

**Environmental Impact Assessment for the
proposed Ubuntu Wind Energy Project near
Jeffrey's Bay, Eastern Cape:
Final Environmental Impact Assessment Report**

Chapter 14: Conclusions and Recommendations



Contents

CHAPTER 14. CONCLUSIONS AND RECOMMENDATIONS	14-2
14.1 INTRODUCTION	14-2
14.2 IMPACT ON TERRESTRIAL FLORA AND FAUNA	14-2
14.3 IMPACT ON BIRDS	14-4
14.4 IMPACT ON BATS	14-6
14.5 VISUAL IMPACT	14-7
14.6 NOISE IMPACT	14-9
14.7 ECONOMIC IMPACTS	14-10
14.8 IMPACT ON ARCHAEOLOGY	14-11
14.9 IMPACT ON PALAEOONTOLOGY	14-12
14.10 OTHER IMPACTS	14-12
14.11 NO GO OPTION	14-13
14.12 CONSIDERATION OF ALTERNATIVES	14-15
14.13 CUMULATIVE EFFECTS	14-16

Tables & Figures

Table 14.1: Proposed Wind Farms in the Kouga Region 14-17

Figure 14.1: Proposed no-go areas identified in the specialist studies for the proposed Ubuntu project. 14-20

CHAPTER 14. CONCLUSIONS AND RECOMMENDATIONS

14.1 INTRODUCTION

This section presents the conclusion on the most significant impacts identified through the EIA process; together with the management actions required to avoid or mitigate the negative impacts, or to enhance the positive benefits.

The assessment of impacts is presented in the following sections:

- Impact on Terrestrial Flora and Fauna;
- Impact on Birds;
- Impact on Bats;
- Visual Impact;
- Noise Impact;
- Economic Impact;
- Impact on Archaeology; and
- Impact on Palaeontology.

For each of above impacts, specialist studies were conducted, the results of which are presented in Chapters 5 to 11 of the Draft and Final EIA Report.

14.2 IMPACT ON TERRESTRIAL FLORA AND FAUNA

Flora

Mucina & Rutherford classify vegetation units present within the wind farm sites as Humansdorp Shale Renosterveld (Endangered), Gamtoos Thicket (Least threatened) and Loerie Conglomerate Fynbos (Least threatened). Most of the wind farm infrastructure will occur in areas that are transformed cultivated pastures, thus minimising the overall impact to natural vegetation. Areas with an elevated vulnerability (moderate to high) include intact Humansdorp Shale Renosterveld, seeps, drainage lines and wetlands and thicket habitat on slopes. Sixteen terrestrial vegetation impacts that may occur during the construction and operational phases of the proposed project have been identified, which can be divided into three key types of impacts, namely:

- Loss of vegetation habitat;
- Reduction or changes to ecological processes and functioning. This include temporary fragmentation of habitats, increased risk of alien invasion in drainage lines and disturbed areas, changes in natural fire regime and overall reduction of ecosystem functioning; and
- Loss of species of special concern (SSC) and SSC habitat.

Chapter 14 : Conclusions and Recommendations

Mitigation

- Protected flora or species of special concern must be removed from the development footprint to be safeguarded from destruction and relocated either to undeveloped areas or off-site in consultation with conservation authorities and relevant botanical specialists
- Permission must be obtained from the provincial authorities to destroy or remove any protected plant species as per legislation.
- A long term alien plant management plan to control these invasive species must be implemented within the designated Open Space areas.
- Appropriate measures must be implemented where infrastructure crosses drainage lines or seeps and no turbine footprints or lay down areas will be sited within recommended wetland and riparian buffers.
- Kikuyu grass must not be utilised during re-grassing of verges, turbine footprints and other landscaped areas within the site, particularly adjacent to riparian habitat.

Overall the impacts on terrestrial flora are estimated to be **negative** and of **low** significance (after mitigation).

Fauna

Five key faunal impacts have been identified and assessed, namely:

- Habitat destruction of habitat;
- Road mortalities;
- Increased poaching risk;
- Fauna harmed by fences; and
- Corridor disruptions as a result of habitat fragmentation.

The species that will be mostly affected during the construction phase of this project are those that can't vacate the affected area themselves, e.g. tortoises, burrowing reptiles and burrowing mammals. These species can suffer direct mortality during construction activities. Traffic on the access roads to and from the construction sites would most likely result in road kills, including possible amphibian migrations during rainy periods. As indicated, some species of special concern are found in the area and will be affected by this development. All amphibians are of least concern and are well protected elsewhere. The reptiles of special concern are the FitzSimons long-tailed Seps and the Elandsberg Dwarf Chameleon. Although these species are well protected elsewhere (e.g. Lady Slipper Nature Reserve), their known distribution is limited. The likelihood of them being significantly affected by the proposed development is however low. The impact on the terrestrial fauna will largely be temporary and is expected to return to its normal state after construction, other than road mortalities, the risk of which are likely to persist.

Mitigation

- Removal of animals from the affected areas before the start of site clearing and construction, and relocating these to safe areas would only be a valid mitigation option in the case of tortoises, so far as reasonable possible. All other reptile and small mammal species are extremely difficult to catch and it would be futile to attempt to relocate them. Before site clearing, affected areas should be thoroughly searched for tortoises. Tortoises found must be released in adjacent unaffected areas.
- A speed limit of 60 km/h needs to be implemented on the access roads to the site and a 40 km/h speed limit on the construction sites and for the cranes.

Chapter 14 : Conclusions and Recommendations

- Appropriate speed control measures must be implemented to keep vehicular traffic speeds to within recommended limits.
- Road design must be such that it allows free movement of fauna.
- All staff active on site must be instructed and briefed regarding the strict faunal management requirements before construction commences.
- Any fencing must be kept to minimum and recommended measures implemented to minimise risk of impacts to fauna.

All terrestrial floral and faunal impacts have been assessed and it is estimated that these can be mitigated from moderate to low impact through implementation of the recommended mitigation measures during the operational and construction phases of the proposed wind farm development.

14.3 IMPACT ON BIRDS

The main potential impacts of the project on birds are collisions with the project infrastructure, potential displacement of priority bird species and habitat loss as a result of the project. These are discussed below.

