# Environmental Impact Assessment for a Wind Farm in the Kouga Local Municipality

## Executive Summary / Impact Statement of Revised Draft Environmental Impact Report (January 2011)

### DEVELOPMENT PROPOSAL

Red Cap Investments (Pty) Ltd (Red Cap) is proposing to develop a wind farm of up to 121 wind turbines near the villages of St. Francis Bay, Oyster Bay and Paradise Beach in the Eastern Cape.

The proposed wind farm site spans three areas:

- The Eastern Cluster (27 turbines) close to Cape St. Francis and Paradise Beach
- The Central Cluster (41 turbines) close to Oyster Bay
- The Western Cluster (53 turbines) close to the mouth of the Tsitsikamma River

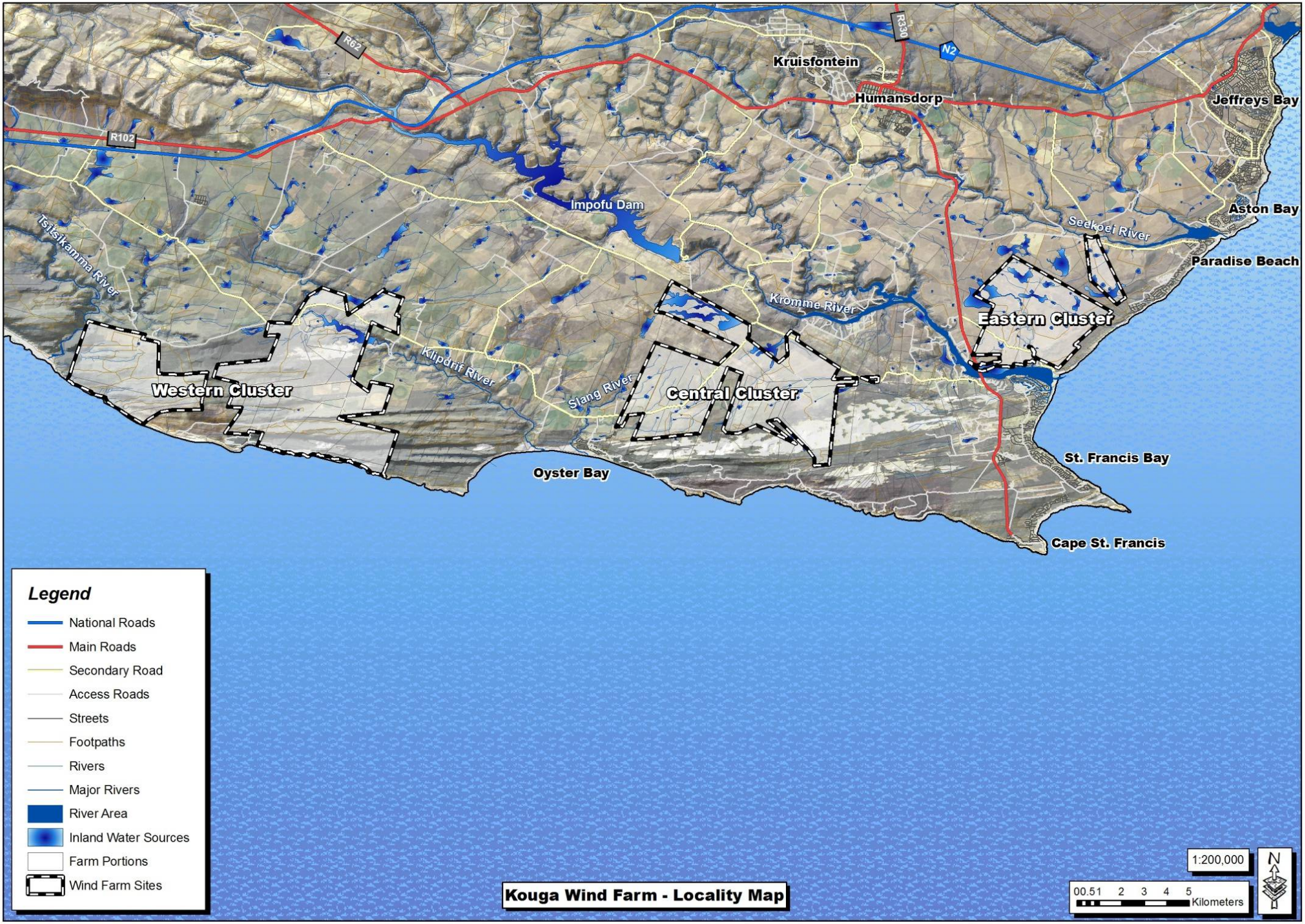
A regional map showing the study area is presented on the following page.

The location of the wind farm site was identified through a more than three year detailed wind data capturing and assessment process which indicated that this site had an exceptional wind regime. The proposed layout of the wind turbines was refined through an iterative process with input from all the environmental and technical specialists as part of the Environmental Impact Assessment (EIA) process. The aim of this iterative process was to ensure the final layout would not have any insurmountable environmental impacts. This was achieved by moving any 'problematic' turbines, roads or associated infrastructure and then reassessing the new layout with input from all the specialists. The final layout resulting from this process is termed "Layout 3" and it is the layout which is assessed in this Revised Draft Environmental Impact Report (EIR).

As part of this iterative process the developer agreed to phase the development with the first phase consisting of a maximum of 50 turbines. This was to ensure that any impacts which had a high uncertainty could be adequately monitored and more easily assessed and mitigated. If monitoring programmes revealed problematic impacts, these could then be addressed and mitigated for in the current and future phases.

Due to the large distances between turbines, the vast majority of the total 9 382ha of land that is being investigated for the wind farm, will not be disturbed. During the first phase less than 1% of the land will be permanently altered with the full wind farm resulting in a maximum of 1% of the land being permanently altered. As this 1% is spread over the 9 382ha the footprint of the development is never substantial in any one area.

No application was made as part of this process for the power lines that will feed the electricity from this project into the grid. Eskom has indicated that they will take the responsibility for connecting the wind farm to the grid, inclusive of any grid related EIAs. As such Eskom is undertaking a Basic Assessment process for one such line that will run through the central cluster. The developer is also in discussions with Eskom regarding the need for other possible short distance power line to feed the electricity generated from the other clusters into the grid. Any additional power line proposals will undergo their own Basic Assessments once finality is reached with Eskom on the way forward.


