Environmental Impact Assessment for the proposed Kap Vley Wind Energy Facility near Kleinzee in the Northern Cape

FINAL SCOPING REPORT

PART B:

Draft Biodiversity Offset Study and Scoping Inputs from Specialists

Environmental Impact Assessment
for the proposed Kap Vley Wind Energy
Facility near Kleinzee in the
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APPENDIX F:

F1 - Biodiversity offset study prepared by Simon Todd Consulting for the juwi Kap Vley WEF

F2 - Letters to provide in-principal agreement from WWF and SANParks to determine a biodiversity offset for the Kap Vley WEF project

APPENDIX F1

JUWI KAP VLEY WIND ENERGY PROJECT NEAR KLEINZEE IN THE NORTHERN CAPE: SCOPING PHASE ECOLOGICAL STUDY

PRODUCED FOR JUWI

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FIGURES

1 INTRODUCTION

Juwi are proposing to development the Kap Vley wind farm near to Komaggas in the Northern Cape. The proposed Kap Vley project would consist of up to 56 turbines with associated infrastructure and a grid connection to the Eskom Gromis Substation approximately 32 km north west of the site. The site is however within a Critical Biodiversity Area as well as within an area variously recognised to be of high biodiversity value. In recognition of these sensitivities Juwi is taking a pro-active approach and investigating the potential need and opportunity for an offset to compensate for the likely impact of the development. Juwi have appointed Simon Todd Consulting to provide input in this regard, and the specific objectives of the report are to inform this process through the following outputs:

- Provide a summary of the Draft National Biodiversity Offset Policy and highlight relevant sections as they pertain to the current development.
- Place the habitats present at the site in a regional context and identify features of the site that may make it of regional significance.
- Identify if and where similar habitat may occur on the coastal plain of Namaqualand.
- Explore identified potential offset areas in terms of the draft national offset guidelines and the regional conservation context.
- Identify required actions and priorities for taking the offset process forward.

2 LEGISLATIVE CONTEXT: THE DRAFT NATIONAL BIODIVERSITY OFFSET POLICY

2.1 Background and Rationale for Offsets in South Africa

Habitat loss is recognized as the primary driver of biodiversity loss and biodiversity offsets are becoming an internationally accepted tool which can be used to ensure that development is ecologically sustainable by enhancing the conservation and sustainable use of priority ecosystems and fragile biodiversity-rich areas not under formal protection. The NBF (National Biodiversity Framework, 2009) states that "*In some cases, following avoidance and mitigation, there is still residual damage to biodiversity as a result of a development. In such cases, if the development is socially and economically sustainable, ecological sustainability may be achieved through a biodiversity offset. A biodiversity offset involves setting aside land in the same or a similar ecosystem elsewhere, at the cost of the applicant, to ensure no net loss of important biodiversity. Biodiversity offsets are particularly important in securing threatened ecosystems and critical biodiversity areas.*"

The desired outcome of biodiversity offsets is to ensure that:

1. The cumulative impact of development authorization and land use change does not:
    - result in the loss of CBA's or jeopardize the ability to meet South Africa's targets for biodiversity conservation;
    - lead to ecosystems becoming more threatened than 'Endangered'; and/or
    - cause a decline in the conservation status of species and the presence of 'special habitats'.
2. Conservation efforts arising from the development application process, and contributing to improved protection of South Africa's unique species and ecosystems in perpetuity, are focused in areas identified as priorities for biodiversity conservation. Particular emphasis is on consolidation of priority areas and securing effective ecological links between priority areas; and
3. Ecosystem services provided by affected biodiversity and on which local or vulnerable human communities - or society as a whole - are dependent for livelihoods, health and/or safety, are at minimum safeguarded, and preferably improved.

The basic principles and tenets that underlie offsets and their practical implementation required to achieve the above goals are outlined below. The majority of this is taken directly or synthesised from the draft 2017 offset guidelines.

Defining Biodiversity Offsets

Biodiversity Offsets are conservation measures designed to remedy the residual negative impacts of development on biodiversity and ecological infrastructure, once the first three groups of measures in the mitigation sequence have been adequately and explicitly considered (i.e. to avoid, minimize and rehabilitate/ restore impacts). Offets are the 'last resort' form of mitigation, only to be implemented if nothing else can mitigate the impact (Figure 1). It is important to note in this regard that the offset is therefore not a mitigation in itself and the implementation of an offset does not release the requirement or need to implement the full array of mitigation and avoidance options at the impacted site.

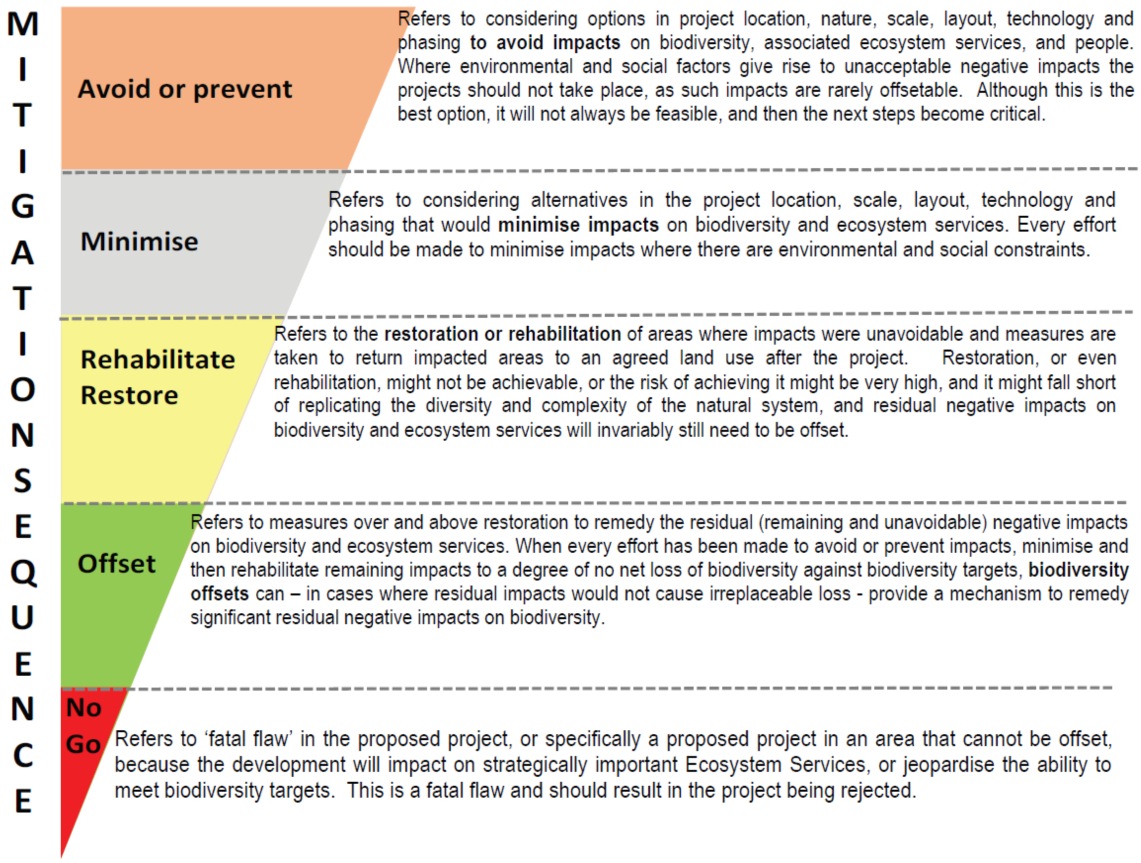


Figure 1. The mitigation hierarchy and the location of offsets within this context as the last resort for development.

There are limits to what can or should be offset

Biodiversity offsets are to be used in cases where the EIA process identifies negative residual impacts of 'medium' or 'high' significance on biodiversity. Activities resulting in impacts of 'low' significance may not require an offset. Impacts on biodiversity of 'very high' significance may not be able to be fully offset because of the conservation status, irreplaceability, or level of threat to affected biodiversity, or the risk of preventing scientific targets for conserving that biodiversity from being met. In these cases, given that the proposed activity would lead to irreversible impacts and irreplaceable loss of biodiversity, alternatives to the proposal should be sought; i.e. the proposed activity should not be authorized in its current form.

The principle of ecosystem protection

Biodiversity offsets should ensure the long-term protection of priority ecosystems on the ground and improve their condition and function, thereby resulting in measurable positive outcomes for biodiversity conservation 'on the ground'. These outcomes could contribute to improved ecosystem integrity and increased use and/ or cultural value of offset areas and the ecosystems of which they are part.

No Net Loss up to specified limits of acceptable change

Offsets should not be used to 'soften' a development proposal that would result in unacceptable loss of biodiversity. Biodiversity offsets should be designed in such a way that scientific targets for conserving ecosystems and other biodiversity features in the long term are attainable and not undermined as a consequence of the proposed activity. No biodiversity feature (species or ecosystem) should be at risk of being pushed beyond an Endangered threat status by a development.

Locating biodiversity offsets in the landscape

Biodiversity offsets should be located in the landscape in such a way that they help to secure priority areas for conservation, improve connectivity between these priority areas, and/ or consolidate or expand existing protected areas. Where priority ecosystem services are residually affected, biodiversity offsets should preferably be located in the landscape in such a way that they deliver equivalent services to affected parties; that failing, additional compensation measures would be needed for these parties.

Equivalence – 'like for like'

Biodiversity offsets should comprise - or benefit - the same biodiversity components as those components that would be negatively affected by development. In exceptional cases only, and only with support from the provincial conservation agency, could consideration be given to the biodiversity offset targeting a relatively more threatened ecosystem or habitat.

Additionality – new action required

Biodiversity offsets must result in conservation gains above and beyond measures that are already required by law or would have occurred had the offset not taken place.

Defensibility

The measure of residual negative impacts on biodiversity caused by a proposed development, as well as the design and implementation of biodiversity offsets, should be based on the best available biodiversity information and sound science, and should incorporate local traditional or conventional knowledge as appropriate. Offsets must consider all significant residual impacts on biodiversity: direct, indirect and/ or cumulative impacts. The scope of assessment must include due consideration of impacts on recognized priority areas for biodiversity conservation; impacts on biodiversity pattern (conservation status of ecosystem and species, importance to migratory species) and ecological and evolutionary processes (must look across scales and take into account connectivity, gradients and corridors); and impacts on ecosystems or species on which there is high dependence for health, livelihoods, and/ or wellbeing.