WKN-Windcurrent has commissioned a pre-construction bird monitoring programme on site which commenced in January 2011. Since the pre-construction monitoring commenced on the site, a number of important developments have taken place. The most important development from an avifaunal impact perspective was the publication of *"Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa"* (Jenkins *et al* 2011) by the Endangered Wildlife Trust (EWT) and BirdLife South Africa (BLSA). Version 1 of this document was placed in the public domain on 31 March 2011, and was slightly amended in August 2011. The monitoring protocol used in this study was designed and commenced with before the existence of any South African best practice guidelines, and originally (Nov 2010) with the available knowledge at the time and after consulting other avifaunal specialists, two sampling periods (summer and winter) were planned. After the guidelines were released, an additional sampling period (spring) was added. The monitoring was completed in September 2011. The following conclusions can be drawn from the pre-construction monitoring, subject to further post-construction monitoring:

- Of the priority species, Blue Cranes may be most at risk of collisions with turbines, but less at risk as far as displacement is concerned, due to the species general high tolerance levels of human activity;
- Denham's Bustard may also be at risk, but the risk could be reduced due to the potential of displacement when the farm is operational;
- Flight patterns of priority species at medium height recorded to date do not indicate any distinct flight corridors which could be mitigated by the relocation of any of the proposed turbine locations. The flights seem to be randomly distributed across the turbine area. Actual collision "hot-spots" (none of which have currently been identified) will only become apparent through post-construction monitoring i.e. systematic carcass searches;
- The overall collision risk to priority species as a group, based on the data that was recorded over the three sampling periods, is predicted to be low;

Chapter 14 : Conclusions and Recommendations

- The survey area is particularly well suited for Denham's Bustard and White-bellied Korhaan, but the study area is not unique in this respect, this statement is applicable to the entire Jeffrey's Bay, Humansdorp and Oyster Bay region.
- Of the bird habitat identified on the site, grassland is the most important habitat for priority species;
- At this stage, one can only speculate about the likelihood of potential displacement of large terrestrial birds in the study area, particularly Denham's Bustard, White-bellied Korhaan, Blue Crane and Secretarybird as this will only become apparent once the post-construction monitoring commences. If the birds are displaced, this could potentially be the most significant impact of the wind farm on the avifauna; and
- The potential for habituation always exists, but due to the scarcity of published research on this topic, no unequivocal predictions can be made. As far as raptors are concerned, the chances of displacement are low, based on research results elsewhere. This trend also seems to be supported by the results of the limited post-construction monitoring conducted at the existing 4 turbines at the Darling Wind Farm. Blue Cranes might also be more tolerant, based on general observations in the study area where Blue Cranes breed and forage in close proximity to agricultural operations.

Assessment rating

As far as collision mortality is concerned, it is predicted that the project will have a negative impact of **Low** significance (with mitigation). This will have to be verified by post-construction monitoring. Birds generally have a high avoidance rate for wind turbines.

As far as displacement of birds is concerned, no firm conclusions can be drawn without actual post construction monitoring. Priority species likely to be affected include Denham's Bustard, White-bellied Korhaan, Blue Crane and Secretarybird. It is predicted that the project will have a negative impact of **Low to Medium** significance (with mitigation), depending on whether habituation takes place, or off-set compensation is implemented.

Mitigation

- Post-construction monitoring should be implemented to assess the impact of displacement, particularly on priority species. Initially, a 12 month period of post-construction monitoring should be implemented, using the same protocol as is currently implemented. Thereafter, the need for further monitoring will be informed by the results of the initial 12-month period;
- The breeding activity of the pair of Secretarybirds at the site must be carefully monitored. In the unlikely event of them re-using the nest in 2012, appropriate mitigation must be agreed upon between the avian specialist and the developer to ensure that the birds are not disturbed during the critical nesting period of August to October;
- Should the results of the post-construction monitoring indicate significant displacement of priority species, appropriate off-set compensation should be negotiated with developer to compensate for the loss of priority species habitat; and

Chapter 14 : Conclusions and Recommendations

- During the construction period, activity should be restricted to the construction footprint itself. Access to the rest of the properties must be strictly controlled to prevent unnecessary disturbance of birds.

14.4 IMPACT ON BATS

Bats play important functional roles as insect predators, pollinators and seed dispersers. They are sensitive to changes in mortality rates and their populations tend to recover slowly from declines. Bats can be classified into three broad functional groups on the basis of their wing morphology and echolocation call structure. Of these groups, open-air foragers, bats that have a wing design and echolocation call adapted to flying fast, high above the vegetation, are mostly at risk from wind turbine developments.

The Ubuntu Wind Energy Project falls within the distributional ranges of 13 species that have been recorded in the area. Open-air foragers, who could forage up to 500 m above ground, are most likely to be negatively impacted upon by the turning turbine blades, because the blades will be within the range of their foraging altitude. Species that migrate over the proposed development site will be further at risk, regardless of their foraging behaviour.

The most important aspect of the project that would affect bats adversely are the wind turbines themselves, and in particular, the operational turning blades. The main direct impacts related to the proposed development are:

- Loss of foraging habitat;
- Direct collisions with the rotating turbine blades; and
- Fatalities from barotraumas (i.e. effect of a change in air pressure caused by the rotation of the wind turbine blades on the internal organs of the bats, such as lungs).

There is furthermore a cumulative impact related to the density of wind farms in the Jeffrey's Bay/Humansdorp vicinity.

The site was visited during January and May 2011. Except for a few buildings, which at the time of the site visits had no indication of bat roosts, the proposed site does not contain habitat that is attractive to bats. It must be noted though that areas bordering the proposed development have habitat that is attractive to bats, such as open water bodies and the overhanging cliffs of the Kabeljous valley.