R62
R330
N2
R102
Kruisfontein
Humansdorp
Jeffreys Bay
Impofu Dam
Aston Bay
Seekoei River
Tsitsikamma River
Paradise Beach
Kromme River
Eastern Cluster
Klipdrif River
Western Cluster
Slang River
Central Cluster
St. Francis Bay
Oyster Bay
Cape St. Francis
Legend
National Roads
Main Roads
Secondary Road
Access Roads
Streets
Footpaths
Rivers
Major Rivers
River Area
Inland Water Sources
Farm Portions
Wind Farm Sites
Kouga Wind Farm - Locality Map
1:200,000
N
0 0.5 1 2 3 4 5
Kilometers

## NEED FOR THE ENVIRONMENTAL IMPACT ASSESSMENT AND THE PROCESS TO DATE

The National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended, requires that activities be investigated that may have a potential impact on the bio-physical environment, socio-economic conditions, and cultural heritage.

Under NEMA the EIA Regulations are published under GNR 385, and the associate Listing Notices GNR 386 and 387. Section 24(5) of NEMA stipulates that certain "listed activities" require environmental authorisation by way of either a Basic Assessment (BA) or a full Scoping and Environmental Impact Assessment as defined in the EIA Regulations Listing Notices (July 2006 EIA Regulations). The proposed construction and operation of the Kouga Wind Farm constitutes listed activities in both Listing Notices. However, GNR 387 supersedes GNR 386 and, as such, a full Scoping and Environmental Impact Assessment must be undertaken. The GNR 387 listed activities include:

1. *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;*

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.*

In accordance with legislative requirements, an application for the proposed Kouga wind farm was submitted on 15 January 2010 to the Department of Environmental Affairs (DEA). The Scoping Report was finalised on 31 May 2010. The Scoping Report and Plan of Study for EIA were accepted by the DEA on 30 July 2010 subject to conditions. The Draft Environmental Impact Assessment Report was then compiled and reported on the investigation and evaluation of the impacts, issues and alternatives identified during the Scoping Phase. Where necessary, those impacts or issues that required detailed assessment were investigated further. All identified impacts were assessed and rated in terms of their environmental impact significance. Appropriate mitigation measures and recommendations were also formulated to minimize the potential negative environmental impacts. A Draft Environmental Impact Report was released for public comment on 12 November 2010 with the initial comment period extended to 8 January 2011.

This report is a revision of the Draft EIR which has been released for further public comment so that input may be provided before the report is finalised and submitted to the DEA for decision-making.

## REASON FOR REVISED DRAFT REPORT

This Revised Draft Environmental Impact Report is an updated version of the Draft EIR released for public review. During the public participation process linked to the initial Draft Environmental Impact Report, numerous questions and issues were raised by Interested and Affected Parties which resulted in the decision to revise the Report to address all these questions and issues.

The Revised Draft EIR has been reworked to better present and clarify project information, identified impacts and the assessment thereof. Where necessary, the specialist studies were also updated and amended to better reflect the findings of the studies or to address new issues raised by Interested and Affected Parties. Additional specialist studies were also undertaken to provide additional assessment of impacts which were not assessed in the Draft EIR. Although the proposed project and the overall findings of the original Report did not change it was decided that the revised report should be distributed for a second round of public comment.

## SUMMARY OF KEY FINDINGS

The issues and concerns that could result in potentially significant impacts identified during the Scoping and Impact Assessment Phase were investigated during the EIA Phase. These included issues and concerns related to the following:

- Vegetation (including wetlands)
- Hydrology
- Terrestrial fauna
- Bats
- Birds
- Cultural Heritage (including palaeontology)
- Visual/ aesthetics
- Noise
- Economics (including tourism)

Specialists were appointed to investigate potential impacts related to these aspects. The results of the studies were used to identify potentially significant impacts and refine the final configuration of the wind farm to ensure an optimal arrangement of turbines with respect to the social and biophysical attributes of the potentially affected environment.

An overview of key specialist findings is provided below.

## VEGETATION AND WETLANDS

The vegetation study resulted in the identification of 7 similar ecological functional groups, namely:

- Grassy Fynbos, Dune Strandveld and Renosterveld communities
- Rocky Refugia habitats
- Seeps, Wetlands and Pans
- Riparian Vegetation along seeps and ephemeral river courses
- Thicket and Dune Forest
- Drift Sands, Dune Fields and Littoral Vegetation
- Transformed vegetation

The percentage coverage of these vegetation types is variable for each of the clusters and, consequently, the habitat sensitivity is also variable. An overview of findings for each cluster follows.

### *Eastern cluster*

This area is characterised by an abundance of *Soutvlei Inland Pans* forming a network between islands of *Osbosch Thicket-Renosterveld* on higher lying areas. *Humansdorp Perennial Stream* along drainage lines, with *Kabeljous Valley Thicket* on dunes and slopes. *St. Francis Strandveld* and *Zeekoei Limestone Strandveld* along coastal belt. *Soutvlei Inland Pans* are ephemeral or seasonal in nature, tending to have a perched water table with standing water present after rainfall. These pans tend to have a dominant grassy composition, with herbs, shrubs and trees being excluded due to period inundation with water. *Inland pans* are clearly differentiated from surrounding vegetation by the presence of shallow depressions and by being dominated by grasses. Some areas of *Inland Pans* have been modified and excavated to increase water storage capacity. Transformed areas (predominantly agricultural pastures) are limited in extent to peripheral areas, since ephemeral pans have not been historically used for pasture cultivation due to perched water table.

### *Central cluster*

Vegetation in the central cluster is dominated by *Oyster Bay Thicket-Grassy Fynbos*, with *Kouga Mesic Proteoid Fynbos* on hilltops. An extensive network of drainage lines (*Tsitsikamma Perennial Streams*) drain the site to the north and to the south. Bands of *St. Francis Strandveld* and *Inland Primary* Dune are present on vegetated dunes along the coastal belt interspersed with un-vegetated *Primary Dunes*. *Oyster Bay Thicket-Grassy Fynbos* and *Tsitsikamma Perennial Streams* which have been highly modified through agriculture, with extensive areas converted to irrigated pastures throughout the site. Intact portions tend to be limited to isolated pockets (islands) between pastures and along drainage lines. Seep and wetland areas have also been drained to increase pasture footprint within the cluster. *Mesic Proteoid Fynbos* tends to be intact, especially where exposed rocky outcrops are present, due to unsuitability for cultivation.

***Western cluster***

Vegetation in this area is predominantly *St. Francis Strandveld* in southern portion of site on linear vegetated dunes. *Tsitsikamma Dune Forest* and *Tsitsikamma Riverine Forest* occur on the peripheral northern portions of the site with *Oyster Bay Thicket-Grassy Fynbos* and *Tsitsikamma Riverine Forest* in northern areas on hills and drainage line slopes. *Inland Primary Dune* and *Drift Sands* also present within the site. A number of wetlands are present in dune slacks within the *Inland Primary Dune* vegetation.

***Seeps, Wetlands, Streams and Pans***

Of special interest is the fact that there are a number of seeps, wetlands, pans and streams in the clusters and particularly in the Eastern Cluster. These seasonal wetlands, seeps and riparian areas comprised primarily of the Soutvlei Inland Pans but are also represented by the Humansdorp Perennial Stream, St. Francis Dune Stream and Tsitsikamma Perennial Stream Variant.

