.* These last effects may not be very significant in practice).

Nevertheless, it is recommended that specialist palaeontological mitigation be carried out at least within the two small areas demarcated in the satellite image in the Specialist Volume. The proposed specialist mitigation should involve the intense recording and judicious collection of fossil material within the designated two areas, as well as the recording of pertinent geological data (e.g. sedimentological information).

Note that the palaeontologist involved will be required to obtain beforehand a palaeontological collection permit from SAHRA and to arrange a suitable repository for any fossils collected (*e.g.* Albany Museum, Grahamstown, BPI, Wits University, Johannesburg or Iziko: South African Museums, Cape Town).

Should substantial fossil remains, such as vertebrate bones, teeth or petrified wood, be found or exposed anywhere within the study area during construction of the Cookhouse wind farm, the responsible ECO should safeguard these – *in situ*, if feasible – and alert SAHRA as soon as possible so that appropriate mitigation can be undertaken by a professional palaeontologist at the developer's expense.

Note that *providing* appropriate mitigation is carried out, as outlined here, the Cookhouse wind farm development should usefully contribute to our understanding of the rich palaeontological heritage of the Great Karoo region.

Significance Statement
According to the CES significance rating scheme the overall impact of the proposed Cookhouse wind farm on palaeontological heritage is assessed as LOW. This accords with "an acceptable impact for which mitigation is desirable but not essential". Failure to mitigate will probably result in the loss of local fossil heritage, while mitigation will probably provide new palaeontological data that is of regional significance (a moderately beneficial outcome). The no-go option will have a low negative impact compared with construction of the wind farm accompanied by recommended specialist mitigation, since the opportunity to collect further palaeontological data will be lost for the time being.

Without Mitigation
The palaeontological impacts in the construction phase would be **probable** and have ***moderate*** permanent negative impacts. This would affect the *local area* and would be of LOW negative significance.

With Mitigation
The palaeontological impacts in the construction phase would be **probable** and have ***moderate*** permanent negative impacts. This would affect the *regional area* and would be of MODERATE positive significance.

Impact	Effect			

	Temporal Scale		Spatial Scale		Severity of Impact		Risk or Likelihood		Total Score	Overall Significance
CONSTRUCTION PHASE										
Without Mitigation	Permanent	4	Localised	1	Moderate	2	Probable	3	**10**	**LOW -**
With Mitigation	Permanent	4	Regional	3	Moderately Beneficial	2	Probable	3	**12**	**MODERATE +**
NO-GO OPTION										
Without mitigation	Long term	3	Study area	2	Moderate	2	Probable	3	**13**	**LOW -**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.2 Operational Phase Impacts

9.2.1 Introduction

As discussed in the previous section, the EAP also investigated the cumulative impacts for the operational phase of establishing four wind farms in the area of Cookhouse, Bedford and Middleton in the Eastern Cape Province. The cumulative impact is discussed together with the individual impact it pertains to.

9.2.2 Impact 1: Change in the agricultural landscape as a result of establishing a wind farm

Cause and Comment
The current landscape character is that of commercial stock and irrigated farming. The landscape character has a low sensitivity to the change that will be caused by introduction of a wind farm. It is expected that land use of stock farming will not be altered by introduction of wind turbines in the area. However, this is a large wind farm and the landscape aspect will be affected, especially initially when the wind farm is still a new feature in the landscape.

Mitigation and Management
There are no mitigation measures that will change the significance of the landscape impact other than avoiding the site entirely. A reduction in wind turbine numbers are unlikely to have an appreciable effect since even a few wind turbines will still have high visibility.

Significance Statement
The duration of the impact is long term (not permanent) since the turbines can be removed from the landscape after their life span of 40 years has been reached. The spatial scale is regional due to the visibility and size of the project. The severity of the impact is expected to be moderate since the landscape character sensitivity is low but the wind farm is particularly large. The likelihood of the impact occurring is probable (and not definite) since it is not yet known what the impact of a wind farm on an agricultural landscape will be in South Africa. The significance of the landscape impact is therefore expected to be **moderate.**

Without mitigation
In the agricultural landscape in the operation phase would be **probable** and have ***moderate*** long-term negative impacts. This would affect the *regional area* and would be of MODERATE negative significance.

Cumulative Impact Statement
The development of multiple wind energy facilities in the area has the potential for cumulative impact on the change in the agricultural landscape. The visual impact of the proposed wind farm is reduced due to Eskom's transmission lines that presently transverse the proposed site, thus the area has already been impacted, and no longer be seen as a pristine agricultural landscape. The cumulative impact will compound this moderate impact into a high impact. The cumulative impact is therefore assessed to be of high concern. There are no mitigatory measures available to reduce the impact.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without Mitigation	Long Term	3	Regional	3	Moderate	2	Probable	3	**11**	**MODERATE -**
With Mitigation	Long Term	3	Regional	3	Moderate	2	Probable	3	**11**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long Term	3	Regional	3	Moderate	2	Definite	4	**12**	**HIGH -**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.2.3 Impact 2: Intrusion of large wind turbines on the existing views of sensitive visual receptors

Cause and Comment

Most of the viewers/viewpoints identified in this report are highly sensitive to changes in their views. However, the region has a low population density and the proposed site is far removed from visually sensitive areas such as pristine wilderness sites and protected areas. A large network of high voltage power lines radiates across most of the study area and pylons are visible from most viewpoints. The wind farm will alter a number of views due to its size (spatial extent and the height of the turbines) and visibility (located on ridges). There are a few visual receptors (viewers and viewpoints) for which the visual intrusion will be very high (residents living on or close to the wind farm area), although they have agreed to turbines on their properties.

Mitigation and Management

Most of the viewers/viewpoints identified in this report are highly sensitive to changes in their views. There are no mitigation measures that will change the significance of the intrusion impact other than avoiding the site entirely. A reduction in wind turbine numbers are unlikely to have an appreciable effect since even a few wind turbines will still have high visibility.

Significance Statement

Without mitigation

The impact of intrusion of large wind turbines on the existing views of sensitive visual receptors in the operation phase would be **definite** and have ***moderate*** long-term negative impacts. This would affect the *regional area* and would be of HIGH negative significance.

With mitigation

The impact of intrusion of large wind turbines on the existing views of sensitive visual receptors in the operation phase would be **definite** and have *moderate* long-term negative impacts. This would affect the *regional area* and would be of HIGH negative significance.

The duration for the impact is **long term** since the life span of a wind turbine can be up to 40 years after which it can be dismantled, or upgraded. The extent of the impact is **regional** since residents and other sensitive viewers will potentially view the wind farm from different areas in the region. Many existing views will be altered by the wind farm. It is not clear whether the change will be perceived as positive (i.e. as a symbol of sustainable and environmentally less harmful energy harvesting) or negative, since opinions on the visual aesthetics of wind farms differ widely. It is expected that the **severity** of the impact will be high for a number of residents who live on or very close to the wind farm area (many of whom presumably are in favour of the wind farm). For most of

the other sensitive viewers discussed above the severity will be **moderate to low**. The impact will **definitely** occur. The overall significance of the visual impact on sensitive viewers is **high**.

Cumulative Impact Statement
The impact statement remains the same as for the single wind energy project as assessed above due to the fact that the change could be perceived as positive (i.e. as a symbol of sustainable and environmentally less harmful energy harvesting) or negative, since opinions on the visual aesthetics of wind farms differ widely. There are no mitigation measures available.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without Mitigation	Long Term	3	Regional	3	Moderate	2	Definite	4	**12**	**HIGH**
With Mitigation	Long Term	3	Regional	3	Moderate	2	Definite	4	**12**	**HIGH**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long Term	3	Regional	3	Moderate	2	Definite	4	**12**	**HIGH**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.2.4 Impact 3: Impact of shadow flicker on residents in close proximity to wind turbines

Cause and Comment
The impact of shadow flicker[1] caused by wind turbines appears to be a minor issue in most countries where wind farms are common. There is no official set of regulations governing the levels of exposure to shadow flicker and it is unclear what the health risks are. Most reports on shadow flicker suggest that the threshold for a significant impact is 30 hours per year or more and many countries have adopted this as an informal regulation, following a court judgement made in Germany (EDR 2009).

Mitigation and Management
The following mitigation measures can reduce the impact of shadow flicker:

- Trees are an effective measure against shadow flicker and if residents are willing trees can be planted to reduce flickering.
- Alternatively, a sensor can be installed at homes potentially affected by shadow flicker which shuts down the turbine on the rare occasion that the conditions are such that shadow flicker can occur (Portwain 2008). It is unclear how practical this is as a solution but it should be investigated.
- Adjust layout of the wind farm (site of turbines) to lower the number of residents affected by shadow flicker.

[1] An impact particular to wind turbines is very large moving shadows created by the giant blades when the sun is low on the horizon

Significance Statement

Without mitigation

The impact of shadow flicker on residents in close proximity to wind turbines would be **unlikely** and have ***severe*** long-term negative impact. This would affect the *local area* and would be of MODERATE negative significance.

With mitigation

The impact impact of shadow flicker on residents in close proximity to wind turbines would be unlikely and have *moderate* long-term negative impacts. This would affect the *local area* and would be of LOW negative significance.

Cumulative Impact Statement

As the number of wind energy facilities increase, so could the effect of shadow flicker due to the number of wind turbines and their heights in a single area. However, the Cookhouse, Bedford and Middleton area is a rural/agricultural region and therefore is unlikely to have many viewers. The topography of the landscape in the area where the wind farm is to be located is such that many viewers within the wind farm area will see only a few turbines at a time relative to viewers outside the area and west of Cookhouse. This is due to the fact that the wind farm will be located in an area with irregular relief and which is lower than most of the surrounding region.

There are no mitigation measures available to address on a cumulative scale. Thus mitigation should be considered by the individual proponents as suggested above.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without Mitigation	Long Term	3	Localised	1	Severe	4	Unlikely	1	**9**	**MODERATE -**
With Mitigation	Long Term	3	Localised	1	Moderate	2	Unlikely	1	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long term	3	Regional	3	Severe	4	Definite	4	**14**	**HIGH -**
With mitigation	N/A		N/A		N/A		N/A			**N/A**

9.2.5 Impact 4: Impact of Noise during the Operation Phase

The impact of the noise pollution that can be expected from the site during the operational phase will largely depend on the climatic conditions at the site. The ambient noise increases as the wind speed increases. Under very stable atmospheric conditions, a temperature inversion or a light wind the turbines will not be operational as the cut-in speed is 4m/s.

Cause and Comment

During the operational phase, the results indicate the following:

- The noise level at two (Project 1) noise sensitive areas during the operational phase was found to be unacceptable. This has been remodelled based on the final layout and been found to be adequate.
- 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 not high enough (i.e. are well below 90 dB) to cause physiological effects.

Mitigation and Management
Given that it is not possible to eliminate all noise during the operational phase, the following general recommendations are made:

- All wind turbines should be located at a setback distance of 500m from any homestead and a noise criteria level at the nearest residents of 45 dB(A) should be used to locate the turbines.

Significance Statement
Noise sensitive areas (NSA) 5 and 7.

Without mitigation
The impact of noise on *NSA 5 and 7* the above-mentioned noise sensitive areas in the operation phase would be **definite** and have ***severe*** long-term negative impacts. This would affect the *local area* and would be of HIGH negative significance. NSAs 5 and 7 are affected by Project 1. **NOTE THAT NOISE MODDELLING ON THE UPDATED LAYOUT FOR PROJECT 1 HAS CONFIRMED THAT NO SENSITIVE RECEPTORS ARE NEGATIVELY AFFECTED.**

***Noise sensitive areas (NSA)* 3 & 6**
Without mitigation
The impact of noise on *NSA 3 & 6* as a result of the operation phase would be **definite** and have ***severe*** long-term negative impacts. This would affect the *local area* and would be of HIGH negative significance. NSAs 3 and 6 are affected by Project 1.

With mitigation
The impact of noise *NSA 3 & 6* as a result of the operation phase **may occur** and have ***slight*** long-term negative impacts. This would affect the *local area* and would be of LOW negative significance.

Cumulative Impact Statement
The cumulative impacts of noise during operational phase could be determined to be low negative. The noise will be localised and only slight as the turbines would be micro-sited away from homesteads and noise sensitive receptors. Due to the remoteness and distance away from nearest neighbours, no cumulative impact is envisaged.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE NSA *5 & 7*										
Without Mitigation	Long Term	3	Localised	1	Slight	1	May occur	2	**7**	**LOW -**
With Mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
OPERATIONAL PHASE NSA *3 & 6*										
Without Mitigation	Long Term	3	Localised	1	Severe	4	Definite	4	**12**	**HIGH -**
With Mitigation	Long Term	3	Localised	1	Slight	1	May occur	2	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long Term	3	Localised	1	Slight	1	May occur	2	**7**	**LOW -**
With mitigation	Long Term	3	Localised	1	Slight	1	May occur	2	**7**	**LOW -**

9.2.6 Impact 5: Disturbance of birds

Cause and Comment
During operation the disturbance caused by the noise and visual movement of the wind turbines will disturb avifauna. This disturbance is likely to result in shy and sensitive species leaving the area.

Mitigation and Management
No mitigation is required, as it is unlikely that any measures that are feasible will reduce the impact of this disturbance to an extent where the shy and sensitive species will remain. In comparison to the other impacts, this impact is relatively minor.

- Wind turbines should be fitted with technology that reduces the amount of noise produced by their machines. This will especially reduce the disturbance to nesting birds.
- The wind turbines must not be placed on the leading edge of the ridges as that is the prime area the birds (mainly raptors) move along depending on the direction of the wind. The current layout for Project 1 has been ground-truthed by the bird specialist and has been found to be aligned with his reccomendations.
- Noise must be kept to a minimum when servicing the wind energy facility.
- Visitors and maintenance staff to the facility or vehicles should stick to the roadways.
- If practical, red aircraft warning lights should be used in preference to white lights.

Significance statement
While the table below shows that this impact has been rated as moderate, this is misleading as the temporal scale and risk or likelihood push this impact score up. The significance should rather be seen as low.

Without mitigation
The impact of disturbance displacement during the operation of the wind energy facility would **probably** have ***moderate*** long term negative impacts. This would affect the *study area* and would be of MODERATE negative significance.

With mitigation
The impact of disturbance displacement during the operation of the wind energy facility would **probably** have ***slight*** long term negative impacts. This would affect the *study area* and would be of MODERATE negative significance.

Cumulative Impact Statement
The cumulative impact on birds increases due to the spatial scale increasing from *study area* to *regional*, as well as the impact being of a *severe* nature. The sensitivity map presented in the specialist study aids to guide the placing of turbines. Low sensitivity is reported for the area surrounding the power lines traversing the proposed site.

There are no mitigation measures available to address on a cumulative scale. Thus mitigation should be considered by the individual proponents as suggested above.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without Mitigation	Long Term	3	Study Area	2	Slight	1	Probable	3	**9**	**MODERATE -**
With Mitigation	Long Term	3	Study Area	2	Slight	1	Probable	3	**9**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**

With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long Term	3	Regional	3	Severe	4	Probable	3	**13**	**HIGH -**
With mitigation	Long Term	3	Regional	3	Severe	4	Probable	3	**13**	**HIGH -**

9.2.7 Impact 6: Disruption in local bird movement patterns

Cause and Comment
Large scale wind energy facilities will no doubt be a significant obstacle for birds to avoid and this avoidance behaviour may lead to decreased fitness[2] as birds expend more energy flying from one point to another. Of particular concern is the cumulative impact of multiple wind energy facilities in one area (as will be the case here).

Mitigation and Management
The following mitigation measures can be used to minimise the effects of barriers caused by the wind energy facility:

- Corridors must be left between turbines to allow birds to fly safely from one side of the site to the other.

Significance statement
The significance of this impact has been rated as moderate both with and without mitigation. The mitigation for this impact should not be seen as solving the problem as it is uncertain as to whether birds will use corridors between turbines and if they do how much increased risk they will face from collisions.

Cumulative Impact Statement
Important Bird Areas (IBAs) (Birdlife South Africa www.birdlife.org.za) have been mapped during the investigation of cumulative impacts for the Golden Valley WEF Project. IBAs are key sites for conservation globally. There are 122 IBAs in South Africa. They are small enough to be conserved in their entirety and often already part of a protected area network. They hold significant numbers of one or more threatened bird species; endemic species; and/or hold large numbers for migratory or congregatory bird species.

The closest IBA to the Cookhouse area is 95km away near to Fort Beaufort. Table 9-2 below details the IBAs within approximately 250km of Cookhouse.

Table 9-2 – Important Bird Areas near to the Golden Valley WEF Project

NAME OF IMPORTANT BIRD AREA	AREA AND PROTECTION STATUS
Katberg – Readsdale Forest Complex (Sa091)	20,000ha, Partially Protected
Amathole Forest Complex (Sa092)	42,000ha, Partially Protected
Alexandria Coastal Belt (Sa094)	15,460ha, Partially Protected
Algoa Bay Islands Nature Reserve (Sa095)	40ha, Fully Protected
Swartkops Estuary, Redhouse And Chatty Salt (Sa096)	926ha, Partially Protected
Maitland-Gamtoos Coast (Sa097)	1,800ha, Unprotected
Kouga-Baviaanskloof Complex (Sa093)	172,000ha, Partially Protected

[2] The ability to survive to reproductive age and produce viable offspring. Fitness also describes the frequency distribution of reproductive success for a population of sexually mature adults.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without Mitigation	Long term	3	Study area	2	Moderate	2	Definite	4	**11**	**MODERATE -**
With Mitigation	Long term	3	Study area	2	Slight	1	Probable	3	**9**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long term	3	Regional	3	Moderate	2	Definite	4	**12**	**HIGH -**
With mitigation	Long term	3	Regional	3	Slight	1	Probable	3	**10**	**MODERATE -**

9.2.8 Impact 7: Collisions of birds with the turbines

Cause and Comment

The cause of birds colliding with the turbines has been explained in this report and the various theories presented. Please refer to sections 8.1.1 and the Avifauna Specialist Report in the Specialist Volume. In general, the main cause will be the positioning of the turbines in or close to important bird flight paths. This impact of collisions is seen as the largest impact on avifauna for this project and as such the one that requires the most mitigation.

Mitigation and Management

The most important mitigation activity will be positioning the turbines away from sensitive avifaunal sites. These sites include the Fish River and the associated agriculture, as well as the canals, dams and pans etc.

The following mitigation measures can be used to minimise the effects of bird mortalities from collision with the wind energy facility:

- Reduce the number of perches available to birds on the turbine and tower. It is clear that the tubular tower greatly reduces opportunities for perching and therefore should be the structure of choice for the new wind energy project.
- Intermittent lighting must be used if possible (i.e. if it does not contradict aviation regulations), as well as red light which is less attractive to birds than white light.
- These recommendations are in line with the *Aviation Act (Act No. 74 of 1962): 13th Amendment of the Civil Aviation Regulations 1997* which states that: Night time wind turbine obstruction lighting should consist of medium intensity type B aviation red flashing lights. Minimum intensities of 2 000 candela for night-time red flashing or strobe lights are required. *Note: Steady-burning obstruction lights shall not be used.*
- To reduce the effects of motion smear rotor blades must either be painted with black stripes across the blade, in different positions on each blade, or a single solid black blade with two solid white blades. However, such marking of blades would possibly enhance the visual impact to surrounding communities and would need to be assessed by a specialist prior to further consideration. According to the *Aviation Act (Act No. 74 of 1962): 13th Amendment of the Civil Aviation Regulations 1997:* nothing is mentioned about the colour of rotor blades. The only instance that colour is mentioned is in reference to the colour of the actual turbine: Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness. The colours grey, blue and darker shades of white should be avoided altogether. If such colours have been used, the wind turbines shall be supplemented with daytime lighting, as required.
- The wind turbines must not be placed on the leading edge of the ridges as that is the prime area the birds (mainly raptors) move along depending on the direction of the wind. The

current layout for Project 1 has been ground-truthed by the bird specialist and has been found to be adequate.

- Spacing between turbines at a wind facility can have an effect on the number of collisions. Therefore turbines should be placed at least 300m apart.
- Monitoring for at least the first two years of operation should take place. If high bird mortalities are recorded then the wind farm must investigate emitting broadcasts of a certain radio frequency to discourage birds from entering high collision areas. This must be implemented if the specialist recommends it.
- Turbines could be programmed to switch off under specific conditions prone to bird collision such as during low wind.

Significance statement
The impact of collisions is a moderate impact and must be mitigated to reduce the impact. The site specific EMPr will, to a large extent, tighten up and further define the mitigation measures required in order to do this.

Without mitigation
The impact of bird mortalities associated with the wind energy facility would **probably** have ***severe*** long term negative impacts. This would affect the *study area* and would be of MODERATE negative significance.

With mitigation
The impact of bird mortalities associated with the wind energy facility **may** have ***moderate*** long term negative impacts. This would affect the *study area* and would be of MODERATE negative significance.

Cumulative Impact Statement
While a relatively low rate of bird mortality is associated with an individual wind energy facility, the cumulative impact of many wind farms on any one area will greatly increase the rate of mortalities. The proposed turbines may shield the power lines from bird collisions and from a cumulative impact point of view this will be advantageous for avifauna. There will be little or no need for specific site assessment during the EMPr.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without Mitigation	Long Term	3	Study area	2	Severe	4	Probable	3	**11**	**MODERATE -**
With Mitigation	Long Term	3	Study area	2	Moderate	2	May occur	2	**9**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long Term	3	Regional	3	Severe	4	Probable	3	**13**	**HIGH -**
With mitigation	Long Term	3	Regional	3	Moderate	2	May occur	2	**10**	**MODERATE -**

9.2.9 Impact 8: Collisions and electrocutions of birds with power lines and substations

Cause and comment
Collisions are one of the biggest single threats posed by overhead power lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted are bustards, storks, cranes and manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power

lines. Depending on the routes and number of overhead power lines in this project, this could have a serious impact on avifauna. Electrocutions of birds in the substation yards and on the power line poles could also have a large effect depending on the design of the infrastructure.

Mitigation and management
Mitigation for the impact of the electrical infrastructure will include the following:

Electrocutions- It is highly recommended that the steel monopole design be used for the 132KV power line poles. This design is generally very safe for birds as the clearances between live phases and earth phases is greater than 1.8 metres, which is the length of the largest species wingspan. The steel monopole must also have the standard bird perch fitted, which will allow raptors a safe area to perch on the pole. Electrocutions in the substation yards should not be significant as the sensitive species are not known to use these sites for perching or roosting. If fatalities are recorded during monitoring mitigation measures should entail adding insulation to infrastructure.

Collisions- The significance of the short power lines that will service this facility in relation to the collision risk of birds with the turbines is very small. In addition the 132KV lines will, for the most part, follow existing transmission lines. This will help to mitigate the impact of collision as power lines grouped together are more visible to birds while in flight. The power line routes must be walked during the site specific EMPr and any sections of collision concern should be marked with standard anti-collision marking devices to mitigate the impact of collision.

Significance Statement
The significance has been rated as moderate. However, should the steel monopole design be used for the power line and sensitive areas marked for collisions during the EMPr, this can rather be viewed as a low impact.

Without mitigation
The impact of the collisions and electrocutions of birds with power lines and substations during the operational phase **may** have ***moderate*** long-term negative impacts. This would affect the *study area* and would be of MODERATE negative significance

With mitigation
The impact of the collisions and electrocutions of birds with power lines and substations during the operational phase **may** have ***slight*** long-term negative impacts. This would affect the *study area* and would be of MODERATE negative significance

Cumulative Impact Statement
There is a low sensitivity reported for the area surrounding the power lines traversing the proposed site (Avifauna Specialist Report in Specialist Volume). The proposed turbines may shield the power lines from bird collisions and from a cumulative impact point of view this will be advantageous for avifauna.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Long-term	3	Study area	2	Moderate	2	May occur	2	**9**	**MODERATE -**
With mitigation	Long-term	3	Study area	2	Slight	1	May Occur	2	**8**	**MODERATE -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
With mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
CUMULATIVE IMPACT										

Without mitigation	Long-term	3	Regional	3	Moderate	2	May occur	2	**10**	**MODERATE -**
With mitigation	Long-term	3	Regional	3	Slight	1	May Occur	2	**9**	**MODERATE -**

9.2.10 Impact 9: Loss of Thicket

Cause and comment

During operation, the wind farm will require maintenance and transport to and from the various wind turbines. As such, a limited amount of disturbance and trampling of vegetation will occur during these operations. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

Mitigation and management

- Keep removal of vegetation to a minimum (turbine sites are not situated within the few remaining patches of thicket).

Significance Statement

Without mitigation

In the operation phase of the development, the impact will be permanent, localised, may occur and moderate, resulting in an overall significance of moderate negative. This impact was assessed with a high level of confidence.

With mitigation

In the operation phase of the development, severity of the impact is reduced to slight and remains an overall significance of low negative.

Cumulative Impact Statement

Due to the scope of this study it was not possible to ascertain vegetation types at all four proposed wind farm sites. Therefore, it is determined that the vegetation loss over the extent of the four proposed wind energy facilities could be extensive[3]. Every effort must be made to reduce the trampling and disturbance of vegetation, including the rehabilitation of affected areas. The spatial scale of the loss of vegetation is increased to regional and the overall impact is moderately negative, with and without mitigation.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Permanent	4	Localised	1	Moderate	2	May occur	2	**9**	**MODERATE -**
With mitigation	Permanent	4	Localised	1	Slight	1	Unlikely	1	**7**	**LOW-**
NO-GO OPTION										
Without mitigation	Permanent	4	Localised	1	Beneficial	1	May occur	2	**8**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
CUMULATIVE IMPACT										
Without mitigation	Permanent	4	Regional	3	Moderate	2	May occur	2	**11**	**MODERATE -**
With mitigation	Permanent	4	Regional	3	Slight	1	Unlikely	1	**9**	**MODERATE -**

[3] Determination reached based on the precautionary principle, as there is a lack of information.