WKN-Windcurrent has commenced with a bat monitoring programme on site from 19 May 2011. The monitoring is informed by "*The South African Good Practice Guidelines for Surveying Bats in Wind Farm Development* (Sowler and Stoffberg, 2011)". During May three Anabat bat detecting recorders were installed on site. The monitoring data for May and June have been included in the bat specialist report included as Chapter 7 of the DEIA. Limited numbers of *Neoromicia capensis*, *Miniopterus natalensi* (Near Threatened), *Myotis tricolor* (Near-threatened in SA), *Taphozous mauritianus*, *Tadarida aegyptiaca* were recorded on site. Of these species, *Tadarida aegyptiaca* and *Taphozous mauritianus* are open air foragers. It is therefore expected that they will be negatively impacted upon by the wind turbine development.

The current turbine layouts have been informed by recommendations from the bat specialist working on this project. Therefore buffer zones have been incorporated in the layout to exclude areas that might have bat activity, such as open water bodies and derelict buildings.

Chapter 14 : Conclusions and Recommendations

If data collected up to now is taken into account, the impact of the wind turbines on bats at the Ubuntu Wind Energy Project is predicted to be **negative** and of **low** significance with mitigation. Confidence levels are **medium**, as only two months of monitoring data have been incorporated, but the bat monitoring will be continued on site and the monitoring results will be updated.

Mitigation

- Pre-construction bat monitoring to continue and include spring and Summer, as well as more extensive Autumn monitoring;
- Post-construction monitoring should be implemented;
- If further monitoring data confirms **low bat activity**, the main mitigation proposed is to completely seal off roofs of new buildings within the study area, and those of existing buildings that do not have any bats roosting in them at present within the study area, so as to prevent bats from moving in, thus making them more prone to coming into contact with the turbines in the surrounding area; If a high number of bats are recorded during the following ten months monitoring, bat roost sites could be established (e.g. roost boxes) as a trade-off to offset potential mortalities during turbine operation;
- If a high number of bats are recorded during the complete monitoring period, bat roost sites could be established (e.g. roost boxes) as a trade-off to offset potential mortalities during turbine operation; and
- If future monitoring data shows high activity, the client together with a bat specialist should investigate further mitigation measures. This includes an increase in buffer zone distance, depending on the foraging habitat of species that will be impacted upon, and refining operational procedures of the turbines, such as to increase turbine cut-in speed. (i.e. minimum wind speed at which blades start rotating, currently 4 m/s).

14.5 VISUAL IMPACT

Visual or aesthetic impacts will occur during the construction, operational and decommissioning phases of the proposed project. The main visual impacts of the proposed WKN-Windcurrent wind energy project are:

- Visual impact on the landscape;
- Visual impact on viewers;
- Intrusion of large highly visible wind turbines on the existing views of sensitive visual receptors; and
- Visual impact of night lights of a wind farm on existing nightscape.

The wind farm will be located within a mixed landscape containing agricultural and coastal resort elements. Agricultural landscapes have a low sensitivity to changes brought by wind farms, and the coastal resort landscapes in Kouga are rapidly changing as towns expand and merge.

The wind farm will be built on a highly visible plateau above the N2, and it will potentially be visible over a large region. Viewers who will be most affected by the wind farm are those living on farms surrounding the development site, especially for viewpoints west and south of the site where existing views contain relatively few man-made structures and a sense of remoteness prevails. However, there are not many sensitive viewers in these areas who will be highly exposed to the wind farm. Views from Jeffrey's Bay are unlikely to be affected severely since scenic views are normally directed at the mountains to the north or towards the sea. Protected areas in the region are generally too far from the site to be highly impacted.

Chapter 14 : Conclusions and Recommendations

Assessment rating:

The significance of the impact on the landscape character of the region is **moderate** since the impact duration is long and its extent regional, but the intensity is expected to be **low**.

The significance of the visual impact on sensitive viewers during the construction phase of the wind farm is **high** due to the number of sensitive viewers who will be affected. Not all of the construction phase will necessarily have a negative visual impact since the construction of wind turbines is an incredible engineering feat and viewers are likely to find it fascinating to observe.

The overall significance of the visual impact on sensitive viewers during the operational phase of the wind farm is **high** due to the regional extent, long term and severe effect of the impact. The intensity of the impact is expected to be high for a number of highly sensitive viewers (residents) who will potentially be highly exposed to the wind farm, and since there are no structures of similar size in their existing views the visual intrusion will be high.

The significance of the impact of lighting of the turbines according to aviation regulations is expected to be **moderate** for residents living in close proximity, but **low** overall since it is unlikely to contribute to light pollution and there is an existing sky-glow produced by settlements and other developments in the region which will often be a backdrop to views of the lights.

Mitigation

- Dust suppression is important as dust will raise the visibility of the development;
- New road construction should be minimised and existing roads should be used where possible;
- The contractor should maintain good housekeeping on site to avoid litter and minimise waste;
- Clearance of indigenous vegetation should be minimised and rehabilitation of cleared areas should start as soon as possible;
- Erosion risks should be assessed and minimised as erosion scarring can create areas of strong visual contrast with the surrounding vegetation, which can often be seen from long distances since they will be exposed against the hillslopes;
- Laydown areas and stockyards should be located in low visibility areas (e.g. valleys between ridges) and existing vegetation should be used to screen them from views where possible;
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency;
- Ensure that there are no wind turbines closer than 500 m to a residence;
- Maintenance of the turbines is important. A spinning rotor is perceived as being useful. If a rotor is stationary when the wind is blowing it is seen as not fulfilling its purpose and a negative impression is created (Gipe 1995);
- Signs near wind turbines should be avoided unless they serve to inform the public about wind turbines and their function. Advertising billboards should be avoided;
- According to the Aviation Act, 1962, Thirteenth Amendment of the Civil Aviation Regulations, 1997: "Wind turbines shall be painted bright white to provide maximum daytime conspicuousness. The colours grey, blue and darker shades of white should be avoided altogether. If such colours have been used, the wind turbines shall be supplemented with daytime lighting, as required;"
- Lighting should be designed to minimise light pollution without compromising safety. Investigate using motion sensitive lights for security lighting. Turbines are to be lit according to Civil Aviation regulations;

Chapter 14 : Conclusions and Recommendations

- An information centre (provided that it is located in a low visibility area) and trails along the wind farm can enhance the project by educating the public about the need and benefits of wind power. 'Engaging school groups can also assist the wind farm proponent, as energy education is paramount in developing good public relations over the long term. Instilling the concept of sustainability, and creating awareness of the need for wind farm developments, is an important process that can engage the entire community' (Johnston 2001). This has also been borne out by a more recent study on the effect of wind farms on tourism in which respondents said they would visit wind farms as long as there was an information centre (Frantál & Kunc 2010); and
- The aviation standards have to be followed and no mitigation measures are applicable in terms of marking the turbines. Lighting of ancillary buildings and structures should be designed to minimise light pollution without compromising safety. Motion sensitive lighting can be used for security purposes.