***Impact Assessment***

The impact assessment for the vegetation was done in a two pronged approach using the 7 ecological functional groupings detailed above:

1. A Terrestrial Habitat Sensitivity Assessment was undertaken for all three clusters to identify which turbines and infrastructure components are situated in a High Sensitivity Area and thus required specific mitigation or removal from the area.
2. An assessment of the impacts on the receiving environment (ecological functional groupings) in the study area to quantify these impacts and look at possible mitigation measures specific to each ecological functional grouping.

Potential impacts on the ecological functional groupings for all three clusters have been considered under several categories, including:

- Direct loss of vegetation and habitat
- Changes to species composition and ecological processes
- Loss of species of special concern (SSC) and their habitat
- Changes in natural fire regime and increased risk of alien infestations.

From this specialist assessment of the impact on the vegetation it was found that, with suitable mitigation, there would be no impacts of high negative significance and no fatal flaws to the development.

A number of potential impacts during construction on vegetation were found to have a high negative significance rating before mitigation. Through the implementation of appropriate mitigation measures, the majority of these dropped to low significance and the rest to medium (see summary Table 1 below). During operation two impacts, namely, Loss of species of special concern and SSC habitat of Rocky Outcrops, and the reduction of changes to ecological processes and functioning and habitat fragmentation of seeps, wetlands and streams, were identified as having a potential High significance which dropped to medium after mitigation. Changes to the fire regime in Fynbos, Renosterveld and Dune Strandveld, was found to be a medium positive impact after

mitigation both during construction and operation. Some of the major mitigation measures were the need for micro-siting, vegetation search and rescue, rehabilitation as well as alien and fire management and these along with others have all been included in the EMP.

## HYDROLOGY AND SURFACE/ GROUNDWATER LINKS WITH WETLANDS

The specialist study undertaken for this aspect dealt with specific impacts from a hydrological point of view on the ground water, hydrology and surface/ groundwater links with wetlands in the affected environments. An overview of the hydrology and wetlands of the proposed wind farm area is presented below for each of the clusters.

### *Eastern Cluster*

The Eastern Cluster is located about halfway between Paradise Beach and St. Francis Bay and the nearest two wind turbines are approximately 1.5 km and 1.72 km from the coastline. The Eastern Cluster lies within the K90E and K90F quaternary catchments. The area is drained by the Krom River to the south and the Seekoei River to the north.

The occurrence of wetlands in this cluster is driven primarily by surface rather than groundwater interactions. The relatively flat topography in the general area, coupled with low groundwater permeability, facilitates the spread of surface runoff, which pools in low-lying depressions and flats, giving rise to the extensive salt marsh (Soutvlei inland pans) and other wetland habitats, which occur between higher-lying terrestrial areas.

### *Central Cluster*

The Central Cluster is located about halfway between Oyster Bay and Cape St. Francis with the two nearest wind turbines of the Central Cluster located approximately 1.67 km and 1.99 km from the coast line. The Central Cluster lies within the K90E and K80F quaternary catchments. The area is drained by an extensive network of streams and watercourses to the south and tributaries of the Krom River to the north. The broader area around the study site is characterized by significant water resources in particular the Impofu Dam located along the Krom River to the north of the cluster. This dam tends to moderate high flows in the Krom River.

Wetlands in this area are driven by both surface and groundwater flows, and comprise a combination of wetland depressions, hillslope seeps and valley bottom wetlands. Of these, the latter drain mainly into the Slang River, which flows along the northern edge of the Oyster Bay dunefield and passes into the sea at Oyster Bay, to the east. However, valley bottom wetlands draining the eastern portion of the central cluster pass into the dunefield itself which is situated outside the study site. Wetlands in this cluster are largely disturbed systems, the integrity of which has already been impacted to some extent by largely agricultural activities in their vicinity and upstream catchment areas.

### *Western Cluster*

The Western Cluster is located on the coast between Oyster Bay and the Tsitsikamma River and lies within the K80F quaternary catchment. The two wind turbines located nearest to the coast line are approx 1.09 km and 1.19 km from the coast, with the nearest wind turbines to Oyster Bay located approximately 7.3 north-west, inland from Oyster Bay. The area is drained by tributaries of the Klipdrift River to the north and the Tsitsikamma River to the west.

The wetlands and rivers / streams in this cluster, are likely to be driven by both surface and groundwater flows. Although the mobile dune areas in this area are small in comparison with the Oyster Bay dunefield in the vicinity of the central cluster, surface and groundwater flows from the north are nevertheless likely to play a role in recharge of the dune aquifer which is outside the study area.

### *Impact Assessment*

From a groundwater perspective, the proposed wind farm would have a low and insignificant impact.

The Nuclear-1 EIA at the nearby Thyspunt site established that the stage height in major rivers in the area seldom rises by more than 5 to 8 m before discharging into the ocean. As the wind turbine situated at the lowest altitude would be at about 14 m above mean sea level (amsl), it is evident that the development of the wind farm is not at risk of major flooding and will not impede the flow of any of the perennial rivers. In addition, the infrastructure associated with the development of the Wind Farm has been located and designed to minimise any impact on the hydrology of the area.

The wetlands will be impacted by the development but given the fact that only about 1% of the over 9 000 ha will be permanently altered, and this will be spread across the three clusters, this potential impact is not seen as being significant if standard mitigation is implemented.

From this specialist assessment of the potential impact on the hydrology it was found that, with suitable mitigation, there would be no impacts of high negative significance and no fatal flaws to the proposed development. The mitigation measures included those proposed for wetlands by the vegetation specialist, as well as the need to undertake a Water Use Licence Application (WULA) as required by the National Water Act (Act No. 36 of 1998) and complying with all requirements of the Act with regards to surface water hydrology. These are all included in the EMP.

**TERRESTRIAL FAUNA**

The terrestrial fauna study deals with amphibians, reptiles and mammals which were identified through a site survey following which findings were compared with distribution records in relevant literature.

Key findings of the study for each cluster are as follows:

***Eastern cluster***
This cluster contains many reptilian species ranging from common to Red Data Species snakes, frogs and lizards The combination of wetlands and pans in the eastern cluster represents a significant potential habitat for Peringuey's Coastal Leaf-toed Gecko (*Cryptactites peringueyi*) which has a critically endangered conservation status. Its presence to the southwest of the cluster has been recorded. The two salt pan plant species *Restio* sp. and *Sarcocornia* sp. are known to be favoured by this gecko species. While the mammal list of the eastern cluster is somewhat reduced compared to the western and central clusters due to the agricultural use of the land, it is still noteworthy. Mammal species present range from non-threatened common species to those included in the Red Data Species list.