9.2.11 Impact 10: Loss of Bedford Dry Grassland

Cause and comment
Construction of the wind farm will result in loss of Bedford Dry Grassland on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

If nothing were built on the site, the overall significance would be positive

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.

Significance Statement
Without mitigation
In the operation phase of the development, the impact will be permanent, restricted to the study are, probable and slight, resulting in an overall significance of moderate negative. This impact was assessed with a high level of confidence.

With mitigation
For the operation of the development, some Bedford Dry Grassland will have to be permanently removed. In the operation phase of the development, only the severity of the impact is reduced, resulting in an unchanged overall significance of moderate negative.

Cumulative Impact Statement
Due to the scope of this study it was not possible to ascertain vegetation types at all four proposed wind farm sites. Therefore, it is determined that the vegetation loss over the extent of the four proposed wind energy facilities could be extensive[4]. Every effort must be made to reduce the tramping and disturbance of vegetation, including the rehabilitation of affected areas. The spatial scale of the loss of vegetation is increased to regional and the overall impact is moderately negative, with and without mitigation. The impact is reduced to moderately negative with mitigation measures in place.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Permanent	4	Study area	2	Moderate	2	Probable	3	**11**	**MODERATE -**
With mitigation	Permanent	4	Study area	2	Low	1	Probable	3	**10**	**MODERATE -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Beneficial	1	Definite	4	**11**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
CUMULATIVE IMPACT										
Without mitigation	Permanent	4	Regional	3	Moderate	2	Probable	3	**12**	**HIGH -**
With mitigation	Permanent	4	Regional	3	Low	1	Probable	3	**11**	**MODERATE -**

[4] Determination reached based on the precautionary principle, as there is a lack of information.

9.2.12 Impact 11: Loss of Karroid Thicket

Cause and comment
Construction of the wind farm will result in loss of Karroid Thicket on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

If nothing were built on the site, the overall significance would be a positive.

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.

Significance Statement
Without mitigation
In the operation phase of the development, the impact will be permanent, restricted to the study are, probable and moderate, resulting in an overall significance of moderate negative. This impact was assessed with a high level of confidence.

With mitigation
In the operation phase of the development, only the severity of the impact is reduced, resulting in an unchanged overall significance of moderate negative.

Cumulative Impact Statement
Due to the scope of this study it was not possible to ascertain vegetation types at all four proposed wind farm sites. Therefore, it is determined that the vegetation loss over the extent of the four proposed wind energy facilities could be extensive[5]. Every effort must be made to reduce the tramping and disturbance of vegetation, including the rehabilitation of affected areas. The spatial scale of the loss of vegetation is increased to regional and the overall impact is moderately negative, with and without mitigation. The impact is reduced to moderately negative with mitigation measures in place.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Permanent	4	Study area	2	Moderate	2	Probable	3	**11**	**MODERATE -**
With mitigation	Permanent	4	Study area	2	Low	1	Probable	3	**10**	**MODERATE -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Beneficial	1	Definite	4	**11**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
CUMULATIVE IMPACT										
Without mitigation	Permanent	4	Regional	3	Moderate	2	Probable	3	**12**	**HIGH -**
With mitigation	Permanent	4	Regional	3	Low	1	Probable	3	**11**	**MODERATE -**

[5] Determination reached based on the precautionary principle, as there is a lack of information.

9.2.13 Impact 12: Loss of Scrub Grassland

Cause and comment
Construction of the wind farm will result in loss of Scrub Grassland on the site. This loss will occur as a result of trampling of the vegetation as well as extra clearing needed for construction. Mitigation measures can be used in order to reduce the trampling and rehabilitate the vegetation respectively.

If nothing were built on the site, the overall significance would be positive.

Mitigation and management
Mitigation measures include the following:

- Keep removal of vegetation to a minimum.

Significance Statement

Without mitigation
In the operation phase of the development, the impact will be permanent, restricted to the study are, probable and moderate, resulting in an overall significance of moderate negative. This impact was assessed with a high level of confidence.

With mitigation
In the operation phase of the development, only the severity of the impact is reduced, resulting in an unchanged overall significance of moderate negative.

Cumulative Impact Statement
Due to the scope of this study it was not possible to ascertain vegetation types at all four proposed wind farm sites. Therefore, it is determined that the vegetation loss over the extent of the four proposed wind energy facilities could be extensive[6]. Every effort must be made to reduce the tramping and disturbance of vegetation, including the rehabilitation of affected areas. The spatial scale of the loss of vegetation is increased to regional and the overall impact is moderately negative, with and without mitigation. The impact is reduced to moderately negative with mitigation measures in place.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Permanent	4	Study area	2	Moderate	2	Probable	3	**11**	**MODERATE -**
With mitigation	Permanent	4	Study area	2	Low	1	Probable	3	**10**	**MODERATE -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Beneficial	1	Definite	4	**11**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A		**N/A**	**N/A**
CUMULATIVE IMPACT										
Without mitigation	Permanent	4	Regional	3	Moderate	2	Probable	3	**12**	**HIGH -**
With mitigation	Permanent	4	Regional	3	Low	1	Probable	3	**11**	**MODERATE -**

9.2.14 Impact 13: Introduction of alien plant species

[6] Determination reached based on the precautionary principle, as there is a lack of information.

Cause and comment

As with all building operations, the introduction of alien and invader species is inevitable; with disturbance comes the influx of aliens. Alien invader species need to be consistently managed over the entire operation phase of the project.

Mitigation and management

Mitigation measures to reduce the impact of the introduction of alien invaders, as well as mitigation against alien invaders that have already been recorded on the site should be actively maintained throughout both the construction and operation phases. Removal of existed alien species should be consistently done. Also, rehabilitation of disturbed areas after the construction of the wind energy facility should be done as soon as possible after construction is completed. Invasive plant species are most likely to enter the site carried in the form of seeds by construction vehicles and staff, these should be cleaned before entering the site to prevent alien infestation

Significance Statement

Without mitigation

In the operation phase of the project, the impact will be permanent, restricted to the study area, definite and with a severe severity. Overall significance would be a high negative. Should the proposed development not go ahead (the No-Go option), the impact would be permanent, definite and restricted to the study area with a severity of moderate and an overall significance of high negative. This impact was assessed with a high level of confidence.

With mitigation

For the operation phase of development; temporal scale is reduced to medium-term, severity of impact to slight and likelihood to may occur, thus reducing the overall significance from high negative to low negative. Alien invasion is just as likely to occur if no development takes place and mitigation measures for the No-Go option will reduce temporal scale, severity and likelihood as well, giving an overall significance of low negative.

Cumulative Impact Statement

It is uncertain how much of the surrounding land is infested with alien vegetation, and how the alien vegetation will spread during the construction and operation phases of the four wind energy facilities. The results from the Ecological Report (Specialist Volume) were extrapolated across the four proposed wind energy projects to give an indication of the possible cumulative impact of the introduction and spread of alien species. The spatial scale of the introduction of alien species is increased to regional and the impact, without mitigation, is high. The impact is reduced to moderately negative with mitigation measures in place.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Permanent	4	Study area	2	Severe	4	Definite	4	**14**	**HIGH-**
With mitigation	Medium term	2	Study area	2	Slight	1	May occur	2	**7**	**LOW -**
NO-GO OPTION										
Without mitigation	Permanent	4	Study area	2	Moderate	2	Definite	4	**12**	**HIGH -**
With mitigation	Medium term	2	Study area	2	Slight	1	May occur	2	**7**	**LOW -**
CUMULATIVE IMPACT										
Without mitigation	Permanent	4	Regional	3	Severe	4	Definite	4	**15**	**HIGH-**
With mitigation	Permanent	4	Regional	3	Slight	1	May occur	2	**10**	**MODERATE -**

9.2.15 Impact 14: Disturbance displacement of bats

Cause and comment

The lack of bat feeding and roosting sites in the area suggest that there are not many bats (Prof Bernard, pers comm). Disturbance or displacement from around the turbines may result in reduced breeding productivity or reduced survival if bats are displaced from preferred habitat and are unable to find suitable alternatives. Disturbance may be caused by the presence of turbines, and/or by maintenance vehicles and people, as well as during the construction of the turbines.

Mitigation and management
Not a great deal can be done to minimise the effects of disturbance displacement from construction activities. However, within reason noise must be kept to a minimum when constructing the wind energy facility.

Significance Statement
In the operation phase without mitigation the impact will occur over the long term, be restricted to the study area, is probable and moderate with an overall significance of Moderate Negative. In the operation phase with mitigation (continual monitoring and application of new mitigation measures), the severity is likely to be reduced to slight, resulting in an overall impact of Moderate Negative.

Cumulative Impact Statement
The cumulative impact of the disturbance caused to bats over an expanse of land similar to that disturbed by the construction and operation of four wind energy facilities in the area is far-reaching. The spatial scale is increased to regional and the severity will be moderate. There are not many mitigatory measures available and thus the cumulative impact remains moderately negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Long term	3	Study area	2	Moderate	2	Probable	3	**10**	**MODERATE-**
With mitigation	Long term	3	Study area	2	Slight	1	Probable	3	**9**	**MODERATE-**
NO-GO OPTION										
Without mitigation	Long term	3	Localised	1	Slight	1	May occur	2	**7**	**LOW +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long term	3	Regional	3	Moderate	2	Probable	3	**11**	**MODERATE-**
With mitigation	Long term	3	Regional	3	Slight	1	Probable	3	**10**	**MODERATE-**

9.2.16 Impact 15: Loss of bat habitat due to vegetation clearing

Cause and comment
The lack of bat feeding and roosting sites in the area suggest that there are not many bats (Prof Bernard, pers comm.). Change to or loss of habitat due to wind turbines and associated infrastructure. A relatively small area of habitat for bats will be completely destroyed in the construction process.

Mitigation and management
The following mitigation measures can be used to minimise the effects of loss of habitat:

- The wind turbines should not be placed on the tops of ridges.
- Every effort should be made to rehabilitate the damaged vegetation to minimise the habitat losses to resident bat species.

Significance Statement
Without mitigation

In the operation phase without mitigation the impact occurs over the long term, is restricted to the study area, is probable and has a slight severity giving an overall significance of Moderate Negative.

With mitigation
With mitigation the overall significance remains Moderate Negative.

Cumulative Impact Statement
Similar to the impact discussed above, the spatial scale is increased to regional and the severity will be moderate. There are not many mitigatory measures available and thus the cumulative impact remains moderately negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Long term	3	Study area	2	Slight	1	Probable	3	**9**	**MODERATE-**
With mitigation	Long term	3	Study area	2	Slight	1	May occur	2	**8**	**MODERATE-**
NO-GO OPTION										
Without mitigation	Long term	3	Study area	2	Slight	1	May occur	2	**8**	**MODERATE +**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Long term	3	Regional	3	Slight	1	Probable	3	**10**	**MODERATE-**
With mitigation	Long term	3	Regional	3	Slight	1	May occur	2	**9**	**MODERATE-**

9.2.17 Impact 16: Bat mortalities from colliding with turbine blades, tower and/or associated infrastructure

Cause and comment
This impact is probably the most crucial impact associated with the wind farm in regard to bats. Collision with the moving turbine blades, with the turbine tower or associated infrastructure such as overhead powerlines, or the wake behind the rotors can cause injury, leading to direct mortality of bats. The behavioural responses of bats to wind turbines (see Box 1 below) explains why many of them are killed, however, there are additional explanations for this behaviour. There are several reasons proposed for the number of bat fatalities, one is that the turbines attract insects, and thus foraging insect-eating bats (Ahlen 2003, Kunz *et al*. 2007). Alternatively, bats may mistake turbines for trees when they are looking for a roost, or be acoustically attracted to the wind turbines (Kunz *et al*. 2007). The cause of death is not entirely explained by collision with turbine blades, but instead is caused by internal haemorrhaging. Most bats are killed by barotrauma, which is "caused by rapid air-pressure reduction near many turbine blades" (Baerwald *et al*.). Barotrauma "involves tissue damage to air-containing structures caused by rapid or excessive pressure change".

BOX 1: BEHAVIOURAL RESPONSES OF BATS TO WIND TURBINES

Horn *et al*. (2008) conducted a study on the behavioural responses of bats to wind turbines and discovered the following:

- Bats actively forage near operating turbines
- Bats approach both rotating and non rotating blades
- Bats followed or were trapped in blade-tip vortices
- Bats investigated the various parts of the turbine with repeated fly-bys
- Bats were struck directly by rotating blades

This impact will definitely occur as bats are known to be killed directly by wind turbines, and there are several species that may occur in the proposed Golden Valley WEF Project area.

Mitigation and management

The tops of ridges should be avoided for placement of turbines, turbines should also be shut off during times when bats are active, low wind speeds at night is the best time (and when little electricity is being generated by the turbines). The lower the turbines the less bat fatalities there are likely to be. If cut-in speed is set at 6 metres per second, bat fatalities can be halved. It is recommended that bat fatalities, and their causes at the wind farm are monitored, as there is no information available for wind farms in South Africa. More applicable mitigation measures (see Box 2) can be applied when there is more information. The Bat specialist has indicated that the final layout is taking these considerations into effect.

BOX 2: MITIGATION MEASURES TO AVOID BAT FATALITIES AT WIND FARMS

In a study conducted to determine the effects of turbine size on bat fatalities, Barclay *et al*. (2007) discovered that the diameter of the rotor had no effect on bat fatalities. Height of the turbines, however, though having no effect on bird fatalities, bat fatalities increased exponentially with an increase in turbine height (Barclay *et al*. 2007). There are, as a result, a few mitigation measures that have been suggested to reduce bat fatalities, these are:

- Ultrasound broadcast can deter bats from flying into wind turbines. (Szewczak and Arnett 2007)
- Minimizing turbine height will help to reduce bat fatalities (Barclay *et al*. 2007).
- Wind turbine operating times should be restricted during times when bat activity is high (Brinkman *et al*. 2006). Bats are at higher risk of fatality on nights with low wind speeds (Horn *et al*. 2008).
- Introduce a turbine cut-in wind speed of at least 5m.s^{-1} (Arnett *et al*., 2009)

Significance Statement

This impact applies only to the operation phase of the development. Without mitigation the impact is probable, is restricted to the study area, over the long term with a moderate severity and an overall significance of Moderate Negative. With mitigation the likelihood is reduced to may occur but the overall significance remains Moderate Negative.

Cumulative Impact Statement

Similar to the two impacts on bats discussed above, the spatial scale is increased to regional and the severity will be moderate. There are few many mitigatory measures available and thus the cumulative impact remains moderately negative.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Long term	3	Study area	2	Moderate	2	Probable	3	**10**	**MODERATE-**
With mitigation	Long term	3	Study area	2	Moderate	2	May occur	2	**9**	**MODERATE-**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACTS										
Without mitigation	Long term	3	Regional	3	Moderate	2	Probable	3	**11**	**MODERATE-**
With mitigation	Long term	3	Regional	3	Moderate	2	May occur	2	**10**	**MODERATE-**

9.2.18 Impact 17: Heritage Impacts

Cause and comment

During the operational life of the wind farm, it is expected that physical impacts to heritage will diminish or cease. Impacts to intangible heritage are expected to occur. There could be numerous impacts on contemporary cultural values and sense of place within a given study area (AWEA & ACNT, 2004). People sometimes describe an emotional and spiritual connection with places where wind farms are proposed. Sometimes, these connections appear to be shared by the community generally, or by particular groups. There may be cultural connections made to an area within poetry, art, theatre and/or music. Those connections might be adversely affected by the introduction of wind farms into those places. By adding a mechanical element (in the form of many turbines) into an environment, feelings towards the landscape may change.

In the case of this project, impacts to remote and rural landscape and wilderness qualities are of concern. The point at which a wind turbine may be perceived as being “intrusive” from a given visual reference point is a subjective judgment, however it can be anticipated that the presence of such facilities close to (for example) wilderness and heritage areas will destroy many of the intangible and aesthetic qualities for which an area is valued. The characteristics of wind turbines that invoke these impacts are listed below.

- Due to the size of the turbines the visual impacts are largely immitigable (they are easily visible from 10 km) in virtually all landscapes (personal observations), however indications are (PGWC 2006) that they are perceived to aesthetically/artistically more acceptable in agricultural or manicured landscapes.
- Visual impact of road cuttings into the sides of slopes will affect the cultural, natural and wilderness qualities of the area.
- Residual impacts can occur after the cessation of operations. The large concrete base will remain buried in the ground indefinitely. Bankruptcy of, or neglect by a wind energy company can result in turbines standing derelict for years creating a long term eyesore.

Mitigation and Management

The number, size and placement of turbines will influence the degree to which they impact on the intangible qualities of an area. Mitigation of visual impacts is not feasible; however some measures can be taken to avoid impacts to the farm houses and their surrounds. Almost all the farm houses in the study area rest with the general protections of the NHRA and therefore the act applies to the aesthetic and intangible elements of each structure that is more than 60 years old.

It is recommended that the following mitigation measures are implemented.

- Turbines must be positioned in such a way that they are at least 500m away from farm complexes.
- Turbines must be positioned in such a way that shadow flicker does not affect any farm complexes.
- Road alignments must be planned in such a way that the minimum of cut and fill operations are required.
- Guarantees for demolition of turbines after their useful life must be in place as a condition of approval.

Significance Statement

Implementation of the proposed activity will change the character of the study area and its surrounds. The rural and wilderness qualities of the study area will change for the long term and take on a more industrial character in places. It is predicted that at first the presence of the wind turbines will be perceived as a novelty and evoke some interest in the area, however as this kind of industry gains pace in South Africa, the novelty value will fall away and the perceived visual impacts will increase.

In summary the way the landscape looks will change, its wilderness qualities will diminish. Given that there are no heritage sites on the landscape that are of any particular importance, the overall impact to cultural landscape is moderate. The impact on wilderness qualities of the site will be high, however the natural element of cultural heritage is only protected under the NHRA if it can be associated with an area of exceptional biodiversity in terms of the definition of cultural significance.

The no-go alternative. Not implementing the proposal will result in no impacts to heritage, apart from those impacts caused by natural forces such as erosion.

Without mitigation

Heritage impacts in the operation phase would **definitely** have ***high*** permanent negative impacts. This would affect the *study area* and would be of HIGH negative significance.

With mitigation

Heritage impacts in the operation phase would **probably** have ***moderate*** permanent negative impacts. This would affect the *study area* and would be of HIGH negative significance.

Cumulative Impact Statement

Impacts relate to changes relating to feel, atmosphere and identity of a place or landscape. Such changes are evoked by visual intrusion, noise, changes in land use and population density. This is especially the case in terms of cumulative impacts given the fact together with three similar proposals adjacent to the study area, which if authorized will create one of the biggest clusters of wind farms in the world (http://en.wikipedia.org/wiki/List_of_large_wind_farms). This change is likely to have a knock-on effect in terms of changes to the identity and associations of the towns of Bedford and Cookhouse. The cumulative impact is determined to be high, regardless of the mitigation measures proposed.

Impact	Effect						Risk or Likelihood		Total Score	Overall Significance
	Temporal Scale		Spatial Scale		Severity of Impact					
OPERATIONAL PHASE										
Without mitigation	Permanent	4	Study area	2	Severe	4	Definite	4	**14**	**HIGH -**
With mitigation	Permanent	4	Study area	2	Moderate	2	Definite	4	**12**	**HIGH -**
NO-GO OPTION										
Without mitigation	N/A		N/A		N/A		N/A			**N/A**
With mitigation	N/A		N/A		N/A		N/A			**N/A**
CUMULATIVE IMPACT										
Without mitigation	Permanent	4	Regional	3	Severe	4	Definite	4	**14**	**HIGH -**
With mitigation	Permanent	4	Regional	3	Moderate	2	Definite	4	**13**	**HIGH -**

10 RELEVANT LEGISLATION

According to Appendix 3 of Government Notice Regulation 982 of 2014, an Environmental Impact Assessment Report must contain: "*a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context*".

In line with the above-mentioned legislative requirement, the development of the proposed St Lucia wind energy project, described in Chapter 2 above, will be subject to the requirements of a number of laws both international and national. These include:

10.1 International

10.1.1 The 1992 United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC is a framework convention which was adopted at the 1992 Rio Earth Summit. South Africa signed the UNFCCC in 1993 and ratified it in August 1997 (Glazwesky, 2005). The stated purpose of the UNFCCC is to, "*achieve….stabilisation of greenhouse gas concentrations in the atmosphere at concentrations at a level that would prevent dangerous anthropogenic interference with the climate system*".

Relevance to the proposed project:

The UNFCCC is relevant in that the proposed project will contribute to a reduction in the production of greenhouse gases by providing an alternative to fossil fuel-derived electricity, and will assist South Africa to begin demonstrating its commitment to meeting international obligations.

10.1.2 The Kyoto Protocol (2002)

The Kyoto Protocol is a protocol to the UNFCCC which was initially adopted for use on 11 December 1997 in Kyoto, Japan, and which entered into force on 16 February 2005 (UNFCCC, 2009). The Kyoto Protocol is the chief instrument for tackling climate change. The major feature of the Protocol is that, "*it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels, over the five-year period 2008-2011"* (UNFCCC, 2009). The major distinction between the Protocol and the Convention is that, "*while the Convention **encouraged** industrialised countries to stabilize GHG emissions, the Protocol **commits** them to do so".*

Relevance to the proposed project:

The Kyoto Protocol is relevant in that the proposed project will contribute to a reduction in the production of greenhouse gases by providing an alternative to fossil fuel-derived electricity, and will assist South Africa to begin demonstrating its commitment to meeting international obligations.

10.2 National

10.2.1 The Constitution Act (108 of 1996)

This is the supreme law of the land. As a result, all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right:

a) To an environment that is not harmful to their health or well-being; and
b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:
(i) Prevent pollution and ecological degradation;
(ii) Promote conservation; and
(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Relevance to the proposed project:
Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.

10.2.2 The National Environmental Management Act (NEMA) (107 of 1998)

The objective of NEMA is: "*To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith*." A key aspect of NEMA is that it provides a set of environmental management principles that apply throughout the Republic to the actions of all organs of state that may significantly affect the environment. The proposed development must be assessed in terms of possible conflicts or compliance with these principles.

As these principles are utilised as a guideline by the competent authority in ensuring the protection of the environment, the proposed development should, where possible, be in accordance with these principles. Where this is not possible, deviation from these principles would have to be very strongly motivated. NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution, and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons. Employees who refuse to perform environmentally hazardous work, or whistle blowers, are protected in terms of NEMA. In addition NEMA introduces a new framework for environmental impact assessments, the EIA Regulations (2010) discussed previously.

Relevance to the proposed project:
The developer must be mindful of the principles, broad liability and implications associated with NEMA and must eliminate or mitigate any potential impacts.

10.2.3 The National Environment Management: Biodiversity Act (10 of 2004)

This Act provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act 107 of 1998 (see Box 2). In terms of the Biodiversity Act, the developer has a responsibility for:

a) The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).
b) Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity.
c) Limit further loss of biodiversity and conserve endangered ecosystems.

The objectives of this Act are:

d) To provide, within the framework of the National Environmental Management Act, for –
(iv) The management and conservation of biological diversity within the Republic;
(v) The use of indigenous biological resources in a sustainable manner.

The Act's permit system is further regulated in the Act's Threatened or Protected Species Regulations, which were promulgated in February 2007.

Relevance to the proposed project:
- The proposed development must conserve endangered ecosystems and protect and promote biodiversity;
- It must assess the impacts of the proposed development on endangered ecosystems;
- No protected species may be removed or damaged without a permit; and
- The proposed site must be cleared of alien vegetation using appropriate means.

10.2.4 The National Forests Act (84 of 1998)

The objective of this Act is to monitor and manage the sustainable use of forests. In terms of Section 12 (1) (d) of this Act and GN No. 1012 (promulgated under the National Forests Act), no person may, except under licence:

- Cut, disturb, damage or destroy a protected tree; or
- Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree.

Relevance to the proposed project:
If any protected trees in terms of this Act occur on site, the developer will require a licence from the DAFF to perform any of the above-listed activities.

10.2.5 National Heritage Resources Act (25 of 1999)

The protection of archaeological and paleontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the State. "*Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority*".

Relevance to the proposed project:
An archaeological and paleontological impact assessment must be undertaken during the detailed EIR phase of the proposed project. No person may alter or demolish any structure or part of a structure, which is older than 60 years or disturb any archaeological or paleontological site or grave older than 60 years without a permit issued by the relevant provincial heritage resources authority. No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter or deface archaeological or historically significant sites.

10.2.6 National Environmental Management: Air Quality Act (39 of 2004)

As with the Atmospheric Pollution Prevention Act 45 of 1965, the objective of the new Air Quality Act is to protect the environment by providing the necessary legislation for the prevention of air pollution. However, in terms of the proposed project it is not expected that any of the Act's provisions will be applicable.

10.2.7 Electricity Regulation Act (Act No. 4 of 2006)

The Electricity Regulation Act (Act No. 4 of 2006) became operational on 1 August 2006 and the objectives of this Act are to:

- Facilitate universal access to electricity;
- Promote the use of diverse energy sources and energy efficiencies, and;
- Promote competitiveness and customer and end user choice.

Relevance to the proposed project:
The proposed Wind Farm project is in line with the call of the Electricity Regulation Act No. 4 of 2006 as it is has the potential to improve energy security of supply through diversification.

10.2.8 Electricity Regulation on New Generation Capacity (Government Gazette No 32378 of 5 August 2009)

On 5 August 2009 the government of the Republic of South Africa promulgated the Electricity Regulations on New Generation Capacity (Government Gazette No 32378) which were made by the Department of Energy in terms of the Electricity Regulation Act 2006 (see 3.2.11 above), and are applicable to:- (a) all types of generation technology including renewable generation and co-

generation technology (i.e. landfill gas, small hydro (less than 10 MW), wind and concentrated solar power (with storage)) but excluding nuclear power generation technology; (b) base load, mid-merit and peak generation; and (c) take effect from the date of promulgation, unless otherwise indicated. The objectives of these regulations are:

- The regulation of entry by a buyer and an Independent Power Producer (IPP) into a power purchase agreement;
- The facilitation of fair treatment and the non-discrimination between IPP generators and the buyer;
- The facilitation of the full recovery by the buyer of all costs incurred by it under or in connection with the power purchase agreement and an appropriate return based on the risks assumed by the buyer there under and, for this purpose to ensure the transparency and cost reflectivity in the determination of electricity tariffs;
- The establishment of rules and guidelines that are applicable in the undertaking of an IPP bid programme and the procurement of an IPP for purposes of new generation capacity;
- The provision of a framework for the reimbursement by the regulator, of costs incurred by the buyer and the system operator in the power purchase agreement, and;
- The regulation of the framework of approving the IPP bid programme, the procurement process, the Renewable Feed in Tariff (REFIT) programme, and the relevant agreements to be concluded.