14.6 NOISE IMPACT

The noise impact during the construction period will be localised around the turbine sites, as well as noise from construction vehicles accessing the sites. There will be a short term increase in noise in the vicinity of the site during the construction phase as the ambient noise level will be exceeded. The impact during the construction phase will be difficult to mitigate. The significance of the construction noise impact is predicted to be **low** (without mitigation).

Noise impacts were modelled for the operational phase, taking into consideration noise sensitive areas (i.e. receptors of noise impacts, such as offices or houses). The noise modelling (using WindPro Software) is precautionary, and does not take into account the masking effect that ambient wind noise will have on the turbine noise. Ambient noise increases as the wind speed increases. Under very stable atmospheric conditions (e.g. temperature inversion or a light wind), the turbines will in all likelihood not be operational as the cut-in speed is 4 m/s. As the wind speed increases above the cut-in speed, the ambient noise will also increase. If the atmospheric conditions are such that the wind is very light (<4 m/s) at ground level but exceeds the cut-in speed at hub height, it is feasible that little ambient noise masking will occur. The critical wind speeds are thus between 4-6 m/s when there is a possibility of little masking. Above 8 m/s the wind noise starts masking the turbine noise. The noise modelling indicates that, in general, noise from the turbines will be below the SANS10103 limits for rural areas at a distance of approximately 500m from the turbines.

Provided that the mitigation measures presented bellow are implemented effectively the overall noise impact (with mitigation) is expected to be **negative** and of **Low** significance.

Mitigation

- All construction operations should only occur during daylight hours if possible;
- No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions;
- Ensuring that construction staff is given "noise sensitivity" training; and
- Ambient noise monitoring is recommended at three NSA's per year over a three year period.

Chapter 14 : Conclusions and Recommendations

14.7 ECONOMIC IMPACTS

The main impacts identified during the construction and operational phases of the project include the following:

- Impacts on land owners within the site boundaries;
- Impact on surrounding land uses;
- Impacts on tourism; and
- Impacts on commercial activity associated with expenditure linked to the construction and operation of the development.

It is highly likely that the impacts on land owners within the site boundaries would be net positive. The project would provide a welcome source of additional income while allowing existing farming activities to continue and introducing relatively minimal risks and potential negative impacts with adequate mitigation. No significant negative impacts on the agricultural activities on surrounding farms are anticipated for the same reason mentioned above.

Assessing the overall risk to tourism (i.e. considering negatives and positives) needs to be recognised as an exercise with high levels of uncertainty. Nevertheless, considered as a whole, a low to medium level of risk for tourism with mitigation is anticipated.

The project has the potential to have a highly significantly positive impact on economic activity in the local area and sub-region given the size of the new spending injection associated with it and the need for economic opportunities. Preliminary estimates indicate that a total of approximately R1.6 billion would be spent on the entire construction phase. Approximately 187 jobs of one year duration would be associated with the entire construction phase with the majority of jobs in the low and medium skill sectors as expected. It is anticipated that approximately 82 of these jobs would be allocated to workers from the Kouga Municipal area and a further 72 to workers from the rest of the Eastern Cape. Direct incomes flowing to construction workers from the Kouga Municipality area would amount to R9.7 million over the course of the project while R11.7 million would accrue to workers from the rest of the Eastern Cape. With regard to direct employment during operations, it is expected that approximately 10 direct employment opportunities would be created by the project equally spread across skill levels. Although initially high skill positions probably will have to be filled by foreign technicians (with a view to filling positions with locals over time), medium and low skill positions will offer immediate opportunities for locals and those from the region.

The overall impact on economy (with mitigation) is expected to be **negative** and of **low** significance. The impacts associated with project investment/expenditure is expected to be **positive** and of **medium** significance given the significance of the injection relative to economy.

Mitigation

- Implement recommendations of noise, visual, ecological, bird and bat specialist studies;
- Adequate setbacks from buildings, structures and residences to be strictly enforced;
- Set targets for use of local labour and maximise opportunities for training;
- Use local sub-contractors where possible; and
- Explore ways to enhance local community benefits with a focus on broad-based BEE through mechanisms such as community shareholding schemes and trusts.

Chapter 14 : Conclusions and Recommendations

14.8 IMPACT ON ARCHAEOLOGY

Only a few weathered quartzite Middle Stone Age stone tools were observed where the pebble/cobble gravels were exposed by ploughing. These stone tools date between 30 000 and 250 000 years old. They were mainly thick, small 'informal' flakes and chunks manufactured from quartzite. All stone tools were in secondary context and not associated with any other remains. Although none was found, one would also be expected to find occasional Earlier Stone Age stone tools (1,5 million – 250 000 years old) in the gravels as well.

The nearest important cultural sites to the proposed development are the Kabeljous Rock Shelters (2,5 kilometres south of the closest turbine), a large number of sites along the coastline (7 kilometres south of the closest turbine) and Sara Baartman's grave site at Hankey (8 kilometres north of the closest turbine). The turbines will have little or no visual impact on the Kabeljous Rock Shelters because the shelters face south and are situated in the Kabeljous River valley along the eastern embankment. The turbines will be visible from the coastal sites and possibly also from Sara Baartman's grave.

The area investigated appears to be of low archaeological sensitivity and the impact of construction will be insignificant. The isolated distribution of the finds, their very low numbers, and the fact that all of the occurrences occur in a disturbed context (ploughed fields) mean that the archaeological remains located during the study are in secondary context and are rated as having **low** significance. It is also highly unlikely that any archaeological heritage remains of any value will be found in situ or of any contextual value. The impact of the development on archaeological sites/materials will be limited. The area is also situated more than five kilometres from the coast which is further than the maximum distance shell middens are expected to be found inland. No such features were observed.