***Central cluster***
The reptiles of the central cluster are primarily rock- and water-dependent as a result of the flat rocky outcrops that characterise this area. Again, the range of reptiles found there is wide from common to near threatened species. The rocky outcrops are also the preferred habitat for many amphibians due to the damp and cool conditions provided by the geological feature. Of significance is the corridor provided by the rocky outcrops into the natural undeveloped areas through to the seep areas. This is essential habitat for the survival of faunal species within the cluster. All the amphibians within the cluster are listed as least concern in terms of their conservation status. As with the western cluster (see below) mammals of all sizes are common to the central cluster and include species ranging from non-threatened common species to those included in the Red Data Species list.

***Western cluster***
The reptilian component of the western cluster comprises a variety of snake species from non-threatened to near threatened e.g. Yellow Bellied House Snake. Lizards are common to the cluster

and incorporate a wide variety, some of which, like the FitzSimon's Long-tailed Sep are considered vulnerable. Others, like the Elandsberg Dwarf Chameleon, which is listed as endangered, is also thought to occur in the cluster. Amphibians are also common to the area, typically around water bodies, with no endangered species being identified. Many of the reptiles in the cluster are water dependent. Mammals of all sizes are common to the western cluster and include species ranging from non-threatened common species like the Scrub Hare to those included in the Red Data Species list such as the Honey Badger and Blue Duiker.

***Impact Assessment***
Potential impacts on fauna for all three clusters have been considered under several categories, including:

- Direct habitat destruction through site clearing and construction of turbines and associated infrastructure
- Road mortality by vehicle activity
- Entrapment or exclusion
- Disruption of ecological corridors
- Poaching.

From this specialist assessment of the impact on the terrestrial fauna it was found that, with suitable mitigation, there would be no impacts of high negative significance and no fatal flaws to the development.

The construction impacts of habitat destruction and road mortality from trucks, cars and other service vehicles on reptiles, amphibians and mammals, were found to have a high significance before mitigation and these reduced to low and medium after mitigation. No impacts of high significance were identified either post or pre mitigation for the operation phase and rather there were two positive impacts after mitigation during this phase. Some of the major mitigation measures are search and rescue operations, maintenance of corridors particularly where roads cross rivers and wetland areas, careful driving practices and these along with others have been included in the EMP.

**BATS**

The specialist bat study was based on desktop research and a site inspection aimed at identifying suitable bat roosting sites including buildings and hollow trees. Given a general dirth of information on the effect of wind farms on bats the findings of the study are associated with a degree of uncertainty.

It is estimated that approximately 12 bat species may occur in the general study area, and none of these species occur in the higher conservation categories of Vulnerable or Endangered. Suitable roosting habitat for three species were found in abundance in the form of sheds, barns and tree hollows. Cave dwelling species are less likely to occur due to the absence of suitable habitat.

Although the establishment of the wind farm is not expected to detrimentally affect bat roosts or foraging habitat, studies undertaken elsewhere indicate that bats may suffer severe injuries to their respiratory systems caused by a sudden drop in air pressure that occurs when bats get close to turbine blades. Migrating bat species may be particularly vulnerable to this form of mortality.

***Impact Assessment***
The specialist study identifies two categories of potential impacts during the operation phase:

- Site specific mortality from wind turbine blades
- Mass mortality affecting bat recruitment on a regional scale

From this specialist assessment of the impact on the bats it was found that, with suitable mitigation, there would be no impacts of high negative significance and no fatal flaws to the development.

The second impact can be regarded as a cumulative effect of more than one wind farm site in the region, particularly if these are sited on migratory routes which, to date, have not been clearly identified. The significance of the cumulative impact is the only one rated as high before mitigation but this reduces to low after mitigation. The confidence in the prediction of the magnitude of the impact on bats is not high but it is believed that with the proposed mitigation, which includes phasing the project, setting the turbines back from major water sources and conducting a monitoring program, any significant impacts can be avoided. Some of these mitigation measures have already been incorporated in the final layout and all of them are included in the EMP.

**BIRDS**

The avi-fauna (bird) study was based on a site visit and review of published information on bird distribution and abundance. As with the bat study, a limitation of the bird study is a lack of information about the nature of interaction between birds and wind farms specifically in South Africa. This is poorly understood in South Africa given the lack of existing wind farms and an absence of primary data.

The findings of the bird study indicate the possible occurrence of 74 species of conservation concern in the study area. These species are categorised as either near threatened or vulnerable. The Eastern Cape coastal precinct is known to have the highest densities of Denham's Bustard and White-bellied Korhaan in the country, and also has very high densities for Blue Crane, Secretarybird and White Stork. The Humansdorp population of White-bellied Korhaan (Barrow's Korhaan) is virtually isolated from the rest of the country, making it extremely important to protect. Coordinated Waterbird Count data for the area indicated the occurrence of cormorants, ducks, geese, gulls, egrets, terns, ibises, geese, ducks, plovers and assorted waders south of the eastern cluster at the Krom River Mouth. Based on these findings, the following species were identified as most likely to be negatively impacted by the proposed wind farm: Denham's Bustard, White-bellied Korhaan, Blue Crane; African Marsh Harrier, Black Harrier, Secretary bird and White Stork.

***Impact Assessment***
Potential impacts on birds for all three clusters have been considered under several categories, including:

- Collision of birds with wind turbines
- Habitat destruction associated with the construction of the turbines
- Disturbance of birds by the turbines and associated infrastructure
- Habitat destruction during construction of associated infrastructure.

From this specialist assessment of the impact on the birds it was found that, with suitable mitigation, there would be no impacts of high negative significance and no fatal flaws to the proposed development.

Collision of birds with the turbines is the only impact that was given a high negative significance before mitigation. The assessment of this impact is complicated by the number of factors affecting the likely mortality rate including bird species, prey abundance, landscape features, weather, number of turbines, turbine size and spacing and lighting. Due to the conservation value of birds that may be affected, the potential impact was rated as high without mitigation and medium with mitigation, although this finding is qualified by uncertainty about the extent to which collisions may occur.

Mitigation measures proposed to reduce the significance of impacts on birds have been incorporated into the EMP and these include turbine design requirements and pre- and post-

construction monitoring. The latter will be facilitated by the proposed phased construction plan which will enable a better understanding of the impacts on birds, based on the results of monitoring during the first phase, as a basis for mitigation during subsequent construction and operational phases.

## CULTURAL HERITAGE

A Cultural Heritage Impact Assessment was undertaken with the aim of locating, identifying and assessing the significance of cultural heritage resources, inclusive of archaeological deposits or sites, built structures older than 60 years, burial grounds and graves, and cultural landscapes or viewscapes that may be affected by the proposed development. The findings of the Cultural Heritage Impact Study for each cluster are described below.