The Guidelines describe the basic structure of the REFIT programme, including the roles of various parties in the programme, namely National Energy Regulator of South Africa (NERSA), Eskom and renewable energy generators. Pursuant to the Guidelines, Eskom's "Single Buyer Office" is to be appointed as the Renewable Energy Purchasing Agency (REPA), the exclusive buyer of power under the REFIT programme.

Generators participating in the REFIT scheme are required to sell power generated by renewable technologies to Eskom as the REPA under a Power Purchase Agreement, and are entitled to receive regulated tariffs, based on the particular generation technology. NERSA is tasked with the administration of the REFIT programme, including setting the tariffs and verifying that generation is genuinely from renewable energy sources.

While the Regulations deal generally with procurement under an IPP bid programme (defined in the Regulations to mean a bidding process for the procurement of new generation capacity and/or ancillary services from IPPs), and specify the use of a bidding process involving requests for prequalification, requests for proposals and negotiations with the preferred bidder, the Regulations set out a special process for the procurement of renewable energy and cogeneration under the REFIT programme, described in Regulation 7. This Regulation states that NERSA is to, "*develop rules related to the criteria for the selection of "renewable energy IPPs… that qualify for a licence"* and sets out a list of matters that the criteria prescribed by NERSA should take account of. These include:

- Compliance with the integrated resource plan and the preferred technologies;
- Acceptance by the IPP of a standardised power purchase agreement;
- Preference for a plant location that contributes to grid stabilisation and mitigates against transmission losses;
- Preference for a plant technology and location that contributes to local economic development;
- Compliance with legislation in respect of the advancement of historically disadvantaged individuals;
- Preference for projects with viable network integration requirements;
- Preference for projects with advanced environmental approvals;
- Preference for projects demonstrating the ability to raise finance;
- Preference for small distributed generators over centralized generators; and
- Preference for generators that can be commissioned in the shortest time.

According to Dewey & LeBouef (August, 2009), it appears, therefore, that successful REFIT projects may not be selected through a conventional bidding process, but instead, applications will be selected on the basis of prescribed criteria. Just what such criteria are, and how they will be applied and weighted is not yet clear, but it is expected that this will be set out in the rules to be developed by NERSA as required by Regulation 7(2)(a).

Relevance to the proposed project:

- The proposed Wind Energy Project is required to comply with any guidelines relating to the IPP bid programme and the REFIT programme.

10.2.9 Aviation Act (Act No. 74 of 1962): 13th Amendment of the Civil Aviation Regulations 1997

Section 14 of obstacle limitations and marking outside aerodrome or heliport (CAR Part 139.01.33) under this Act specifically deals with wind turbine generators (wind farms). According to this section, "*A wind turbine generator is a special type of aviation obstruction due to the fact that at least the top third of the generator is continuously variable and offers a peculiar problem in as much marking by night is concerned.* The Act emphasizes that, when wind turbine generators are grouped in numbers of three or more they will be referred to as "wind farms". Of particular importance to the proposed project are the following:-

- **Wind farm placement:** Due to the potential of wind turbine generators to interfere on radio navigation equipment, no wind farm should be built closer than 35km from an aerodrome. In addition, much care should be taken to consider visual flight rules routes, proximity of known recreational flight activity such as hang gliders, en route navigational facilities etc.
- **Wind farm Markings:** Wind turbines shall be painted bright white to provide the maximum daytime conspicuousness. The colours grey, blue and darker shades of white should be avoided altogether. If such colours have been used, the wind turbines shall be supplemented with daytime lighting, as required.
- **Wind farm Lighting:** Wind farm (3 or more units) Lighting: In determining the required lighting of a wind farm, it is important to identify the layout of the wind farm first. This will allow the proper approach to be taken when identifying which turbines need to be lit. Any special consideration to the site's location in proximity to aerodromes or known corridors, as well as any special terrain considerations, must be identified and addressed at this time.

Relevance to the proposed project:

The proposed wind farm project is required to get authorisation from the Civil Aviation Authority for the construction of wind turbines.

10.2.10 Occupational Health and Safety Act (85 of 1993)

The objective of this Act is to provide for the health and safety of persons at work. In addition, the Act requires that, "*as far as reasonably practicable, employers must ensure that their activities do not expose non-employees to health hazards*" (Glazewski, 2005: 575). The importance of the Act lies in its numerous regulations, many of which will be relevant to the proposed wind energy project. These cover, among other issues, noise and lighting.

Relevance to the proposed project:

The developer must be mindful of the principles and broad liability and implications contained in the OHSA and mitigate any potential impacts.

Other relevant legislation

Other legislation that may be relevant to the proposed St Lucia wind energy project includes:-

National:

- The Telecommunication Act (1966) which has certain requirements with regard to potential impacts on signal reception;
- The Environment Conservation Act No 73 of 1989 (ECA) Noise Control Regulations, which specifically provide for regulations to be made with regard to the control of noise, vibration and shock, including prevention, acceptable levels, powers of local authorities and related matters;
- The Conservation of Agricultural Resources Act 43 of 1983 controls and regulates the conservation of agriculture and lists all regulated invasive species;
- The Development Facilitation Act 67 of 1995 provides for development and planning;
- The Environmental Conservation Act 73 of 1989 provides for effective protection, control and utilisation of the environment;
- The Mountain Catchment Areas Act 63 of 1970 provides for catchment conservation;
- The National Water Act 36 of 1998 regulates all matters relating to water including- drainage lines;
- The Physical Planning Act 135 of 1991 provides land use planning;
- The Tourism Act 72 of 1993 provides for the promotion of tourism and regulates the tourism industry;
- The Skills Development Act 97 of 1998 promotes the development of skills; and
- Provincial Nature and Environmental Conservation Ordinances (that list species of special concern which require permits for removal).

In addition to the above, aside from the environmental authorisation, there are other permits, contracts and licenses that will need to be obtained by the project proponent for the proposed project some of which fall outside the scope of the EIA. However, for the purposes of completeness, these include:-

- Local Municipality: Land Rezoning Permit. LUPO Ordinance 15 of 1985
- National Energy Regulator of South Africa (NERSA): Generation License
- Eskom: Connection agreement and Power Purchase Agreement (PPA)

11 CONCLUSIONS AND RECOMMENDATIONS

This Chapter of the EIR provides a summary of the findings of the proposed Golden Valley WEF – Project 1, a comparative assessment of the positive and negative implications of the proposed project and identified alternatives. In addition, this Chapter provides the EAP's opinion as to whether the activity should or should not be authorised as well as the reason(s) for the opinion.

11.1 Summary of the key findings of the EIA

Table 11-1 provides a summary of the impacts associated with the proposed Golden Valley WEF - Project 1 with and without mitigation.

11.1.1 Construction Phase

During the construction phase, the proposed Golden Valley WEF Project will have a high visual impact with regards to the intrusion of large and highly visible construction activity on sensitive viewers. This is mainly because the height of the features that will be built, and the siting on ridges will expose construction activities against the skyline. Additionally, an increase in activity, vehicles and workers in an otherwise quiet area will affect views. Activity at night is also probable since transport of large turbine components may occur after work hours to minimise disruption of traffic on main roads. With the incorporation of mitigation measures, this impact will be reduced to moderate.

However it is also worth noting that the visual impact of the construction phase may likely be positive, especially during assembly of the turbine towers. The construction engineering feat of lifting and attaching components weighing more than 50 tons in a highly visible area is bound to be spectacular (see for example, (Degraw 2009)). Further, most of the sensitive viewers living in close proximity to the turbines have agreed to have turbines on their properties and are presumably informed on the effect of the construction phase on their views (*pers.comm.*CES).

The Loss of plant Species of Special Concern (SSC) including *Pachypodium bispinosum, Pelargonium sidoides, Crassula perfoliata, Euphorbia globosa, Euphorbia meloformis, Aloe tenuior, Anacampestros* sp, *Euphorbia meloformis, Tritonia* sp, *Watsonia* sp, *Drosanthemum* sp, *Psilocaulon* sp and *Trichodiadema* sp. during the construction phase of the proposed Golden Valley WEF - Project 1 is of concern. However, BioTherm Energy has commissioned botanists to groundtruth the footprint of the WEF, and apply for permits for the translocation of these species.

The majority of the other impacts associated with the proposed project during the construction phase before mitigation are of moderate or low significance, and the significance of all of these impacts with the exception of the Loss of plant SSC during the construction phase (see Section 11.2 below), palaeontological impacts, and the loss of bird habitat due to vegetation clearing, after the incorporation of appropriate mitigation measures, can be reduced to Low.

Table 11-1: Summary of impacts associated with the proposed Golden Valley WEF – Project 1

IMPACT	SIGNIFICANCE					
	DIRECT IMPACTS				CUMULATIVE IMPACT	
	WITHOUT MITIGATION		WITH MITIGATION		WITHOUT MITIGATION	WITH MITIGATION
		NO-GO		NO-GO		
CONSTRUCTION PHASE						
Intrusion of large and highly visible construction activity on sensitive views (**visual** impact)	HIGH -	N/A	MOD -	N/A	The cumulative impacts for the construction phase are **not considered** due to the fact that it is **highly unlikely** that all four wind energy facilities will be constructed at the same time.	
Impact of the construction **noise** on the surrounding environment	LOW -	N/A	LOW -	N/A		
Disturbance of **birds**	LOW -	N/A	LOW -	N/A		
Loss of **bird** habitat due to habitat destruction	MOD -	N/A	MOD -	N/A		
Loss of Thicket	LOW -	MOD +	LOW -	N/A		
Loss of Bedford Dry Grassland	MOD -	MOD +	LOW -	N/A		
Loss of Karroid Thicket	MOD -	MOD +	LOW -	N/A		
Loss of Scrub Grassland	MOD -	MOD +	LOW -	N/A		
Loss of **plant** species of special concern	MOD -	MOD +	MOD -	N/A		
Introduction of alien **plant** species	MOD -	HIGH -	LOW -	LOW -		
Loss of **faunal** biodiversity	MOD -	HIGH +	LOW -	N/A		
Loss of **faunal** species of special concern	LOW -	HIGH +	N/A	N/A		
Disturbance displacement of **bats**	LOW -	LOW +	LOW -	N/A		
Loss of **bat** habitat due to vegetation clearing	LOW -	MOD +	LOW -	N/A		
Construction of the wind farm and its impact on **heritage** aspects	MOD -	N/A	LOW -	N/A		
Palaeontological Impacts	LOW -	LOW -	MOD +	N/A		

IMPACT	SIGNIFICANCE					
	DIRECT IMPACTS				CUMULATIVE IMPACT	
	WITHOUT MITIGATION		WITH MITIGATION		WITHOUT MITIGATION	WITH MITIGATION
		NO-GO		NO-GO		
OPERATIONAL PHASE						
Impact of a change in the agricultural landscape as a result of establishing a wind farm (**visual** impact)	MOD -	N/A	MOD -	N/A	HIGH -	N/A
Intrusion of large wind turbines on the existing views of sensitive visual receptors (**visual** impact)	HIGH -	N/A	HIGH -	N/A	HIGH -	N/A
Impact of shadow flicker on residents in close proximity to wind turbines (**visual** impact)	MOD -	N/A	LOW -	N/A	HIGH -	N/A
Impact of the operational **noise** on the surrounding environment (NSA 1,5, 7,8,9,10,11,12 & 13)	LOW -	N/A	N/A	N/A	LOW -	LOW -
Impact of the operational **noise** on the surrounding environment (NSA 2,3,4 & 6)	HIGH -	N/A	LOW -	N/A	LOW -	LOW -
Disturbance of **birds**	MOD -	N/A	MOD -	N/A	HIGH -	HIGH -
Disruption in local **bird** movement patterns	MOD -	N/A	MOD -	N/A	HIGH -	MOD -
Bird mortalities from colliding with turbine blades, tower, and/or associated infrastructure	MOD -	N/A	MOD -	N/A	HIGH -	MOD -
Collisions and electrocutions of **birds** with power lines and substations	MOD -	N/A	MOD -	N/A	MOD -	MOD -
Loss of Thicket	MOD -	MOD +	LOW -	N/A	MOD -	MOD -
Loss of Bedford Dry Grassland	MOD -	MOD +	MOD -	N/A	HIGH -	MOD -
Loss of Karroid Thicket	MOD -	MOD +	MOD -	N/A	HIGH -	MOD -
Loss of Scrub Grassland	MOD -	MOD +	MOD -	N/A	HIGH -	MOD -
Introduction of alien **plant** species	HIGH -	HIGH -	LOW -	LOW -	HIGH -	MOD -
Disturbance of **bats**	MOD -	LOW -	MOD -	N/A	MOD -	MOD -
Loss of **bat** habitat due to vegetation clearing	MOD -	MOD +	MOD -	N/A	MOD -	MOD -
Bat mortalities from colliding with turbine blades, tower and/or associated infrastructure	MOD -	N/A	MOD -	N/A	MOD -	MOD -
Impacts of the operation of the wind farm on **heritage** aspects	HIGH -	N/A	HIGH -	N/A	HIGH -	HIGH -

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The No-Go Option will have a few beneficial/positive impacts with regards to the following:-

- Loss of Thicket
- Loss of Bedford Dry Grassland
- Loss of Karroid Thicket
- Loss of Scrub Grassland
- Plants Species of Special Concern (SSC)
- Loss of faunal biodiversity
- Loss of faunal species of special concern (SSC)
- Disturbance/displacement of bats
- Loss of bat habitat

However, the introduction of alien species will be a High negative with the No-Go Option (i.e. No development), but with mitigation measures, the significance of this impact can be reduced to Low negative.

11.1.2 Operational Phase

During the operational phase, the proposed Golden Valley WEF - Project 1 will have a high visual impact with regards to the intrusion of large wind turbines on the existing views of sensitive visual receptors (residents living on or close to the wind farm area). Regardless of the incorporation of mitigation measures, this impact will remain high.

Bat fatalities as a result of the proposed project are likely to be of moderate significance. Regardless of the incorporation of appropriate mitigation measures, this impact will remain moderate. It is important to note however, that there is currently no information available on bat fatalities, and their causes at windfarms in South Africa, therefore this EIA assumed the worst-case scenario.

The introduction of alien species will also be high with the proposed project as well as the No-Go option. However, if alien invader species are consistently managed over the entire operation phase of the project, and an alien eradication program implemented (in terms of the No-Go option), the significance of this impact can be reduced to low.

The noise impact of the final layout has been assessed by the noise specialist and has been found to be adequate.

The majority of the other impacts associated with the proposed project during the operational phase before mitigation are of moderate significance, and the significance of all of these impacts with the exception of the following (whose significance is reduced to low after the incorporation of appropriate mitigation measures), after the incorporation of appropriate mitigation measures remains moderate-

- Impact of shadow flicker on residents in close proximity to wind turbines
- Loss of thicket

11.1.3 Cumulative Impacts

The cumulative impact of many wind farms being proposed for the area of Cookhouse and Bedford has far-reaching and serious impacts which require careful consideration during the environmental impact process, as well as other process authorising these wind farms such as, but not limited to, rezoning, geotechnical studies, National Energy Regulating licence application.

Assessing cumulative impacts is a relatively new discipline when considering the effects on wind farms and as such the individual specialists did not always include such findings in their reports.

Another important finding of the process of compiling cumulative impacts, was the discovery of a glaring lack of guidance strategically. It is strongly recommended that a Strategic Environmental Assessment (SEA) be undertaken for the purpose of providing guidance when siting and developing wind farms.

Cumulative impacts were not assessed during the construction phase of the project as it is highly unlikely that all four wind farms will be constructed at the same time. Cumulative impacts were, however, identified and assessed for the operational phase of the project.

All the visual cumulative impacts were assessed to be of high significance. There are no mitigation measures available and so the impact is marked as “not applicable”. Other cumulative impacts assessed to be of high significance were disturbance to birds; disruption in local bird movement patterns; bird mortalities from colliding with turbine blades, tower, and/or associated infrastructure; loss of certain types of vegetation; and the introduction of alien plant species. The cumulative impact on heritage, first introduced in the heritage Specialist Study, is also assessed to be of high significance.

Mostly all of the cumulative impacts with high significance can be mitigated to ratings of moderate or low negativity, except for disturbance of birds and the impact on heritage aspects.

11.2 EAP’s Recommendation

We recommend that the application for a split of the Environmental Authorisation be approved, since there is no change in project scope, and therefore no change in impacts. We recommend that the original mitigation measures be applied to the amended Environmental Authorisation as well.

Phase	Impact	Mitigation Measures
Construction	Intrusion of large and highly visible construction activity on sensitive viewers	• New road construction should be minimised and existing roads should be used where possible. • The contractor should maintain good housekeeping on site to avoid litter and minimise waste. • Clearance of indigenous vegetation should be minimised and rehabilitation of cleared areas should start as soon as possible. • Erosion risks should be assessed and minimised as erosion scarring can create areas of strong contrast which can be seen from long distances. • Laydown areas and stockyards should be located in low visibility areas (e.g. valley between the ridges) and existing vegetation should be used to screen them from views. • Night lighting of the construction sites should be minimised within requirements of safety and efficiency. See section on lighting for more specific measures. • Fires and fire hazards need to be managed appropriately.
Operation	Intrusion of large wind turbines on the existing views of sensitive visual receptors	• Turbines should not be associated with power lines and similar structures and should be as far removed from them as possible.

Phase	Impact	Mitigation Measures
		• Inter-connecting power lines between the turbines should be buried. • Maintenance of the turbines are important. A spinning rotor is perceived as being useful. If a rotor is stationary when the wind is blowing it is seen as not fulfilling its purpose and a negative impression is created (Gipe 1995). • Signs near wind turbines should be avoided unless they serve to inform the public about wind turbines and their function. Advertising billboards should be avoided. • According to the Aviation Act, 1962, Thirteenth Amendment of the Civil Aviation Regulations, 1997: "*Wind turbines shall be painted bright white to provide maximum daytime conspicuousness. The colours grey, blue and darker shades of white should be avoided altogether. If such colours have been used, the wind turbines shall be supplemented with daytime lighting, as required*." • Lighting should be designed to minimise light pollution without compromising safety. Investigate using motion sensitive lights for security lighting. Turbines are to be lit according to Civil Aviation regulations. • An information kiosk (provided that the kiosk and parking area is located in a low visibility area) and trails along the wind farm can enhance the project by educating the public about the need and benefits of wind power. 'Engaging school groups can also assist the wind farm proponent, as energy education is paramount in developing good public relations over the long term. Instilling the concept of sustainability, and creating awareness of the need for wind farm developments, is an important process that can engage the entire community' (Johnston 2001).
	Bat fatalities	• Turbines should be shut off during times when bats are active, low wind speeds at night is the best time (and when little electricity is being generated by the turbines). • It is recommended that bat fatalities, and their causes at the wind farm are monitored, as there is no information available for wind farms in South Africa. More applicable mitigation measures to reduce bat fatalities (see below) can be applied when there is more information. o Ultrasound broadcast can deter bats from flying into wind turbines. (Szewczak and Arnett 2007) o Minimizing turbine height will help to reduce bat fatalities (Barclay *et al*. 2007). o Wind turbine operating times should be restricted during times when bat activity is high (Brinkman *et al*. 2006). Bats are at higher risk of fatality on nights with low wind speeds (Horn *et al*. 2008).

11.3 The Way Forward

The Draft EIR was available for public review from 2 August 2010 to 2 September 2010. It was then finalised and submitted to the Department of Environmental Affairs in October 2010. The project was authorised in the EA dated 5 April 2011. Six (6) amendments to the EA were made to the EA in the subsequent years. This is report has been prepared in support of an additional amendment, which seeks to "split" the authorisation into two components, in order to comply with the DoE's REIPPPP requirements.

Upon thorough examination of the EIR, the authority will issue an Environmental Authorisation, which either authorises the project or rejects it, or requires further details to clarify certain issues. Should authorisation be granted, the Environmental Authorisation usually carries Conditions of Approval. The project proponent is obliged to adhere to these conditions.

Within a period determined by the competent authority, all registered I&APs will be notified in writing of (i) the outcome of the application, and (ii) the reason for the decision. The public will then have one month in which to appeal the decision should they wish to do so. The appeals procedure will also be communicated by the EAP. Any appeal must be submitted to the Minister of Water and Environmental Affairs.

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APPENDICES

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APPENDIX A: EA FROM DEA – MEASUREMENT MASTS

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA
Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

Reference: 12/12/20/1715
Enquiries: Ms P Mashego
Telephone: (012) 310 3249 Fax: (012) 320 7539 E-mail: PMashego@deat.gov.za

Mr. H Ramsden
Terra Power Solution (Pty) Limited
P. O. Box 68063
BRYANSTON
2021

Fax: 086 530 9050

Dear Mr. Ramsden

ENVIRONMENTAL AUTHORISATION FOR THE PROPOSED ESTABLISHMENT OF FOUR WIND MEASUREMENT MASTS ON THE FARMS GUAGGAS KUYL, SMOORS DRIFT, VARKENS KUYL AND OLIVE WOOD ESTATE AT COOKHOUSE,EASTERN CAPE PROVINCE

With reference to the abovementioned application, please be advised that the Department has decided to grant authorisation for this project. The environmental authorisation and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2006, you are instructed to notify all registered interested and affected parties, in writing and within ten (10) calendar days of the date of this letter, of the Department's decision in respect of your application as well as the provisions regarding the lodging of appeals that are provided for in the regulations.

Your attention is drawn to Chapter 7 of the Regulations which regulate the appeals procedure. Attached please find a simplified table of the appeals procedure to be followed. Kindly include a copy of this procedure with the letter of notification to interested and affected parties.

A copy of the official appeal form can be obtained from:
Mr TH Zwane Senior Legal Administration Officer Tel: 012 310 3929 tzwane@deat.gov.za; or
Ms. MM Serite Legal Administration Officer Tel: 012 310 3788 mserite@deat.gov.za

Any party wishing to appeal any aspect of the decision must, *inter alia*, lodge a notice of intention to appeal with the Minister, within 10 days of receiving notice of the decision, by means of one of the following methods:

By facsimile: (012) 320 7561
By post: Private Bag X447, Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Forum Building, North Tower, Cnr. van der Walt and Pretorius Streets, Pretoria.

Should the applicant decide to appeal, the applicant must serve a copy of its notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection.

Please include the Department in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

The authorised activities may not commence within thirty (30) days of the date of signature of the authorisation. Please further note that the minister may, on receipt of appeals against the authorisations or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours faithfully

Ms Lize McCourt
Chief Director: Environmental Impact Management
Department of Environmental Affairs
Letter signed by: Mr Dumisane Mthembu
Designation: Director: Environmental Impact Evaluation
Date: 17/02/2010

CC: Dr K Whittington Coastal & Environmental Services Fax: (046) 622 6564

APPENDIX B: THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The Environmental Impact Assessment process comprises two key phases – the Scoping Phase and the Environmental Impact Assessment Phase. These phases are described in detail below.

B1. THE SCOPING PHASE

Scoping is the first step in the EIA process. It allows for all role players – stakeholders and Interested and Affected Parties (I&APs) - to gain a greater understanding of the project by means of a public participation process. Scoping is also critical in as much as it facilitates the early identification of important natural and social issues that will need to be considered later in the process.

The principal objectives of the Scoping Phase are:-

- Describe the nature of the proposed project;
- Preliminary identification and assessment of potential environmental issues or impacts to be addressed in the subsequent EIA phase;
- Define the legal, policy and planning context for the proposed project;
- Describe important biophysical and socio-economic characteristics of the affected environment;
- Undertake a public participation process that provides opportunities for all I&APs to be involved;
- Identify feasible alternatives that must be assessed in the EIA phase; and
- Define the Plan of Study (PoS) for the EIA phase.

Each of the steps involved in the scoping phase is discussed in detail below.

B1.1. Project description

A description of the components of the proposed project is provided.

B1.2. Preliminary assessment of the project

Baseline data and information on the proposed development is collected, primarily from the project proponent, but also from preliminary site surveys and published literature, and from legislation, guidelines and other regulatory instruments, in order to determine the activities for which approval must be sought from the competent environmental authority.

Information sourced from the project proponent includes the proposed location and layout of the development, and the technology to be adopted. A preliminary assessment of this data and information, in the context of legal requirements and an understanding of the receiving environment, is by way of a preliminary risk assessment or fatal flaw analysis. It enables major risks to the project or to the receiving environment to be identified at an early stage in the EIA process, and informs subsequent decisions about aspects of the development identified as being potentially problematic.

B1.3. Legal context

The legislation relevant to the proposed Project is identified and reviewed.

B1.4. Identification of key bio-physical and socio-economic issues

The key biophysical and socio-economic issues related to the project are identified during the Scoping Phase. Relevant information is drawn from as wide a range of sources as possible, including local authorities, local communities, and specialists.

B1.5. Public Participation Process

A public participation process is an explicit requirement of the NEMA EIA regulations, and must take place throughout the EIA process. The approach to public consultation depends largely on the location of the proposed development, the nature of the project, the sensitivity of the receiving environment, the previous level of exposure of the public to the EIA process, and the level of education of those who will be affected by the proposed development. Among other things, involvement of the public in the EIA process is an opportunity to gather local knowledge from individuals, communities and organisations.