2.2 General procedures to be followed when considering offsets

The 2014 EIA Regulations as part of the introduction of the "One Environmental System" (where different application and authorisation processes are run concurrently), impose very tight timeframes on BAR and S&EIR processes. In order for the biodiversity impacts to be adequately assessed and evaluated, and the mitigation sequence applied, it is desirable to evaluate the probable need for – and design of - offsets in the pre-application phase. It is therefore important for the applicant and EAP to work with the Competent Authority (CA), i.e. DEA in the pre-application phase to finalise as much of the biodiversity-related work as possible before the application is submitted. This should include:

a. Pre-application meeting with the CA and EAP to determine the possibility of an offset being required. If an offset might be required, it becomes imperative for the applicant to investigate other project alternatives during the EIA process, particularly where impacts are likely to be of high or very high significance.

b. The biodiversity specialist(s), appointed by the applicant, should be fully appraised of the development proposal, including feasible location or siting alternatives, proposed layouts, operational activities, associated activities and infrastructure on which the development depends, likelihood of risks (amongst others) in order to perform specialist studies that can produce reliable and defensible significance ratings for negative impacts on biodiversity, as well as mitigation recommendations. Specialist studies should be done well in advance of the submission of the application.

c. Should there be potentially significant negative impacts on biodiversity, the environmental assessment should undertake a process to exhaust the mitigation sequence to reduce the impact on biodiversity through the investigation of alternatives. The study should clearly show how the mitigation sequence has been followed.

d. Should residual impacts of very high significance be probable, the applicant would effectively be pursuing his/ her application on risk.

e. If the biodiversity specialist(s) subsequently confirms that the residual negative impacts on biodiversity of medium/high significance would be unavoidable, offsets should be discussed with the CA and, if deemed appropriate, offset investigation, planning and design would best commence pre-authorisation and be incorporated into all stages of the EIA process.

f. If an offset is required, the authorisation should state that development may only commence after the offset has been secured.

2.3 Designing and locating an offset

There is no single best approach to decide on an appropriate offset. However, unless there is a compelling reason not to follow this process, the offset design process should comprise of the following seven steps:

1. Obtain a measure of the residual loss of biodiversity (i.e. residual negative impacts) as a consequence of the proposed development. This measure at minimum relates to the area and condition of affected ecosystem/ habitat;

2. Determine the best type of offset;

3. Determine the required size of offset and, where applicable, its optimum location;

4. Investigate candidate offset site(s) in the landscape that could meet the offset requirements. Check whether any eligible offset receiving area is suitable;

5. Decide on the best way to secure the offset, and ensure that the offset option would be acceptable to the CA and the statutory conservation authorities;

6. Prepare an Offsets Report or dedicated section within the EIA report; and

7. Conclude agreements on offsets (between the applicant and an implementing agent) and develop an Offset Management Programme, where applicable.

2.4 Requirements for a proposed offset as part of the EIA process

The CA may require that an Offset Report or an Offset Agreement to be submitted as part of the final Basic Assessment or EIA Report, or that an Offset Agreement be concluded prior to the commencement of the listed activity. Where the applicant has secured and will manage (or contract a third party to manage) an offset, an Offsets Management Plan/ Programme may also be required to be submitted to the CA.

Reporting on Offset performance and sufficiency should be included in the EMPr for any project.

Any Offset Report would be submitted as a specialist report with, and incorporated into, the BAR or EIR. At minimum, it should include the following information (see Appendix 3 of the 2014 EIA Regulations):

1. An evaluation of the adequacy of measures considered and adopted to avoid, minimize and rehabilitate potentially significant negative impacts on biodiversity. (That is, were these measures sufficient; were reasonable and feasible alternative measures investigated, or could greater effort have been made particularly to avoid and minimize these impacts?)

2. A clear statement regarding the appropriateness of considering biodiversity offsets in this case. (That is, are there any residual impacts of 'very high' significance that could lead to irreplaceable loss of biodiversity and/ or priority ecosystem services?).

3. A reliable measure of residual negative impacts on significant biodiversity and ecosystem services requiring offsets.

    - It must take into account gaps in information or low levels of confidence in the predicted negative impacts.

    - It must give due consideration to uncertainties or low levels of confidence in the outcome of proposed measures to avoid, minimise and/ or rehabilitate negative impacts.

4. The duration of residual negative impacts of the proposed activity on biodiversity, taking a risk-averse approach, to determine the minimum duration of the biodiversity offset(s).

5. An explicit statement on the required size of the biodiversity offset to remedy these residual negative impacts, applying the basic offset ratio and adjustments as appropriate.

6. A description of the offset options considered (like for like habitat, trading up, or other), giving defensible reasons for arriving at the proposed offset type.

7. Where the proposed offset comprises land to be secured and managed:

    a) Evaluation of the probable availability of suitable offset site(s) in the surrounding landscape to meet offset requirements.

    b) Description of potential site(s) for biodiversity offset(s).

    c) Description of stakeholder engagement process in identifying and evaluating the adequacy and acceptability of the proposed offset site.

d) Description of proposed approach to securing the offset site(s) (e.g. conservation servitude, protected area consolidation/ stewardship) and how it would be managed.

e) Evaluation of probable adequacy of proposed offset site(s) by biodiversity specialist(s) and, where relevant, a social/ livelihood specialist:

- Is there a high level of confidence that offset site(s) would remedy residual impacts on a) biodiversity pattern (threatened ecosystems, threatened species and special habitats), b) biodiversity process, and c) on ecosystem services, while making a positive contribution to the long term conservation of biodiversity in the South Africa?)
- Would the offset sites be located in recognised 'offset receiving areas'?
- If relevant, is the motivation for a 'trading up' offset defensible in the specific context?
- Would the offset site(s) be functionally viable in the long term?

f) A reliable estimate of the costs of acquiring or securing, rehabilitating and managing the necessary offset site(s) for the duration of residual negative impacts;

g) Responsibility for managing, monitoring and auditing the biodiversity offset;

- Who would be responsible for implementing, managing and auditing the biodiversity offset?
- Statement regarding the adequacy of capacity of the institution, organization or other party to meet obligations in terms of above responsibilities;

h) What measures would be taken to ensure that society as a whole, and affected communities in particular, would not be left more vulnerable or less resilient as a consequence of the proposed development [i.e. where offsets are to remedy loss of biodiversity underpinning valued ecosystem services, would the proposed offset(s) be affordable, accessible and acceptable to the main affected parties];

- Any negative impacts on local communities and/or society as a whole as a consequence of the proposed offset. If yes, how would these negative impacts be avoided;
- Would the proposed use of the biodiversity offset site(s) be compatible with biodiversity conservation objectives? In particular, where an offset for residual negative impacts on biodiversity also provides offsets for residual impacts on ecosystem services, assurance must be provided that the latter would not compromise the biodiversity value of that offset (e.g. if biodiversity is to be a direct-use resource, then use could lead to degradation of that biodiversity / ecosystem).

i) What mechanism is to be used to provide sufficient funds for acquiring/ securing and managing the biodiversity offset site(s) for the duration of residual negative impacts of the proposed activity (i.e. Who will be the recipient of money? How will funds flow to the implementing agent?)

3 THE REGIONAL CONTEXT AND SIGNIFICANCE OF THE KAP VLEY SITE

In this section, the regional context and features of the site are analysed, starting at a broad scale and filtering down through ever-finer scales to the habitats of significance present at the site and finally the species of concern that have been observed at the site and the significance of their presence. It is important to note that the level of certainty with regards to the information provided increases significantly as the scale of study decreases. As such, the information as provided in the National Vegetation Map (Mucina and Rutherford 2006) is considered significantly less reliable than the fine-scale vegetation mapping and observations of SCC present at the site. Some of the information presented below for the conservation planning context is not yet published and as such there is a possibility there may be some small changes before these products are released to the public and as such should be considered draft documents.

3.1 Conservation Planning Context

In this section, the relevant conservation planning tools for the broad area are illustrated and discussed. The most important of these are the recently completed Northern Cape Conservation Plan (2016) and the Northern Cape Protected Area Expansion Strategy (2017). These maps indicate biodiversity priority areas required to maintain species richness and ecological processes in the first instance and areas that should be targeted for formal conservation expansion in the second. The two above plans are not entirely independent of one another as all areas demarcated as conservation expansion focus areas, are classified as Tier 1 or Tier 2 CBAs and some of the CBAs are demarcated with the specific purpose in mind of maintaining development-free corridors between existing conservation areas to facilitate future expansion of the conservation areas into these corridors. The location of NCPAES Focus Areas is designed so as to ensure the minimum land requirement to meet conservation targets but also to avoid isolated target areas and append these onto existing conservation areas where possible.

The relevant section of the recently developed Northern Cape Conservation Plan which maps Critical Biodiversity Areas (CBA) map for the Northern Cape is illustrated below in Figure 2. The map illustrates that the majority of the site lies within a level 1 CBA, indicating a high priority area for biodiversity maintenance. Although the associated land-use guidelines for the CBA have not yet been released, such areas are usually not considered favourable for development and would likely represent one of the main arguments for the requirement of an offset for the site if it were to be developed. One of the reasons that the area has been identified as a CBA is because it has been identified as biodiversity priority area by experts under the SKEP Programme (Figure 3).

The site also falls within a Northern Cape Protected Area Expansion Strategy (NCPAES) Focus Area (2017), which further highlights the significance of the area for conservation purposes (Figure 4). Apart from highlighting the significance of the study area for conservation, the NCPAES also highlights areas where an offset would be seen as being most beneficial and desirable. Motivating for an offset outside of the NCPAES target areas is difficult and would require specific circumstances that are not met under the current project situation.

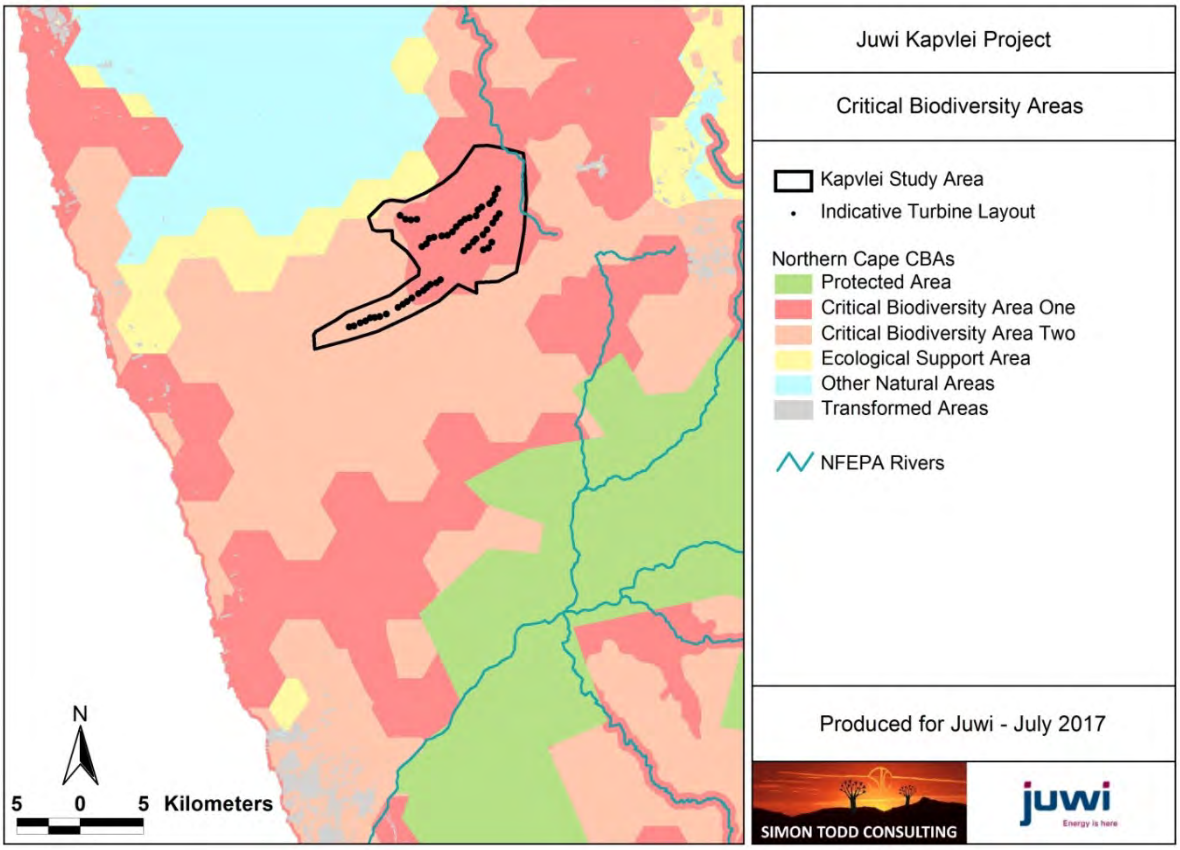


Figure 2. Critical Biodiversity Areas map for the study area, showing that the majority of site falls within a level one CBA and the remainder within a Tier 2 CBA.