A palaeontological study was also undertaken which considered palaeontological fossils within the study area. The findings of the study identified no palaeontological issues of significance.

### *Eastern cluster*

Five heritage sites were identified in the Eastern Cluster. Three of them comprise of Colonial Period farmsteads, pre-dating 60 years of age. These sites are at present all still in use and are fenced with access gates. One Colonial Period Cemetery was found which is no longer in use but is fenced with an access gate. The fifth site comprises of a low density and insignificant primarily Earlier Stone Age (ESA) Acheulean scatter.

### *Central cluster*

Six archaeological and cultural heritage resources were identified during assessment of the central cluster study site. Four of these constitute Historical Period homesteads, pre-dating 60 years of age. With the exception of one house, the sites are at present still in use. One of the sites is formally fenced for purposes of conservation in terms of the National Heritage Resources Act. The remaining sites in this cluster comprise a fenced Historical Period Cemetery and a highly significant ESA and Middle Stone Age (MSA) site where artefacts are strewn over an approximate 1 km x 300 m area of exposed dunes.

### *Western cluster*

Seven sites were identified in the Western Cluster as well as 2 potentially sensitive areas. Six of these are Historical Period farmsteads, structures or villages, older than 60 years of age. The sites are largely still in use, with the majority thereof fenced with access gates. The remaining site comprises a fenced Historical Period cemetery. Both potentially sensitive areas are characterized by a mosaic of overgrown and white shifting dunes; very reminiscent of the typical Late Stone Age (LSA) 'strandloper' type site environments. They have thus been identified as potentially sensitive areas even though no archaeological or heritage sites were identified in these areas during the field visits.

### *Impact Assessment*

From the specialist assessment of the impacts on the cultural heritage resources it was found that, with suitable mitigation, there would be no fatal flaws to the proposed development. The proposed configuration of the wind farm ensures that there are no direct impacts on historical or stone age sites. The only site to have a high negative impact before mitigation was the site in the Central Cluster. The development layout was altered so that this site is not impacted and can thus be formally conserved which changed this impact to a high positive impact.

Over and above this there were two related impacts, one with a high negative significance and one with a high positive significance after mitigation. The negative impact was the impact on the cultural landscapes and viewscapes for sensitive visual cultural receptors. However, this is a subjective impact and depending on the cultural receptor the significance could be different. The positive impact was the impact on the Cultural Landscapes and viewscapes with regard to conservation of heritage resources. It was noted that the wind farm, due to it using up a large area

of land but only permanently impacting about 1% of this, may be a very good means to identify cultural resources through EIA studies and a good way to ensure the land was not used for other more destructive activities thus conserving the resources.

The mitigation measures proposed included micro-siting, on site monitoring for some potentially sensitive sites during excavation and conservation of the sensitive stone age site. These and other mitigation measures are included in the EMP.

**VISUAL**

From a visual perspective, the landscape into which the wind farm will be introduced is largely agricultural and contains relatively few man-made structures. The blade tips of the turbines at an approximate maximum height of 150 to 160 m, will result in a marked change in the visual character of the landscape. Anticipated visual effects are described in a specialist visual study that was based on a site visit and photographic survey combined with an analysis using Geographic Information Systems (GIS) and a literature review. Criteria for defining potential visual impact include visibility of the wind farm components, viewer sensitivity, viewer exposure and visual intrusion. Map overlays including landforms and land cover are used to create sensitivity maps which indicate areas that are sensitive to change.

***Impact Assessment***
The findings of the specialist study resulted in the identification of five types of visual impact:

- Intrusion of large and highly visible construction activities on sensitive viewers
- Changes to views from mixed coastal resort-agricultural landscape
- Intrusion of large wind turbines on the existing views of sensitive visual receptors
- Impact of night lights on existing nightscape
- Impact of shadow flicker on residents in proximity to the wind farm.

Given the subjectivity associated with visual perception, the findings of the impact assessment are qualified by a medium level of confidence in the prediction. The most significant impact is likely to be associated with changes to views of the landscape from resort residents (sensitive viewers), specifically those residents of St. Francis Bay that would see the Eastern Cluster from their properties, albeit at a distance. The significance of this impact is rated high with few mitigation options available to reduce the significance. However, it is noted that it is possible that this impact will reduce over time as viewers become accustomed to the turbines in their view. The impact of the turbines in changing the landscape is the only other impact rated as high but this could be negative or positive as it is very subjective and will most likely also reduce over time.

However, no fatal flaws were identified by the specialists and a range of mitigation measures, where possible, are proposed to reduce visual impact and these are included in the EMP.

**NOISE**

An increase in noise levels is a concern associated with wind farms which manifests during both the construction and operational phases of the development. A noise specialist was appointed to determine the likely increase in noise levels and recommend appropriate mitigation. The methodology used in the noise study included a desktop modelling exercise (using validated computer software) to predict noise levels from the operation of the turbines and field measurements to determine ambient noise levels in the vicinity of the proposed turbine localities. The field measurements were undertaken at seven monitoring points throughout the study area, chosen on the basis of their proximity to the proposed turbines and sensitive receptors (fauna, avifauna and human), using methods based on the South African National Standard (SANS) for noise monitoring.

***Impact Assessment***

From this specialist assessment of the impact of noise it was found that, with suitable mitigation, there would be no impacts of high negative significance and no fatal flaws to the proposed development.

The most significant impacts were identified to potentially be during the operational phase of the development. The predicted noise levels during operation are calculated using the manufacturer's specifications for two commonly used types of wind turbines. It is important to note that the noise modelling that was done for this study was very conservative as it did not take into consideration the effect that any ambient noise and specifically the prevailing wind may have on masking the operational noise of the turbines. This means that at a setback distance of 500 m, the operation of the turbines may very likely not be audible above the background noise of the prevailing winds especially as the wind speed increases. The results of this conservative modelling for all identified noise sensitive areas (NSA's) is presented in the specialist study. It is shown that recommended day/night limit of 45 dB(A) is only possibly exceeded at 6 out of the 32 Noise Sensitive Areas. Four of these areas are located in the Central Cluster and two in the Western Cluster. Based on the findings, the potential impact of noise during the operational phase is rated as high without mitigation but can be reduced to low post-mitigation and this is using the conservative noise modelling estimates, so the impact will most likely be less.

The two most important mitigation measures in this regard are micro-siting of the turbines affecting the 6 noise sensitive areas and ambient noise monitoring once these turbines are erected to determine the exact power mode settings of the turbines needed to comply with the guideline limit of 45 dB(A) at the noise sensitive areas. These mitigation measures and others are incorporated into the EMP.