Key stakeholders are identified and notified of the proposed development and the ways in which they can be involved. These stakeholders include:-

- Local and regional authorities
- Ratepayers associations
- Ward councillors and representatives
- Non-governmental Organisations (NGOs) and Community Based Organisations (CBOs)
- Landowners adjacent and close to the site of the proposed development.

Stakeholders and I&APs are informed of the proposed development by means of:-

- Advertisements in newspapers
- A background information document (BID)
- Letters to key stakeholders and neighbouring landowners/occupiers
- Notice boards placed at the site

All of the above must include name(s) and contact details - telephone and fax numbers, and e-mail address(es) to which stakeholders and I&APs can direct written or verbal comments.

Advertisements are placed in a minimum of one local and one regional newspaper, depending on the nature and extent of the proposed development. Stakeholders and I&APs are encouraged to register by sending their names and contact details to the EAP, whereupon they are sent a copy of the BID, and are thereafter kept informed of and involved in all subsequent stages of the EIA process. The BID is a brief document that provides information on the nature and location of the proposed development, and details of how the EIA process will be undertaken. However, it is unlikely that the final design specifications of some proposed developments are known at this stage, and there may be changes to the information presented in the BID as the project progresses.

In addition, public meetings, open house meetings and/or focus group meetings may be held. In the early stages of the Scoping Phase these meetings provide an opportunity for the Environmental Assessment Practitioner (EAP) to present and discuss the information in the BID, to elicit information from local sources, and to register I&APs. Comment forms provide a further way by which comments may be submitted. In the latter stages meetings provide opportunities to discuss the draft version of the Scoping Report before it is submitted to the competent environmental authority.

B1.6. Identification of alternatives

Possible alternatives to the proposed development must be identified during the Scoping Phase. These may include fundamental alternatives, such as maintaining the current land use, or proposing a development of a different nature to the one proposed by the project proponent. Design alternatives are intended to modify certain design aspects of the proposed project, such as alternative technologies, timing of activities, or the location of infrastructure, so as to minimise negative impacts on the environment. The identification of alternatives must be reasonable and practical.

B1.7. Plan of Study for the EIA Phase

The information and comments received and recorded during the Scoping Phase inform the larger and more comprehensive EIA Phase. This is usually achieved by the development of the Plan of Study (PoS) for the EIA. The PoS defines the actions, steps, and studies that must be undertaken in the EIA Phase.

B1.8. Scoping Reports

The data collected during the baseline data collection and public participation processes must be synthesised in a Scoping Report. In line with NEMA regulations, registered I&APs are entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing an application. Accordingly a Draft Scoping Report is made available for public comment for a minimum period of 30 days. All comments on the draft report must be considered, and necessary changes made to the Draft before it is submitted for review to the competent authority as the final Scoping Report. This report includes the PoS discussed in A1.7 above.

B2. ENVIRONMENTAL IMPACT ASSESSMENT PHASE

The Environmental Impact Assessment (EIA) is a comprehensive evaluation and study phase that addresses all the issues raised in the Scoping Phase. It is a substantial phase that has seven key objectives:-

- Describe the biophysical and socio-economic environment that is likely to be affected by the proposed development.
- Undertake specialist studies to address the key biophysical and socio-economic issues.
- Assess the significance of impacts that may occur from the proposed development.
- Assess the alternatives proposed during the Scoping Phase.
- Provide details of mitigation measures and management recommendations to reduce the significance of impacts.
- Provide a framework for the development of Environmental Management Plans.
- Continue with the public participation process.

B2.1. Specialist Studies

Specialist studies are undertaken to provide a detailed and thorough examination of key issues and environmental impacts. Specialists gather relevant data to identify and assess environmental impacts that might occur on the specific component of the environment that they are studying (for instance waste management, air quality, noise, vegetation, water quality, pollution, waste management). Once completed, these studies are synthesised in, and presented in full as appendices to the Environmental Impact Report (EIR).

B2.2. Public Participation Process

The public participation process (PPP) initiated at the beginning of the Scoping Phase continues into the EIA Phase. Once again the PPP provides a platform from which all I&APs are able to voice their concerns and raise issues regarding the project.

B2.3. Assessment of the Significance of Impacts

It is necessary to determine the significance, or seriousness, of any impacts on the natural or social environment. It is common practice in the EIA Phase to use a significance rating scale that determines the spatial and temporal extent, and the severity and certainty of any impact occurring, including impacts relating to any project alternatives. This allows the overall significance of an impact or benefit to be determined.

The overall intent of undertaking a significance assessment is to provide the competent authority with information on the potential environmental impacts and benefits, thus allowing them to make an

informed, balanced and fair decision.

B2.4. Mitigation Measures and Recommendations

Critical to any EIA is the recommendation of practical and reasonable mitigation measures and recommendations. These recommendations relate to the actions that are needed in order to avoid, minimise or offset any negative impacts from the development.

B3.5. Planning Input

An effective EIA process should actively engage and contribute to the project planning process so as to mitigate environmental impacts through improved design and layout.

B3.6. Environmental Impact Report

The above-mentioned tasks are synthesised in an Environmental Impact Report (EIR). This will allow the assessment of the relationship of environmental impacts to project actions, as well as to assess the overall significance of these impacts. The EIR will also provide sufficient information to allow the competent authority to make an informed decision.

A summary report covering key findings is prepared in a manner that is easy to read and understand. Text will be kept short and technical detail to a minimum, while information will be presented in the form of photographs and figures wherever possible.

B4. ENVIRONMENTAL MANAGEMENT PLANS

Environmental management and action plans based on the findings and recommendations set out in the EIR are prepared. Environmental Management Programmes (EMPrs) and, where necessary, Social Management Plans (SMPs) consist of a set of practical and actionable mitigation, monitoring and institutional measures to be taken into account during construction and operation of the proposed development. The aim is to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. These plans include: -

- The standards and guidelines that must be achieved in terms of environmental legislation.
- Mitigation measures and environmental specifications that must be implemented at ‘ground level’, that is, during construction and operation.
- Provide guidance through method statements to achieve the environmental specifications.
- Define corrective action that must be taken in the event of non-compliance with the specifications of the EMPrs and SMPs.
- Prevent long-term or permanent environmental degradation.

B5. ENVIRONMENTAL AUTHORISATION AND APPEALS PROCESS

On thorough examination of the EIR, the competent authority will issue an Environmental Authorisation or reject the application. Should authorisation be granted, it will carry Conditions of Approval. The proponent is obliged to adhere to these conditions.

I&APs are notified of the decision and have 10 days in which to lodge a notice of intention to appeal the decision, and a further 30 days in which to submit the appeal.

APPENDIX C: PLAN OF STUDY FOR EIA

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA
Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

Reference: 12/12/20/1717
Enquiries: Ms P Mashego
Telephone: (012) 310 3249 **Fax:** (012) 320 7539 **E-mail:** PMashego@deat.gov.za

Dr K Whittington-Jones
Coastal & Environmental Services
Private Bag X934
GRAHAMSTOWN
6140

Fax no: (046) 622 6564

Dear Dr Whittington-Jones

ACCEPTANCE OF FINAL SCOPING REPORT AND PLAN OF STUDY FOR THE PROPOSED COOKHOUSE WIND ENERGY PROJECT, BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

The above document dated December 2009 and received by the Department on 08 December 2009 refers.

The Department has evaluated the submitted Final Scoping Report (FSR) dated December 2009 and is satisfied that the FSR complies with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2006. The FSR is hereby accepted by the Department in terms of GN R.385 (31) (1) (a) of the EIA Regulations, 2006.

You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the plan of study for environmental impact assessment as required in terms of the EIA Regulations, 2006.

Please ensure that comments from all relevant authorities are submitted to the Department with the Final Environmental Impact Report. This includes but is not limited to the: Eastern Cape Department of Economic Affairs, Environment and Tourism.

You are requested to submit at least two copies of the EIR.

You are hereby reminded that the activities may not commence prior to an environmental authorisation being granted by the Department.

Yours sincerely

Ms Lize McCourt
Chief Director: Environmental Impact Management (Acting)
Department of Environmental Affairs
Letter signed by: Mr Dumisani Mthembu (P.P)
Designation: Director: Environmental Impact Evaluation
Date: 12/02/2010

CC: Mr. H Ramsden Terra Power Solutions (Pty) Ltd Fax: 086 530 9050

APPENDIX D: PUBLIC PARTICIPATION

APPENDIX D-1: WRITTEN NOTICES TO LANDOWNERS AND I&APS

COASTAL & ENVIRONMENTAL SERVICES
Environmental Management and Impact Assessment

67 African Street P.O. Box 934
Grahamstown 6140 SOUTH AFRICA
Tel: 046 622 2364 Fax: 046 622 6564
International: +27 46 622 2364
Email: info@cesnet.co.za
Website: www.cesnet.co.za

2 Marine Terrace P.O. Box 8145
East London 5210 SOUTH AFRICA
Tel: 043 742 3302 Fax: 043 742 3306
International: +27 43 742 3302
Email: cesel@cesnet.co.za
Website: www.cesnet.co.za

29 July 2010

ATTENTION: Mr Jan Troskie

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Coastal and Environmental Services (CES) would like to notify you of the release of the Specialist volume, Draft Environmental Impact Report (EIR) and Draft Environmental Management Plan (EMP) for public review and comment. The review period is from 2 August 2010 till 2 September 2010.

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Please also note that a public meeting will be held at the Golden Valley Country Inn on 23 August 2010 at 13:00.

CES will be pleased if you can send us a letter confirming your receipt of notification. For more information, please feel free to contact Kate Bezuidenhout/Marc Hardy at the CES Grahamstown office numbers shown above.

Yours sincerely,

Ms. Samantha Bodill
Environmental Consultant

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Tel: 043 742 3302 Fax: 043 742 3306
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29 July 2010

ATTENTION: Mr Alwny Raubenheimer

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Ms. Samantha Bodill
Environmental Consultant

Henque 1018 t/a Coastal & Environmental Services • Reg no. CK 1997/061914/23 • Vat No. 4380172835
Members: Dr AM Avis (PhD Rhodes) • Prof RA Lubke (PhD Western Ontario)
Mrs CE Avis (MA Rhodes, CAIB) • Dr P Scherman (PhD Rhodes)
Dr AJ Carter (PhD Rhodes, CPA USA)

LETTER SENT TO JOHANNA MARIA NOLTE C/O ANDRE VAN DER LINGEN

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Environmental Management and Impact Assessment

67 Africas Street P.O. Box 934
Grahamstown 6140 SOUTH AFRICA
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29 July 2010

ATTENTION: Mr Andre vd Lingen

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29 July 2010

ATTENTION: Mr Louis Whitehead

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Yours sincerely,

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Environmental Consultant

29 July 2010

ATTENTION: Mr Julius Helmuth

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Yours sincerely,

Ms. Samantha Bodill
Environmental Consultant

29 July 2010

ATTENTION: Mr Steven Lombard / Melody Lombard

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29 July 2010

ATTENTION: Mr Louw

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Mrs CE Avis (MA Rhodes, CAIB) • Dr P Scherman (PhD Rhodes)
Dr AJ Carter (PhD Rhodes, CPA USA)

29 July 2010

ATTENTION: Mr AJP Louw

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Yours sincerely,

Ms. Samantha Bodill
Environmental Consultant

29 July 2010

ATTENTION: Mr Frans Ungerer

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29 July 2010

ATTENTION: Mr JP Lombard

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

Coastal and Environmental Services have been appointed by Terra Power Solutions (Pty) Limited to conduct an Environmental Impact Assessment for the construction and operation of the Cookhouse Wind Energy Project to be developed in Cookhouse, in the Eastern Cape Province of South Africa. The proposed project will entail the construction and operation of 214 wind turbines with a maximum installed capacity of ~500 MW.

Coastal and Environmental Services (CES) would like to notify you of the release of the Specialist volume, Draft Environmental Impact Report (EIR) and Draft Environmental Management Plan (EMP) for public review and comment. The review period is from 2 August 2010 till 2 September 2010.

Copies of the draft EIR and EMP will be available for review at the following locations:

- Cookhouse Public Library
- The CES website (www.cesnet.co.za) – click on public documents

Please also note that a public meeting will be held at the Golden Valley Country Inn on 23 August 2010 at 13:00.

CES will be pleased if you can send us a letter confirming your receipt of notification. For more information, please feel free to contact Kate Bezuidenhout/Marc Hardy at the CES Grahamstown office numbers shown above.

Yours sincerely,

Ms. Samantha Bodill
Environmental Consultant

Henque 1018 t/a Coastal & Environmental Services • Reg no. CK 1997/061914/23 • Vat No. 4380172835
Members: Dr AM Avis (PhD Rhodes) • Prof RA Lubke (PhD Western Ontario)
Mrs CE Avis (MA Rhodes, CAIB) • Dr P Scherman (PhD Rhodes)
Dr AJ Carter (PhD Rhodes, CPA USA)

COASTAL & ENVIRONMENTAL SERVICES
Environmental Management and Impact Assessment

67 African Street P.O. Box 934
Grahamstown 6140 SOUTH AFRICA
Tel: 046 622 2364 Fax: 046 622 6564
International: +27 46 622 2364
Email: info@cesnet.co.za
Website: www.cesnet.co.za

2 Marine Terrace P.O. Box 8145
East London 5210 SOUTH AFRICA
Tel: 043 742 3302 Fax: 043 742 3306
International: +27 43 742 3302
Email: cesel@cesnet.co.za
Website: www.cesnet.co.za

29 July 2010

ATTENTION: Mr Nico Lombard

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Email: cesel@cesnet.co.za
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29 July 2010

ATTENTION: Mr Chris Wilken

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Email: cesel@cesnet.co.za
Website: www.cesnet.co.za

29 July 2010

ATTENTION: Mr R Beach

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Environmental Management and Impact Assessment

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Grahamstown 6140 SOUTH AFRICA
Tel: 046 622 2364 Fax: 046 622 6564
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2 Marine Terrace P.O. Box 8145
East London 5210 SOUTH AFRICA
Tel: 043 742 3302 Fax: 043 742 3306
International: +27 43 742 3302
Email: cesel@cesnet.co.za
Website: www.cesnet.co.za

29 July 2010

ATTENTION: Lario van Niekerk

NOTIFICATION OF PUBLIC REVIEW OF DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND MANAGEMENT PLAN (EMP) FOR THE PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

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Mrs CF Avis (MA Rhodes, CAIB) • Dr P Scherman (PhD Rhodes)
Dr AR Carter (PhD Rhodes, CPA USA)

From: k.bezuidenhout.co.za [k.bezuidenhout@cesnet.co.za] Sent: Thu 9/2/2010 11:17 AM
To: 'harold@eastcape.net'; 'xyze@jabama.co.za'; 'johnwhitehead@mweb.co.za'; 'bjdeklerk@ananzi.co.za'; 'bhobson@iexchange.co.za'; 'agknott@r63.co.za'; 'noelk@idc.co.za'; 'lfbirch@internode.on.net'; 'Trevor.Biggs@bmgi.com'
Cc: 'Marc Hardy'; 'Samantha Bodill'; 'Natalie O'Neill'
Subject: Terra Power Solutions Cookhouse Wind Energy Project

Dear Surrounding Landowner of the Terra Power Solutions Cookhouse Wind Energy Project

RE: PUBLIC REVIEW PERIOD COOKHOUSE EIA

It has been brought to our attention that you, the surrounding landowners of the abovementioned project, have not yet been notified of the public documents available for your comment. This email serves for your notification of the current status of the Cookhouse Environmental Impact Assessment (EIA).

- The Draft Environmental Impact Report (EIR) is a public document and has been placed at the Cookhouse Public Library and on the CES website at www.cesnet.co.za – click on the public documents link. Please review the document and direct any questions to the person listed below.
- If you experience problems accessing the documents, please let us know and we shall email you the relevant documents you require.
- The public review period will run from 2 August 2010 to 2 September 2010. In light of this poor communication, we will accept comments from you until the report is ready to be submitted to the authorities. Please submit your comments **on or before 13 September 2010** so they can be included in our reporting process.
- Please direct your comments to: Ms Natalie O'Neill at ppp@cesnet.co.za or P O Box 934, Grahamstown, 6140. Tel: 046 622 2364. Fax: 046 622 6564

Should you have any queries please feel free to contact me.

Kind Regards,

Kate Bezuidenhout
Senior Environmental Consultant
Coastal & Environmental Services

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 02:05 PM
To: 'martheanne@wessaep.co.za'
Cc:
Subject: cookhouse EIA PPP

Dear Morgan Griffiths

PUBLIC REVIEW PERIOD COOKHOUSE EIA

This email serves for your notification of the current status of the Cookhouse EIA. The public review period will run from 2 August 2010 to 2 September 2010, public documents will be placed at the Cookhouse Public Library and on the CES website at www.cesnet.co.za – click on the public documents link.

In addition, a public meeting will be held on 23 August 2010 at 13:00 at the Golden Valley Country Inn.

All landowners and Interested and Affected Parties are currently being accordingly notified of the review period and public meeting.

I trust that this is sufficient for your current purposes. Should you have any queries please feel free to contact me at the CES offices (Grahamstown) on the number shown below.

Kind Regards,

Samantha Bodill
Environmental Consultant
Coastal & Environmental Services
P.O. Box 934, Grahamstown, South Africa,6140
Tel: +27 46 622 2364
Fax: +27 46 622 6564
Cell: 083 254 7770
Website: www.cesnet.co.za

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 01:00 PM
To: 'Andries.Struwig@deaet.ecape.gov.za'
Cc: 'Nicole.Gerber@deaet.ecape.gov.za'
Subject: cookhouse EIA PPP

Dear Mr Andries Struwig

Cc: Miss Nicole Gerber

PUBLIC REVIEW PERIOD COOKHOUSE EIA

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Kind Regards,

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P.O. Box 934, Grahamstown, South Africa,6140
Tel: +27 46 622 2364
Fax: +27 46 622 6564
Cell: 083 254 7770
Website: www.cesnet.co.za

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 01:00 PM
To: 'LGrobbelaar@deat.gov.za'
Cc: 'dmthembu@deat.gov.za'; 'Kate Bezuidenhout'
Subject: cookhouse EIA PPP

Dear Ms Lene Grobbelaar

CC: Dumisane Mtentu

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P.O. Box 934, Grahamstown, South Africa,6140
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Fax: +27 46 622 6564
Cell: 083 254 7770
Website: www.cesnet.co.za

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 01:00 PM
To: 'mokgadi.mathekgana@energy.gov.za'
Cc: 'Kate Bezuidenhout'
Subject: cookhouse EIA PPP

Dear Ms M Mathekgana; N Qase

PUBLIC REVIEW PERIOD COOKHOUSE EIA

This email serves for your notification of the current status of the Cookhouse EIA. The public review period will run from 2 August 2010 to 2 September 2010, public documents will be placed at the Cookhouse Public Library and on the CES website at www.cesnet.co.za – click on the public documents link.

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Kind Regards,

Samantha Bodill
Environmental Consultant
Coastal & Environmental Services
P.O. Box 934, Grahamstown, South Africa,6140
Tel: +27 46 622 2364
Fax: +27 46 622 6564
Cell: 083 254 7770
Website: www.cesnet.co.za

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 02:01 PM
To: 'mmanager@bcrm.gov.za'; 'tpillay@cacadu.co.za'
Cc: 'Kate Bezuidenhout'
Subject: cookhouse EIA

Dear Municipal Mangager

CC: Executive Mayor

PUBLIC REVIEW PERIOD COOKHOUSE EIA

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Fax: +27 46 622 6564
Cell: 083 254 7770
Website: www.cesnet.co.za

You forwarded this message on 2010/08/18 12:57 PM.

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 02:16 PM
To: 'tom.smith@eskom.co.za'; 'mail@caa.co.za'
Cc: 'pdhoull@isfrica.com'; 'Kate Bezuidenhout'
Subject: cookhouse PPP

Dear Key Stakeholder

Cc: Interested and Affected Parties

PUBLIC REVIEW PERIOD COOKHOUSE EIA

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P.O. Box 934, Grahamstown, South Africa,6140
Tel: +27 46 622 2364
Fax: +27 46 622 6564
Cell: 083 254 7770
Website: www.cesnet.co.za

From: Samantha Bodill [s.bodill@cesnet.co.za] Sent: Wed 2010/07/28 02:05 PM
To: 'mthiyiseli.ntsabo@agr.ecprov.gov.za'; 'dorcas.pillay@agr.ecprov.gov.za'; 'glen.thomas@agr.ecprov.gov.za'; 'dan.sandi@agr.ecprov.gov.za'
Cc: 'Kate Bezuidenhout'
Subject: cookhouse EIA

Dear Key Stakeholder

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Cell: 083 254 7770
Website: www.cesnet.co.za

APPENDIX D-2: PROOF OF WRITTEN NOTICES SENT TO LANDOWNERS AND I&APS

SLIPS PROVING THAT LETTERS OF NOTIFICATION WERE SENT TO MUNICIPALITY, COMMUNITY ORGANISATIONS AND OTHER ORGANS OF STATE

List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
(with an insurance option/met 'n versekeringsopsie)

Full tracking and tracing/Volledige volg en spoor

Post Office

Name and address of sender:
Naam en adres van afsender: N O'Neill (138)
CES, 67 AFRICAN STREET, GRAHAMSTOWN, 6139

Enquiries/Navrae
Toll-free number
Tovry nommer
0800 111 502

No	Name and address of addressee / Naam en adres van geadresseerde	Insured amount / Versekerde bedrag	Insurance fee / Versekeringsgeld	Postage / Posgeld	Service fee / Diensgeld	Affix Track and Trace customer copy / Plak Volg-en-Spoor-kliëntafskrif
1	Mr Nico Lombard, Box 197, Somerset East, 5850					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 199 ZA CUSTOMER COPY 301028R
2	Mr/Ms P.S Zwaska, Box 19 Somerset East 5820.					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 208 ZA CUSTOMER COPY 301028R
3	Mr R. Beach, P.O.Box 197 Somerset East, 5850					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 211 ZA CUSTOMER COPY 301028R
4	Mr Chris Wilken, Box 197 Somerset East 5850					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 225 ZA CUSTOMER COPY 301028R
5	Mr ASP Louw, Box 27, Somerset East 5853					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 239 ZA CUSTOMER COPY 301028R
6	Mr Steven Lombard, Box 8 Middleton, 5810					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 242 ZA CUSTOMER COPY 301028R
7	Mr A van der Linden, Box 27, Somerset East, 5850					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 256 ZA CUSTOMER COPY 301028R
8	Mr Hans Ungerer, Box 50 Golden Valley, 5821.					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 260 ZA CUSTOMER COPY 301028R
9	Mr A. Raewbekheimer Box 1, Golden Valley, 5821					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 273 ZA CUSTOMER COPY 301028R
10	Mr Jan Troskie, Box 27, Somerset East, 5850.					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 287 ZA CUSTOMER COPY 301028R
	Total / Totaal	R	R	R	R	

Number of letters posted / Getal briewe gepos: 10 (ten)

Signature of client / Handtekening van kliënt: Klaata

Signature of accepting officer / Hantekening van aanneembeampte:

Date Stamp
GRAHAMSTOWN 4 2010-07-30 6140
Datumstempel

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R2 000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

701248

LEBONE LITHO PRINTERS (PTY)LTD.

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Lys van GEREGISTREERDE BRIEWE
(with an insurance option/met 'n versekeringsopsie)

Full tracking and tracing/Volledige volg en spoor

Post Office

Name and address of sender:
Naam en adres van afsender: N O'Neill (138)
CES, 67 African St,
Grahamstown 6139

Enquiries/Navrae
Toll-free number
Tovry nommer
0800 111 502

No	Name and address of addressee / Naam en adres van geadresseerde	Insured amount / Versekerde bedrag	Insurance fee / Versekeringsgeld	Postage / Posgeld	Service fee / Diensgeld	Affix Track and Trace customer copy / Plak Volg-en-Spoor-kliëntafskrif
1	Mr J.P. Lombard, Box 8 Middleton, 5810.					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 295 ZA CUSTOMER COPY 301028R
2	Mr Louis Whitehead, Box 10 Bedford, 5780.					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 300 ZA CUSTOMER COPY 301028R
3	Mr Julius Helmuth, Box 27 Somerset East 5852					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 313 ZA CUSTOMER COPY 301028R
4	Mr Jan Louw Box 27, Somerset East, 5852					REGISTERED LETTER (with a domestic insurance option) ShareCall 0860 111 502 www.sapo.co.za RD 044 883 327 ZA CUSTOMER COPY 301028R
5						
6						
7						
8						
9						
10						
	Total / Totaal	R	R	R	R	

Number of letters posted / Getal briewe gepos: 4 (four)

Signature of client / Handtekening van kliënt: [signature]

Signature of accepting officer / Hantekening van aanneembeampte: [signature]

Date Stamp
GRAHAMSTOWN 4 2010-07-30 6140
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Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

701248

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APPENDIX D-3: ADVERTISEMENT FOR PUBLIC REVIEW OF DRAFT EIR

ENGLISH NEWSPAPER ARTICLE:

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

PUBLIC REVIEW OF DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

Coastal and Environmental Services have been appointed by Terra Power Solutions (Pty) Limited to conduct an Environmental Impact Assessment for the construction and operation of the Cookhouse Wind Energy Project to be developed at Cookhouse, in the Eastern Cape Province of South Africa.

The proposed project will entail the construction and operation of 214 wind turbines each generating 2.5 MW of power with a total generation capacity of ~500MW. The windfarm will cover an area of approximately 29400 hectares. All interested and affected parties are hereby notified of the availability of the draft specialist volume, EIR and EMP for public review and comment. The review period is from 2 August 2010 to 2 September 2010.

Copies of the draft specialist volume, EIR and EMP will be available for review at the following locations:

- Cookhouse Public Library
- The CES website (www.cesnet.co.za) – click on public documents

A PUBLIC MEETING WILL BE HELD AT THE GOLDEN VALLEY COUNTRY INN ON 23 AUGUST 2010 AT 13:00

For further information and submission of comments and directions to the meeting venue please do not hesitate to contact: Ms Natalie o'Neill, P.O. Box 934, Grahamstown 6140. Tel: 046-622 2364; Fax: 046-6226564 Email: ppp@cesnet.co.za.