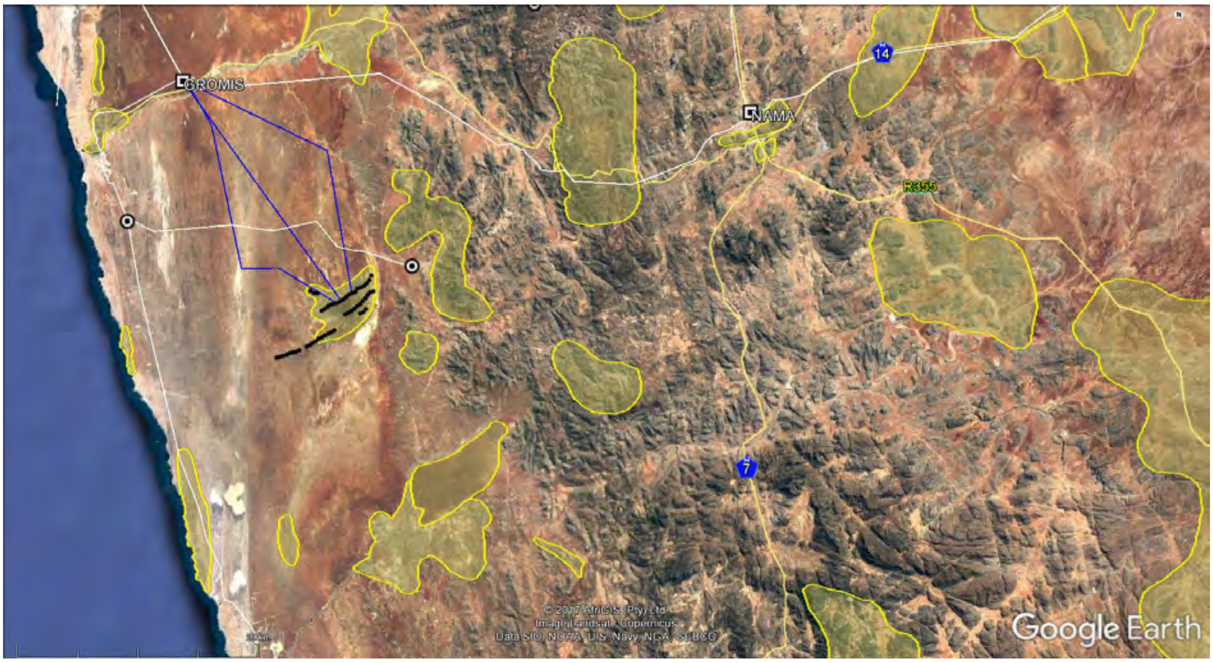


Figure 3. SKEP Expert Priority Areas that were identified by various experts as part of the SKEP programme. This includes Sandberg, which occupies the majority of the Kap Vley site.

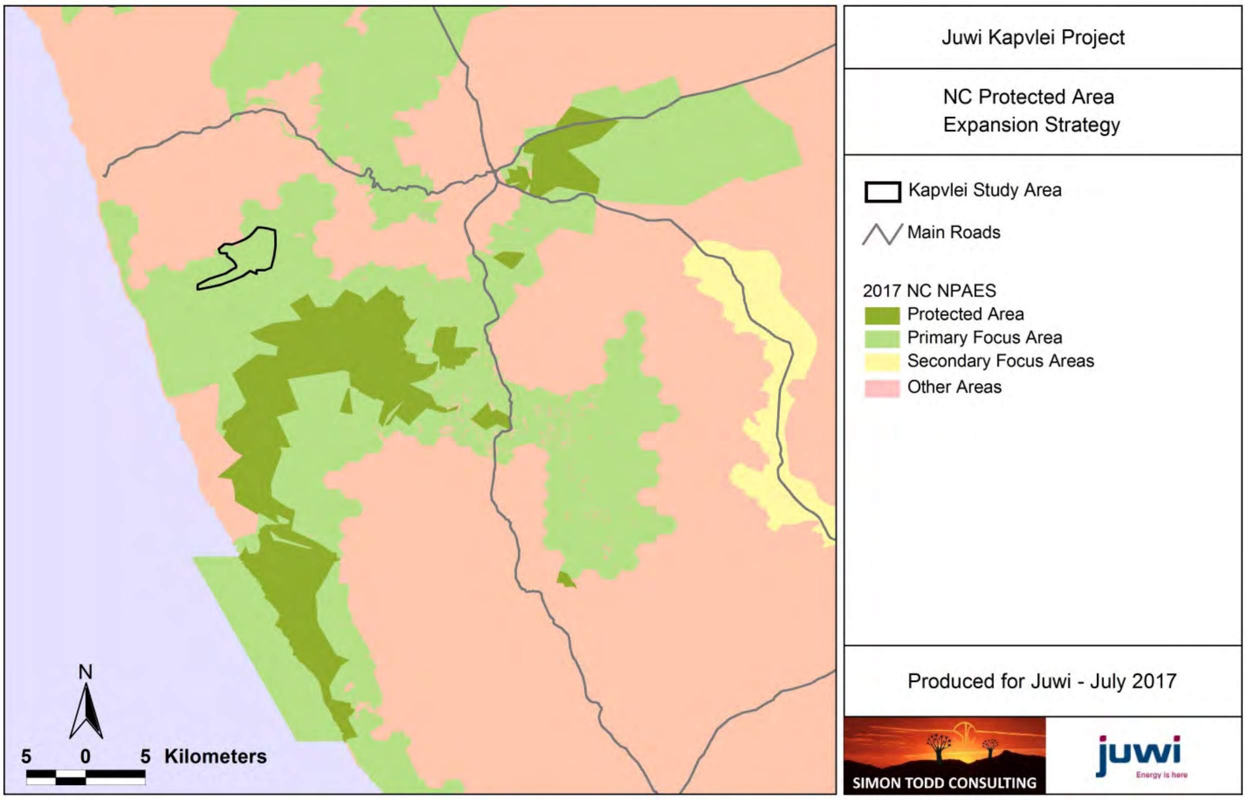


Figure 4. Northern Cape Protected Area Expansion Strategy map for the broader study area, showing the Kap Vley site falling within a Primary Focus Area.

3.2 Kap Vley Site Characterisation

According to the national vegetation map (Mucina & Rutherford 2006/2012), there are three vegetation types within the boundaries of the study area, Namaqualand Klipkoppe Shrubland, Namaqualand Strandveld and Namaqualand Sand Fynbos (Figure 5).

The majority of the site is mapped as Namaqualand Klipkoppe Shrubland. This vegetation unit occupies 10936 km^2 of central Namaqualand from Steinkopf to Nuwerus in the south. Namaqualand Klipkoppe Shrubland is associated with the rocky hills, granite and gneiss domes of the mountains of central Namaqualand. Due to its' steep and rocky nature, Namaqualand Klipkoppe Shrubland has not been impacted by intensive agriculture and 6% is currently conserved, mainly within Goegap and the Namaqua National Park. As Namaqualand Klipkoppe Shrubland is still largely intact it has been classified as Least Threatened. Mucina & Rutherford list 15 endemic species for this vegetation type. At a coarse level, it is sensitive largely in terms of offering a diverse habitat for fauna such as reptiles but relatively speaking does not have a high abundance of listed plant species.

The majority of the lower-lying parts of the site are classified as Namaqualand Strandveld which occurs in the Northern and Western Cape Provinces from the southern Richtersveld as far south as Donkins Bay. Especially in the north of this unit it penetrates up to 40 km inland and approaches the coast only near the river mouths of the Buffels, Swartlintjies, Spoeg, Bitter and Groen Rivers. In the south of the unit it is variably narrow and approaches the coast more closely. It consists of flat to undulating coastal peneplains with vegetation being a low species richness shrubland dominated by a plethora of erect and creeping succulent shrubs as well as woody shrubs and in wet years annuals are also abundant. It is associated with deep red or yellowish-red Aeolian dunes and deep sand overlying marine sediments and granite gneisses. Mucina and Rutherford list eight endemic species for this vegetation type. About 10% of this vegetation type has been lost mainly to coastal mining for heavy metals and it is not currently listed.

There is a narrow strip of Namaqualand Sand Fynbos mapped along the eastern boundary of the study area. Namaqualand Sand Fynbos typically occurs on acid to neutral sands, often on windblown dunes and on the dune slacks. It is distributed in the Northern and Western Cape from the vicinity of the study area to Koekenaap in the south, along the coastal plain. It occurs on Aeolian deep, loose, red sands overlying marine or other sediments. It is usually a low to medium shrubland, often dominated by restios, with *Proteaceae* often present, usually in low numbers. Bulbs and annuals may be common, with succulents common only on dune slacks. It is not a fire driven system and often forms mosaics with various Strandveld types, and boundaries can be very diffuse.