Mitigation

- In the unlikely event that any concentrations of archaeological material are uncovered during further development of the site, it should be reported to the Albany Museum and/or the South African Heritage Resources Agency immediately so that systematic and professional investigation/excavations can be undertaken. Sufficient time should be allowed to remove/collect such material;
- The visual effect of the development on important cultural sites in the wider area, such as Sara Baartman's grave and archaeological sites along the nearby coast must be included in the visual investigation for community/public consultation. The development will have little or no effect on the Kabeljous River Rock Shelters due to their location in the Kabeljous River valley; and
- Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites. It is suggested that a person be trained to be on site to report to the site manager if sites are found.

Chapter 14 : Conclusions and Recommendations

14.9 IMPACT ON PALAEOLOGY

The study area is largely underlain by fluvial conglomerates and minor sandstones of the Mesozoic Enon Formation (Uitenhage Group) that are locally mantled with a veneer of pebbly relictual soils of the so-called Bluewater Bay Formation (Algoa Group). Both of these rock units are very sparsely fossiliferous, so any proposed development on the coastal plateau here is likely to have very little impact on the local palaeontological heritage.

On the other hand, beds of sandy marls reported towards the base of the Enon succession near the Kabeljousrivier may prove fossil-rich (e.g. plant compressions) and are therefore of palaeontological interest. Marine sediments – mainly dark mudrocks - of the Devonian Bokkeveld Group underlying the Kabeljousrivier valley on the western margin of the study area have yielded invertebrate fossils (notably various brachiopods) in the past, although most fossils in these rocks have probably been destroyed by tectonic deformation or weathering since the break-up of Gondwana in Cretaceous times.

The operational and decommissioning phases of the Ubuntu wind energy project are unlikely to have any significant impacts on local fossil heritage. The overall impact on palaeontology (with mitigation) is therefore expected to be negative and of **Low** significance.

Mitigation

- Any substantial fresh excavations into lower Enon or Bokkeveld Group rocks in the Kabeljousrivier Valley area should be recorded, sampled and monitored by a qualified palaeontologist during the construction phase of this development, at the expense of the project proponent. An appropriate schedule and *modus operandi* for monitoring should be negotiated by the palaeontologist with the proponent before construction starts; and
- Should substantial fossil remains be exposed at any stage during development, these should be safeguarded - *in situ*, if feasible – and recorded by the responsible Environmental Control Officer (photos, GPS readings). SAHRA should be alerted as soon as possible so that appropriate mitigation measures may be considered.

14.10 OTHER IMPACTS

Historical and cultural features

No cemeteries or burial sites have been identified or mapped on the sites proposed for the Ubuntu wind energy project. Therefore no impacts on such features are expected. Nonetheless, it is noted as a general mitigation measure that should any historical or cultural features (e.g. burial sites) be identified during the construction process, then any disturbance thereof must be avoided, and the features must be fenced off. No disturbance or development should occur in an area of 20 m from the fence around the historical or cultural features.

Shadow flicker

Shadow flicker is unlikely to be an issue since the wind farm layout has gone through a number of iterations to ensure that wind turbines are far enough away from buildings that shadow flicker will not impact on residents.

Chapter 14 : Conclusions and Recommendations

Impact on agriculture

An agricultural study for the Ubuntu site was commissioned by WKN-Windcurrent during the preparation of the Draft EIA report. Johann Lanz, a soil scientist, was contracted to investigate and report on soil conditions at the Ubuntu wind farm site. The aim of the investigation was to make an assessment of the agricultural suitability of the land that will be potentially impacted by the proposed wind farm project. The study was commissioned in response to a request from DEA to undertake a soil study after the review of the Scoping Report.

Soil conditions and agricultural capability are very uniform across the site. The soils are well drained, yellow-brown, sandy soils with abundant stone throughout the profile, and are classified as Clovelly soil form in terms of the South African soil classification system. These soils are limited by the very high stone content which serves as a mechanical limitation to cultivation. It also severely limits the total water holding capacity and nutrient holding capacity of the soils, which is further limited by the low clay content. The soils are therefore categorised as having medium agricultural potential. The land capability (which includes both soil and climate factors) is classified as non-arable, low to moderate potential grazing land. It is classified as having a grazing capacity of 6 hectares per large stock unit.

Impacts on agricultural potential and productivity were identified as:

1. Loss of agricultural land;
2. Interruption of current agricultural activities; and
3. Disturbance of run-off and resultant potential impact on erosion

The approximate loss of agricultural land was determined as only 15 hectares which represents a mere 0.36% of the agricultural land on the site. Mitigation measures were recommended for some of the impacts. All the identified impacts on agricultural potential and productivity were considered to be of low significance.

In conclusion, the proposed wind farm seems to represent an opportunity for multiple land use on the site, with a very low level of disturbance to current or likely future agricultural productivity.

Aviation

WKN-Windcurrent obtained approval from the South African Civil Aviation Authority for the proposed Ubuntu project (see Appendix C of the Draft EIA Report).

14.11 NO GO OPTION

The "no go" option was investigated during the EIA. If the project does not proceed, the following opportunities would be lost:

- Lost income for workers from the Kouga Municipality which would probably amount to R9.7 million over the course of the project,
- Lost opportunity to establish renewable energy facilities in the Kouga region and in the promotion of renewable energy.
- Lost opportunity for increased generation capacity in the Eastern Cape, especially in the Kouga area, a region that requires increased power supply and grid stability.
- Delay in the metro reaching its target of 10% power from renewable energy.

Chapter 14 : Conclusions and Recommendations

- Lost opportunity to contribute 100 MW of additional generative capacity of green energy to the South Africa, with zero CO₂ emissions. The proposed Ubuntu project of 100 MW could offset over 200 000 tonnes of CO₂ per year, or 4 000 000 tonnes of CO₂ over the lifetime (20 years) of the project^{1,2}. Additional power to the local grid will continue to be provided via Eskom, with power generation approximately 90% coal-based with associated high levels of CO₂ emissions and water consumption.
- Lost opportunity to reduce the requirement for new long-distance high-voltage transmission lines to the Eastern Cape and thereby reduce the significant impacts of these transmission lines, especially in terms of visual impacts and impacts on birds (e.g. from collisions, causing injury or mortality). The generation of coal-based power to provide an additional 100MW in the western region of the Eastern Cape requires the transport of the power over considerable distances (e.g. approximately 1200 km from coal power stations in Mpumalanga).