**ECONOMY AND TOURISM**

An economic specialist study was undertaken to assist in determining the potential impact of the proposed wind farm on the local economy and on tourism. Various sources of information were, as part of desktop review, utilised in combination with consultation with community members and authorities. Potential impacts were assessed in relation to the following:

- Institutional factors and policy
- Financial viability
- Financial benefit to landowners
- Land values in the potentially affected surroundings
- Tourism potential and development
- Economic spin-off during the construction and operations phases, including job creation, upliftment of the local communities through a BBBEE trust and corporate social investment initiatives.

***Impact Assessment***

The only impacts with high significance are positive impacts after mitigation and these are both during construction and operation. Benefits would be particularly prominent for the project proponents, land owners on the site, Historically Disadvantaged South Africans (HDSAs) residing within the geographic location of the Kouga Local Municipality through the proposed Broad-Based Black Economic Empowerment (BBBEE) trust, the general community through Corporate Social Investment (CSI) initiatives and in the achievement of national and regional energy policy goals. Less significant negative impacts would occur, *inter alia*, as a result of loss of land, general disruption and loss of amenity related to noise and visual aspects, and crime associated with an influx of contractual labour.

This economic analysis of the various phases of the wind farm project and its likely effects on the environment concluded that, with appropriate mitigation measures applied, the greatest benefit will be swayed in favour of society in general.

## CUMULATIVE IMPACTS

The potential exists for negative consequences from the cumulative impacts caused by development of a significant number of wind farms across the country. Some of the potential negative cumulative impacts that were assessed in the EIR are the impacts on sensitive habitats, terrestrial fauna, vegetation, birds and bats as well as socio-economic and visual impacts.

Such potential cumulative impacts would only be a concern if decision making was undertaken in a policy vacuum, in the absence of appropriate policies/ legislation. Fortunately, in South Africa, developments such as this are subject to a broad range of legislated processes requiring approval including, but not limited, to the EIA process. The concern does however exist that existing legislation does not take into account wind farms and the potential cumulative impacts.

The key government departments instrumental in providing permission for the construction of wind farms in South Africa are the DEA and the Department of Agriculture, Forestry and Fisheries (DAFF). Both of these departments have existing legislation empowering them to control the current development pipeline. Over and above the existing legislation, both Departments are currently finalising polices specific to the development of wind farms and their cumulative impacts. These policies will be an important addition to their existing arsenal of policies and will further ensure that the development of wind farms is done in a pragmatic, sustainable and sensible manner. The DEA is also finalising a Geographic Information System (GIS) based tool covering the entire country to assist the Department in assessing the potential impacts of wind farms and all future applications, including this one.

Another important factor to bear in mind when grappling with the issue of cumulative impacts is the fact that any wind farm planned on agricultural land will require the permission of the minister of DAFF to enter into a long term lease, over and above a positive authorisation. Although DAFF does not have any legislation specific to wind farms currently in place, they will only be entertaining the wind farm applications for long term leases post the finalisation of their policy.

Although the legislative barriers to the development of wind farms are significant, there are additional safeguards that will prevent an unchecked proliferation of wind farms in South Africa. The main barrier to a rapid expansion of wind farms is the limiting factor of suitable grid connections. This is an issue nationally and in the Kouga region specifically, the latest assessment by Eskom is that the maximum Mega-Watts (MW) that can be evacuated in the medium term is 220 MW (approximately 88 turbines). Over and above this is the fact that, at present, the government has only agreed to procuring up to 400 MW (possibly increasing to 700 MW) of wind energy up till 2013 for the whole of South Africa (as indicated in the Department of Energy's (DOE) Integrated Resource Plan 1 and 2) .

When assessing the cumulative impacts, one has to be cognisant of both the negative and positive impacts. The DOE has initiated the Medium Term Risk Mitigation Plan (MTRMP) to "keep the lights on". This plan shows two scenarios, the first being a 'business as usual' scenario where nothing extraordinary is done in the national electricity supply. In this scenario there is a total shortfall of 42 000 Giga-Watt Hours (GWh) of electricity over the period 2011 – 2016. The second scenario anticipates mitigation measures, such as the construction of wind farms and aggressive energy efficiency measures. The second scenario does, however, fall short of ensuring that the lights stay on. The consistent theme in the plans is that without extraordinary measures the lights will go out. The cost of this to the country has been calculated at R75,00/ kWh of unserved energy. The cumulative effect of which would result in significantly dire consequences to the national economy. As wind is considered the most appropriate technology to bring significant amounts of renewable energy onto the grid in the shortest time period and at the lowest cost, the potential positive cumulative impact of wind farms nationally is extremely significant, as would be the associated increased investment and job creation.

Another key positive cumulative impact is the carbon/ emissions free generation of electricity. This has a marked positive impact on the local health of communities in the vicinity of coal fired power stations as well as the global problem of climate change.

In weighing up the potential negative and positive cumulative impacts, the balance of probabilities is that the positive cumulative impacts outweigh the negative.

**ALTERNATIVES**

The EIA Regulations require that alternatives to a proposed listed activity be considered. Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives considered in the Revised Draft EIR include: site alternatives, land use alternatives, alternative layouts, the many small turbines versus less large turbines scenario and the no-go option.

The proposed land parcels contained in the three clusters are zoned as Agriculture, and are mainly used for extensive cattle grazing. Other than the current agricultural practices, no other alternative land uses have been proposed.

The state of technology at the present time is that the largest turbines that realistically can be used in South Africa have a nominal generation capacity of 3 MW. Hence as a minimum 100 turbines are needed to achieve the production capacity desired by the developer. Analysis has confirmed that all three clusters are required to carry the full 300 MW of wind generation capacity and ensure that mandatory ecological sustainability targets were not severely compromised. For this reason the proposed Kouga Wind Farm EIA has undergone major iterations of the project development plan in order to find the most acceptable solution from an environmental perspective and thus many alternative layouts have been assessed in an iterative process to arrive at Layout 3 which was assessed in this Report.

The scale of the facility will have an influence on the risk. To date it has been shown that large turbines kill the same number of birds as smaller ones. This means that with newer technology and larger turbines, fewer turbines are needed for the same power generation, possibly resulting in less mortalities altogether. By using a combination of the largest turbine models in the range of 2.3 to 3.0 MW each, the Kouga Wind Farm has responded positively to the issue of turbine size. For optimal wind power generation, relatively large spaces are required between turbines in order to avoid wake and turbulence effects. It can also have an effect on the number of collisions with birds. This constraint was responded to by placing turbines into all three clusters.

The no-go alternative is included in the EIA as a benchmark against which to assess the impacts (positive and negative) of the proposed wind power project. Government's long-term goal is the establishment of a renewable energy industry that will offer a sustainable, fully non-subsidised alternative to coal based power generation. Government's 10-year target is 10 000 GWh renewable energy contributions to final energy consumption by 2013, which is to be produced primarily from biomass, wind, solar and small-scale hydro. This is approximately 4% (1 667 MW) of the projected electricity demand for 2013 (41 539 MW), and is equivalent to replacing two 660 MW units of Eskom's combined coal fired power stations. The realisation of these targets would be greatly reduced should the no-go option be preferred over installing the wind power turbines on the Kouga coast.