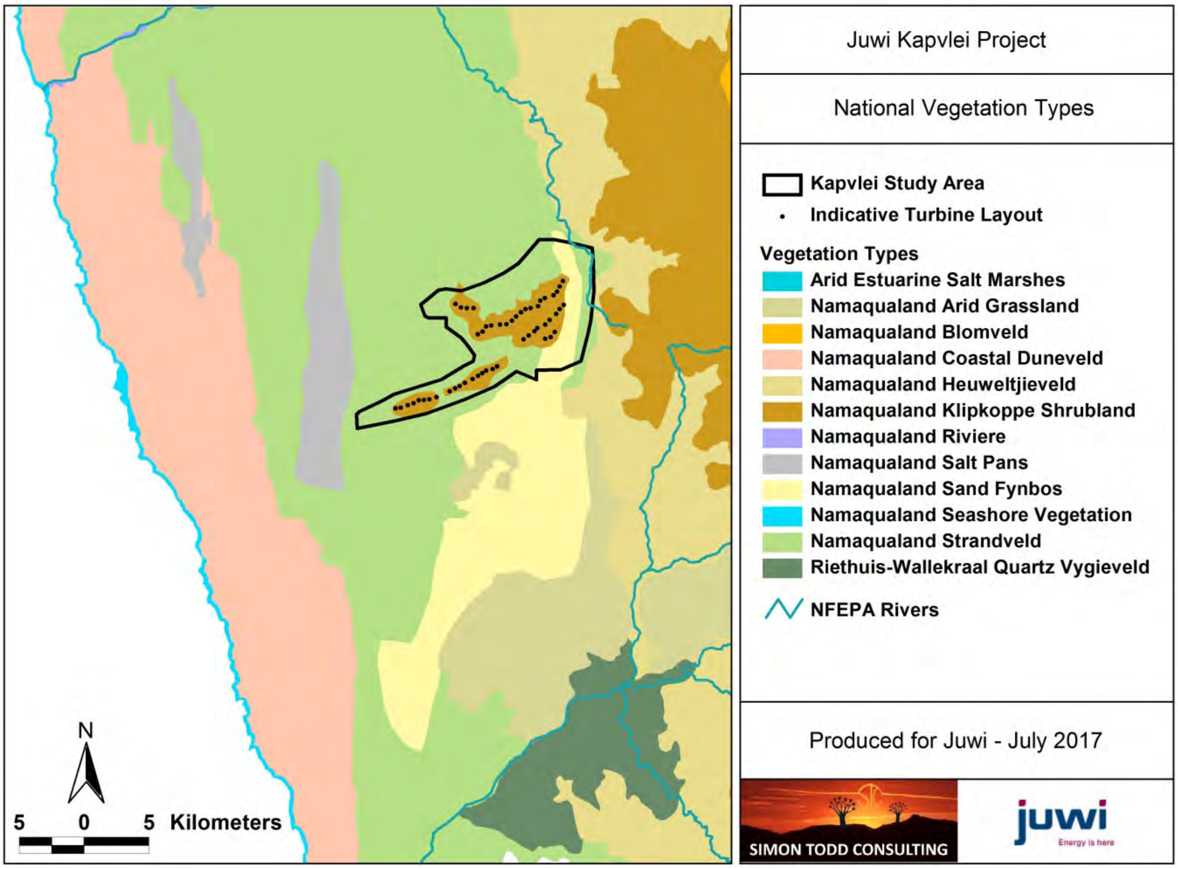


Figure 5. Vegetation map of the study area according to the 2012 update of the Mucina & Rutherford (2006) vegetation map.

The national vegetation map does not provide a very satisfactory reflection of the vegetation of the site. Mostly this relates to the large extent of Namaqualand Klipkoppe Shrubland which has been mapped at the site compared to the limited extent of this unit actually present at the site. Although there are some rocky hills and outcrops present at the site which can be considered representative of this unit, the slopes of the hills on-site are generally covered in Aeolian sand and consist of sand fynbos, which has been significantly under-mapped at the site. These problems have been recognised before and are largely resolved in the next section.

3.3 Fine-Scale Vegetation Patterns.

The Sand Fynbos vegetation types of the coastal plain have been mapped in detail by Desmet, Turner & Helme, (2009) and the section including the site is illustrated below (Figure 6). This study however maps only Sand Fynbos and related units and other vegetation types have not been mapped in greater detail, with the result that it must still be used on conjunction with the Vegmap to provide a full picture of the vegetation in and around the site. The fine-scale mapping recognises the presence of several plant communities at the site including Restio Fynbos, which characterises the valley between the two ridges of the site as well as several types of Dune Fynbos, which includes the deeper and sometimes more mobile sands which occur along the ridges of the site. The fine-scale mapping provided by Desmet *et al*. significantly improves our understanding of the presence and distribution of Sand Fynbos on the Coastal Plain of Namaqualand. As they have considered a variety of habitats as well as the unit as a whole, it is useful in indicating the types and distribution of the different habitat units identified. This also provides the primary basis for identifying potential offset areas where similar habitats as affected at the Kap Vley site can be found in the broader Namaqualand Coastal Plain region.

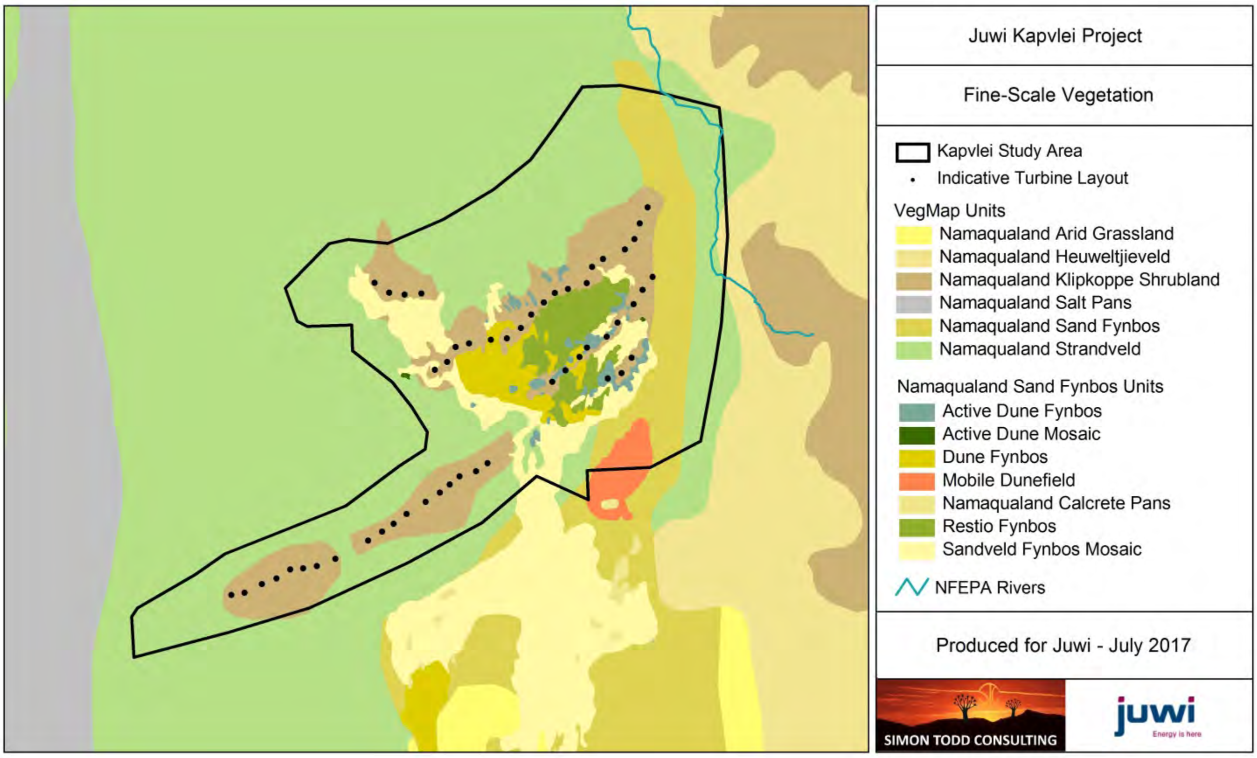


Figure 6. Combined vegetation map showing the Sand Fynbos vegetation units identified by Desmet, Turner and Helme (2009) within the site as well as the 2012 update of the Mucina & Rutherford (2006) national vegetation map for all units not mapped by Desmet at al..

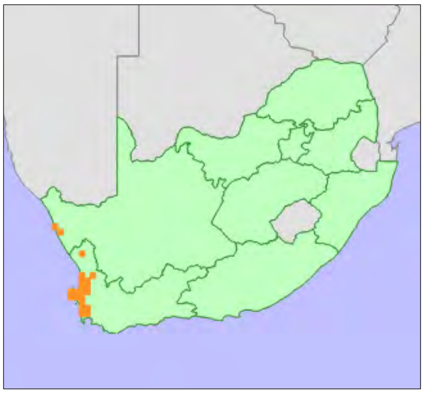
3.4 Species of Conservation Concern

Based on the preliminary fieldwork that has been conducted at Kap Vley there are a number of endemic and species of conservation concern present at the site (Table 1). Since this list is based on only a single day at the site, there are likely to be a number of additional such species present, some of which could be of high conservation concern with significant implications for the development. The proceeding analysis is therefore limited to a consideration of the species confirmed present, but would need to be reconsidered once detailed fieldwork at the site has been completed to identify firstly what other SCC are present at the site and secondly the extent to which the populations of such species at the site would be impacted by the development.

The relevance of these species to the current study is that the impact of the development on the vegetation of the Kap Vley site would be dictated largely by the impact on these species and secondly, as these are the major defining species of concern at the site, the presence of these species within potential offset areas is considered a prerequisite for their acceptability as offset targets. As such, offset target areas should be identified and evaluated based on the presence of these species as well as any others that are identified during the detailed fieldwork at the site for the EIA process.

Table 1. Species of Conservation Concern (SCC) confirmed present at the Kap Vley site, with maps of their distribution taken from the Red List of South African Plants (see http://redlist.sanbi.org/redcat.php) and a short consideration of their likely significance for the development of the site.

Species & Image	IUCN Status & Abundance on-site	Significance for Kap Vley development
Aspalathus albens 	Recently downgraded from VU to LT 	Populations are localised and so avoidance would probably be effective. Overall significance at site is low.
Metalasia adunca 	NT Occasional on dunes and sandy slopes 	Not common and occasional scattered individuals can be avoided. As this is fairly widespread species, it is not considered highly significant.

Species & Image	**IUCN Status & Abundance on-site**	**Significance for Kap Vley development**
Muraltia obovata 	VU Common and widespread across most habitats with sandy soils 	Very common at the site and avoidance will not be possible, but impact on local population not likely to be highly significant as it is common within favourable habitat. Implications for the development are low.
Agathosma elata 	EN Locally abundant on sandy slopes 	Scattered but healthy populations can probably avoided. Impact on this species would have high significance but avoidance is likely to be possible.
Argyrolobium velutinum 	EN Occasional on sandy slopes 	Occasional scattered plants that probably can't be avoided. Moderate implication for development. Population is probably larger than currently known.

Species & Image	**IUCN Status & Abundance on-site**	**Significance for Kap Vley development**
Caesia sabulosa 	VU Uncommon 	Not common and significant impact is not likely. Implications for the development is low.
Lampranthus procumbens 	VU Uncommon 	Not common at the site. Impact on this species would have high significance but density is low and it is likely that it can be avoided.
Phyllobolus tenuiflorus 	VU Uncommon on rocky soils 	Not common at the site and it is not likely that a significant impact would be generated. Low significance for the development.

Species & Image	IUCN Status & Abundance on-site	Significance for Kap Vley development
Leucospermum praemorsum 	VU Occasional to common among dunes 	Common on sand dunes and avoidance may be difficult. Moderate to high significance for development as this is probably the most northern population.

3.5 Faunal Communities

The fauna present at the site are generally of secondary significance compared to the flora, as there are not likely to be any fauna of high conservation concern restricted to or with regionally significant populations present at the site. There are however some endemics present as well as the potential presence of several relatively widespread species of lower conservation concern.

In terms of mammals, the only species of some concern likely to be present is Grant's Golden Mole *Eremitalpa granti* (Vulnerable), which is likely to occur in the dunes and sandy areas of the site. This species is listed as Vulnerable as a result of their scarcity and the negative impact coastal mining activities have had on their habitat. The development of a wind energy facility at the site could potentially have a significant impact on golden moles. These subterranean animals 'swim' through the soft sand and hardened surfaces such as roads would pose a significant obstacle for movement. In addition, they also use subtle vibrations in the soil to detect their prey and it is possible that noise and vibration transferred from the turbines to the soil would have a negative impact on the local populations of golden moles.