AFRIKAANS NEWSPAPER ARTICLE:

OMGEWINGS IMPACT EVALUERINGS PROSES

PUBLIEKE OORSIG VAN KONSEP OIE-VERSLAG

VOORGESTELDE ONTOWIKKELING VAN DIE COOKHOUSE WIND ENERGIE PROJEK, COOKHOUSE

Coastal and Environmental Services is aangestel deur Terra Power Solutions (Pty) Limited om 'n Omgewings Impak Evaluering vir die konstruksie en operasie van 'n Wind Energie Projek to ontwikkel by Cookhouse in die Oos-Kaap Provinsie van Suid-Afrika.

Die voorgestelde projek is beplan om 214 turbines uit te sit, elk met 'n nominale krag uitsit van 2.5 Mega Watts (MW). The totale potensiale uitsit van die windmetingsmaste sal ~500 MW wees. Die windmetingsmas sal 'n area bedek van omtrent 29400 hektaar.

Alle geïntereseerde en geafekteerde partye word hierby in kennis gestel van die beskikbaarheid van die draft Omgewings Impak Evaluering Verslag vir publieke oorsig en komentaar. Die oorsig tydperk is vanaf 2 Augustus 2010 tot 2 September 2010.

Kopië van die draft Omgewings Impak Evaluering Verslag is beskikbaar vir oorsig en komentaar by die volgende plekke:

- Cookhouse Publiek Biblioteek
- Die CES webtuiste (www.cesnet.co.za) – kliek op publieke dokumente.

'n Openbare vergadering sal gehou word by die GOLDEN VALLEY COUNTRY INN op 23 Augustus 2010 om 13:00

Vir verdere inligting en submissie van komentaar, kontak asseblief: Ms. Natalie o'Neill, Posbus 934, Grahamstad 6140. Tel: 046-622 2364; Faks: 046-622 6564; Epos: ppp@cesnet.co.za

APPENDIX D-4: COPY OF NEWSPAPER ADVERTISEMENTS

EP HERALD (PROVINCIAL) – 30 July 2010

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ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

PUBLIC REVIEW OF DRAFT EIA REPORTS

PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

Coastal and Environmental Services have been appointed by Terra Power Solution (Pty) Limited to conduct an Environmental Impact Assessment for the construction and operation of the Cookhouse Wind Energy Project to be developed at Cookhouse, in the Eastern Cape Province of South Africa.

The proposed project will entail the construction and operation of 214 wind turbines each generating 2.5 MW of power with a total generation capacity of ~500MW. The windfarm will cover an area of approximately 29400 hectares.

All interested and affected parties are hereby notified of the availability of the draft specialist volume, EIR and EMP for public review and comment. The review period is from 2 August 2010 to 2 September 2010.

Copies of the draft specialist volume, EIR and EMP will be available for review at the following locations:

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A PUBLIC MEETING WILL BE HELD AT THE GOLDEN VALLEY COUNTRY INN ON 23 AUGUST 2010 AT 13:00

For further information and submission of comments and directions to the meeting venue please do not hesitate to contact:
Ms Natalie o'Neill, P.O. Box 934, Grahamstown 6140. Tel: 046-622 2364; Fax: 046-6226564 Email: sao@cesnet.co.za

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SOMETHING TO CELEBRATE ... Marcos Baghdatis, of Cyprus, ended a four-match losing streak at the LA Open. Picture: AP

Baghdatis shakes off losing run to triumph in LA

SOMERSET BUDGET (LOCAL) – 29 July 2010

Cradock Courant, Middelburg Courant, Somerset Budget, Winterberg Nuus, Port Beaufort Advocate Donderdag / Thursday 29 Julie/July 2010 13

Plaaslik & Algemeen Local & General

OMGEWINGSIMPAK-EVALUERINGSPROSES

PUBLIEKE OORSIG VAN KONSEP OIE-VERSLAG

VOORGESTELDE ONTWIKKELING VAN DIE COOKHOUSE WINDENERGIEPROJEK, COOKHOUSE

Coastal and Environmental Services is aangestel deur Terra Power Solution (Pty) Limited om 'n Omgewingsimpak Evaluering vir die konstruksie en operasie van 'n Windenergieprojek te ontwikkel by Cookhouse in die Oos-Kaap Provinsie van Suid-Afrika.

Die voorgestelde projek is beplan om 214 turbines op te rig, elk met 'n nominale kragopwekking van 2.5 Mega Watts (MW). The totale potensiële uitset van die windmeulingsplaas sal ~500 MW wees. Die windmeulingsplaas sal 'n area bedek van omtrent 29 400 hektaar.

Alle geïnteresseerde en geaffekteerde partye word hierby in kennis gestel van die beskikbaarheid van die draft Omgewingsimpak Evalueringsverslag vir publieke oorsig en kommentaar. Die oorsig tydperk is vanaf 2 Augustus 2010 tot 2 September 2010.

Kopieë van die konsep Omgewingsimpak Evalueringsverslag is beskikbaar vir oorsig en kommentaar by die volgende plekke:

- Cookhouse Publieke Biblioteek
- Die CES webtuiste (www.cesnet.co.za) – kliek op publieke dokumente.

'n Openbare vergadering sal gehou word by die GOLDEN VALLEY COUNTRY INN op 23 Augustus 2010 om 13:00

Vir verdere inligting en submissie van kommentaar, kontak asseblief: Ms. Natalie o'Neill, Posbus 934, Grahamstad 6140
Tel: 046-622 2364; Faks: 046-622 6564; Epos: ppp@cesnet.co.za

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

PUBLIC REVIEW OF DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

PROPOSED DEVELOPMENT OF THE COOKHOUSE WIND ENERGY PROJECT, COOKHOUSE

Coastal and Environmental Services have been appointed by Terra Power Solution (Pty) Limited to conduct an Environmental Impact Assessment for the construction and operation of the Cookhouse Wind Energy Project to be developed at Cookhouse, in the Eastern Cape Province of South Africa.

The proposed project will entail the construction and operation of 214 wind turbines each generating 2.5 MW of power with a total generation capacity of ~500MW. The windfarm will cover an area of approximately 29 400 hectares.
All interested and affected parties are hereby notified of the availability of the draft specialist volume, EIR and EMP for public review and comment. The review period is from 2 August 2010 to 2 September 2010.

Copies of the draft specialist volume, EIR and EMP will be available for review at the following locations:

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Ms Natalie o'Neill, P.O. Box 934, Grahamstown 6140
Tel: 046-622 2364; Fax: 046-6226564 Email: ppp@cesnet.co.za

Briewe/Letters

The Editor
No political games at the Sitting Festival.

SLABBERT ELEKTRIES

GELISENSIEERDE ELEKTRISIEN
FAKS 042 243 0589
SEL 082 969 7858

SPESIALISEER IN MOTORS EN STARTERS
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INSTALLEER VAN KRAGOPWEKKERS
& ALLE LOODGIETERWERK

SLABBERT ELEKTRIES SE KANTOOR SAL GESLUIT WEES TOT EINDE AUGUSTUS.
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JAMMER VIR DIE ONGERIEF.

YELLOWWOODS PREPARATORY SCHOOL

- an educational oasis -

Founded 1996

Active member of the Independent Schools' Association of South Africa (ISASA)

Applications are invited for the following Primary School Post:

Boarding House/Kitchen Superintendent January 2011

Applicants should:
- have suitable experience and knowledge of domestic and kitchen supervision
- have a passion for working with and mentoring young children
- have the knowledge, experience and expertise in childcare after hours

Interested parties are requested to submit a written application, CV and details of two references by Friday 20 August 2010 to:

The School Principal	Tel: (046) 684 0706
P.O. Box 136	Fax: (046) 684 1122
ADELAIDE	email: yellowwoods@procomp.co.za
5760	

Members of staff are expected to support the Christian ethos of the school.
Please note: Short-listed applicants only, will be contacted for interviews.

YELLOWWOODS PREPARATORY SCHOOL

- an educational oasis -

Founded 1996

Active member of the Independent Schools' Association of South Africa (ISASA)

Applications are invited for the following Primary School Post:

Junior Primary Foundation Phase Teacher (Grade 1 - 3) January 2011

Applicants should:
- have a suitable teaching qualification
- have a passion for teaching and mentoring young children
- be equipped to coach sport
- be registered with SACE

A music qualification is preferable.

Interested parties are requested to submit a written application, CV and details of two references by Friday 20 August 2010 to:

The School Principal	Tel: (046) 684 0706
P.O. Box 136	Fax: (046) 684 1122
ADELAIDE	email: yellowwoods@procomp.co.za
5760	

Members of staff are expected to support the Christian ethos of the school.
Please note: Short-listed applicants only, will be contacted for interviews.

APPENDIX D-5: ATTENDANCE REGISTER FROM PUBLIC MEETING AT GOLDEN VALLEY INN, COOKHOUSE ON 23 AUGUST 2010

Attendance Register

Cookhouse Wind Energy Project: Public meeting, Cookhouse. Golden Valley Country Inn. 23rd August 2010 13h00.

Name and Organisation (if any)	Address	Contact			e-mail
		Tel	Fax	Cell	
Basil Read/ Neport Constructio	Markman Port Elizabeth	041 4611488		0824172090	paul@Neweportconstruction.co.za
TERRA POWER	ANDREW DEJAGER	021-7625490		082 787 5899	andrew@terrapower.co.za
TERRAPOWER	RUSS COOPER	021 7625490		0827471888	rob@terrapower.co.za
TERRA POWER	DAVE ROSSITER	0827723910.		0827723910.	DAVE@geomechanics.co.za.
Franz Ungerer	Posbus 50 G V	0828507810			F.J.U.@Boskor.xyz@jabama.co.za
HAROLD LUMBARD	POSBUS 25, S.E. 5850	042-2472187 0825497116		0825497116	haroldl@eastcape.net
LOURENS RIEGHARDT	BUSI KOOKHUIS	0422472136		0762362090.	
LOUIS WHITEHEAD	OLIVEWOODS BEDFORD	042 2472194		072 1477321	
JOHN WHITEHEAD	OLIVEWOODS BEDFORD	042 2472194		082 3210810	johnwhitehead@mweb.co.za
JOSINE TROSKIE VIA JAN TROSKIE	POSBUS 69 PEARSTON	042 247-2249/ 246-1489		082 632 8359	–
	LEEUDRIFT BEDFORD				

Attendance Register

Cookhouse Wind Energy Project: Public meeting, Cookhouse. Golden Valley Country Inn. 23rd August 2010 13h00.

Name and Organisation (if any)	Address	Contact			e-mail
		Tel	Fax	Cell	
Florencia Botha Olyvenfontein	PO Box 218 Somerset Oos Boerdery 5850	0720734761	0866753315	072 0734761	info@lanternsquare.co.za
Akwaggaskuil AJ Rautenbach	Posbus Golden Valley 5821	0422472180	0422472180	0826532630	

APPENDIX D-6: SIGNED RECEIPT LETTER FROM COOKHOUSE LIBRARY DATED 2 AUGUST 2010

ATTENTION: The Librarian/Assistant Librarian

29 July 2010

DRAFT SPECIALIST VOLUME, ENVIRONMENTAL IMPACT REPORT (EIR) AND ENVIRONMENTAL MANAGEMENT PLAN (EMP) FOR PUBLIC REVIEW: PROPOSED COOKHOUSE WIND ENERGY PROJECT, BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE OF SOUTH AFRICA

Coastal and Environmental Services has been appointed by Terra Power Solution (Pty) Limited to conduct an Environmental Impact Assessment for the construction and operation of a Wind Energy Project to be developed in Cookhouse, in the Blue Crane Route Local Municipality, Eastern Cape Province of South Africa.

The proposed project will entail the construction and operation of 214 turbines, each with a nominal power output of 2.5 Mega Watts (MW). The total potential output of the wind farm will therefore be 500MW. The windfarm will cover an area of approximately 29400 hectares.

In accordance with the requirements of section 56 (6) (b) of the Environmental Impact Assessment Regulations (2006) made in terms of section 24(5) of the National Environmental Management Act (Act No 107 of 1998) as amended, we are required to ensure that, "*participation by potential interested and affected parties is facilitated in such a manner that all potential interested and affected parties are provided with a reasonable opportunity to comment on the application*". In accordance with this requirement, please find here-with attached the specialist volume, Draft EIR and EMP for public review and comment. We would highly appreciate it if you could keep a copy of this report in a central location in your establishment where any Interested and Affected Parties can have access to it. The period this report needs to remain available is from

For further information, please do not hesitate to contact: Ms. Kate Bezuidenhout, P.O. Box 934, Grahamstown 6140.
Tel: 046-622 2364; Fax: 046-6226564 Email: k.bezuidenhout@cesnet.co.za.

CES would highly appreciate it if you could please acknowledge receipt of this letter as well as the EIR and EMP which you will make available in your establishment from 2/August/2010 to 2/September/2010.

RECEIVED BY: Nomme C. Zaki

SIGNATURE: .....

DATE: 02-08-2010

Yours sincerely,
Kate Bezuidenhout
Senior Environmental Consultant

APPENDIX D-7: ISSUES AND RESPONSE TRAIL

Raised By:	Event & Date	Issue, Concern, Comment	Response
Visual Issues			
Dr Paul Martin	06.09.2010 via email	Similarly the cumulative visual impacts of all the wind farms proposed for an area need to be assessed, not just on an individual project basis.	Noted. The cumulative visual impacts of the proposed project will be reported in the final EIA report.
Avifaunal Issues			
Dr Paul Martin	06.09.2010 via email	The cumulative impacts of all proposed wind farms in an area need to be assessed. The large number of wind farms proposed for the Cookhouse area will result in the sterilization of large areas of land for the larger bird species such as Blue Cranes, Denham's Bustards and Secretary birds as they are expected to avoid the areas where the turbines are located. This is expected to have a large negative impact on their populations via loss of useable habitat.	Noted. These avifaunal and vegetation considerations have been taken into account in the EIA and the cumulative impacts thereof will be reported in the final EIA report.
Issues with the Proposed site			
Dr Paul Matin	06.09.2010 via email	While renewable energy intiatives are welcomed, a lack of policy direction and guiding SEA with respect to the potential locations of wind farms in SA, and the maximum number of turbines to be allowed in each area so as to maximise the positive impacts and minimize the negative impacts has resulted in a plethora of proposals for wind farms in the Eastern & Western Cape Provinces. The projects cannot be assessed on a piecemeal basis.	Concerns are noted. Where relevant and possible, these issues and potential cumulative impacts will be flagged for more detailed assessment and discussions during the EIA phase reporting. The need for a more strategic level assessment with regard to wind farm siting in the province had been put forward to the relevant Provincial and National authorities on numerous occasions. It is not anticipated, however, that this will eventuate in the short to medium term future due to financial and human resource constraints.
Impact on other Businesses			
Mr Harold Lombard	03.09.2010 via email	It definitely is going to affect the tourism aspect of this area negatively and this is something that is only now beginning to gain momentum after a number of years' hard work.	The potential negative impacts on tourism in the area have been noted in the report.
Mr Harold Lombard	03.09.2010 via email	On the same level, it will then, as a result, probably strengthen or boost another area's tourism.	Noted
Impacts on Property Values			
Mr Harold Lombard	03.09.2010 via email	What is possibility of the government laying claim on farms for BEE and land reform as soon as wind turbines are up and running in the same way they are earmarking farms near or next to towns?	This is not within CES's EIA reporting ambit and scope of work. It is a scenario that will be driven by the various national and provincial line function departments should this ever eventuate. Accordingly, we have no comment on this issue.

Mr Harold Lombard	03.09.2010 via email	A last threat is what local authorities might do to our farms' land tax tariffs – a big concern for me.	Once again this is a scenario that CES cannot respond to as there is no way of pre-empting or determining what the relevant local authority's future intentions in this regard may be, as well as not being within the scope of works/issues under assessment in this EIA process.
General Issues/queries/comments			
Ms Noma Qase (National Department of Energy)	13.09.2010 via email	What is the current use of the farms?	The farms are currently being used for agriculture: cultivation of crops and cattle farming. The farms will be able to continue operating during the operation of the wind farm with minimal disruption during the construction phase of the project.
BCDA (Mr. Nico Lombard)	09.09.2010 via email	Currently, four wind farms are proposed for Cookhouse (total 750 turbines). We suggest that that at this stage only one wind energy facility should be supported (The African Clean Energy Developments (ACED) Cookhouse Wind Energy Facility which has received Environmental Authorisation to proceed)). This will allow the municipality and local communities to properly assess both benefits and pitfalls of the projects in the local area, including: 1) Direct and indirect jobs created in the Cookhouse and Somerset East areas, 2) Level of tourism and the impact on local communities, 3) visual impact of wind farm of local communities, 4) Local economic development in Cookhouse and Somerset East through improved education and training.	Noted
BCDA (Mr. Nico Lombard)	09.09.2010 via email	Concerns over the cumulative impact of numerous windfarms in the Cookhouse area, and the risk that the constraints on common resources such as roads, water, and construction equipment may result in project being delayed and not completed properly or to a sufficient standard.	Noted

BCDA (Mr. Nico Lombard)	09.09.2010 via email	We would like to inform you about the actions taken by Cacadu District Municipality and enclose herewith their comments and directives: CDM in partnership with DBSA & other district stakeholders are identifying mechanisms to drive shared growth on a strategic basis. A project within this initiative is to explore the potential for renewable energy as a growth opportunity. CDM undertook rapid assessment and audit of the potential of renewable energy within the Cacadu district. Please see letter from BCDA (Appendix D-7) of the Final Environmental Impact Report for a description of objectives and outcomes of this assessment by CDM	Noted
Dr Paul Martin	06.09.2010 via email	Note that these comments hold for all wind farm projects. Please register me as an I&AP for all wind farm projects that you may be involved in in the Eastern Cape (I am already registered for the Coega Project).	Noted. You have been included as an IAP for this project and for the other wind energy projects we are involved with in the Eastern Cape.
Dr Paul Martin	06.09.2010 via email	The cumulative impacts need to be assessed and authorisations given to only those wind farms that are located in the most appropriate areas. Authorisations should not be allocated on a first come, first served basis.	Noted. The need for a more strategic level assessment with regard to wind farm siting in the province had been put forward to the relevant Provincial and National authorities on numerous occasions.

Reply from BCDA

BLUE CRANE DEVELOPMENT AGENCY

Tourism
Chris Wilken
082 329 4546
Agriculture
Nico Lombard
082 329 4545
Business
Rob Beach
082 329 4547
Finance
Conrad Everson
082 796 8951

BLUE CRANE DEVELOPMENT AGENCY

P.O. Box 197
Somerset East
5850
72-74 Paulet Street
Somerset East
5850
Tel : 042-24 30095
Fax : 042-24 30097
E-mail: bcda@lantic.net
Web:
www.bluecranedevelopmentagency.co.za

09 September 2010

For Attention: Kate Bezuidenhout & Natalie O'Neal
Coastal & Environmental Services
P.O. Box 934
Grahamstown
6140

Dear Sir/Madam

COMMENTS OFN THE PROPOSE DEVELOPMENT ON THE COOKHOUSE WIND ENERGY PROJECT

We would like to respond and comment on your letters dated the 29th of July 2010 and the 30th of August 2010.

Executive Summary

Currently there are at least 4 separate wind energy facilities being developed in the immediate Cookhouse area, totalling over 750 individual wind turbines. Wind energy can bring many benefits including clean energy, local employment and economic stimulation, but it also comes with risks.

The Blue Crane Development Agency is of the view that a single wind energy facility should be supported, as a pilot project in the Cookhouse area. This will allow the municipality and the local communities to properly assess both the benefits and pitfalls of the projects in the local area.

Of the 4 wind energy facilities, only one has received its Environmental Authorisation to proceed, the African Clean Energy Developments' (ACED) Cookhouse Wind Energy Facility. Other projects should be put on hold until the success of the Cookhouse Wind Energy Facility can be tested.

Background

South Africa has a national renewable energy target of 10,000 GWh renewable energy contribution to final energy consumption by 2013 through its White Paper on Renewable Energy, published in 2003. The South African National Energy Regulator ("NERSA") implemented a Renewable Energy Feed-in Tariff ("REFIT") in March 2009, in order to create an

enabling environment to achieve South Africa's renewable energy target by 2013, and to contribute towards socio-economic and environmentally sustainable growth beyond this target.

Under South Africa's integrated resource plan, there is an electricity generation capacity allocation of 400MW to wind energy projects over the next three years through to 2013, which includes 200MW during 2011 and 200MW during 2012. Therefore, the allocation to wind energy projects under the REFIT Programme is likely to be approximately 400MW in the short term.

Projects Under Development

Currently, there are multiple wind energy projects under development in the Cookhouse area, however, only one single project (which has been under development since 2008), has received authorization to proceed from the Department of Environmental Affairs for the construction of 200 wind turbines in the Cookhouse area, known as the ACED Cookhouse Wind Energy Facility.

ACED Cookhouse Wind Energy Facility

African Clean Energy Developments Pty Ltd and its project company ACED Cookhouse Renewables Pty Ltd are developing the Cookhouse Wind Energy Facility on a site 5km east of Cookhouse in the Eastern Cape, and is located adjacent to the Poseidon substation – an already disturbed area due to existing Eskom operations. The site offers good wind conditions, however a key consideration in determining the site's location was that it is already disturbed, from an environmental perspective, and that the connection to the Eskom lines was very straightforward, requiring no power line servitudes outside the project's boundaries.

Due to these factors the project is the least complicated in the area.

The wind energy facility is proposed for up to 200 wind turbines to be constructed over an area of approximately 91 km^2 (see appendix for map). The Cookhouse Wind Energy Facility is one the leading wind energy projects in the country as it is the only project in the country to receive full environmental authorisation and provisional civil aviation approval and is therefore likely to be the preferred wind project selected under the REFIT Programme in South Africa.

Other wind energy projects being developed in the area include the Terra Power Cookhouse Wind Energy Project, the Amakhala Emoyeni Wind Energy Facility which are currently in the draft Scoping Phase of their environment impact assessments and the RES project.

Terra Power Cookhouse Wind Energy Project

Terra Power Solutions is developing the Cookhouse Wind Energy Project located to the east of Cookhouse, and runs to the south east of Cookhouse. The project is proposed for up to 214 wind turbines, with an installed capacity of up to 500MW to be constructed over an area of approximately 29400 hectares (see appendix for map).

The project extends over an enormous area including the banks of the fish river and lowland agricultural areas. The project can connect into Eskom distribution lines at low volumes; however will ultimately require servitudes for overland powerlines to connect into the substation which is not adjacent to the project's contracted land.

The project has not received its environmental authorisation to proceed.

Amakhala Emoyeni Wind Energy Facility

Windlab Developments South Africa Pty Ltd is developing a wind energy facility on a site between Cookhouse and Bedford. The wind energy facility is proposed for up to 350 wind turbines to be constructed over an area of approximately 273 km^2 (see appendix for map). This project has been registered with National DEA under Application Reference number 12/12/20/1754.

The project can connect into Eskom distribution lines at low volumes; however will ultimately require servitudes for overland powerlines to connect into the substation which is not adjacent to the project's contracted land.

The project has not received its environmental authorisation to proceed.

RES

Finally, Renewable Energy Systems Southern Africa ("RES") is in the very early stages of development of its wind energy project located near Cookhouse, and has submitted a proposal for the establishment of up to seven wind monitoring masts on a site between Somerset East and Grahamstown in the Eastern Cape Province.

Rationale

By supporting a single pilot project, the Blue Crane Development Agency, and local municipalities will be able to accurately monitor and assess the impact of the ACED Cookhouse Wind Energy Facility in terms of local economic development and job creation in the Cookhouse and Somerset East areas.

These factors are a key focus of the ACED Cookhouse Wind Energy Facility, through its cooperation with the Blue Crane Development Agency and the Industrial Development Corporation of South Africa.

We propose that only a single wind energy project should be supported as the pilot project in the Cookhouse area, so that we can effectively monitor the effects of the wind farm with regards to:

- No. of direct and indirect jobs created in the Cookhouse and Somerset East areas;
- Level of tourism and the impact on local communities;
- The visual impact of wind farm of local communities;
- Local economic development in Cookhouse and Somerset East through improved education and training.

If several wind energy facilities are to proceed in the immediate area there is a risk that the constraints on common resources such as roads, water, and construction equipment may result in projects being delayed and not completed properly or to a sufficient standard.

We propose that the Cookhouse Wind Energy Facility, which has already received environmental authorization, should be supported as the single pilot project, as it is will enable us to effectively assess the impacts of the wind farm in terms of creating jobs and in stimulating local economic development in the local areas. Once we have properly assessed the real impacts of this first pilot project, we will then be able to determine whether additional renewable energy projects are desired in the immediate area.

We would also like to inform you about the actions taken by Cacadu District Municipality and enclose herewith their comment and directives.

LAND USE AND LOCATIONAL POLICY FOR RENEWABLE ENERGY PROJECTS: CACADU DISTRICT MUNICIPALITY

The CDM is currently in the process, in partnership with the DBSA, and other district stakeholders of identifying mechanisms to drive shared growth on a strategic basis. A project within this initiative is to explore the considerable potential for renewable energy as a growth opportunity.

With reference to the above, the CDM undertook a rapid assessment and audit of the potential of renewable energy within the Cacadu district. The primary objective of this assessment was to:

- Formulate a summary of relevant policies and strategies;
- Audit existing renewable energy practices within the district;
- Present recommendations for promoting and managing renewable energy within the district.

A key outcome of the assessment identified the lack of locational policy and resultant implications for land use planning resulting from the establishment of renewable energy projects.

As such, the CDM has appointed a service provider to fulfill the following activities:

- Formulate a detailed locational and land use strategy for the establishment of wind farms and large scale renewable energy projects;
- Implement District wide land use and locational guidelines with respect to renewable energy technologies;
- Assess the impact and possible spin-offs of renewable energy, especially wind farms, on the municipal rates base;
- Develop District level guidelines and policy for possible roll-out to individual LM's and province.