## CONCLUSIONS

The EIA process undertaken for the proposed wind farm and summarised in this Revised Draft EIR aims to ensure that the can make an informed decision on the environmental acceptability or otherwise of this proposed development.

The Revised Draft EIR for the proposed Kouga Wind Farm presents the findings of specialist investigations of nine key areas of concern that were identified during the Scoping and Impact Assessment process. The configuration of the roads and turbines were adjusted on the basis of the initial findings and there is further intention to optimise the layout and design based on the following:

- The proposed project will be developed in phases with the first phase having no more than 50 turbines
- Micro-siting which will be informed by engineering and environmental specialists
- Monitoring undertaken during the first phase of the development that will inform final detailed planning decisions for subsequent phases.

### *Construction Impacts*

**In weighing up the Construction Impacts after mitigation it appears the High positive local, regional, and national impacts outweigh the High, becoming Medium to Low negative impacts and that when, taking all the impacts into account, there is a positive bias.**

When weighing up the fact that less than 1% of the area will be permanently altered and that all High negative biophysical impacts can be adequately mitigated, juxtaposed with the fact that there is a pressing need for investment, expenditure and employment in the area, it is concluded that the High positive social impacts which address these social issues outweigh the residual (after mitigation) Medium to Low negative biophysical impacts.

In weighing up all the other positive and negative construction impacts that were not rated as High before or after mitigation, it is concluded that they do not have a significant cumulative negative bearing on the environmental acceptance of this development as long as they are mitigated/ enhanced as required.

A summary of all the construction impacts is presented in Table 1.

**Table 1: Summary of the Construction Phase Impacts Significance Ratings**

| | Section | Impact | Pre-Mitigation Significance | Post-Mitigation Significance |
|---|---|---|---|---|
| Vegetation | | | | |
| Fynbos, Renosterveld and Dune Strandveld | | | | |
| | 7 | Direct loss of vegetation and habitat | High | Medium |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | Medium | Low |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| | 7 | Changes in natural fire regime | Low (+ve) | Medium (+ve) |
| | 7 | Increased risk of alien invasion | Medium | Low |
| Thicket and Dune Forest | | | | |
| | 7 | Direct loss of vegetation and habitat | Medium | Low |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | High | Low |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| Rocky Outcrops | | | | |
| | 7 | Direct loss of vegetation and habitat | High | Low |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | High | Low |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| Seeps, Wetlands and Streams | | | | |
| | 7 | Direct loss of vegetation and habitat | High | Medium |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | High | Medium |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| | 7 | Increased risk of alien invasion | Medium | Low |
| Terrestrial Fauna | | | | |
| | 9 | Reptiles, Amphibians and Mammals: Habitat destruction | High | Medium |
| | 9 | Reptiles, Amphibians and Mammals: Road mortality from trucks, cars and other service vehicles | High | Low |
| | 9 | Reptiles and Mammals: Fauna harmed by fences | Medium | Low |
| | 9 | Reptiles and Amphibians: Corridor continuity | Medium | Medium |
| | 9 | Mammals: Corridor continuity | Medium | Low |
| | 9 | Mammals: Poaching | Low | Low |
| Birds | | | | |
| | 11 | Habitat destruction caused by construction of turbines | Low | Low |
| | 11 | Disturbance to birds | Medium | Medium |
| | 11 | Habitat destruction from construction of associated infrastructure | Low | Low |
| Visual | | | | |
| | 14 | Large construction site and activities on sensitive viewers (*Status may be negative or positive depending on the viewer- i.e. subjective) | Medium (+ve / -ve)* | Medium (+ve / -ve)* |
| Noise | | | | |
| | 15 | Impact of the construction noise on the NSAs | Low | Low |
| Socio-Economic | | | | |
| | 16 | Disturbance of land-owners and users on the site | Medium | Low |
| | 16 | Disturbance of surrounding land users | Low | Low |
| | 16 | Disturbance of surrounding town residents | Medium | Low |
| | 16 | Associated project expenditure and investment | Medium (+ve) | High (+ve) |
| | 16 | Suppression of tourism | Medium | Low |
| | 16 | Increase in employment | Medium (+ve) | High (+ve) |
| | 16 | Crime associated with influx of work force | Medium | Low |

As the decommissioning stage should have similar impacts to construction the same conclusions can thus be deduced for decommissioning.

***Operational Impacts***

**In weighing up the Operational Impacts after mitigation it appears the High positive local, regional and national benefits outweigh the High negative local impacts and that when, taking all the impacts into account, there is a positive bias.**

The impacts with residual (after mitigation) High negative significance are all related to changes in the views due to the wind farm. These predominantly impact on the local population and holiday makers. The residual impacts with a High positive impact are also socio-cultural and have a significant positive spinoff for the regional and national economy as well as the local community in general and more specifically the HDSAs of the area.

It would thus appear the groups most negatively impacted on by the proposed development also have some gain from the same development. The fact that wind energy will help reduce green house gas emissions and thus also help reduce global warming and related sea level rise in the long run, may also have a positive impact in the future on the communities of coastal towns like St. Francis Bay which is already experiencing significant impacts from sea shore erosion. Furthermore, the benefit of electricity to those fortunate enough to have it in the Kouga area must also be taken into consideration when weighing up the pros and cons of this project especially given the dire situation the country faces if significant generation capacity is not brought on line in a very short time frame (one of wind energy's advantages is that it can be brought on line faster than any other economically viable large scale energy generation technique).

The benefits regionally, nationally and globally due to renewable energy over conventional energy generation are comprehensively documented and the exponential increase of renewable energy production globally is directly linked to these benefits for the global community. The South African Government has also recognized these benefits and that is why renewable energy is such an important part of the governments planning for future energy production in its integrated resource planning. These regional and national benefits also need to be weighed up against the local negative impacts.

The two main negative bio-physical impacts are the contentious impacts on birds and bats. However, the specialists involved believe that with the phasing of the project and the correct monitoring procedures these impacts are no longer of a High negative significance rating and are not fatal flaws of the proposed development.

In summary, there are High positive regional and national spinoffs from the proposed project and the local communities who are most negatively impacted are also the ones who gain the most from the related High positive benefits. Thus, there appears to be an overarching positive bias to the development if the project is looked at from a local, regional and national level.

In weighing up all the other positive and negative operational impacts that were not rated as High before or after mitigation it is concluded that they do not have a significant cumulative negative bearing on the environmental acceptance of this development which would alter the positive bias from the highly significant impacts weighed up above. This is as long as all the impacts are mitigated/ enhanced as required.