Existing reptile lists of the area are very poor and it is likely that fieldwork at the site will return some new distribution records for the area, especially of sand-associated species. Although there are a number of Namaqualand endemics likely or confirmed present at the site such as Austen's Gecko *Pachydactylus austeni*, Namaqua Day Gecko *Phelsuma ocellata*, Namaqua Gecko *Pachydactylus namaquensis* and Peers' Girdled Lizard *Namazonurus peersi*, these are all currently classified as Least Concern and are relatively widespread on the coastal plain of Namaqualand. As there is no natural standing water on-site there are not likely to be many amphibians present and the only species likely to be present would be the Namaqua Rain Frog *Breviceps namaquensis*, which is endemic but not of conservation concern.

In general, the fauna present at the Kap Vley site are likely to less specific in terms of broad habitat requirements than the flora, so provided that the identified offset area has the identified plant species of concern present, then it is likely that the associated fauna will also be present. A unique feature of the Kap Vley site that cannot easily be replicated is the fine-scale habitat diversity and the juxtaposition of numerous habitats within a small area and especially the presence of rocky outcrops surrounded by Sand Fynbos which is a combination that does not occur often.

4 IDENTIFICATION OF POTENTIAL OFFSET AREAS

The primary characteristic of the Kap Vley site which leads to its' high conservation value and hence CBA and NCPAES status is the presence of Sand Fynbos at the site, as well as the unique broader context of Sandberg. The footprint of the development will be largely within the areas of Sand Fynbos and the offset requirement would therefore also need to focus largely on this habitat and especially the presence of identified key species of conservation concern. At this stage the best available information on the distribution of Sand Fynbos in Namaqualand is the fine-scale mapping of Desmet *et al*. (2009). This indicates that the Kap Vley site is at the northern-most extent of Sand Fynbos and that all other mapped units are to the south of the site Figure 7. Based on the habitat diversity at Kap Vley, it appears that the areas of Sand Fynbos immediately south of the site may not have the required SCC present as this area consists largely of the Sandveld Fynbos Mosaic habitat type. This habitat unit is characterised by a fine-scale mix of Strandveld and Sand Fynbos with Strandveld on the dune crests and slopes and Sand Fynbos in the low-lying dune slacks were moisture availability is higher. If the presence of Restio Fynbos and Dune Fynbos are taken as key indicators, then significant habitat does not occur until south of the Spoeg River over 75 km from Kap Vley. However, based on personal experience, there are also some potential target areas inland of Hondeklipbay to the north of the Spoeg River, approximately 50 km south of Kap Vley.

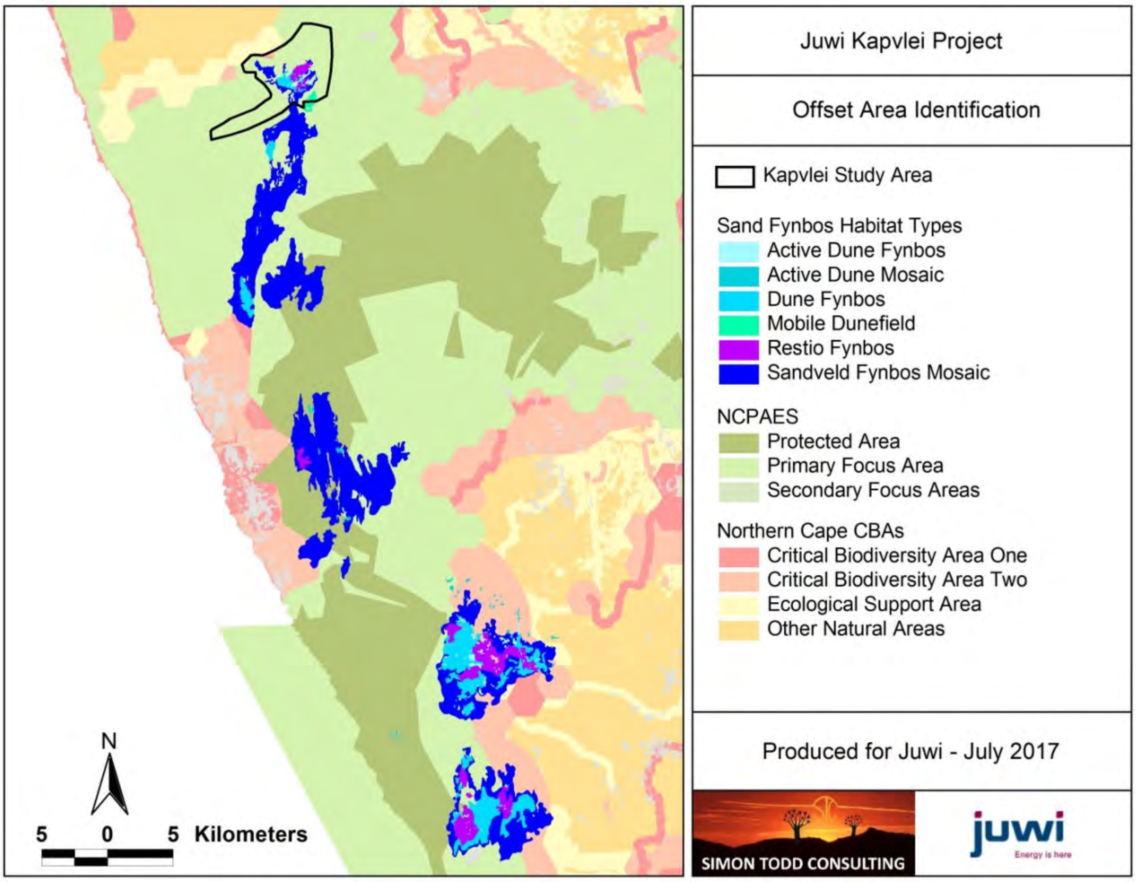


Figure 7. Combined map showing the distribution of Sand Fynbos habitat types over-laid on the NCPAES and the CBA map for the area from Kap Vley to just south of the Bitter River.

The presence of the key plant species of conservation concern should however be the primary determinant of offset target areas and some additional fieldwork to investigate their presence in the area immediately south of Kap Vley may be required to verify whether or not this area represents a valid offset target area or not. However, preliminary indications are that the areas of Sand Fynbos immediately north and south of the Spoegriver would be the likely potential offset target areas (Figure 8, Figure 9). Both of these areas abut onto the Namakwa National Park, which would facilitate incorporation of any offset area into the park.

In terms of the identification and refinement of possible target offset areas, it would not be necessary to identify actual properties for purchase in the EIA phase. The requirement for an offset is usually included as one of the conditions of the Environmental Authorisation and usually has a 5-year implementation limit or that the offset agreement must be in place before construction commences. Given these possibilities, the implementation of the offset would be triggered by the project being selected as a preferred bidder. Consequently, the main objectives of the offset study at the EIA stage would be to identify a number of target properties or areas where an offset would be considered suitable and rank these according to their suitability.

Figure 8. Example of Sand Fynbos habitat from the extensive area of Sand Fynbos south of the Spoeg River, showing dense restio-dominated vegetation on the lower-lying areas between the dunes and grey *Cladoraphis*-dominated areas and larger shrubs on dunes.

Figure 9. Example of Sand Fynbos habitat from the area north of the Spoeg River, inland of Hondeklipbay. The landscape consists of flats dominated by restios alternating with vegetated dunes with a higher abundance of shrubs.

Figure 10. Image showing the relatively homogenous restio fynbos between the two main hills of the Kap Vley site, as well as some loose dunes and the foreground and the rocky outcrops on the top of the hills in the distance. The large trees are alien *Acacia*.

5 CONCLUSION AND RECOMMENDATIONS

Important implications of the Draft National Biodiversity Offset Policy include the following:

- Offsets cannot and are not intended to compensate for significant impact on species or habitats of conservation concern. As such, the priority for the EIA remains to minimise impact on the populations of SCC present at the site as far as possible. The fine-scale mapping that has been done at the site suggests that impacts on SCC can be reduced to acceptable levels through careful planning and detailed vegetation surveys in the forthcoming spring season.

- While it is not necessary to identify the actual target offset property at this stage, the Offsets Report should include a number of potential target areas and provide associated species lists and rank the various options in terms of their suitability.

- In order to comply with the principle of equivalence or 'like for like', the most likely offset mechanism would be land purchase unless a strong argument can be made for an alternative offset mechanism.

- The total extent of the required offset is not identified here, but the draft guidelines indicate that a ratio of 20 to 1 is usually required for situations where CBAs and protected area expansion focus areas are being impacted. This will be clarified once the detailed fieldwork has been conducted and the actual footprint within the different habitat types can be accurately calculated.

In terms of the site characterisation component of this study, the major findings can be summarised as follows:

- This study confirms the regional sensitivity of the Kap Vley site. The primary characteristic of the Kap Vley site which leads to its' high conservation value and hence CBA and NCPAES status is the presence of Sand Fynbos at the site with a high abundance of plant species of conservation concern, as well as the unique broader context of Sandberg.

- The likely need for an offset for the development would be motivated by the following factors:

    - The site lies within a Level 1 CBA
    - The site lies within a NCPEAS Primary Focus Area
    - The presence of numerous SCC on site
    - Regional significance of the site

- The footprint of the development will be largely within the areas of Sand Fynbos and the offset requirement would therefore also need to focus largely on this habitat and especially the presence of identified key species of conservation concern.

- The fine-scale mapping of Sand Fynbos habitat units on the Coastal Plain by Desmet *et al* (2009), provides a basis for identifying similar habitats as affected at Kap Vley, elsewhere in the region. This mapping as well as previous experience in the area suggests that there are similar habitats available in several areas to the south of the site, especially in the vicinity of the Spoegriver, inland of Hondeklipbay.

- In general, the fauna present at the Kap Vley site are likely to less specific in terms of broad habitat requirements than the flora, so provided that the identified offset area has the identified plant species of concern present, then it is likely that the associated fauna will also be present.

- A unique feature of the Kap Vley site that cannot easily be replicated is the fine-scale habitat diversity of the site and the juxtaposition of numerous habitats within a small area and especially the presence of rocky outcrops surrounded by Sand Fynbos which is a combination that does not occur often.

In terms of priorities for taking the offset process forward, the following are identified as the most important actions:

- Meet with SanParks and other relevant conservation agencies such as WWF to discuss the potential offset target areas in context of the Namaqua National Park and any priority expansion areas that may have already been identified for the park. In addition, it is critical to obtain confirmation from SanParks as to the acceptability of the offset and their willingness of accommodate an additional area into the national park.

- Conduct detailed fieldwork at Kap Vley so that the impact of the development can be better quantified in terms of the following:

    - The presence of any additional SCC at Kap Vley that have not been identified so far. This information is required to evaluate the impact of the development on SCC as well as identify appropriate offset areas based on the presence of these SCC.

    - The likely impact of the development on key habitats such as the different Sand Fynbos habitat types.

    - The overall significance of impacts at Kap Vley and verify that the development does not constitute a fatal flaw in terms of impact on SCC.

- Evaluate the need to conduct additional fieldwork in the broad offset target areas to confirm the presence of the target SCC in these areas and refine possible offset target properties and rank their acceptability as offset areas.