In terms of the above, the CDM would now like to meet with each Local Municipality so as to:

- Detail the objectives of the exercise more fully.
- Gain insight of "renewable energy" development pressures for each LM and the resultant implication on the respective municipal rates base.

Furthermore, we recognise that a number of municipalities are currently under pressure to assess current land use applications with respect to renewable energy projects. As an interim measure prior to the eventual policy approval the following points are to be utilised as guidelines with respect to application assessment.

- All renewable energy projects within the LM's area of jurisdiction should be submitted to the Municipality for assessment and approval.
- Assessment and approval to be done in terms of the relevant requirements of the Land Use Planning Ordinance (Ordinance 15 of 1985).
- Applications should be for rezoning of individual turbine footprints.
- The rezoning process should zone turbine footprints from Agriculture to Special Purposes : Wind Turbine.
- It is acknowledged that wind farm / wind turbines is regarded as permanent structures and rezoning is therefore required.
- Rezoning can be accompanied by an application to subdivide of individual footprint area.
- Approval from the Department of Agriculture in terms of Act 70 of 1970 is required in all cases, whether subdivision is permitted or whether it is a long term lease agreement in favour of a developer / investor.
- Application should only be assessed once a positive Record of Decision has been issued and the Municipality is satisfied that all ROD conditions can be adhered to.

- Cognisance should be taken of proposed access / service roads, and other infrastructure requirements.
- All applications should be submitted with a detailed site development plan, outlining height, footprint coverage, access, supporting infrastructure, power lines and exact co-ordinated location. Final special purpose zone approval should be based on development parameters as per the site development plan (s).
- The Local Authority should make sure that applications are referred to surrounding property owners and all other interested and affected parties for comment, prior to a final decision. Specific reference is made to National Parks, conservation areas, aviation authorities, etc.

We trust that you will find the above in order and we wait to hear from you. Please keep us informed about further developments.

Regards.

_____

N. Lombard
(Blue Crane Development Agency)

APPENDIX D-8: CONTACT LIST OF I&APS CONTACTED DURING THE EIR PHASE

Contact Person	Organisation	Telephone	Fax	Cellphone	Email	Postal Address
LANDOWNERS						
Jan Troskie	Leuwe Drift	042 246 1489				c/o Abrahamson and Reynolds Attorneys, PO Box 27, Somerset East, 5852
Alwyn Raubenheimer	Quaggas Kuyl	042 247 2180		082 653 2360		P O Box 1, Golden Valley 5821
Johanna Maria Nolte	Varkens Kuly	042 243 1105	042 243 1645	082 855 2369	att@arlaw.co.za	c/o Abrahamson and Reynolds Attorneys, PO Box 27, Somerset East, 5852
Louis Whitehead	Olive Woods Estate	042 247 2194		072 147 7321		P O Box 10, Bedford, 5780
Julius Helmuth	Olyfenfontein Boerdery Trust			082 463 7983		c/o Abrahamson and Reynolds Attorneys, PO Box 27, Somerset East, 5852
Florence Botha				072 073 4761		
Steven Lombard / Melody Lombard	Matjiesfontein	042 243 2360		Rather contact JP Lombard 0832273600 (Steven Lombard's son)	klombard7@gmail.com	P O Box 8 Middleton 5810
Gerda Louw (084443204)	Lushof	Contact:Jan Louw		082 847 3111	kroonkop@bosberg.co.za	c/o Abrahamson and Reynolds Attorneys, PO Box 27, Somerset East, 5852
Jan Louw Jnr	Kroonkop			082 847 3111	kroonkop@bosberg.co.za	c/o Abrahamson and Reynolds Attorneys, PO Box

						27, Somerset East, 5852
AJP Louw	Ondersmoordrift			082 451 8891	junior.louw@telkomsa.net	P O Box 50 Golden Valley 5821
Frans Unggere	Oude Smoor Drift/Gedagtenis	042 257 2185		076 732 9780		c/o Abrahamson and Reynolds Attorneys, PO Box 27, Somerset East, 5852
J P Lombard	Wagenaarsdrift			083 227 3600	klombard7@gmail.com	P O Box 8 Middleton 5810
REGISTERED I&AP'S						
Mr. Chris Wilken	Blue Crane Development Agency	042 243 0095/7			bcdan@lantic.net	
Nico Lombard	Blue Crane Development Agency	042 243 0095/7		082 329 4547	bcdan@lantic.net	P O Box 197 Somerset East 5850
R. Beach	Blue Crane Development Agency	042 243 0095/7	082 329 4547		bcdan@lantic.net	P O Box 197 Somerset East 5850
Lario van Niekerk	Port Elizabeth	041 372 1845	041 372 1821		lario@sjw.co.za	PO Box 336, Hunters Retreat, Port Elizabeth, 6017
P S Zwosha	Resident			072 998 8889		P O Box 19 Somerset East 5850
KEY STAKEHOLDERS						
Morgan Griffiths	WESSA - EASTERN PROVINCE REGION	041 585 9606 / 041 585 1157	041 586 3228		martheanne@wessaep.gov.za	2b Lawrence Street, Central Hill, Port Elizabeth, 6001, South Africa / PO Box 12444, Centrahil, 6006

Mr Andries Struwig	Assistant Director (Environmental Impact Management: Cacadu Region) DEDEA	041 5085840	041 5085865		Andries.Struwig@deaet.ecape.gov	Private Bag X5001, Greenacres, 6057
Miss Nicole Gerber	Regional Manager: Environmental Affairs, DEDEA	041 508 5844	041 508 5865		Nicole.Gerber@deaet.ecape.gov.za	Private Bag X5001, Greenacres, 6057
Ms Lene Grobbelaar	Assistant Director: Parastatals, Department of Environmental Affairs	012 310 3087	012 320 7539		LGrobbelaar@deat.gov.za	Private Bag X 447, Pretoria, 0001
Mr Dumisane Mthembu	Director: Environmental Impact Evaluation, Department of Environmental Affairs	012 310 3230	012 320 5014 / 012 320 7539		dmthembu@deat.gov.za	Private Bag X 447, Pretoria, 0001
Ms Mokgadi Mathekgana	Chief Director: Clean and Renewable Energy, Department of Energy	012 444 4261			mokgadi.mathekgana@energy.gov.za	Private Bag X19, Arcadia, 0007
Ms Noma Qase	Department of Energy	012 444 4105			nomawethu.qase@energy.gov.za	Private Bag X19, Arcadia, 0008
Mr Andre Otto	Project Manager: South Africa Wind Energy Programme (SAWEP)	012 444 4248		082 877 0128	andre.otto@energy.gov.za	Private Bag X19, Arcadia, 0009
Municipal Mangager	Blue Crane Route Municipality				mmanager@bcrm.gov.za	

Executive Mayor	Cacadu District Municipality				tpillay@cacadu.co.za	
Tom Smith	Land Development Manager Eskom Southern Region	043 703 2336	043 703 2392	082 806 1665	tom.smith@eskom.co.za	Private Bag X1 Beacon Bay 5205
Mr Mthiyiseli Ntsabo	Eastern Cape Department of Agriculture	SENIOR MANAGER: TSOLO AGRICULTURE & RURAL DEVELOPMENT INSTITUTE	047 542 0025	040 635 0604	Mthiyiseli.Ntsabo@agr.ecprov.gov.za	
Ms Dorcas Pillay	Eastern Cape Department of Agriculture	PERSONAL ASSISTANT TO MEC Sogoni	040 609 3472	040 636 3462	Dorcas.Pillay@agr.ecprov.gov.za	
Mr Glen Thomas	Eastern Cape Department of Agriculture	Head of Department: SUPERINTENDENT GENERAL	040 609 3471	040 635 0604	Glen.Thomas@agr.ecprov.gov.za	
Prof Dan Sandi	Eastern Cape Department of Agriculture	SENIOR MANAGER: CACADU DISTRICT	041 402 6201	041 402 6212	Dan.Sandi@agr.ecprov.gov.za	
Ms Lizell Ströh	Civil Aviation Authority	011 545 1000	011 545 1465		mail@caa.co.za	Private Bag X 73, Halfway House, 1685 Ikhaya Lokundiza, Building 16, Treur Close, Waterfall Park, Bekker Street, Midrand, Gauteng
Patrick Cull	EP Herald - Assistant Editor			082 893 2870	pdhcull@ifarica.com	

Thomas Donnelly	Macquarie	(021) 813 2768 / (021) 813 2769	(021) 813 2848		Thomas.Donnelly@macquarie.com	PO Box 50525 Waterfront 8002
Sam Cooper	Macquarie	(021) 813 2768 / (021) 813 2769	(021) 813 2848		Sam.Cooper@macquarie.com	PO Box 50525 Waterfront 8002
I&AP'S ATTENDANCE REGISTER DATED 23/08/2010						
Basil Reud	Newport construction	041 461 1488		082 417 2090	paul@newportconstruction.co.za	
Andrew DeJager	Terra Power	021 762 5490		082 782 5899	andrew@terrapower.co.za	
Rob Cooper	Terra Power	021 762 5490		082 747 1888	rob@terrapower.co.za	
Dave Rossitor	Terra Power	021 762 5490		082 772 3910	dave@geomechanics.co.za	
Frans Ungerer				082 850 7810	F.J.U.@bosberg.co.za	P O Box 50. golden valley
Harold Lumbard		042 247 2187		082 549 7116	harold@eastcape.net xyze@jabama.co.za	P O Box 25 somerset east 5850
Lourens Triegaardt	Busi Kookhuis	042 249 2136		076 236 2090		
Louis Whitehead	Olive Woods Estate landowner	042 247 2194		072 147 7321		
John Whitehead	Olive Woods Estate landowner	042 247 2194		082 321 0810	johnwhitehead@mweb.co.za	
Josine Troskie	on behalf of Jan Troskie	042 247 2249		082 632 8339		
Florence Botha	Olyfenfontein Boerdery Trust		086 675 3315	072 0734761	info@lantonsquare.co.za	P O Box 218 somerset east 5850
AJ Raubenheimer	Kwaggaskuyl	042 247 2180		082 653 2630		

SURROUNDING LANDOWNERS						
Harold Lombard	Farm Creguskraal	042 247 2187		082 549 7116	harold@eastcape.net xyze@jabama.co.za	P O Box 25 somerset east 5850
Hollardine Trust (Mr Marc Whitehead)	Remainder of Olive Woods Estate	042 247 2194		082 321 0810	johnwhitehead@mweb.co.za	
Barend Jacobus De Klerk	RE Farm 259	046 685 0191	046 685 0191	076 621 0545	bjdeklerk@ananzi.co.za	1 Ernst Nel Street, bedford, 5780
Penderry Prop Trust - Geoff Hobson	RE Farm 260	046 685 0616	046 685 0616		bhobson@iexchange.co.za	PO Box 15, Bedford, 5780
Pierre Van Niekerk	RE Farm 242 (Pierre Van Niekerk Family Trust), Portion 5 of Farm 149 (Great Knoffel Fonteyn)	042 247 7821 / 042 247 2123		083 744 7821		PO Box 101, Bedford, 5780
Andrew Knott	North of Alwyn Raubenheimer's farm			073 090 2438	agknott@r63.co.za	
Noel Kamrajh (IDC)	Sugar Beet Plantation	011 269 3546 / 3000			noelk@idc.co.za	
Trevor Biggs	South of Mr Lombard's farm	084 511 2284			Trevor.Biggs@bmgi.com	
Mr Sid Birch	South of Mr Lombard's farm. Voorspoed and Endor	042 247 1474 / 042 247 1384		082 490 2209	lfbirch@internode.on.net	

APPENDIX E: CORRESPONDENCE WITH DEPARTMENT OF WATER AFFAIRS

Natalie

From: Ntshebe Lorna [NtshebeL@dwa.gov.za]
Sent: Wednesday, August 18, 2010 10:18 AM
To: k.bezuidenhout.co.za
Cc: Guzana Thulani (ELS); Jacobs Joseph (PLZ); Tshatshu Portrait
Subject: RE: Proposed Windfarm in Cookhouse, Eastern Cape

Follow Up Flag: Follow up
Flag Status: Completed

Dear Kate

According to the National Water Act, 1998 (Act 36 of 1998), the natural channels are regarded as watercourses. Therefore, the electric duct crossings (each and every one of them) will constitute a water use in terms of this Act, for the following:

- Section 21 (c)- Impeding or diverting the flow of water in a watercourse (if there will be any) and
- Section 21 (i)-Altering the bed, banks, course or characteristics of a watercourse.

These crossings will have an impact on the watercourse (bed & banks) so an authorization is needed.

When submitting the Section 21 (c) & (i) registration forms, you are only required to fill in one form per each water use but listing all the GPS coordinated of the crossings. For example, for Section 21 (i) you will only fill in one form but list all the coordinates of the 100 crossing points and for Section 21 (c) as well.

I hope this will give you clearance on the water use authorization process. Please do not hesitate to contact me should you have any questions.

Regards,
Lorna

From: k.bezuidenhout.co.za [mailto:k.bezuidenhout@cesnet.co.za]
Sent: Wednesday, August 18, 2010 9:58 AM
To: Ntshebe Lorna
Subject: RE: Proposed Windfarm in Cookhouse, Eastern Cape

Hi Lorna,

A friendly reminder that we are waiting for DWA's guidance on the numerous water crossings. As per our phone conversation on Monday you said you'd prepare an email setting out what is required for the authorization process.

Looking forward to hearing from you.

Kind regards,

Kate Bezuidenhout
Senior Environmental Consultant
Coastal & Environmental Services
67 African Street

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APPENDIX F-1: EA DATED 5 APRIL 2011

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682
NEAS Reference: DEAT/EIA/12410/2011
DEA Reference: 12/12/20/1717
Enquiries: Ms Portia Mashego
Telephone: 012-310-3249 **Fax:** 012-320-7539 **E-mail:** PMashego@environment.gov.za

Mr H Ramsden
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 68063
BRYANSTON
2021

Fax no: 086 530 9050

PER FACSIMILE / MAIL

Dear Mr Ramsden

APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998: GN R.387: PROPOSED CONSTRUCTION OF TERRA WIND ENERGY GOLDERN VALLEY PROJECT, BLUE CRANE ROUTE LOCAL MUNICIPALITY, COOKHOUSE, EASTERN CAPE PROVINCE

With reference to the abovementioned application, please be advised that the Department has decided to accept the Final Environmental Impact Assessment Report (EIR) dated October 2010 and received by the Department on 26 October 2010 and grant authorisation. The environmental authorisation and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010, you are instructed to notify all registered interested and affected parties (IAPs), in writing and within twelve (12) calendar days of the date of this letter, of the Department's decision in respect of your application as well as the provisions regarding the making of appeals that are provided for in the Environmental Impact Assessment (EIA) Regulations, 2010.

Your attention is drawn to Chapter 7 of the EIA Regulations, 2010, which regulates appeal procedures. Attached please find a simplified copy of the appeals procedure to be followed. Kindly include a copy of this procedure with the letter of notification to IAPs.

A copy of the official appeal form can be obtained from: Mr TH Zwane; Senior Legal Administrator (Appeals); Tel: 012 310 3929;TZwane@environment.gov.za, at the Department.

Should any party, including the applicant, wish to appeal any aspect of the decision, they or the applicant must, *inter alia*, lodge a notice of intention to appeal with the Minister, within 20 days after the date of the decision, by means of one of the following methods:

By facsimile: 012 320-7561
or
By post: Department of Environmental Affairs
Private Bag X447
Pretoria
0001
or
By hand: Fedsure Forum Building,
2nd Floor North Tower
Corner Van der Walt and Pretorius Streets
Pretoria

If the appellant is a person other than the applicant, the appellant must within ten (10) days of lodging the notice of intention to appeal, provide a copy of the notice to the applicant and a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.

If the applicant is the appellant, the applicant must also provide a copy of the notice of intention to appeal, within ten (10) days of having lodged such notice, to each person and organ of state which was a registered interested and affected party. The applicant must furthermore provide all the above-mentioned registered interested and affected parties with a notice indicating that the appeal submission will be made available on the day of lodging it with the Minister or MEC, and indicate where and for what period the appeal submission will be available for inspection by such person or organ of state.

Please include the Department, attention of the Director: Environmental Impact Evaluation, in the list of IAPs, notified through your notification letter of the decision, for record purposes.

The authorised activities shall not commence within thirty (30) days of the date of signature of the authorisation. An appeal under this section does not suspend an environmental authorisation or exemption, or any provisions or conditions attached thereto, or any directive, unless the Minister, MEC or delegated organ of state directs otherwise.

Yours sincerely

Mr Dumisani Mthembu
ACTING CHIEF DIRECTOR: ENVIRONMENTAL IMPACT MANAGEMENT
Department of Environmental Affairs
Date: 5/04/2011

CC:	Dr K Whittington-Jones	Coastal and Environmental Services	Fax: 046 622 6564
	Mr M Mene	Blue Crane Local Municipality	Fax: 042 243 2250
	Mr TH Zwane	Appeals Authority (DEA)	

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APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 AS PER GN R. 543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive notice of Environmental Authorisation (EA) from the relevant Competent Authority (CA).	1. Receive notice of Environmental Authorisation (EA) from Applicant/Consultant.
2. Within 20 days after the date of the decision, notify the relevant Appeal Authority of the intention to appeal.	2. Within 20 days of date of the decision, notify the relevant Appeal Authority of the intention to appeal.
3. The Applicant must within 10 days of having submitted the notice of intention to appeal, as indicated in 2 above, provide to each persons and organ of state who was a registered IAP- 3.1 a copy of the notice of intention to appeal; and 3.2 a notice indicating that the appeal submission will be made available on the day of lodging it with the Appeal Authority and where and for what period the appeal submission will be available for inspection by such registered IAP.	3. Appellant must within 10 days of having submitted the notice of intention to appeal, as indicated in 2 above, provide the applicant with- 3.1 a copy of the notice of intention to appeal; and 3.2 a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.
4. The appeal must be submitted to the Appeal Authority within 30 days after the lapsing of the 20 days period which is allowed for the submission of the notice of intention to appeal.	4. The appeal must be submitted to the Appeal Authority within 30 days after the lapsing of the 20 days period which is allowed for the submission of the notice of intention to appeal.
5. A person or organ of state that receives notice of an appeal may submit a responding statement to the relevant Appeal Authority or designated organ of state within 30 days from the date that the appeal submission was lodged with the Appeal Authority.	5. An applicant that receives notice of an appeal may submit a responding statement to the relevant Appeal Authority or designated organ of state within 30 days from the date the appeal submission was lodged with the Appeal Authority.

NOTES:

1. **An appeal against a decision must be lodged with-**
   a) the Minister of Water and Environmental Affairs if the decision was issued by the Director-General of the Department of Environmental Affairs (or another official) acting in his/her capacity as the delegated Competent Authority;
   b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director-General of the Department of Environmental Affairs (or another official) acting in his/her capacity as the delegated Competent Authority;
   c) the MEC if the decision was issued by the Head of Department (or another official) acting in his/her capacity as the delegated Competent Authority; or
   d) the delegated organ of state where relevant.

2. **An appeal lodged with-**
   a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
   b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;
   c) the MEC must be submitted to the provincial department responsible for environmental affairs; or
   d) the delegated organ of state, where relevant, must be submitted to the delegated organ of state.

3. **An appeal must be-**
   a) on an official form obtainable or published by the relevant Appeal Authority;
   b) accompanied by:
      - a statement setting out the grounds of appeal;
      - supporting documentation which is referred to in the appeal and is not available to the relevant Appeal Authority;
      - a statement that the appellant has complied with regulation 60 (2) or (3) has been complied with together with copies of the notices referred to in regulation 60; and
      - the prescribed appeal fee, if any.

4. **A copy of the official appeal form can be obtained from:**
   Mr TH Zwane, Senior Legal Administrator (Appeals): Tel: 012 310 3929, TZwane@environment.gov.za

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environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

Authorisation register number:	12/12/20/1717
NEAS Reference:	DEAT/EIA/12410/2011
Last amended:	First issue
Holder of authorisation:	Terra Wind Energy Golden Valley (Pty) Ltd
Location of activity:	EASTERN CAPE PROVINCE, Cookhouse, Blue Crane Route Local Municipality

This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

5/04/2011

Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activity specified below.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2006 the Department hereby authorises –

TERRA WIND ENERGY GOLDEN VALLEY (PTY) LTD

with the following contact details –

Mr. H Ramsden
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 68063
BRYANSTON
2021

Tel: 087 808 1501
Fax: 086 530 9050

to undertake the following activities (hereafter referred to as "the activities"):

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GN R.387:

Item 1 (l) *"The construction of facilities or infrastructure including associated structures or infrastructure, for the generation of electricity where the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more".*

GN R.386:

Item 1(m) *"Any purpose in the one in ten year floodline of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including*

(i) Canals;
(ii) Channels;
(iii) Bridges;
(iv) Dams; and
(v) Weirs".

Item 7 *"The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30m^3 at any one location or site".*

Item 12 *"The transformation or removal of indigenous vegetation of 3ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)".*

Item 16 (a) *"The transformation of undeveloped, vacant or derelict land to residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare."*

DGC 7/04/2011

-for the proposed wind powered electricity generation facility on eleven farms namely Olive Wood Estate, Olive Fonteyn, Quaggas Kuyl, Lushof, Kroonkop, Oude Smoor Drift, Maatjiesfontein, Leuwe Drift, Gedagtenis, Varkens Kuyl and Wagenaarsdrift, all found around the town of Cookhouse as described on page 12 of the Environmental Impact Assessment Report (EIR) dated October 2010, which falls within the jurisdiction of the *Blue Crane Route Local Municipality* of the *Eastern Cape Province*, hereafter referred to as "the property".

The proposed development will comprise of the following components:

- Up to 214 wind turbines with a nominal power output of 2.5MW each (mounted on 800-100m masts and nacelle; 100m diameter rotor-consisting of 3x50m blades).
- Concrete foundations to support the wind turbine towers.
- Internal access roads to each turbine –approximately 5 metres wide.
- Underground cables connecting the wind turbines.
- 132kV overheard power lines linking the site to either the Poseidon Substation and/or the overhead power lines traversing the farms.
- Possible upgrading of existing roads for the transportation of the turbines to the Wind Energy Facility.
- Up to two substations on the Wind Energy Facility to receive the generated power.
- A building to house the control instrumentation and backup power support. As well as a store room for the maintenance equipment.

The granting of this environmental authorisation is subject to the conditions set out below.

Conditions

1. Scope of authorisation

1.1 Authorisation of the activities is subject to the conditions contained in this authorisation, which conditions form part of the environmental authorisation and are binding on the holder of the authorisation.

1.2 The holder of the authorisation must be responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the holder of the authorisation.

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1.3 The activities authorised may only be carried out on the eleven farms as described on page 12 of the Environmental Impact Assessment Report (EIR) dated October 2010.

1.4 The recommendations and mitigation measures recorded in the EIAR dated October 2010 must be adhered to.

1.5 Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.

1.6 These activities must commence within a period of three (3) years from the date of issue. If commencement of the activities does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activities to be undertaken.

1.7 Commencement with one activity listed in terms of this authorization constitutes commencement of all authorized activities.

1.8 This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

1.9 Relevant legislation that must be complied with by the holder of this authorisation includes but is not limited to:

- Compliance with the requirements of Section 38(1), (3) and (7) of the National Heritage Resources Act, Act 25 of 1999, including the comments and recommendations of the relevant heritage resources authority responsible for the area in which the development is proposed. Should any heritage resources be exposed during excavation for the purpose of construction, construction in the vicinity of the finding must be stopped. A registered heritage specialist or professional paleontologist must be called to the site for inspection. Under no circumstances shall any heritage material be destroyed or removed from the site. The relevant heritage resource agency or the South African Heritage Resources Agency (SAHRA) must be informed about the findings within forty hours (48) hours.
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).
- National Water Act, 1998 (Act No. 36 of 1998).

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- National Forests Act, 1998 (Act No. 84 of 1998).
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and its Regulations.
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) and its Regulations.
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and its Regulations.
- Hazardous substance Act (Act No. 15 of 1973).
- National Environmental Management: Air Quality, Act 2004 (Act No. 39 of 2004).
- Civil Aviation Act, 2009 (Act No. 13 of 2009).
- Should fill material be required for any purpose, the use of borrow pits must comply with the provisions of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) administered by the Department of Mineral Resources.

1.10 The holder of an environmental authorisation has the responsibility to notify the competent authority of any alienation, transfer and change of ownership rights in the property on which the activity is to take place.

2. Notification of authorisation

2.1 The holder of the authorisation must notify every registered interested and affected party, in writing and within 10 (ten) calendar days of the date of this environmental authorisation, of the decision to authorise the activity.

2.2 The notification referred to must –

2.2.1 specify the date on which the authorisation was issued;

2.2.2 inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the Environmental Impact Assessment (EIA) Regulations, 2010;

2.2.3 advise the interested and affected party that a copy of the authorisation will be furnished on request; and

2.2.4 give the reasons for the decision.

3. Management of the activity

3.1 The Environmental Management Plan (EMP) submitted as part of Application for EA must be amended and submitted to the Department for written approval prior to

DEA
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commencement of the activity. The recommendations and mitigation measures recorded in the EIR dated October 2010 must be incorporated as part of the EMP. Once approved, the EMP must be implemented and adhered to.

3.2 Please note that this Department is compiling a guideline document on renewable energy installations. Once this guideline has been published in the Government Gazette in terms of section 24J of the National Environmental Management Act, 1989 (Act No. 107 of 1998) (NEMA), it will be expected that you adhere to the relevant sections of the guideline.

4. Monitoring

4.1 The applicant must appoint a suitably experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this authorisation are implemented and to ensure compliance with the provisions of the EMP.

4.2 The ECO shall be appointed before commencement of any authorised activity/ies.

4.3 Once appointed, the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring of the Department.

4.4 The ECO shall keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

4.5 A detailed incident (including spillage of bitumen, fuels, chemicals, or any other material) and complaint register must be kept on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.