Conversely, if the project does not proceed, the following negative impacts could be avoided:

- Avoid the visual impact of a maximum of 50 turbines on the local environment.
- Avoid the impact of the turbines on birds and bats. However, additional fossil-fuel based electricity could still be required to meet the projected growth of the Kouga municipal area and the Nelson Mandela Bay Metro, necessitating additional transmission lines, which would in turn escalate the risk of bird and bat mortalities.

Based on the findings of this EIA process, the “no-go” option is not recommended, for the following reasons:

- The proposed project area is an appropriate location for a wind energy project of this scale, in terms of factors such as need for the energy, suitable wind regime, and available supporting infrastructure such as grid connection and road access;
- If wind energy is not promoted in this area of the Eastern Cape, additional power may need to be transported to the region via new high-voltage transmission lines extending over more than a thousand kilometres (e.g. from coal-power stations in Mpumalanga). These power lines would have significant environmental impacts (e.g. visual impacts and impacts on birds).
- With mitigation applied effectively, the predicted negative impacts of the project are mostly of **Low** to **Medium** significance. The only exception is the visual impacts of the turbines, which are predicted to be of **High** significance (negative), given the vertical scale of the project. However, the impact could be perceived as a positive visual impact as the project represents a move towards renewable energy, which is a strategic priority for South Africa and the Western Cape Province.
- The impact of the wind turbines on bats is predicted to be of **Low** significance (with mitigation; confidence levels are **medium**, as only two months of monitoring data have been incorporated). Monitoring is essential to building a better understanding and to manage these impacts. WKN-Windcurrent has started with a pre-construction bat monitoring programme on site and is committed to continue this programme to obtain at least one full year of pre-construction bat monitoring data.
- WKN-Windcurrent has completed their pre-construction bird monitoring programme on site in accordance with the “Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa”, which was

¹ <http://www.iea.org/co2highlights/>

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

Chapter 14 : Conclusions and Recommendations

released by the Endangered Wildlife Trust and Birdlife South Africa in April 2011. The monitoring results and recommendations are included in the updated Chapter on Birds (Chapter 7 of the Final EIA Report). WKN-Windcurrent supports establishing a public reporting process.

14.12 CONSIDERATION OF ALTERNATIVES

During the pre-feasibility for the project, WKN-Windcurrent reviewed a range of potential sites in the Kouga Region. Based on the review of various factors, the Ubuntu site near Jeffrey's Bay was selected to be taken forward in this EIA. Following site selection WKN-Windcurrent moved forward towards a feasibility study. An environmental screening study for the Ubuntu site was undertaken by the CSIR in November 2009. Based on this preliminary screening, it was concluded that there were no fatal flaws identified from an environmental perspective that would necessitate termination of the project at this stage, provided that the exclusion criteria are reviewed in more detail as part of the forthcoming planning in the EIA phase.

Apart from the "no-go" alternative, various other types of alternatives are considered in this EIA. These are described in Chapter 4 of this EIA Report, with the main alternatives being:

- **Land use alternatives** – The physical footprint of the turbines is very limited. Turbines will be supported on foundations dimensioned to the geotechnical properties, for example reinforced concrete spread foundations of approximately 20 m by 20 m and 3 m in depth. The farm covers approximately 1138 hectares. After construction, the turbine mast footprints will cover approximately 0.09 % of the total area. Current cattle farming activities would continue beneath and around the turbines.
- **Technology alternatives** – Options such as vertical axis technology for wind turbines were considered at a conceptual level, and found to be unsuitable for the proposed project.
- **Turbine scale and layout alternatives** – Different scales of turbines and different turbine technology providers were considered by WKN-Windcurrent. When considering alternative suppliers, key factors were availability of turbines on the international market, suitable to the South African wind climate as well as availability of turbines in the local market, and service levels and experience in South Africa. Currently WKN-Windcurrent has selected the alternative turbine suppliers and sizes listed below for the proposed Ubuntu wind energy project. The selection of the turbine providers might however still change according to market and price variables. WKN-Windcurrent has prepared three alternative layouts based on these alternative suppliers and turbine sizes.
 - Vestas V90 (2 MW) – will comprise 50 turbines (see layout in Chapter 4; Figure 4.7);
 - Vestas V112 (3 MW) – will comprise 33 turbines (see layout in Chapter 4; Figure 4.8); and
 - Nordex N100 (2.5 MW) – will comprise 40 turbines (see layout in Chapter 4; Figure 4.9).

In addition to the three potential turbine layouts listed above WKN-Windcurrent is also proposing four additional turbine locations. These alternative turbine locations will be used should individual turbine locations of the current proposed locations not be favourable from an environmental perspective.

Chapter 14 : Conclusions and Recommendations

Subsequent to the selection of the three turbine types above, WKN-Windcurrent identified the REpower 3.2 MW turbine as potentially suitable for this project, one of the reasons being that it allows for a larger local manufacturing component. The 3.2 MW REpower turbine has been included in the Final EIA Report as an alternative turbine type that may be used. The range of turbine sizes in the Final EIA report is therefore from 2.0 to 3.2 MW. The total number of turbines could therefore vary from 31 turbines of 3.2 MW, to 50 turbines if a 2 MW turbine is used. The specifications (e.g. physical scale and noise emissions) for the 3.2 MW REpower turbine are directly comparable to the Vestas V122 3.0 MW turbine that was assessed as one of the typical turbines in the specialist studies. The final turbine selection will depend on the availability of turbines, commercial factors and local manufacturing opportunities.