A summary of all the operation impacts are presented in Table 2.

**Table 2: Summary of the Operational Phase Impacts Significance Ratings**

| | Section | Impact | Pre-Mitigation Significance | Post-Mitigation Significance |
|---|---|---|---|---|
| Vegetation | | | | |
| Fynbos, Renosterveld and Dune Strandveld | | | | |
| | 7 | Direct loss of vegetation and habitat | Medium | Low |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | Medium | Low |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| | 7 | Changes in natural fire regime | Low (+Ve) | Medium (+Ve) |
| | 7 | Increased risk of alien invasion | Medium | Low |
| Thicket And Dune Forest | | | | |
| | 7 | Direct loss of vegetation and habitat | Medium | Low |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | Medium | Low |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| Rocky Outcrops | | | | |
| | 7 | Direct loss of vegetation and habitat | Medium | Low |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | Medium | Low |
| | 7 | Loss of species of special concern and SSC habitat | High | Medium |
| Seeps, Wetlands And Streams | | | | |
| | 7 | Direct loss of vegetation and habitat | Medium | Low |
| | 7 | Reduction or changes to ecological processes and functioning and habitat fragmentation | High | Medium |
| | 7 | Loss of species of special concern and SSC habitat | Medium | Low |
| | 7 | Increased risk of alien invasion | Medium | Low |
| Ground Water, Hydrology And Surface/ Groundwater Links With Wetlands | | | | |
| | 8 | Impact on Ground Water, Hydrology and surface/ groundwater links with wetlands | Medium | Low |
| Terrestrial Fauna | | | | |
| | 9 | Reptiles, Amphibians and Mammals: Habitat destruction | Medium (+Ve) | Medium (+Ve) |
| | 9 | Reptiles and Amphibians: Road mortality from trucks, cars and other service vehicles | Low | Very Low |
| | 9 | Mammals: Road mortality from trucks, cars and other service vehicles | Very Low | Insignificant |
| | 9 | Reptiles and Mammals: Fauna harmed by fences | Medium | Low |
| | 9 | Reptiles, Amphibians and Mammals: Corridor continuity | Medium (+Ve) | Medium (+Ve) |
| | 9 | Mammals: Poaching | Low | Low (+Ve) |
| Bats | | | | |
| | 10 | Site-specific mortality | Medium | Low |
| | 10 | Depression of recruitment of bats through mass mortality caused by several wind farms | High | Low |
| Birds | | | | |
| | 11 | Collision of birds with turbines | High | Medium |
| | 11 | Disturbance to birds | Medium | Medium |
| Cultural Heritage | | | | |
| | 12 | Impact on Colonial Period farmsteads or structures, pre-dating 60 years of age | No Impact | No Impact |
| | 12 | Impacts on Colonial/ Historical Period cemeteries | No Impact | No Impact |
| | 12 | Impacts on Site 1.3- low density primarily Early Stone Age (ESA) Acheulean scatter | Low To Very Low | Low To Very Low |
| | 12 | Impacts on Site 2.3- significant ESA and MSA site | High | High/ Medium (+Ve) |
| | 12 | Impacts on the intangible heritage resources | Neutral | Neutral |
| | 12 | Impacts on the cultural landscapes and viewscapes - for sensitive visual cultural receptors | High | High |

| | Section | Impact | Pre-Mitigation Significance | Post-Mitigation Significance |
|---|---|---|---|---|
| | 12 | Impacts on the cultural landscapes and viewscapes- With regard to conservation of heritage resources | High | High (+Ve) |
| Palaeontology | | | | |
| | 13 | Impacts on palaeontology | Low | Low |
| Visual | | | | |
| | 14 | Change in mixed coastal resort - agricultural landscape | High (Reducing Over Time) | High (Reducing Over Time) |
| | 14 | Existing views of sensitive visual receptors (*Status may be negative or positive depending on the viewer- i.e. subjective) | High (Possibly Reducing Over Time) (+Ve / -Ve)* | High (Possibly Reducing Over Time) (+Ve / -Ve)* |
| | 14 | Night lighting on sensitive viewers | Medium | Medium |
| | 14 | Shadow flicker of wind turbines on sensitive viewers | Low | Very Low |
| Noise | | | | |
| | 15 | Operational noise on the NSAs (except NSA 7, 8, 9, Ext 1, west Ext 1 and west Ext 2) | Low | Low |
| | 15 | Operational noise on NSA 7, 8, 9, Ext 1, west Ext 1 and west Ext 2 | High | Low |
| Socio-Economic | | | | |
| | 16 | Disturbance of land-owners and users on the site | Medium, | Low |
| | 16 | Disturbance of surrounding land users | Medium (-Ve To Neutral) | Low (-Ve To Neutral) |
| | 16 | Disturbance of surrounding town residents | Low | Low |
| | 16 | Financial benefits of the wind farm operation (local, regional and national) | Medium (+Ve) | High (+Ve) |
| | 16 | Suppression of tourism | Low (-Ve To Neutral) | Medium (-Ve To Neutral) |
| | 16 | Increase in employment | Medium (+Ve) | High (+Ve) |
| | 16 | Decline in property value | Medium | Low |
| Aerodromes | | | | |
| | 17 | Impact on Aerodromes | High | No Impact |

***Cumulative Impacts***

As has been indicated in the section summarising cumulative impacts above, in weighing up the potential negative and positive cumulative impacts, the balance of probabilities is that the positive cumulative impacts outweigh the negative.

## RECOMMENDATIONS

Based on the findings of the EIA process undertaken for the proposed Kouga Wind Farm Development no fatal flaws were identified. As outlined in the Conclusion section above, when weighing up the residual positive and negative impacts for all the phases of the project, there is an inherent positive bias. All the communities that are impacted negatively will also gain positively from the project so no communities are benefiting at the total expense of another.

Furthermore, the positive residual impacts with high significance are local, regional and national whereas all the highly significant residual negative impacts are local, subjective socio-cultural impacts that will not endanger any biophysical environments. Finally, there are also the non-project specific significant positive impacts of renewable energy over conventional energy production, which are both biophysical and socio-cultural, with far reaching and long term implications.

In weighing up the potential negative and positive cumulative impacts, the balance of probabilities is that the positive cumulative impacts far outweigh the negative. Based on all of the above, it is recommended that the development be authorised to proceed as long as the mitigation measures identified in this EIA and incorporated in the Draft EMP are implemented.

**DOCUMENT CONTROL SHEET**
**(FORM IP180/B)**

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| **TITLE OF DOCUMENT** | **:** | Revised Draft EIR Executive Summary | | |
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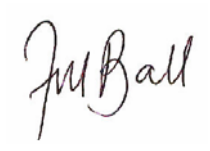
| **DATE** | **SIGNATURE**  | **SIGNATURE**  | **SIGNATURE**  |

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