- Ensure that provincial conservation authorities (DENC) are regularly engaged and kept informed about the offset process as they will be an important commenting authority in the EIA and it is important to ensure that the offset is acceptable to them, even if they will not have the responsibility of managing the offset.

6 REFERENCES

Desmet, P.G., Turner, R. C. and Helme, N. A. 2009. Namaqua Sands Regional Context Vegetation Study. Report for Golder Associates Africa, Halfway House, South Africa.

Mucina L. & Rutherford M.C. (eds) 2006. *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

APPENDIX F2

Letters to provide in-principal agreement from WWF and SANParks to determine a biodiversity offset for the Kap Vley WEF project

WWF South Africa
World Wide Fund For Nature

Reg. No: 003-226 NPO
VAT No: 4820122481
Web: www.wwf.org.za
PBO No.: 130002490

Head Office:
Boundary Terraces
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Mariendahl Lane
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P O Box 23273
CLAREMONT 7735
Tel: +27 21 657 6600
Fax: 086 535 9433

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Tel: +27 11 339 1152
08610 WWFSA (99372)
Fax: 086 538 7391

WWF *for a living planet*®

To: Corné Van Der Westhuizen
Juwi Renewable Energies (PTY) LTD
corne.vanderwesthuizen@juwi.co.za

10 August 2017

Dear Corné,

RE: In-principle support from WWF-SA for offset mechanism to expand Namaqua National Park.

WWF-SA hereby expresses our in-principle support for collaboration with Juwi Renewable Energies (PTY) LTD around the investigation of an offset mechanism to assist with the expansion of the Namaqua National Park.

As you are aware, our Land and Biodiversity Stewardship Programme is actively involved with the expansion of protected areas throughout South Africa and we are keen to explore any viable mechanism that could further our aims in this regard.

Offsets, when properly planned and implemented offer a valuable means to contribute towards protected area expansion. In meetings and correspondence with Juwi Renewable Energies a compelling opportunity for collaboration (with potential outcomes that could be of benefit to SanParks protected area expansion plans) has been presented. We are eager to explore this opportunity with Juwi and our partners to arrive at an outcome that is agreeable to all parties.

Yours Sincerely

Angus Burns
Senior Manager: WWF-SA Land & Biodiversity Stewardship Programme
Email: aburns@wwf.org.za / Mobile*: 084 400 1234*

To develop and manage a system of national parks that represents the biodiversity, landscapes, and associated heritage assets of South Africa for the sustainable use and benefit of all.

South African NATIONAL PARKS

Park Planning & Development
South African National Parks
PO Box 76693
Port Elizabeth
Email: mknight@nmmu.ac.za
Tel:+27-41-5085411

2017/08/25

Ref: 13/1/2/2/6

Mr Corné Van Der Westhuizen
Juwi Renewable Energies (Pty) Ltd
Metropolitan Centre
7 Walter Sisulu Avenue
CAPE TOWN
8001

Dear Mr van der Westhuizen

In-principle support from SANParks for the proposed methodology to determine an mechanism to implement an biodiversity offset to expand the Namaqua National Park.

SANParks hereby expresses in-principle support for the proposed methodology to determine a mechanism to implement, as set out in the attached Screening Phase Offset Study for the Kap Vley Wind Farm.

The 2014 EIA Regulations, as part of the introduction of the "One Environmental System, impose very tight timeframes on BAR and S&EIR processes. In order for the biodiversity impacts to be adequately assessed and evaluated, and the mitigation sequence applied, it is desirable to evaluate the probable need for – and design of - offsets in the pre-application phase. Thus, this letter in no manner constitutes an agreement to the offset itself. Comment to this effect can only be provided once the proposed methodology has been implemented to determine an actual offset, to be evaluated.

Yours faithfully

Dr Mike Knight
GM: Park Planning and Development
South African National Parks

643 Leyds Street
MUCKLENEUK
0002

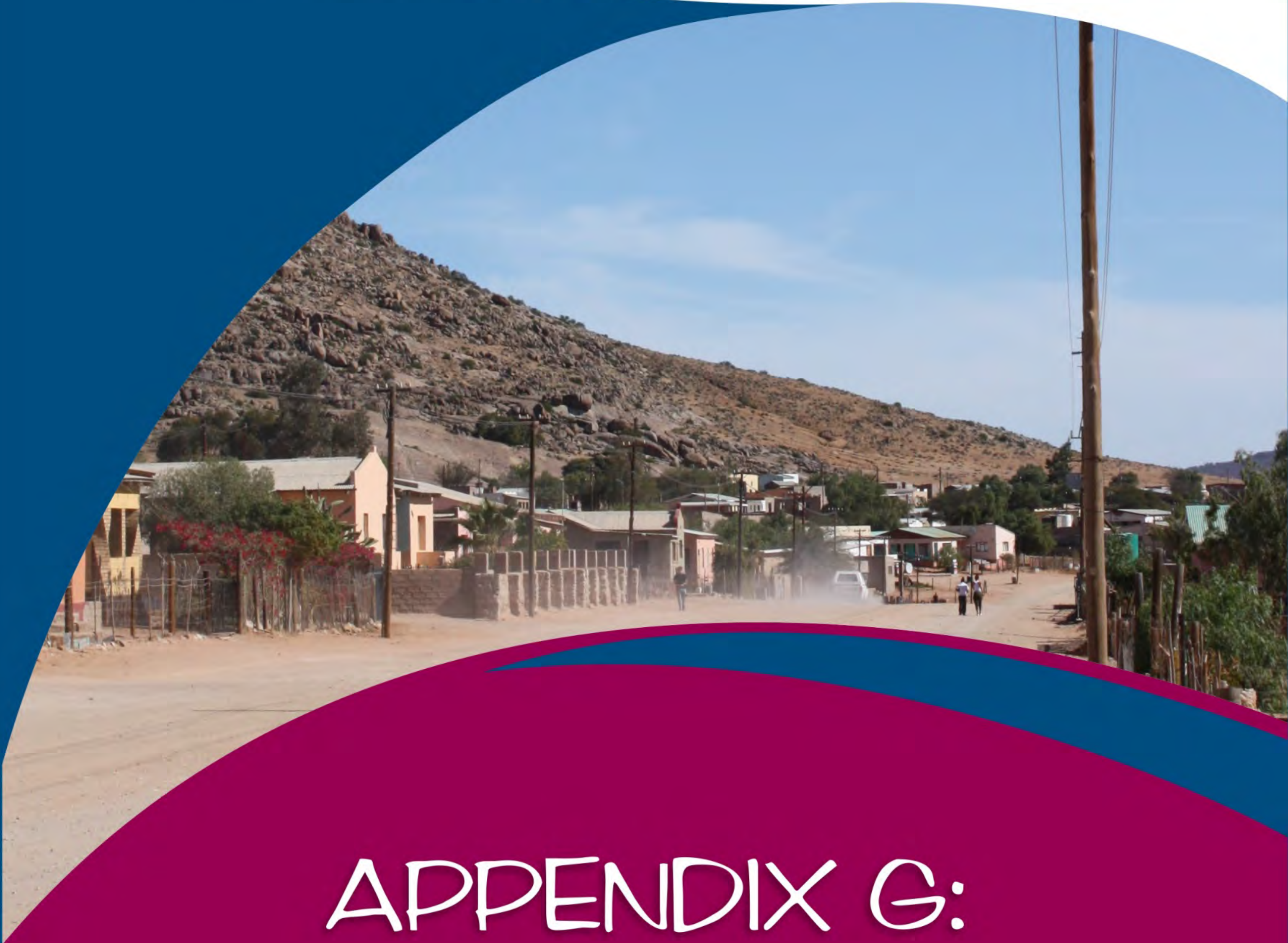
P.O. Box 787
PRETORIA
0001

Tel: 012 426-5000

central reservations: 012 428 911
reservations@sanparks.org
www.sanparks.org

Environmental Impact Assessment for the proposed Kap Vley Wind Energy Facility near Kleinzee in the Northern Cape

FINAL SCOPING REPORT



APPENDIX G:

Scoping inputs from Specialists

CONTENTS

STUDY	ORGANISATION	NAME
Terrestrial Ecology (including fauna and flora) Biodiversity Offset study	Simon Todd Consulting	Simon Todd
Bird Impact Assessment	ARCUS	Andrew Pearson
Bat Impact Assessment	ARCUS	Jonathan Aronson
Aquatic Impact Assessment	CSIR (External Review)	Luanita Snyman v.d Walt
Visual Impact Assessment	Bernard Oberholzer Landscape Architect and BOLA	Bernard Oberholzer and Quinton Lawson
Heritage Impact Assessment (Archaeology, and Cultural Landscape)	ASHA Consulting (Pty) Ltd	Dr Jayson Orton Jayson
Desktop Palaeontological Impact Assessment	Private, sub-contracted by ASHA Consulting (Pty) Ltd	John Pether
Soils and Agricultural Potential Assessment	Private	Johann Lanz
Socio-Economic Impact Assessment	CSIR (External Review)	Surina Laurie
Noise Impact Assessment	Enviro-Acoustic Research cc	Morné de Jager
Transportation Impact Assessment	WSP	Christo Bredenhann

SCOPING INPUTS FROM SPECIALIST:

Terrestrial Ecological Study: Fauna and Flora

Scoping and Environmental Impact Assessment for the Proposed Development of the Kap Vley Wind Energy Facility near Kleinzee, Northern Cape Province: SCOPING REPORT

Report prepared for:

CSIR – Environmental Management Services

P O Box 320

Stellenbosch

7600

Report prepared by:

Simon Todd

60 Forrest Way

Glencairn

7975

October 2017

Short CV/Summary of Expertise – Simon Todd

SIMON TODD CONSULTING

ECOLOGICAL SPECIALIST SERVICES

Assessment/Management/Research

Simon Todd Pr.Sci.Nat

C: 082 3326502
O: 021 782 0377
Simon.Todd@3foxes.co.za

60 Forrest Way
Glencairn
7975

Ecological Solutions for People & the Environment

- Profession: Independent Ecological Consultant - Pr.Sci.Nat 400425/11
- Specialisation: Plant & Animal Ecology
- Years of Experience: 20 Years

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Nama Karoo, Succulent Karoo, Thicket, Arid Grassland, Fynbos and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity
- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

- 2009 – Present – Sole Proprietor of Simon Todd Consulting, providing specialist ecological services for development and research.
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute

General Experience & Expertise

- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa. Projects have ranged in extent from <50 ha to more than 50 000 ha.
- Widely-recognized arid ecology specialist. Published numerous peer-reviewed scientific publications based on various ecological studies across the country. Past chairman of the Arid Zone Ecology Forum and current executive committee member.
- Extensive experience in the field and exceptional level of technical expertise, particularly with regards to GIS capabilities which is essential with regards to producing high-quality sensitivity maps for use in the design of final project layouts.
- Strong research background which has proved invaluable when working on several ecologically sensitive and potentially controversial sites containing some of the most threatened fauna in South Africa.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of the arid and semi-arid parts of South Africa.
- Maintain several long-term vegetation monitoring projects distributed across Namaqualand and the karoo.
- Guest lecturer at two universities and have also served as an external examiner.
- Reviewed papers for more than 10 international ecological journals.
- Past chairman and current committee member of the Arid Zone Ecological Forum.
- SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

A selection of recent work is as follows:

Strategic Environmental Assessments

Co-Author. Chapter 7 - Biodiversity & Ecosystems - Shale Gas SEA. CSIR 2016.