14.13 CUMULATIVE EFFECTS

In terms of cumulative effects, other wind energy EIAs are in process or have received Environmental Authorisation in the Kouga region (see Table 14.1). These projects are currently in the EIA phase, except for two of them that have received Environmental Authorisation, i.e. the Mainstream SA wind farm project between Humansdorp and Jeffrey's Bay comprising 180 MW; and the Redcap project near St Francis Bay and Oyster Bay that consists of three separate clusters of turbines with a maximum capacity of 300 MW.

The cumulative impacts of the projects listed in Table 14.1 have been considered and assessed in the specialist studies included in this Draft EIA Report. However, the specialists noted that it is impossible to predict at this stage what the cumulative impact of all the proposed wind developments will be on birds and bats, firstly because there is no baseline to measure it against, and secondly because the extent of actual impacts will only become known once a few wind farms are developed. It is imperative that pre-construction and post-construction monitoring programmes are implemented at all the proposed sites, in accordance with the *Best practice guidelines* available locally for bird and bat monitoring.

Furthermore, it needs to be understood that the existing power grid in the Kouga area can only accommodate a limited capacity for electrical transmission. Table 14.1 shows that the proposed wind energy projects total more than 700 MW additional installed capacity (including the Ubuntu project) and therefore when considering cumulative effects it needs to be understood that it is not currently possible to connect all these projects to the grid.

**Environmental Impact Assessment for the proposed Ubuntu Wind Energy Project near Jeffrey's Bay,
Eastern Cape: Final Environmental Impact Assessment Report**

Chapter 14 : Conclusions and Recommendations

Table 14.1: Proposed Wind Farms in the Kouga Region

Environmental Practitioner	Last document released, approval status	Applicant	Location	Number of Turbines	Capacity MW
Savannah Environmental (Pty) Ltd	Draft EIA Report	VentuSA Energy Corp (Pty) Ltd	Dieprivier Mond, 17km west of Humansdorp north of the N2	50	100
Savannah Environmental (Pty) Ltd	Environmental Authorisation obtained	African Clean Energy Developments (Pty) Ltd	Near Cookhouse in the Eastern Cape	Up to 50 turbines	Capacity not indicated in BID
Savannah Environmental (Pty) Ltd	Final EIA Report submitted to DEA	VentuSA Energy Corp (Pty) Ltd	Happy Valley, 3 km west of Humansdorp near the N2	20	40
Savannah Environmental (Pty) Ltd	Draft Scoping Report	Exxaro Resources and Watt Energy (Pty) Ltd Tsitsikamma community	The proposed site is situated approximately 30 km west of Humansdorp, south of the N2 National Road in the Tsitsikamma area	Maximum of 50	100MW
CSIR	Environmental Authorisation granted (April 2011)	Mainstream SA	Between Jeffrey's Bay and Humansdorp north of the N2	40 to 85	180
CSIR	Draft Scoping Report	Windcurrent SA	Banna Ba Pifhu, 3.5 km south of Humansdorp	14 - 25	50
Arcus Gibb http://projects.gibb.co.za/Projects	Environmental Authorisation granted (June 2011)	Redcap Invest.	Western Sector to the east of the Tsitsikamma River	50 to 150	100 to 300
			Central Sector near Oyster Bay		
			Eastern Sector north of St Francis Bay		

Chapter 14 : Conclusions and Recommendations

14.14 PERMIT AND PERMISSION REQUIREMENTS

Before clearing of the proposed site is initiated, the appropriate Environmental Authorisation must be obtained in terms of the National Environmental Management Act (NEMA) and associated 2006 NEMA Regulations. Should the project proceed, micro-siting and planning of access roads would need to be conducted.

If the project leads to the removal of protected plant or animal species, then a permit is needed from the provincial department of Economic Development and Environmental Affairs (DEDEA) for the removal and/or destruction of species protected by the Provincial Nature Conservation Ordinance of 1974. In order to obtain permission to remove or destroy species occurring under the Provincial Nature Conservation Ordinance of 1974 DEDEA must receive notification of the area(s) intended to be cleaned together with an application form.

Should any archaeological or palaeontological materials/sites be found during construction of the wind farm, a permit must be obtained from the South African Heritage Resources Agency (SAHRA) to remove such remains. Such removal should be undertaken by a professional archaeologist/palaeontologist.

14.15 OVERALL EVALUATION OF IMPACTS BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

No negative impacts have been identified that, in the opinion of the Environmental Assessment Practitioner, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

The EIA process included a synthesized mapping of "no go" areas using environmental constraints provided by the specialist team (Figure 14.1). This mapping guided the layout of turbines and internal access roads and cabling. In this way, the environmental and social constraints of the site informed the scale and configuration of the proposed project. Through the course of the EIA process, the project layout went through several iterations after consultation with the specialists on the project team. This indicates how the EIA process has actively and effectively informed the project planning. The specialists have used the three layouts as presented in Chapter 4. They were satisfied with these layouts provided their proposed mitigation measures were implemented.

Residual impacts are those that are expected to remain once appropriate mitigation has been implemented. The main residual negative impacts of the Ubuntu Wind Energy Project are the predicted impact on birds and bats, and the visual impact.

- The impact on birds arises from the possible displacement of priority bird species during the construction and operational phases of the project. The impacts are predicted to be low to medium (after mitigation).
- Another impact is infrequent bat mortality due to collision with the wind turbine blades or barotrauma and the visual impact of the turbines on the sense of place. The impacts on bats are predicted to be of **low** significance after mitigation (**confidence level is medium** as this is based on preliminary bat monitoring data). There is a general paucity of bat data in South Africa, and therefore ongoing pre-construction monitoring of bats on

