PROPOSED TERRA WIND ENERGY GOLDEN VALLEY PROJECT
BLUE CRANE ROUTE LOCAL MUNICIPALITY, COOKHOUSE
EASTERN CAPE PROVINCE OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT
VOLUME 3: ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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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 Power Solutions (Pty) Limited (TPS), a renewable energy company, and General Electric International (Benelux) B.V. the largest wind turbine manufacturer in the world, have formed a joint development company, Terra Wind Energy Golden Valley (Pty) Ltd, which plans to develop a wind powered electricity generation facility (known as a 'wind farm') on the eleven farms: 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, located in the Blue Crane Route Local Municipality (BCRM) in the Eastern Cape Province of South Africa.

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 29 400 hectares (ha).

This proposal was revised in the Environmental Scoping Report phase to reflect that the proposed project is now planned to host 214 turbines (as described in 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. The total potential output of the wind farm is estimated 500MW, but the wind farm will still cover the same area of 29 400 ha.

Need and desirability

According to Terra Wind Energy-Golden Valley (Pty) Ltd, 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. Terra Wind Energy-Golden Valley (Pty) Ltd 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 the proposed Terra Wind Energy-Golden ValleyProject 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 requires a full Scoping and Environmental Impact Assessment (EIA).

Coastal & Environmental Services (CES), a well-established specialist environmental consulting firm with offices in Grahamstown and East London, have been appointed by Terra Wind Energy-Golden Valley (Pty) Limited as Environmental Assessment Practitioner (EAP) to conduct the EIA.

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 Terra Wind Energy-Golden ValleyProject 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), 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 Terra Wind Energy-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 Terra Wind Energy-Golden Valley Project

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.
	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.
	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.

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.

This report – the Final EIR - was produced in accordance with the requirements of Regulation 32 of the EIA Regulations (GNR 385), 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, has been finalised for submission to DEA for final decision making.

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 Terra Wind Energy Golden Valley Project, all electronic equipment will be housed inside one of 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.

The proposed wind energy project is planned to consist of the following:-

- Up to 214 wind turbines of 2.5MW each (mounted on 80-100m 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.
- 132 kilovolt (KV) overhead power lines linking the site to either the Poseidon Sub-Station 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 sub-stations on the Golden Valley 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 electricity will be fed into the national Eskom grid.

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

- *Pre-feasibility*: Terra Wind Energy-Golden Valley (TWEGV) conduct 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 community involvement, wind resources evaluation from existing data, general acceptance of wind energy, grid connectivity, environmental impact, logistical, implications,
- *Feasibility*: TWEGV 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 TWEGV 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. There are five construction phases envisaged which will allow for economical implementation of the project.
- *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. Please refer to Appendix A for a copy of the Environmental Authorisation from DEA.

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 17.2^{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.

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 proposed Terra Wind Energy Golden Valley Project is to be developed in the BCRM. It is likely that the development of the Terra Wind Energy Golden Valley 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 Terra Wind Energy Golden Valley Project

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 Terra Wind Energy Golden Valley 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 EMP, which is seen as a necessity for this project.

The EMP 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 EMP 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 specialist study found that no archaeological sites occur within the area proposed for the Terra Wind Energy 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 Terra Wind Energy 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 proposed Terra Wind Energy 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. A number of residences are within 500m of wind turbines and will potentially be affected by shadow flicker. 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 Terra Wind Energy 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.

With regard to shadow flicker, caused when moving shadows are cast over a residence by the rotating blades of wind turbines, four sites (Klein Riet Fontein Farm 167/1, Remainder of Matjiesfontein Farm 283, Weltevrede Farm 292/1 and Mullerskraal Farm 159/1) are particularly vulnerable as they are in close proximity to selected wind turbines. A high visibility value and close proximity (< 2km) to a wind turbine indicates a potentially high visual exposure to the wind farm.

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 Terra Wind Energy Golden Valley Project are the terrestrial fauna, avifauna and human receptors. The results for of the modelling were found to be unacceptable at four noise sensitive areas as the impacts would result in a noise level exceeding 45 dB(A), which is regarded as the ambient noise limit.