Co-Author. Chapter 1 Scenarios and Activities – Shale Gas SEA. CSIR 2016.

Co-Author – Ecological Chapter – Wind and Solar SEA. CSIR 2014.

Co-Author – Ecological Chapter – Eskom Grid Infrastructure SEA. CSIR 2015.

Contributor – Ecological & Conservation components to SKA SEA. CSIR 2017.

Specialist Ecological Studies

- Fauna Specialist Study for the proposed Eskom Kleinsee 300MW WEF. Savannah Environmental 2012.
- Fauna and Flora Specialist Study for the Project Blue Wind and Solar Energy Facility, Near Kleinsee. Savannah Environmental 2012.
- Fauna and Flora for the G7 Richtersveld Wind Farm. Environmental Resources Management 2011.
- Preconstruction Walk-Through of the Juno-Gromis 400kV Power Line. Nsovo Environmental 2016.
- Specialist Faunal Assessment of the West Coast Resources Mine Expansion. Myezo Environmental. 2016.
- Fauna and Flora specialist Scoping & EIA Study for the Tormin Mineral Sands Inland and Coastal Mining expansion. SRK. 2016.

SPECIALIST DECLARATION

I, **Simon Todd**, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist: ______________________________

Name of Specialist: Simon Todd

October 2017

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TABLES AND FIGURES

SPECIALIST SCOPING INPUTS:

ECOLOGY: FAUNA AND FLORA

1.1. INTRODUCTION AND METHODOLOGY

1.1.1. Scope and Objectives

Juwi Renewable Energies (Pty) Ltd (hereafter referred to as 'juwi') has appointed CSIR to undertake the required environmental authorisation process for the proposed Kap Vley Wind Farm located west of Springbok in the Northern Cape Province. It is anticipated that the Kap Vley Wind Farm will have a maximum number of 56 turbines. A grid connection will also be required, but this will be authorised through a separate Basic Assessment process. The development is currently in the Scoping Phase and CSIR has appointed Simon Todd Consulting to provide a specialist terrestrial biodiversity Scoping Study of the development site as part of the EIA process.

The purpose of the Terrestrial Biodiversity Scoping Report is to describe and detail the ecological features of the proposed site; provide a preliminary assessment of the ecological sensitivity of the site and identify the likely impacts that may be associated with the development of the site as a wind energy facility. Several site visits as well as a desktop review of the available ecological information for the area was conducted in order to identify and characterise the ecological features of the site. This information is used to derive a draft ecological sensitivity map that presents the likely ecological constraints and opportunities for development at the site. The information and sensitivity map presented here provides an ecological baseline that can be used in the planning phase of the development to ensure that the potential negative ecological impacts associated with the development can be minimised. Furthermore, the study defines the terms of reference for the EIA phase of the project and outlines a plan of study for the EIA which will follow the Scoping Study.

1.1.2. Terms of Reference

The study includes the following activities:

- a description of the environment that may be affected by a specific activity and the manner in which the environment may be affected by the proposed project;
- a description and evaluation of environmental issues and potential impacts (including assessment of direct, indirect and cumulative impacts) that have been identified;
- a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts;
- an indication of the methodology used in determining the significance of potential environmental impacts;
- an assessment of the significance of direct indirect and cumulative impacts of the development;
- a description and comparative assessment of all alternatives including cumulative impacts;

- recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Programme (EMPr);
- an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- a description of any assumptions uncertainties and gaps in knowledge; and
  - o an environmental impact statement which contains:
  - o a summary of the key findings of the environmental impact assessment;
  - o an assessment of the positive and negative implications of the proposed activity; and
  - o a comparative assessment of the positive and negative implications of identified alternatives.

General Considerations for the study included the following:

- Disclose any gaps in information (and limitations in the study) or assumptions made.
- Identify recommendations for mitigation measures to minimise impacts.
- Outline additional management guidelines.
- Provide monitoring requirements, mitigation measures and recommendations in a table format as input into the EMPr for faunal or flora related issues.
- The assessment of the potential impacts of the development and the recommended mitigation measures provided have been separated into the following project phases:
  - o Planning and Construction
  - o Operational
  - o Decommissioining

1.1.3. Approach and Methodology

This assessment is conducted according to the 2014 EIA Regulations (Government Notice Regulation 982) (as amended) in terms of the National Environmental Management Act (Act 107 of 1998) as amended (NEMA), as well as best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers *et al*. (2005).

In terms of NEMA, this assessment demonstrates how the proponent intends to comply with the principles contained in Section 2 of NEMA, which amongst other things, indicates that environmental management should:

- (In order of priority) aim to: avoid, minimise or remedy disturbance of ecosystems and loss of biodiversity (Figure 1);
- Avoid degradation of the environment;
- Avoid jeopardising ecosystem integrity;
- Pursue the best practicable environmental option by means of integrated environmental management;
- Protect the environment as the people's common heritage;
- Control and minimise environmental damage; and
- Pay specific attention to management and planning procedures pertaining to sensitive, vulnerable, highly dynamic or stressed ecosystems.

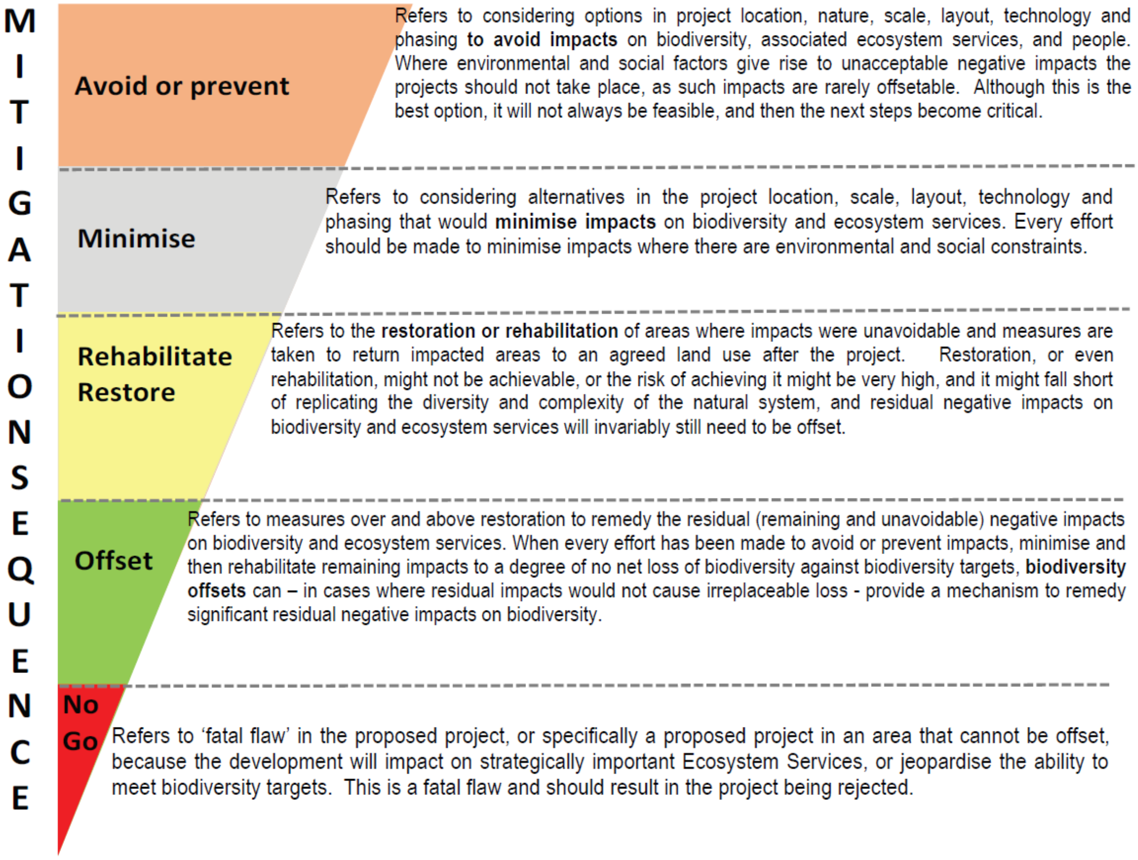


Figure 1. The mitigation hierarchy that is used to guide the study in terms of the priority of different mitigation and avoidance strategies.

Furthermore, in terms of best practice guidelines as outlined by Brownlie (2005) and De Villiers et al. (2005), a precautionary and risk-averse approach should be adopted for projects which may result in substantial detrimental impacts on biodiversity and ecosystems, especially the irreversible loss of habitat and ecological functioning in threatened ecosystems or designated sensitive areas: i.e. Critical Biodiversity Areas (CBAs) (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas.

In order to adhere to the above principles and best-practice guidelines, the following approach forms the basis for the study approach and assessment philosophy:

- The study includes data searches, desktop studies, site walkovers / field survey of the property and baseline data collection, describing:
- A description of the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of **pattern**, the following will be identified or described:

Community and ecosystem level

- The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
- Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, fine-scale systematic conservation plans, etc*).

Species level

- Species of Conservation Concern (SCC) (giving location if possible using GPS)
- The viability of an estimated population size of the RDB species that are present (including the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
- The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Fauna

- Describe and assess the terrestrial fauna present in the area that will be affected by the proposed development.
- Conduct a faunal assessment that can be integrated into the ecological study.
- Describe the existing impacts of current land use as they affect the fauna.
- Clarify species of special concern (SSC) and that are known to be:
    - endemic to the region;
    - that are considered to be of conservational concern;
    - that are in commercial trade (CITES listed species); or
    - are of cultural significance.
- Provide monitoring requirements as input into the EMPr for faunal related issues.

Other pattern issues

- Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
- The condition of the site in terms of current or previous land uses.

In terms of **process**, the following will be identified and/or described:

- The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
- Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries).
- Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
- Furthermore, any further studies that may be required during or after the EIA process will be outlined.

- All relevant legislation, permits and standards that would apply to the development will be identified.
- The opportunities and constraints for development will be described and shown graphically on an aerial photograph, satellite image or map delineated at an appropriate level of spatial accuracy.

1.1.4. Assumptions and Limitations

The current study consisted of several site visits as well as a desktop study, which serves to reduce the limitations and assumptions required for the study. As the site visits took place in the spring flowering season, the vegetation was in a good condition for sampling and there are few limitations with regards to the vegetation sampling and the species lists obtained are considered comprehensive. In addition, the sensitivity mapping was based on high resolution aerial photography taken in 2016 and supplemented with detailed on-site information regarding the location and distribution of plant species of conservation concern within the development footprint.

Many fauna are difficult to observe in the field and their potential presence at the site must be evaluated based on the literature and available databases. In many cases, these databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many remote areas have not been well sampled with the result that the species lists derived for the area do not always adequately reflect the actual fauna and flora present at the site. In order to further reduce this limitation, and ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study site. In order to better characterise the faunal community at the site, camera traps have been set on the site, but this information will only be available for the EIA phase. In addition, the consultant has worked extensively in the area, and information from nearby sites is used as and where appropriate.