4.6 In addition the ECO must maintain the following on site:

- A daily site diary
- Copies of all reports submitted to the Department
- A schedule of current site activities including the monitoring of such activities.

4.7 The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

4.8 Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

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5. Recording and reporting to the Department

5.1 All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this authorisation, must be submitted to the *Director: Compliance Monitoring* at the Department.

5.2 The holder of the authorisation must submit an environmental audit report to this Department upon completion of the construction and rehabilitation activities.

5.3 The environmental audit report must:

5.3.1 Be conducted by an independent environmental auditor;

5.3.2 Indicate the date of the audit, the name of the auditor and the outcome of the audit;

5.3.3 Evaluate compliance with the requirements of the approved EMP and EA;

5.3.4 Include measures to be implemented to attend to any non-compliances or degradation noted;

5.3.5 Include copies of any approvals granted by other authorities relevant to the development for the reporting period; and

5.3.6 Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed.

5.4 The audit report must be submitted prior to commencement of the operation phase of the project.

6. Commencement of the activity

6.1 The authorised activities shall not commence within thirty (30) days of the date of signature of the authorisation.

6.2 The applicant must obtain a Water Use Licence Authorisation (WULA) from the Department of Water Affairs (DWA) prior to the commencement of the project should the applicant impact on any wetland or water resource. The WULA must be submitted to the *Director: Environmental Impact Evaluation* at the Department.

6.3 Pre-construction monitoring must be undertaken during the final design phase within this area in order to inform the positioning of the turbines.

6.4 The applicant must submit a final layout plan for the entire wind energy facility for approval to the department prior to commencement of construction activities on site. The layout plan should indicated the following:

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- Turbine positions;
- Foundation footprint;
- Permanent laydown area footprint;
- Construction period laydown footprint;
- Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible);
- Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used;
- Heritage sites that will be affected by the turbines and associated infrastructure;
- Substation(s) and/or transformer(s) sites including their entire footprint;
- Cable routes and trench dimensions (where they are not along internal roads);
- Connection routes to the distribution/transmission network;
- Cut and fill areas at turbine sites along roads and at substation/transformer sites indicating the expected volume of each cut and fill;
- Borrow pits;
- Spoil heaps (temporary for topsoil and subsoil and permanently for excess material);
- Buildings including accommodation; and
- All "no-go" areas

6.5 The applicant must appoint a qualified botanical and fauna specialists to ground-truth every turbine footprint and the power lines alignments, and their recommendations must form part of the final layout plan of the wind energy facility and the amended EMP to be submitted to the department for approval.

6.6 A geotechnical assessment report proving that the proposed facility will be structurally sound and will not pose a safety risk to surrounding structures or people must be submitted to the Department prior to commencement of construction activities on site.

6.7 The authorised activities must not commence before a connection and use of system agreement is obtained from Eskom Holdings Limited.

6.8 An appeal under section 43 of the National Environmental Management Act (NEMA), Act 107 of 1998 (as amended), does not suspend an environmental authorisation or exemption, or any provisions or conditions attached thereto, or any directive, unless the Minister, MEC or delegated organ of state directs otherwise.

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7. Notification to authorities

7.1 Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence. This notification period may coincide with the period contemplated in 6.1 above.

8. Operation of the activity

8.1 Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.

8.2 The applicant must compile an operational EMP for the operational phase of the activity and submit it to the Department for approval before commencement of the operational phase of the activity.

8.3 The holder of this authorisation must appoint an Environmental Officer (EO) for the operational phase of the project to monitor all operational activities as part of the EMP

9. Site closure and decommissioning

9.1 Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

10. Specific conditions

10.1 Avifauna and bats

10.1.1 An avifaunal specific EMP must be completed by a suitable qualified person to further refine the mitigation once all of the turbine positions have been finalized.

10.1.2 A bird monitoring programme must be implemented to document the effect of the operation of the wind energy facility on avifauna and bats. This shou d commence prior to construction (to provide a benchmark), and continue during operation of the wind energy facility.

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10.1.3 The results of the pre-construction bird monitoring programme must inform the final layout and the construction schedule of the wind energy facility.

10.1.4 Turbines must be placed at least 300m apart to avoid bird collisions.

10.1.5 Reports regarding bird monitoring must be submitted to Birdlife South Africa, the Endangered Wildlife Trust (EWT), CapeNature and this Department on a quarterly basis. The report will assist all stakeholders in identifying potential and additional mitigation measures and to establish protocols for bird monitoring programmes for wind energy development in the country.

10.1.6 Ultrasound broadcast must be used to deter bats and birds from flying into wind turbines.

10.1.7 Wind turbines operating times must be restricted during times when bat activity is high or they must be programmed to switch off under specific conditions prone to bird collision such as during low wind.

10.1.8 The applicant must implement, in collaboration with all project proponents for the respective wind farms in Cookhouse and a suitable qualified avifauna specialist, an active long-term bird monitoring programme in order to understand the nature of impacts on avifauna due to wind energy facilities on the site.

10.1.9 If high bird mortalities are recoded, the applicant must investigate emitting broadcasts for a certain radio frequency to discourage birds from entering high collision areas.

10.1.10 The baseline data collected and documented during the survey must be shared with the EWT and Birdlife South Africa for a better understanding of the distribution or breeding behaviour of any of the priority species listed in the EIR dated October 2010.

10.1.11 Habitat destruction must be kept to an absolute minimum by keeping the lay-down areas as small as possible, reducing the number and size/length or roads and reducing the final extent of the developed area.

10.1.12 Anti-collision devices such as bird flappers must be installed where power lines cross avifaunal corridors. The input of an avifaunal specialist must be obtained for the fitting of the anti-collision devices onto specific sections of the line once the exact positions of the towers have been surveyed and pegged.

10.1.13 The applicant must ensure that lighting on the turbines is kept to a minimum, and is coloured red and intermittent, rather than permanent and white, to reduce confusion effects for nocturnal migrants. Night time wind turbine obstruction lighting must consist of medium intensity type B aviation red flashing lights. Minimum intensities of 2 000 candela for night-time red flashing or strobe lights are required.

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10.1.14 The facility must be designed to discourage their use as perching or nesting substrates by birds.

10.2 Vegetation, wetlands and water resources

10.2.1 All species of special concern (SSC) must be identified and every effort must be made to rescue them.

10.2.2 Critical available biodiversity information must be consulted for the final placement of turbines and infrastructure.

10.2.3 The applicant must ensure that a continuous monitoring and removal of alien plant species such as those of Puntia and Agave species is implemented, as well as careful monitoring of the state of the landscape with the Eastern Cape Biodiversity Conservation Plan (ECBCP) land use planning principles.

10.2.4 Vegetation clearing must be kept to an absolute minimum. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.

10.2.5 A "Plant Rescue and Protection" plan which allows for the maximum transplant of conservation important species from areas to be transformed must be compiled by a vegetation specialist familiar with the site in consultation with the ECO. This plan must be implemented prior to commencement of the construction phase.

10.2.6 Before the clearing of the site, the appropriate permits must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act and from the Eastern Cape Department of Economic Development and Environmental Affairs (DEDEA) for the destruction of species protected in terms of the Provincial Nature Conservation Ordinance (PNCO) Schedule 4. Copies of the permits must be submitted to the Department for record keeping.

10.2.7 Construction activities must be restricted to demarcated areas to restrict impact on vegetation and animals.

10.2.8 A comprehensive habitat rehabilitation plan must be developed for the site. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.

10.2.9 All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs. Reclamation activities should be undertaken as early as possible on disturbed areas.

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10.2.10 All electrical collector lines must be buried in a manner that minimizes additional surface disturbance.

10.2.11 Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation.

10.2.12 The applicant is required to inform the relevant provincial department and/or this Department should the removal of protected species, medicinal plants and "data deficient" plant species be required.

10.2.13 All hard infrastructures should be located within existing areas of low sensitivity, as far as possible.

10.2.14 All turbine and infrastructure must be located at least 100m from the edge of any high sensitive areas.

10.2.15 No exotic plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised.

10.2.16 No activities will be allowed to encroach into a water resource without a water use authorisation being in place from the Department of Water Affairs.

10.2.17 Where infrastructure is to be located close to watercourses, water quality monitoring must be done on a regular basis. The frequency to be agreed with the Department of Water Affairs.

10.2.18 Appropriate erosion mitigation must be implemented to prevent any potential erosion.

10.3 Visual resources

10.3.1 The applicant must ensure to reduce visual impacts during construction by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques, and restoring exposed solid as closely as possible to their original contour and vegetation.

10.3.2 A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

10.3.3 Commercial messages and graffiti on turbines must be avoided.

10.3.4 The lighting and markings of the wind energy facility must comply with the requirements of the Civil Aviation Authority.

10.3.5 Construction activities must be restricted to daylight hours in order to negate or reduce visual impacts associated with lighting.

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10.3.6 To reduce the effects of motion smear, rotor blades should either be painted with black stripes across the blade, in different positions on each blade, or a single solid black blade with two solid white blades.

10.3.7 Wind turbines must be painted bright white to provide the maximum daytime conspicuousness.

10.4 Air emissions

10.4.1 Dust abatement techniques must be used before and during surface clearing, excavation, or blasting activities.

10.4.2 Appropriate dust suppression technique must be implemented on all exposed surfaces during periods of high wind. Such measures must include wet suppression, chemical stabilisation use of wind fence covering surfaces with straw chippings and re-vegetation of open areas.

10.5 Roads and ground transportation

10.5.1 Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.

10.5.2 Road alignments must be planned in such a way that the minimum of cut and fill operations are required.

10.5.3 A transportation plan must be developed, particularly for the transport of turbine components, main assembly cranes and other large pieces of equipment. A permit must be obtained from the relevant transport department for the transportation of all components (abnormal loads) to the sites.

10.5.4 A traffic management plan must be prepared for the site access roads to ensure that no hazards would results from the increased truck traffic and that traffic flow would not be adversely impacted.

10.5.5 Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

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10.5.6 Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.

10.5.7 A designated access to the site must be created and clearly marked to ensure safe entry and exit.

10.5.8 Signage must be erected at appropriate points warning of turning traffic and the construction site.

10.5.9 Internal access roads must be located away from drainage bottoms and avoid wetlands, if feasible.

10.5.10 Internal access roads must be located to minimize stream crossings. All structures crossing steams must be located and constructed so that they do not decrease channel stability or increase water velocity.

10.5.11 Existing drainage must not be altered, especially in sensitive areas.

10.6 Noise

10.6.1 The applicant must ensure that all equipment and machinery are well maintained and equipped with silencers.

10.7 Historical/paleontological resources

10.7.1 Prior to commencement of construction activities, a thorough palaeontological field survey of natural and already existing, artificial bedrock exposures within the study region as a whole must be undertaken by a qualified palaeontologist, to identify specific areas, zones or horizons of high palaeontological sensitivity on the ground that may warrant further specialist mitigation.

10.7.2 Should any graves be found, all construction activities must be suspended and an archaeologist be immediately contacted. The discovered graves must be cordoned off.

10.7.3 If there are any changes to the layout of the turbines, then additional survey work will be required in order to ensure that no sites are directly impacted and/or to identify the need for an excavation permit.

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10.8 Hazardous materials and waste management

10.8.1 Areas around fuel tanks must be bunded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.

10.8.2 Leakage of fuel must be avoided at all times and if spillage occurs, it must be remedied immediately.

10.8.3 Hazardous waste such as bitumen, oils, oily rags, paint tins etc must be disposed of at an approved hazardous waste landfill site.

10.8.4 During the construction phase of the development, an effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage. The applicant must ensure that precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or stormwater system are in place.

10.8.5 Streams, river, pans, wetlands, dams and their catchments must be protected from erosion, direct or indirect spillage of pollutants.

10.8.6 No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity.

10.8.7 Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water.

10.8.8 The applicant must ensure that an effective monitoring system is put in place to detect any leakage or spillage of all hazardous substances.

10.8.9 Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instructions. Furthermore no chemicals must be stored nor any vehicle maintenance must occur within 350 m of the temporal zone of wetlands, whether a drainage line with or without an extensive floodplain or hillside wetlands.

10.8.10 Temporary bunds must be constructed around chemical storage to contain possible spills.

10.8.11 Spill kits must be made available on-site for the clean-up of spills.

10.8.12 An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste shall be disposed of at a landfill licensed in terms

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of section 20 (b) of the National Environment Management Waste Act, 2008 (Act No. 59 of 2008).

10.8.13 Temporary ablution facilities must be provided for staff at all times during the construction phase. The ablutions must be cleaned regularly with associated waste being disposed of at a registered/permitted waste site and must be removed from the site when construction phase is completed.

10.9 Storm water management

10.9.1 A comprehensive storm water management plan must be developed and implemented to control storm water and runoff water on the site and prevent off-site migration of contaminated storm water or increased soil erosion. This plan should form part of the EMP.

10.10 Construction must include appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.

10.11 Human health and safety

10.11.1 A health and safety programme must be developed to protect both workers and the general public during construction, operation and decommissioning of the wind energy facility. The programme must establish a safety zone for wind turbine generator from residences and occupied buildings, roads, right-of-ways, and other public-access areas that is sufficient to prevent accidents resulting from the operation if wind turbine generators.

10.11.2 No temporary site camps will be allowed outside the footprint of the development area as the establishment of such structures might trigger a listed activity as defined in the NEMA Regulations, Government Notice 386 and 387 of 2006.

10.11.3 Potential fire hazards must be managed by ensuring that no fire are permitted on site and that the constructors must be aware of the consequences of starting fire on site to avoid damage to the neighbouring farms.

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10.11.4 Potentials interference with public safety communication systems (e.g. radio traffic related to emergency activities) must be avoided.

10.11.5 The applicant must ensure that the operation of the wind facility has minimal electromagnetic interference (EMI) (i.e. impacts to microwave, radio and television transmissions) and should comply with the relevant communication regulation.

10.11.6 The applicant must obtain a written permit or approval from the South Africa Civil Aviation Authority that the wind facility will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance (CNS) equipment especially the radar prior to commencement of the activity. The approval/permit must be submitted to the Director: Environmental Impact Evaluation.

10.11.7 The applicant must train safety representatives, managers and workers in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant act.

10.11.8 Liaison with land owners/farm managers is to be done prior to construction in order to provide sufficient time for them to plan agricultural activities. If possible, construction should be scheduled to take place within the post-harvest, pre planting season, when fields are lying fallow.

10.12 Excavation and blasting activities

10.12.1 Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses.

10.12.2 Foundations and trenches must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.

10.12.3 Borrow materials must be obtained only from authorized and permitted sites.

10.12.4 Anti-erosion measures such as silt fences must be installed in disturbed areas.

10.13 Overhead power line

10.13.1 A walk-through survey of the final survey power line corridor must be undertaken by a botanical specialist, an ornithologist and a heritage specialist to identify areas where mitigation may be required.

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10.13.2 All sections of the proposed power line passing over, or in close proximity of grasslands, rivers, wetlands, and dams must be marked with suitable bird flight diverters in order to deter large birds from colliding with any powerline. Additional areas of high sensitivity along the preferred alignment must be identified by an avifaunal specialist for the fitment of anti-collision devices according to Eskom Transmission Guidelines.

10.13.3 A Search and Rescue (S&R) operation of all the Red Data as well as rare endangered plants must be undertaken on the exact spots selected on which the pylons will be erected by a suitable qualified botanist. All plants present must be survey and collected for documentation at South National Biodiversity Institute (SANBI) and particular species, especially those which are rare and threatened species are moved to nurseries for re-establishment after construction and/or relocated to protected areas.

10.14 Turbines

10.14.1 Turbines must be positioned in such a way that they are at least 500m away from farm complexes, most of which have moderate degree of heritage significance.

10.14.2 Turbines must be positioned in such a way that shadow flicker does not affect any farm complexes.

10.14.3 The applicant must ensure that the placement of turbine on ridges is avoided.

10.14.4 Facility and infrastructure must not be placed at any slope that is steeper than 18%, preferable be placed on the crest landscape.

10.14.5 Wind turbines and associated laydown areas and access roads which could potentially impact on sensitive areas must be shifted in order to avoid these areas of high sensitivity.

11. General

11.1 A copy of this authorisation must be kept at the property where the activity/ies will be undertaken. The authorisation must be produced to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property.

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11.2 Where any of the applicant's contact details change, including the name of the responsible person, the physical or postal address and/or telephonic details, the applicant must notify the Department as soon as the new details become known to the applicant.

11.3 The holder of the authorisation must notify the Department, in writing and within 48 (forty eight) hours, if any condition of this authorisation cannot be or is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance. Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the regulations.

11.4 National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the applicant or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the applicant with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Date of environmental authorisation: 8/04/2011

Mr Dumisani Mthembu

CHIEF DIRECTOR: ENVIRONMENTAL IMPACT MANAGEMENT (Acting)

Department of Environmental Affairs

Annexure 1: Reasons for Decision

1. Background

The applicant, Terra Wind Energy Golden Valley (Pty) Ltd, applied for authorisation to carry out the following activities –

Item: 2 *"Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or intended to be 20 hectares or more".*

Item: 1 (l) *"The construction of facilities or infrastructure including associated structures or infrastructure, for the generation of electricity where the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more".*

Item:1(m) *"Any purpose in the one in ten year floodline of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including*

(i) Canals;
(ii) Channels;
(iii) Bridges;
(iv) Dams; and
(v) Weirs".

Item: 7 *"The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30m3 at any one location or site".*

Item:12 *"The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of*

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section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)".

Item: 16 (a) *"The transformation of undeveloped, vacant or derelict land to residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare".*

-for the proposed establishment of wind energy facility on the eleven farms namely Olive Wood Estate, Olive Fonteyn, Quaggas Kuyl, Lushof, Kroonkop, Oude Smoor Drift, Maatjiesfontein, Leuwe Drift, Gedagtenis, Varkens Kuyl and Wagenaarsdrift, all found around the town of Cookhouse, which falls within the jurisdiction of the Blue Crane Route Local Municipality of the Eastern Cape Province, as described on page 12 of the EIR dated October 2010.

The applicant appointed Coastal and Environmental Services (CES) to undertake an environmental assessment process in accordance with the EIA Regulations, 2006.

2. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration:

a) The information contained in the EIR dated October 2010;
b) The comments received from the various interested and affected parties (I&APs) which are included in the EIR dated October 2010;
c) Mitigation measures as proposed in the EIR dated October 2010 and the EMP;
d) The information contained in the specialist studies contained in volume 2 of the EIR dated October 2010; and
e) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

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3. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues, which in the Department's view, were of significance are set out below:

a) The need for the proposed development is directly related to enhancing production of renewable energy and to contribute towards the South Africa Government goal of producing 10 000 GWh of renewable energy by 2013.

b) The major benefit of the project is the strengthening of the existing electricity grid and will aid the government in achieving its goal of a 30% share of new power generation being derived from Independent Power Producers (IPP).

c) Six (6) specialist studies were commissioned as part of the EIR and it was found that the impacts associated with the proposed development can be mitigated and are acceptable.

d) A sufficient public participation process was undertaken and the consultant has satisfied the minimum requirements as prescribed in the EIA regulations, 2006 for public involvement.

e) As part of the EIA process, Coastal and Environmental Services (CES) being the principal consultancy identified potential environmental impacts associated with the proposed construction works and proposed feasible mitigation measures to mitigate the identified impacts.

4. Findings

After consideration of the information and factors listed above, the Department made the following findings -

- The EIR includes the identification and assessment of impacts.
- The information contained in the EIR was relevant and credible for decision making.
- The applicant has satisfied the minimum requirements as prescribed in the EIA regulations of 21 April 2006.
- All legal and procedural requirements have been met.
- There has been sufficient consultation with I&AP's.
- The proposed development is compatible with the proposed site for the development.

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- The procedure followed for the impact assessment seems to be adequate for the decision-making process based on the size of the project and affected area. The assessing officer is of the opinion that the assessment is adequate and comprehensive enough and that possible impacts have been assessed correctly.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The authorisation for the activity is accordingly granted.

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APPENDIX F-2: EA AMENDMENT DATED 2 FEBRUARY 2012

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

DEA Reference: 12/12/20/1717
Enquiries: Ms.Thulisile Nyalunga
Telephone: 012-310-3249 **Fax:** 012-320-7539 **E-mail:** tnyalunga@environment.gov.za

Mr. H Ramsden
Terra Wind Energy Golden Valley (Pty) Ltd
P.O. Box 68063
BRYANSTON
2021

Fax No: (086) 530 9050

PER FACSIMILE / MAIL

Dear Mr. Ramsden

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 05 APRIL 2011 FOR THE PROPOSED CONSTRUCTION OF THE TERRA WIND ENERGY GOLDEN VALLEY WIND ENERGY FACILITY NEAR COOKHOUSE, BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

The Departments decision on the above application issued on 05 April 2011 and your amendment application dated 12 December 2011 refer.

Based on a review of reasons for requesting an amendment to the above authorisation, the Department, in terms of regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the environmental authorisation (EA) dated 05 April 2011 as follows:

1. The EA dated 05 April 2011 is amended to rectify the Department's error, by replacing the activities listed on page 3 with the following:

GN R. 386:

Item 1(m) — *The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including -*
(i) canals;
(ii) channels;
(iii) bridges;
(iv) dams; and
(v) weirs.

Item 7 — *The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.*

Item 12	*The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004).*
Item 14	*"The construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission, but excluding -* *(a) masts of 15 metres and lower exclusively used* *(i) by radio amateurs; or* *(ii) for lighting purposes* *(b) flag poles; and* *(c) lightning conductor poles."*
Item 15	*"The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long."*

GN R. 387:

Item 1(a)	*"The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where:* *(i) the electricity output is 20 megawatts or more; or* *(iii) the elements of the facility cover a combined area in excess of 1 hectare."*
Item 1(l)	*"The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more".*
Item 2	*"Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more."*

2. Project description in bullet 1 on page 4 of the EA issued on 05 April 2011:

   "Up to 214 wind turbines of 2.5MW each (mounted on 800-100m masts and nacelle; 100m diameter rotor – consisting of 3x50m blades)".

   Is amended to correct the Department's error, as follows:

   *"Up to 214 wind turbines of 2.5MW each (mounted on **80m**-100m masts and nacelle; 100m diameter rotor – consisting of 3x50m blades)."*

This amendment must be read in conjunction with the Environmental Authorisation dated 5 April 2010.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the EA, of the Department's decision in respect of your application as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. Please note that only the amended sections are subject to an appeal. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile: 012 320 7561;
By post: Private Bag X447,
Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Building, North Tower,
cnr. Van der Walt and Pretorius Streets,
Pretoria.

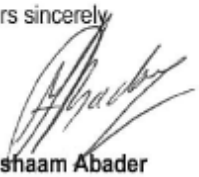
If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department *(Attention: Director: Environmental Impact Evaluation)* in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

Appeals must be submitted in writing to:
Mr T Zwane, Senior Legal Administration Officer (Appeals) of this Department at the above mentioned addresses or fax number. Mr Zwane can also be contacted at:
Tel: 012-310-3929
Email: tzwane@environment.gov.za

The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours sincerely



Mr Ishaam Abader
Deputy Director-General: Environmental Quality and Protection
Department of Environmental Affairs
Date: 21/2/2012

CC: Dr. K Whittington –Jones — Coastal and Environmental Services — Fax: (046) 622 6564
Mr M Mene — Blue Crane Route Local Municipality — Fax: (042) 243 2250
Mr TH Zwane — Appeal Authority (DEA)

3

APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 (THE REGULATIONS) AS PER GN R. 543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION (EA)

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive EA from the relevant Competent Authority (the Department of Environmental Affairs [DEA])	1. Receive EA from Applicant/Consultant
2. Within 12 days of date of the EA notify all IAPs of the EA and draw their attention to their right to appeal against the EA in terms of Chapter 7 of the Regulations.	2. N/A
3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA. with the Minister of Water and Environmental Affairs (the Minister).	3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA. with the Minister of Water and Environmental Affairs (the Minister).
4. After having submitted your notice of intention to appeal to the Minister, provide each registered IAP with a copy of the notice of intention to appeal within 10 days of lodging the notice	4. After having submitted your notice of intention to appeal to the Minister, provide the applicant with a copy of the notice of intention to appeal within 10 days of lodging the notice
5. The Applicant must also serve on each IAP: • a notice indicating where and for what period the appeal submission will be available for inspection.	5. Appellant must also serve on the Applicant within 10 days of lodging the notice, • a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.
6. The appeal must be submitted in writing to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.	6. The appeal must be submitted to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.
7. Any IAP who received a notice of intention to appeal may submit a responding statement to that appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.	7. An Applicant who received notice of intention to may submit a responding statement to the appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.

NOTES:

1. **An appeal against a decision must be lodged with:-**
   a) the Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
   b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
2. **An appeal lodged with:-**
   a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
   b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;
3. **An appeal must be:-**
   a) submitted in writing;
   b) accompanied by:
   - a statement setting out the grounds of appeal;
   - supporting documentation which is referred to in the appeal; and
   - a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62.