Chapter 14 : Conclusions and Recommendations

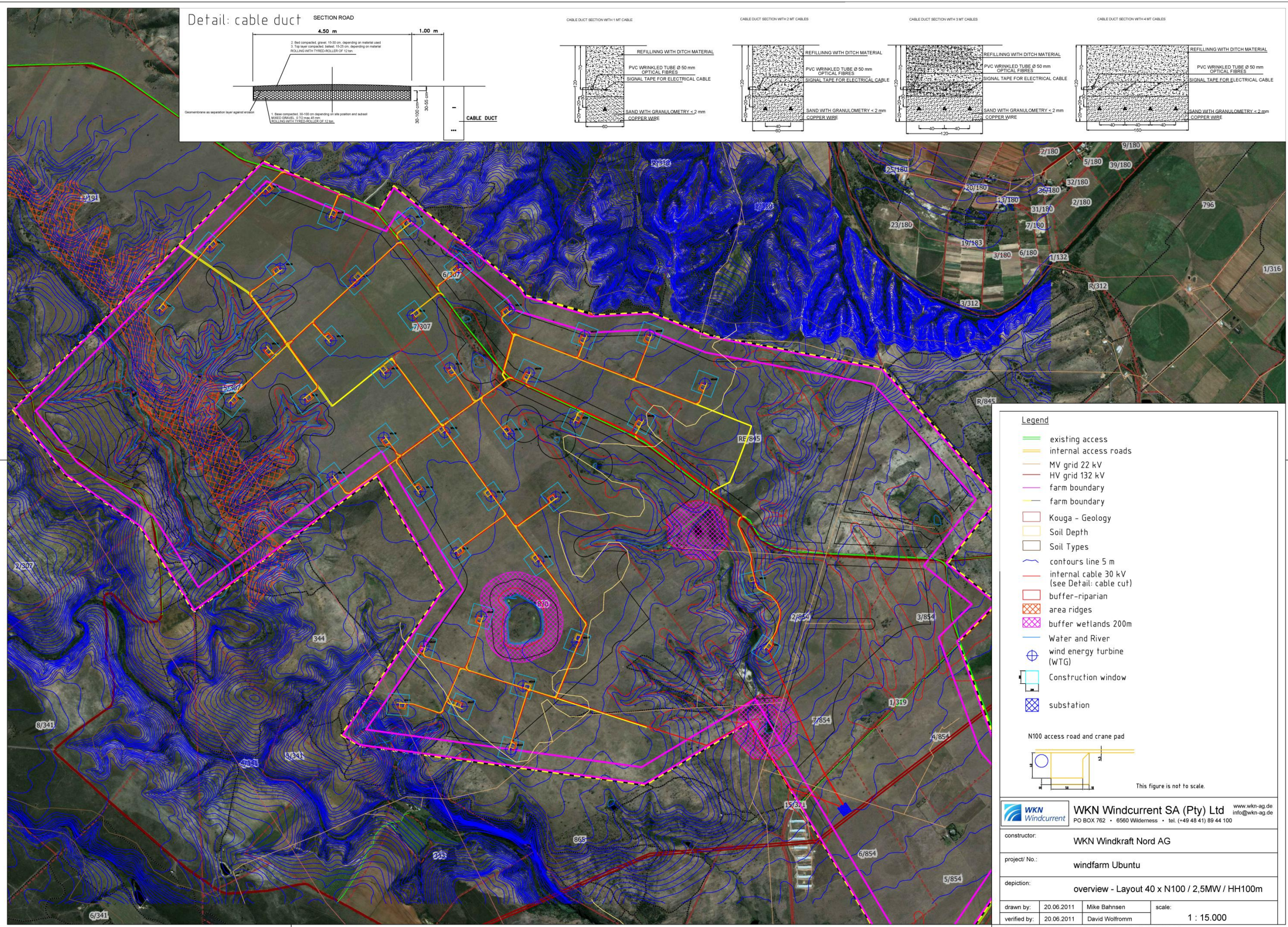
site is proposed to build a better understanding of the bat populations present and determine what management actions could be effective.

- The visual impacts of the turbines on the landscape character are predicted to be of **high** significance (negative). However, the visual impact could be perceived as a positive impact as the project represents a move towards renewable energy, which is a strategic priority for South Africa and the Eastern Cape Province. Of the several wind projects proposed in the Kouga area, the Ubuntu project is in perhaps the least sensitive location in terms of visual impacts, in that it is located at least 3km inland of the N2 national road, and well inland from the coastal towns such as St Francis Bay and Jeffrey's Bay,

If the Ubuntu wind farm is established, the actual physical footprint of the wind turbines is limited to approximately 0.09 % of the total study area of 1 138 ha, and grazing and other agricultural activities can continue in parallel with the operation of the turbines. The project will have no significant impact in terms of loss of agricultural productivity.

In conclusion, given South Africa's need for additional electricity generation and efforts to decrease the country's proportional dependency on coal-based power, renewable energy has been identified as a national priority, with wind energy identified as one of the most readily available, technically viable and commercially cost-effective sources of renewable energy. Taking into consideration the findings of the EIA process for the proposed Ubuntu project near Jeffrey's Bay, it is the opinion of the Environmental Assessment Practitioner that the project benefits outweigh the costs, and that the project will make a positive contribution to steering South Africa on a pathway towards sustainable development. Provided that the specified mitigation measures are applied effectively, it is proposed that the project receives Environmental Authorization in terms of the EIA Regulations promulgated under the National Environmental Management Act (NEMA).

Figure 14.1: Proposed no-go areas identified in the specialist studies for the proposed Ubuntu project.



Legend

- existing access
- internal access roads
- MV grid 22 kV
- HV grid 132 kV
- farm boundary
- farm boundary
- Kouga - Geology
- Soil Depth
- Soil Types
- contours line 5 m
- internal cable 30 kV (see Detail: cable cut)
- buffer-riparian
- area ridges
- buffer wetlands 200m
- Water and River
- ⊕ wind energy turbine (WTG)
- Construction window
- substation

N100 access road and crane pad

This figure is not to scale.

WKN Windcurrent SA (Pty) Ltd
 PO BOX 762 • 6560 Wilderness • tel. (+49 48 41) 89 44 100
 www.wkn-ag.de
 info@wkn-ag.de

constructor: **WKN Windkraft Nord AG**

project/ No.: **windfarm Ubuntu**

depiction: **overview - Layout 40 x N100 / 2,5MW / HH100m**

drawn by: 20.06.2011 Mike Bahnsen
 verified by: 20.06.2011 David Wolfromm

scale: **1 : 15.000**

file: S:\South Africa\Ubuntu\03 Plans_Map\Photos\3.04 Site_Plan_windfarm\MB\20110419 Ubuntu.dwg