- Ou Smoor Drift Farm House (NSA 2) – The wind turbine generator is too close to the dwelling (WTG 117 – 462m). This is resulting in the noise exceeding the recommended limit from 9m/s.
- Matjesfontein Farm House (NSA 3) – The wind turbine generator is too close to the dwelling (WTG 190 – 385m). This is resulting in the noise exceeding the recommended limit from 9m/s.
- Jagersfontein Farm House (NSA 4) – The wind turbine generator is too close to the dwelling (WTG 19 – 269m). This is resulting in the noise exceeding the recommended limit from 6m/s.
- Rietfontein Farm House (NSA 6) – The wind turbine generator is too close to the dwelling (WTG 147 – 245m). This is resulting in the noise exceeding the recommended limit from 5m/s.

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 difficult to mitigate. The noise level at four noise sensitive areas (mentioned above) during the operational phase will be unacceptable. 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 $5ms^{-1}$, 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 Terra Wind Energy 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 Terra Wind Energy Golden Valley Project

Table 3 provides a summary of the impacts associated with the proposed Terra Wind Energy-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 Terra Wind Energy-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 may 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 difficult to mitigate. The noise level at four noise sensitive areas during the operational phase will be unacceptable. These four areas are: (1) Ou Smoor Drift Farm House (NSA 2) – The wind turbine generator is too close to the dwelling (WTG 117 – 462m). This is resulting in the noise exceeding the recommended limit from 9m/s. (2) Matjesfontein Farm House (NSA 3) – The wind turbine generator is too close to the dwelling (WTG 190 – 385m). This is resulting in the noise exceeding the recommended limit from 9m/s. (3) Jagersfontein Farm House (NSA 4) – The wind turbine generator is too close to the dwelling (WTG 19 – 269m). This is resulting in the noise exceeding the recommended limit from 6m/s. (4) Rietfontein Farm House (NSA 6) – The wind turbine generator is too close to the dwelling (WTG 147 – 245m). This is resulting in the noise exceeding the recommended limit from 5m/s. 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 Terra Wind Energy-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 Terra Wind Energy-Golden Valley Project

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 Terra Wind Energy-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**.

The impact of noise on the noise sensitive areas (NSA) is **high** in terms of the operational phase where four individual turbines are located within 500m of household residences. Should the four individual turbines be relocated to a distance of more than 500m from the household residences, the rating will fall to **low** for the operational phase. 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 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 Terra Wind Energy-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 Terra Wind Energy-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.

However, although the EAP is of the opinion that the proposed project should be granted authorisation, it suggested that the proposed Terra Wind Energy Golden Valley Project only be approved subject to a final layout plan being provided to the competent authority. The turbine layout used to assess the environmental impacts of the Terra Wind Energy-Golden Valley Project is a preliminary layout. Terra Wind Energy-Golden Valley will take into consideration the findings of the specialist reports and revise the turbine, road, substation and electrical cable layout so as to minimise the impacts on the receiving environment. The EAP recommends that the competent authority grants authorisation for the preliminary layout, on the condition that the applicant will provide a final layout prior to commencement of construction activities on site. The revised and final layout plan should take into consideration the noise and visual sensitive receptors identified by the specialists.

In addition to the above, the EAP recommends that the project only be granted authorisation under certain conditions, in order to address those impacts with a high significance rating, and included in Chapter 10 of this report. One such condition is that the project proponent furnishes the relevant authority with a geotechnical assessment proving that the proposed facility will be structurally sound and will not pose a safety risk to surrounding structures or people.

In addition, 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. The 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.

The Way Forward – Environmental Authorisation Phase

The Draft EIR, together with the Specialist Volume (Volume 2) and the EMP (Volume 4), were been released for public review for a period of four weeks. The report was updated with the comments received during the public review period and public meeting held in Cookhouse. The report is now finalised for submission to DEA for Environmental Authorisation. Upon thorough examination of the EIR, the competent 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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