APPENDIX F-3: EA AMENDMENT DATED 29 NOVEMBER 2012

MINISTRY
WATER AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

Private Bag x313, Pretoria, 0001, 185 Schoeman Street, Sedibeng Building. Tel: +27 12 336 8733. Fax: +27 336 7817
Private Bag X9052, Cape Town, 8000. 120 Plain Street. Tel: +21 464 1500. Fax: +27 21 465 3362

Ref: LSA 103447
Enquiries: M Davids
Fax: 012 320 7561 **Phone:** 012 310 3172 **E-mail:** mdavids@environment.gov.za

Mr H Ramsden
Terra Wind Energy Golden Valley (Pty) Ltd
P.O. Box 68063
BRYANSTON
2021

Tel no: 087 808 1501
Fax no: 086 530 9050
E-mail: wengelbrecht@biothermenergy.com

Dear Mr Ramsden

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED TO TERRA WIND ENERGY GOLDEN VALLEY (PTY) LTD FOR THE PROPOSED CONSTRUCTION OF GOLDEN VALLEY WIND ENERGY FACILITY WITHIN THE VICINITY OF BLUE CRANE ROUTE LOCAL MUNICIPALITY COOKHOUSE, EASTERN CAPE PROVINCE

I refer to the appeal received from André van der Spuy Environmental Consultants in the above-mentioned matter. The appellant raised the issue that the environmental impact assessment (EIA) report lacks a comprehensive specialist socio-economic assessment, which would have enabled social benefits and impacts of the proposed development to be comparatively assessed and verified, the appellant also alleged that the EIA report does not accurately and fully describe all components of the proposed activity in detail to enable the interested and affected parties (I&APs) and the community to make an informed decision. I have considered and decided that these ground of appeals are indeed valid. Therefore I have decided to vary the

decision of the Chief Director: Environmental Impact Management of the Department of Environmental Affairs, who acted under delegated power for the reasons set out hereunder:

The environmental authorization granted and issued on 05 April 2011 does not direct the applicant to submit a detailed socio-economic development plan with specific developmental programmes and projects that will benefit the community for approval. In addition, a socio economic development plan and the final layout plan must be made available to the appellants, the community and the I&APs for comment before it is submitted to the DEA for approval. The participation of the appellants and the I&APs will ensure that the socio economic development and lay out plans are informed by, and responsive to their concerns.

In view of the aforementioned I hereby, in terms of section 43 (6) of the National Environmental Management Act, 1997 (Act No. 108 of 1997), vary the environmental authorisation (EA) granted and issued to Terra Wind Energy Golden Valley Pty (Ltd) on 05 April 2011 by Chief Director: Environmental Impact Management of the Department of Environmental Affairs (DEA) by inserting condition 6.9 and 6.10 in paragraph 6 under the heading **Commencement of the Activity** of the EA to provide as follows:

6.9 The applicant must compile a socio economic report with the specific programmes and project for the entire life of the proposed development that will benefit the community.

6.10 The applicant must submitt the socio-economic report with the specific programmes and projects and the final layout for the entire wind energy facility to the registered I&APs and immediate communities in the vicinity of the site before they are submitted to the DEA for approval.

These amendments must be read in conjunction with the EA granted and issued on 05 April 2011 and amended on 2 February 2012.

Yours sincerely

MRS B E E MOLEWA, MP

MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS

DATE: 2012/11/29

DW137

MINISTRY
WATER AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

Private Bag x313, Pretoria 0001, 185 Schoeman Street, Sedibeng Building, Tel: +27 12 336 8733, Fax: +27 12 336 7817
Private Bag X9052, Cape Town, 8000, 120 Plain Street. Tel: +27 21 464 1500, Fax: +27 21 465 3362

Fax: 086 530 9050

Mr Ramsden
Terra Wind Energy Golden Valley (Pty) Ltd
P O Box 68063
BRYNSTON
2021

Dear Ramsden

APPEAL AGAINST ENVIRONMENTAL AUTHORIZATION ISSUED FOR THE PROPOSED CONSTRUCTION OF GOLDEN VALLEY WIND ENERGY FACILITY WITHIN THE VICINITY OF BLUE CRANE ROUTE, LOCAL MUNICIPALITY COOKHOUSE, EASTERN CAPE PROVINCE

The Minister of Water and Environmental Affairs, Mrs B E E Molewa, MP has considered the appeal against an environmental authorization issued for the proposed construction of golden valley wind energy facility within the vicinity of blue crane route, local municipality cookhouse, Eastern cape province.

After evaluating the appeal and relevant information submitted to her, the Minister has reached a decision. A copy of her decision is attached hereto.

Yours sincerely

MR K GORVENDER
ACTING CHIEF OF STAFF:
MINISTRY OF WATETR AND ENVIRONMENTAL AFFAIRS
DATE: 11/12/12.

MINISTER
WATER AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

EDMS: LSA106307

APPEAL DECISION

APPEAL AGAINST ENVIRONMENTAL AUTHORISATION ISSUED FOR THE PROPOSED CONSTRUCTION OF GOLDEN VALLEY WIND ENERGY FACILITY WITHIN THE VICINITY OF BLUE CRANE ROUTE LOCAL MUNICIPALITY COOKHOUSE, EASTERN CAPE PROVINCE

1. INTRODUCTION

1.1. In terms of section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998 [NEMA]), read with the Environmental Impact Assessment Regulations, 2006 published in Government Notice No. R. 385 of 21 April 2006 (the EIA Regulations), the Acting Chief Director: Environmental Impact Management (EIM), acting under delegated power, granted Terra Wind Energy Golden Valley Pty (Ltd) (the applicant) on 5 April 2011 an environmental authorisation (EA) to proceed with the above-mentioned project. On 2 February 2012 the EA was amended in terms of regulation 42 of the Environmental Impact Assessment Regulations, 2010 by the Deputy Director-General: Environmental Quality and Protection (EQP) of the Department of Environmental Affairs (DEA).

1.2. The decision was subsequently appealed against, as will be discussed below.

2. BACKGROUND

2.1. The proposed development is located in the area of Cookhouse within the jurisdiction of Blue Crane Route Local Municipality, Eastern Cape Province. The proposed wind powered

electricity generation facility will be constructed on eleven farms, namely Olive Wood Estate, Olive Fonteyn, Quaggas Kuyl, Lushof, Kroonkop, Oude Smoor Drift, Maatjiesfontein, Leuwe Drift, Gedagtenis, Varkens, and Wagenaarsdrift in an area totaling 29,400 hectares (which is the total area of the development and not the actual physical footprint of the wind turbines), and it will consist of up to a maximum of 214 wind turbines with an electricity generating capacity of up to 2.5MW per wind turbine.

2.2. The applicant appointed Coastal Environmental Services, an independent environmental consultant, to conduct an environmental impact assessment (EIA) process for the proposed project.

2.3. According to the applicant the proposed project will contribute to the existing electricity grid for the area, and will aid the government goal to achieve a 30% share of all new power generation being derived from Independent Power Producers (IPP).

3. THE APPEALS

The appeal against authorisation for the proposed wind energy facility (WEF) was lodged by André van der Spuy Environmental Consultants. The appeal is based on an alleged inadequate EIA process.

4. DECISION

4.1. In terms of section 43(6) of NEMA, I have the authority, after considering the appeal, to confirm, set aside or vary the decision, provision, condition or directive of the DEA or make any other appropriate decision.

4.2. In reaching my decision, I have considered the information contained in the following documents:

4.2.1. The information contained in the project file, reference 12/12/20/1717;

4.2.2. The EA granted by the DEA on 5 April 2011 and amended on 2 February 2012;

4.2.3. The grounds of appeal;

4.2.4. The responding statements submitted by the applicant;

4.2.5. The answering statements submitted by the appellant; and

4.2.6. The comments of Directorate: Biodiversity Conservation and Directorate: Environmental Impact Evaluation (EIE) components of the DEA on the appeal.

4.3. Having considered the above information, I have concluded that the Acting Chief Director: EIM and Deputy Director-General: EQP, adequately considered the major anticipated environmental impacts of the proposed WEF. However, I am of the view that there is merit in the ground of appeals set out in paragraph 4.5.1 pertaining to the quality of information not provided by the environmental assessment practitioner (EAP) to enable proper understanding of the proposed project by the appellants and the interested and affected parties (I&APs) and 4.5.2 that the EIA report does not accurately and fully describe all components of the proposed activity in detail to enable the I&APs to make an informed decision.

4.4 Amendment to the EA

I hereby decided to vary conditions of the EA granted and issued by Chief Director: Environmental Impact Management (Acting) on 5 April 2011 and amended on 2 February 2012 by the Deputy Director-General: EQP of the DEA to the applicant to include the following specific socio-economic and public participation process conditions:

4.4.1.1 The applicant must compile a socio-economic report setting out specific programmes and projects for the entire life of the proposed development that will benefit the community; and

4.4.1.2 The applicant must submit the socio-economic report setting out specific programmes and projects referred in 4.4.1.1 above and the final layout for the entire life of the wind energy facility to the registered I&APs and communities in the immediate vicinity for comment and consider the comments before it is submitted to the DEA for approval.

4.4. The grounds of appeal, followed by my discussion in each case, are as follows:

4.5.1. *Quality of information not provided to enable I&APs proper understanding the nature of the issues*

Regulation 29 (1) of the EIA Regulations provides, "*A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping.*" The appellant contends that the Final Scoping Report (FSR) does not comply with the regulation 29 (1) of the EIA Regulations as it does not provide "*all the information*" required for a proper understanding of the issues to be realised. Instead the environmental assessment practitioner (EAP) presents motivation for the renewable energy in its most general sense. The major shortcomming in the EIA process is the lack of a comprehensive specialist socio-economic assessment which would enable social benefits and impacts of the proposed development to be comparatively assessed and verified. This, according to the appellant, attempts to make the applicant appear as if requirements of the EIA Regulations are being met and it has significantly favoured the applicant and disadvantaged the I&APs.

The applicant contends that the lack of detail in the EIR does not in any way detract its firm commitment in identifying and supporting an appropriate local community enhancement projects, and this will be done in consultation with, and in full participation of relevant local authorities and communities. According to the applicant discussions have been held with the local authority, who agreed that appropriate projects must be identified, and when the EA had been received from the DEA and work could proceed. A socio economic report prepared by Letsema Consulting contained in the EIR identified a number of enterprise development opportunities that exist for the local communities mainly in agricultural and tourism sectors. I have noted minutes of the meeting between the applicant and the Blue Crane local Municipality held on 03 November 2010 attached to the socio economic report submitted to the Directorate Appeals on 25 October 2012 by Ms Sibongile Mdluli, an employee of the applicant. In the meeting Ms Sibongile Mdluli made presentations that the community will benefit from the project by receiving R50 000 per wind turbine per year for the life of the projects. This will be funded through a Golden Valley Wind Facility Community Trust

[IT40/2012] (community trust), a community trust established and registered with the Master of the High court on 28 February 2012. Two training programmes will be provided to the community, the first will be during the pre–construction phase, to be financed as part of the construction programme and the second one will be skills development to be financed through a Community Trust. The construction of the proposed project will use local skills where possible. Local communities will be trained as wind turbines technicians to be involved in the Operations and Maintenance of the wind turbines.

The proposed development programmes mentioned above are to be undertaken post authorisation. The meeting of 03 November 2010 was neither with the appellants nor the I&APs. It follows that the proposed specific programmes and projects that will benefit the community were not presented to the I&Aps, nor the appellants and they remain unknown. The EA does not direct the applicant to outline specific programmes and projects that would be undertaken with a view to benefit the targeted communities. I am aware that the DEA is of the view that the information provided by the applicant during the EIA process adequate for it to make an informed decision on this issue. The DEA is empowered in terms of section 24 of the NEMA to make a decision on applications for environmental authorisation. It is enjoined by national environmental management principles contained in section 2 of the NEMA, amongst others, that the participation of all I&AP's in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.

The DEA in its decision making process issues an EA with conditions. The conditions are designed to manage post authorisation events and identified environmental impacts associated with the authorised proposed project. In this instance the DEA failed to include a condition in the EA that directs the applicant to submit a detailed socio-economic development plan with specific developmental programmes and projects that will benefit the community for approval. In addition, that a socio-economic development plan must be made available to the appellants and the I&APs for comment before it is submitted for approval. The participation of the appellants, the community and the I&APs will ensure that the socio

economic development plan is informed by, and responsive to their concerns. This ground of appeal is upheld.

4.5.2. Absence of a detailed description of the proposed activity

Regulation 32 (2) (b) and (f) of the EIA Regulations provides, " *An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 36, and must include-*

"(a)……;

(b) a detailed description of the proposed activity……;

(f) a description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;…. "

The appellant contends that the EIR does not comply with the abovementioned regulation 32 (2) (b) and (f) of the EIA Regulations, in that the EIA report does not accurately and fully describe all components of the proposed activity in detail to enable the I&APs to make an informed decision. Layout plans of the proposed activity must be provided to enable the I&APs to understand project proposals in relation to their own interest. This requires the applicant to complete the design and feasibility studies for the proposal and alternatives fully before engaging in the EIA process. The applicant acknowledges that the information provided in the EIR does not represent final layout of the proposed project. It argues that it is an accepted engineering practice to initiate the detailed design phase only when the EA has been obtained, based on the submission of a carefully considered preliminary design. The DEA concedes that a request for final layout of the facility post EA may be prejudicial to the I& APs because it does not afford them with an opportunity to provide comments. The final layout may have a prejudicial or an adverse effect to the appellants' and the I&AP's property or liberty, and there is a right to be heard. The participation of the appellants and the I&APs at this stage will ensure that the decision of the DEA is informed by, and responsive to

their concerns. In view of the aforementioned it follows that the final layout plans must be made available to the appellants and the I&APs for comment before a decision is taken by the DEA. This ground of appeal is upheld.

4.5.3. Absence of a detailed description and non comparative assessment of alternatives

Regarding the appellant's concern that the EIA lacks feasible and reasonable alternatives required to be described and comparatively assessed in terms of Regulation 29 (1) (b) and 32 (2) (f) of the EIA Regulations as a result thereof the EIR and FSR are noncomplaint with this requirement. The observation by the appellant is correct in that the EIA Regulations does require alternatives to be described and compared. These are important elements of an EIA process and forms part of the NEMA principles. Regulation 29 (1) (b) requires a description of the proposed activity and of any feasible and reasonable alternatives that have been identified. In terms of the aforementioned regulation the operative word, in this instance, will be a *feasible and reasonable alternative.* In other words alternatives must fit the general purpose and requirements of the proposed activity.

The information before me shows that the Golden Valley site was selected because it has sufficient wind resources to develop a WEF that consist of 214 wind turbines with an electricity generating capacity of up to 2.5MW per wind turbine in an area totaling 29,400 hectares. It is reasonably close to the means of connecting to Eskom's high voltage grid. The surrounding area is not densely populated and it has the potential for the Blue Crane Route Municipality to engage with the new technologies and industries. The aforementioned factors were the principal determents of the proposed site.

With regard to the alternatives two types of alternatives were considered during the EIA process, namely the fundamental and incremental alternatives. The fundamental alternatives are for the development totally different from the proposed project or usually involve a different location for the proposed development. Several types of incremental alternatives were considered namely, design layout alternative, the technology to be used in the activity, and the operational aspects of the

APPEAL AGAINST ENVIRONMENTAL AUTHORISATION ISSUED FOR THE PROPOSED CONSTRUCTION OF GOLDEN VALLEY WIND ENERGY FACILITY WITHIN THE VICINITY OF BLUE CRANE ROUTE LOCAL MUNICIPALITY COOKHOUSE, EASTERN CAPE PROVINCE

activity was considered. The design layout alternative was preferred for the proposed development and authorised by the DEA. The contemporary wind turbines were found to be technologically advanced, in terms of their generating output capacity and design intervention to reduce their noise impact. This ground of appeal stands to be dismissed.

4.5.4. Failure to correctly conduct impact assessment and lack of comprehensive assessment of cumulative impacts

The appellants are concerned that FSR did not comply with Regulation 29 (1) (f) of the EIA Regulations in that it failed to describe the environmental issues and potential impacts, including cumulative impacts, that have been identified. The information before me shows that a detailed description of the activity was provided in the FSR where a list of all associated infrastructure were highlighted. The EIR contains specialist studies that assessed each of the identified potential and significant environmental impacts by the proposed project. A comprehensive environmental management plan was submitted to and considered by DEA in its decision-making process. The cumulative impacts of multiple wind energy facilities on avifauna such as Blue Crane, Secretary bird, Denhams Bustard, and White Stork were assessed by Endangered Wildlife Trust. It concluded that from the avifaunal perspective no fatal flaws were found. The impact of collision between the wind turbines with avifauna is expected to be the greatest and recommended that impacts be mitigated by correct placing of the wind turbines. The EA has substantially mitigated the impacts of the proposed project by including specific conditions in paragraph 10 of the EA. In view of the aforementioned this ground of appeal is dismissed.

MRS B E E MOLEWA, MP
MINISTER OF WATER AND ENVIRONMENTAL AFFAIRS
DATE: 20/12/11/29

APPENDIX F-4: EA AMENDMENT DATED 28 MARCH 2013

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 320 4431

Reference: 12/12/20/1717
Enquiries: Ms Thulisile Nyalunga
Telephone: 012 310-3249 **Fax:** 012 320-7539 **E-mail:** TNyalunga@environment.gov.za

Mr U Epstein
Development Director
Terra Wind Energy - Golden Valley (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Fax No: (011) 367 4601

PER FACSIMILE / MAIL

Dear Mr Epstein

EXTENSION OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 05 APRIL 2011 FOR THE PROPOSED CONSTRUCTION OF THE TERRA WIND ENERGY - GOLDEN VALLEY WIND ENERGY FACILITY NEAR COOKHOUSE, BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

Your letter dated 27 February 2013 regarding the extension of the validity period for the Environmental Authorisation (EA) issued on 05 April 2011 has reference.

Please be advised that the Department has decided to grant an extension of the EA issued on 05 April 2011 by one (1) additional year, for the construction of the abovementioned development.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of this letter, of the Department's decision in respect of your request for extension as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should any party wish to appeal this letter a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile: 012 320 4431
By post: Private Bag X447, Pretoria, 0001; or
By hand: 2nd Floor, Fedsure Building, North Tower,
Cnr. Lilian Ngoyi (Van der Walt) and Pretorius Streets,
Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department (Attention: Director: Integrated Environmental Authorisations) in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses or fax number. Mr Hassam can also be contacted at:

Tel: 012 310 3271
Email: AppealsDirectorate@environment.gov.za

Yours sincerely

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 25/03/2013

CC:	Dr K Whittington-Jones	Coastal and Environmental Services	Fax: (046) 622 6564

APPENDIX F-5: EA AMENDMENT DATED 18 JUNE 2013

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA
Private Bag X 447 · PRETORIA · 0001 · Fedsure Building · 315 Pretorius Street · PRETORIA
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

NEAS Reference: DEA/EIA/12410/2011
DEA Reference: 12/12/20/1717
Enquiries: Ms Thulisile Nyalunga
Telephone: 012-310 3249 **Fax:** 012-320-7539 **E-mail:** TNyalunga@environment.gov.za

Mr Uri Eptstein
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 69408
BRYANSTON
2012

Telephone: (011) 367 4628
Fax: (011) 367 4601

PER FACSIMILE / MAIL

Dear Mr Epstein

AMENDMENT OF ENVIRONMENTAL AUTHORISATION: THE PROPOSED CONSTRUCTION OF THE TERRA WIND ENERGY GOLDEN VALLEY WIND ENERGY FACILITY NEAR COOKHOUSE, BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

The Department's decision on the Environmental Authorisation issued on 05 April 2011 and your correspondence dated 30 April 2013 refer.

Based on a review of the reason for requesting an amendment to the above Environmental Authorisation, the Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the Environmental Authorisation (EA) dated 05 April 2011 as follows:

The contact details of the holder of the EA are amended as follows:

From:

Mr H Ramsden
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 68063
BRYANSTON
2021

Telephone: (087) 808 1501
Fax: *(086) 530 9050*

To:

Mr Uri Epstein
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 69408

BRYANSTON
2021
Telephone: (011) 367 4628
Fax: (011) 367 4601

The project description as reflected in the EA is amended:

From:

"The installation of up to 214 wind turbines with a nominal power output of 2.5MW (mounted on 800-100m masts and nacelle, 100m diameter rotor consisting of 3x50m blades)."

To

"The installation of up to 214 wind turbines with a nominal power output of 3MW (mounted on 80-100m masts and nacelle, 130m diameter rotor consisting of 3 blades)."

This letter must be read in conjunction with the Environmental Authorisation dated 05 April 2011.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the amendment decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile:	0123207561;
By post:	Private Bag X447, Pretoria, 0001; or
By hand:	2nd Floor, Fedsure Building, North Tower, Cnr. Lilian Ngoyi (Van der Walt) and Pretorius Streets, Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department *(Attention: Director: Integrated Environmental Authorisations)* in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

Appeals must be submitted in writing to:

Mr Z Hassam Director: Appeals and Legal Review, of this Department at the above mentioned addresses or fax number. Mr Hassam can also be contacted at:

Tel: 012-310-3271
Email: AppealsDirectorate@environment.gov.za
The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours sincerely

Mr Mark Gordon
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 18.06.2013

CC:	Ms K Jodas	Savannah Environmental (Pty) Ltd	Tel: 011 656 3237	Fax: 086 684 0547
	Mr D Govender	EC DEDEA&T	Tel: 041 598 5813	Fax: 086 519 7698
	Mr S Malaza	Compliance Monitoring (DEA)	Tel: 012 310 3397	Fax: 012 320 5744

APPENDIX F-6: EA AMENDMENT DATED 3 OCTOBER 2014

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko, Arcadia· PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 12/12/20/1717/AM4
Enquiries: Muhammad Essop
Telephone: (012) 399 9406 **E-mail:** MEssop@environment.gov.za

Mr Uri Epstein
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 69408
BRYANSTON
2012

Telephone Number: (011) 367 4628
Fax Number: (011) 367 4601
E-mail: UEpstein@biothermenergy.com

PER FACSIMILE / MAIL

Dear Mr Epstein

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 05 APRIL 2011 FOR THE PROPOSED CONSTRUCTION OF THE TERRA WIND ENERGY GOLDEN VALLEY WIND ENERGY FACILITY NEAR COOKHOUSE, BLUE CRANE ROUTE LOCAL MUNICIPALITY, EASTERN CAPE PROVINCE

The Environmental Authorisation (EA) issued for the above application by this Department on 05 April 2011 (as amended by the amendments to the EA issued on 02 February 2012; 29 November 2012; 28 March 2013; and, 18 June 2013) and your application for amendment to the EA received by this Department on 13 August 2014 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the EA dated 05 April 2011 as amended as follows:

Amendment to extend the validity period:

The activity must commence within a period of one (01) year from the date of expiry of the amendment to the EA issued on 28 March 2013 (i.e. the EA lapses on 05 April 2016). If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

This correspondence is only for the extension of the validity period as stated herein. All conditions set out in the original EA dated 05 April 2011 as amended remain unchanged and must be adhered to.

Furthermore, a shapefile of the approved development layout/footprint must be submitted to this Department within two months from the date of this decision. The shapefile must be created using the Hartebeesthoek 84 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .lyr file must also be included. Data must be

mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to:

Postal Address:
Department of Environmental Affairs
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Environment House
473 Steve Biko Road
Pretoria
0083

For Attention: Mr Muhammad Essop
Integrated Environmental Authorisations
Strategic Infrastructure Developments
Telephone Number: (012) 399 9406
Email Address: MEssop@environment.gov.za

This proposed amendment letter must be read in conjunction with the EA dated 05 April 2011 as amended.

In terms of Regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeall any aspect of the amendment decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of this decision, by means of one of the following methods:

By post: Private Bag X447,
Pretoria, 0001; or
By hand: Environment House
473 Steve Biko,
Arcadia,
Pretoria, 0083

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

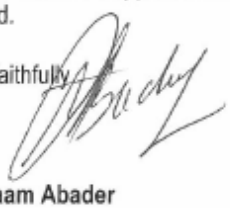
Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:

Tel: (012) 399 9356
Email: AppealsDirectorate@environment.gov.za

Please note that in terms of section 43(7) of the National Environmental Management Act, 1998, an appeal under section 43 of that Act will suspend the decision or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

Yours faithfully



Mr Ishaam Abader
Deputy Director-General: Legal, Authorisations, Compliance and Enforcement
Department of Environmental Affairs
Date: 3/10/2014

cc	Ms J Thomas	Savannah Environmental (Pty) Ltd	Tel: (011) 656 3237	Fax: (086) 684 0547

APPENDIX F-7: EA AMENDMENT DATED 16 JANUARY 2015

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko, Arcadia· PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 12/12/20/1717/AM6
Enquiries: Mr Vincent Chauke
Telephone: (012) 399 9406 **E-mail:** VChauke@environment.gov.za

Ms Sibongile Mdluli
Terra Wind Energy Golden Valley (Pty) Ltd
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
Email Address: eiaadmin@biothermenergy.com

PER EMAIL / MAIL

Dear Ms Mdluli

AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 05 APRIL 2011 FOR THE PROPOSED CONSTRUCTION OF THE TERRA WIND ENERGY GOLDERN VALLEY PROJECT, BLUE CRANE ROUTE LOCAL MUNICIPALITY, COOKHOUSE, EASTERN CAPE PROVINCE

The Environmental Authorisation (EA) issued for the above application by this Department on 05 April 2011 as amended and your application for amendment to the EA received by this Department on 27 October 2014 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the EA dated 05 April 2011 as follows:

Amendment 1: Amendment to the holder of the EA

The current holder of the EA:

"Terra Wind Energy Golden Valley (Pty) Ltd"

Represented by: Mr Uri Epstein
PO Box 69408
BRYANSTON
2012

Telephone Number: (011) 367 4628
Fax Number: (011) 367 4601
Cell Phone Number: (073) 298 0162
E-mail Address: uepstein@biothermenergy.com

Is hereby amended to:

"Terra Wind Energy Golden Valley (Pty) Ltd"

Represented by: Ms Sibongile Mdluli
PO Box 69408
BRYANSTON
2021

Telephone Number: (011) 367 4600
Cell phone Number: (082) 505 5949
Fax Number: (011) 367 4601
E-mail Address: eiaadmin@biothermenergy.com

This proposed amendment letter must be read in conjunction with the EA dated 05 April 2011 as amended.

In terms of Regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the amendment decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of this decision, by means of one of the following methods:

By post: Private Bag X447,
Pretoria, 0001; or
By hand: Environment House
473 Steve Biko,
Arcadia,
Pretoria, 0083

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Appeals must be submitted in writing to:

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:

Tel: (012) 399 9356
Email: AppealsDirectorate@environment.gov.za

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Please note that in terms of section 43(7) of the National Environmental Management Act, 1998, an appeal under section 43 of that Act will suspend the decision or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

Yours faithfully

Mr Ishaam Abader
Deputy Director-General: Legal, Authorisations, Compliance & Enforcement
Department of Environmental Affairs
Date: 16/01/2015