1.1.5. Source of Information

Data sources from the literature consulted and used where necessary in the study includes the following:

Vegetation:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2006 and 2012 update) as well as the National List of Threatened Ecosystems (2011), where relevant.
- Information on plant and animal species recorded for the area was extracted from the new Plants of South Africa (POSA) database hosted by the South African National Biodiversity Institute (SANBI). Data was extracted for a significantly larger area than the study area, but this is necessary to ensure a conservative approach as well as counter the fact that the site itself has not been well sampled in the past.
- The IUCN conservation status of the species in the list was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants (2017).

Habitats & Ecosystems:

- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important protected areas expansion areas were extracted from the Northern Cape Protected Areas Expansion Strategy (NC-NPAES 2017).
- Critical Biodiversity Areas in the study area were obtained from the Northern Cape Conservation Plan (Oosthuysen & Holness 2016).

Fauna:

- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and the ADU databases http://vmus.adu.org.za.
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, EWT & SANBI (2016) and Skinner and Chimimba (2005) for mammals.
- The faunal species lists provided are based on species which are known to occur in the broad geographical area, as well as a preliminary assessment of the availability and quality of suitable habitat at the site.
- The conservation status of mammals is based on the IUCN Red List Categories (EWT/SANBI 2016), while reptiles are based on the South African Reptile Conservation Assessment (Bates et al. 2013) and amphibians on Minter et al. (2004) as well as the IUCN (2017).

1.2. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO ECOLOGICAL IMPACTS

A summary of the relevant components and footprint areas are described briefly below-a full description will be provided in the full Ecological Impact Assessment which will be included in the EIA Report. It is anticipated that the Kap Vley WEF will have an output capacity of up to 300MW, which would be generated by up to 56 turbines with a hub height and rotor diameter of up 150 m and 160 m respectively. The basic components of the development that would require vegetation clearing or generate potential impacts include the following:

- A total of up to 50km of internal gravel surface access roads linking turbines, 8 - 13 m wide;
- Each turbine would have a reinforced foundation of 20 m x 20 m & 1 m deep, with an associated Crane Platform of 1.4 ha each;
- A concrete batching plant of 50 m x 50 m (0.25 ha);
- Operations and maintenance building occupying an area of 1ha;
- Temporary laydown and construction area of 10 ha;
- Temporary hardstand area for plant assembly of 15 ha;
- On-site 33 kV/132 kV substation (~150 x 150 m, ie 225 ha);

A 132kV line which connects the facility to either the existing Gromis Substation or the yet to be constructed Eskom substation west of the site, would also be required. A separate BA process will be undertaken for the 132 kV overhead transmission line and it is not dealt with any further here.

1.3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

1.3.1. Vegetation Types

According to the national vegetation map (Mucina & Rutherford 2006/2012), there are three vegetation types within the boundaries of the study area, Namaqualand Klipkoppe Shrubland, Namaqualand Strandveld and Namaqualand Sand Fynbos (Figure 2).

The majority of the site is mapped as Namaqualand Klipkoppe Shrubland. This vegetation unit occupies 10936 km^2 of central Namaqualand from Steinkopf to Nuwerus in the south. Namaqualand Klipkoppe Shrubland is associated with the rocky hills, granite and gneiss domes of the mountains of central Namaqualand. Due to its' steep and rocky nature, Namaqualand Klipkoppe Shrubland has not been impacted by intensive agriculture and 6% is currently conserved, mainly within Goegap and the Namaqua National Park. As Namaqualand Klipkoppe Shrubland is still largely intact it has been classified as Least Threatened. Mucina & Rutherford list 15 endemic species for this vegetation type. At a coarse level, it is sensitive largely in terms of offering a diverse habitat for fauna such as reptiles but relatively speaking does not have a high abundance of listed plant species.

The majority of the lower-lying parts of the site are classified as Namaqualand Strandveld which occurs in the Northern and Western Cape Provinces from the southern Richtersveld as far south as Donkins Bay. Especially in the north of this unit it penetrates up to 40km inland and approaches the coast only near the river mouths of the Buffels, Swartlintjies, Spoeg, Bitter and Groen Rivers. In the south of the unit it is variably narrow and approaches the coast more closely. It consists of flat to undulating coastal peneplains with vegetation being a low species richness shrubland dominated by a plethora of erect and creeping succulent shrubs as well as woody shrubs and in wet years annuals are also abundant. It is associated with deep red or yellowish-red Aeolian dunes and deep sand overlying marine sediments and granite gneisses. Mucina and Rutherford list eight endemic species for this vegetation type. About 10% of this vegetation type has been lost mainly to coastal mining for heavy metals and it is not currently listed.

There is a narrow strip of Namaqualand Sand Fynbos mapped along the eastern boundary of the study area. Namaqualand Sand Fynbos typically occurs on acid to neutral sands, often on windblown dunes and on the dune slacks. It is distributed in the Northern and Western Cape from the vicinity of the study area to Koekenaap in the south, along the coastal plain. It occurs on Aeolian deep, loose, red sands overlying marine or other sediments. It is usually a low to medium shrubland, often dominated by restios, with *Proteaceae* often present, usually in low numbers. Bulbs and annuals may be common, with succulents common only on dune slacks. It is not a fire driven system and often forms mosaics with various Strandveld types, and boundaries can be very diffuse.

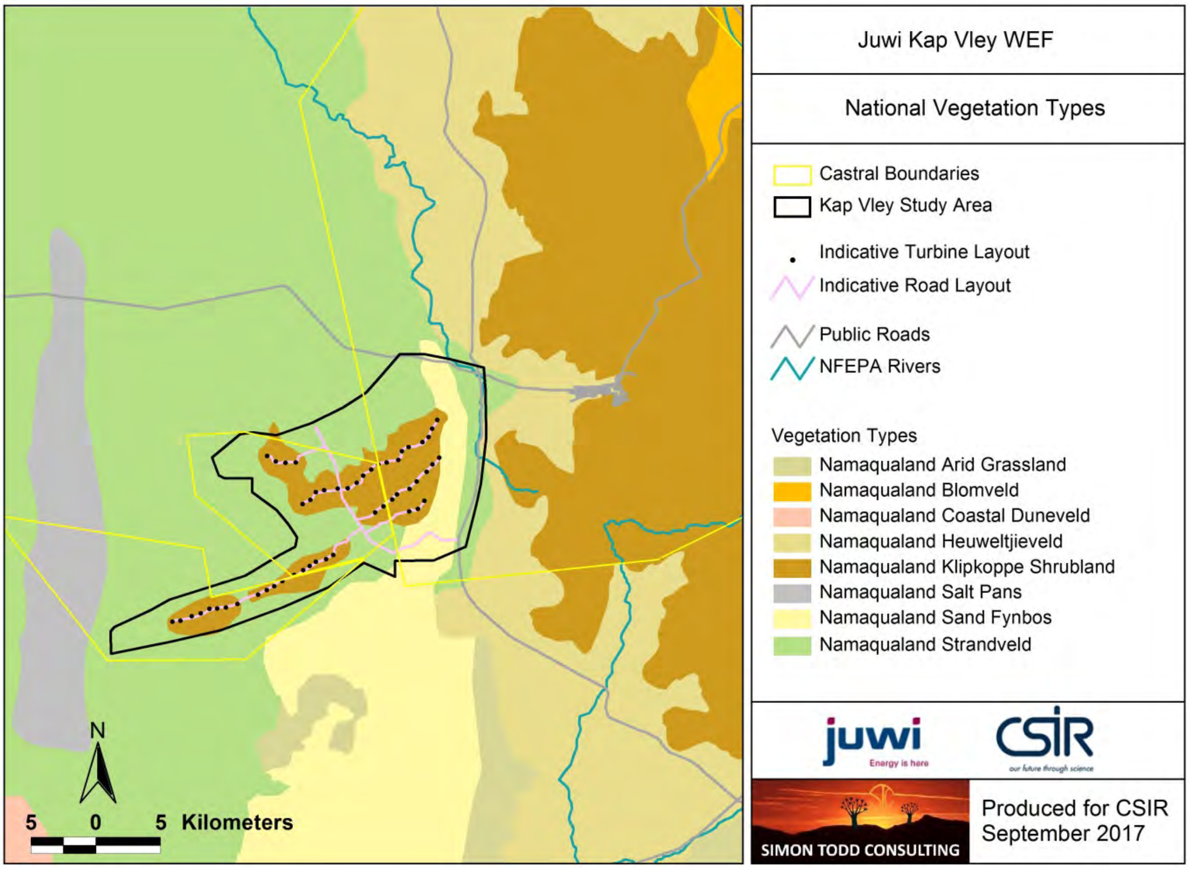


Figure 2. Vegetation map (Mucina and Rutherford 2006 and Powrie Update (2012) of the Kap Vley study area and surrounding area.

The national vegetation map does not provide a very satisfactory reflection of the vegetation of the site. This relates largely to the extensive tracts of Namaqualand Klipkoppe Shrubland which has been mapped at the site compared to the limited extent of this unit actually present at the site. Although there are some rocky hills and outcrops present at the site which can be considered representative of this unit, the lower slopes of the hills on-site are generally covered in aeolian sand and consist of Namaqualand Sand Fynbos, which has been significantly under-mapped at the site. Although there are some broad-scale vegetation mapping studies funded by mines in the area, which have observed and corrected these errors, these are not yet publically available and have yet to be incorporated into the national vegetation map. This information has been used to inform the current study as appropriate, but cannot be explicitly included here until such time as this information is released publically. Of relevance to the current study, is that the site occurs at the northern extreme distribution point of Namaqualand Sand Fynbos and there do not appear to be any areas of this unit to the north of the current site. In addition, this unit has not been well investigated in the past and there are at least 30 endemic or red-listed species of conservation concern known from this vegetation unit. The vegetation of the site as affected by the development is detailed below.

1.3.2. Fine-Scale Vegetation Description

A fine scale habitat map for the study area has been produced, based on high resolution aerial photography of the study area and information collected on-site (Figure 3). The map illustrates the high diversity of habitats present at the site, as well as the high local variation in the number of habitats present. This map forms the basis for the sensitivity mapping at the site and each unit is ascribed a sensitivity rating according to the presence and abundance of Species and features of Conservation Concern within each unit mapped.

In the north of the site, the predominant habitat that would be affected is the rocky hills and adjacent stony flats of the Namaqualand Klipkoppe Shrubland vegetation type. Although this is not a threatened vegetation type, the rocky areas at the site are quartzitic in nature, which is unusual as the majority of the Namaqualand Klipkoppe Shrubland occurs on Gneiss or Granite outcrops. While the abundance of plant species of conservation concern is generally fairly low in this habitat, there are some areas of quartz gravels with a high abundance of habitat specialists present. In addition, the rocky hills represent an important habitat for reptiles and small mammals. In the south east the lower-lying ridges have generally been covered in sand and the majority of the turbines are associated with various types of Sand Fynbos, which generally have a high abundance of species of conservation concern. In the west, development is restricted to a single ridge which gets progressively lower and more arid and the vegetation can best be described as a low succulent shrubland. There are relatively few Species of Conservation Concern in this area.

Additional ground-truthing and vegetation surveys will be required going into the EIA phase to better characterise the plant communities present in each of the mapped habitats and refine the sensitivities of the different units.

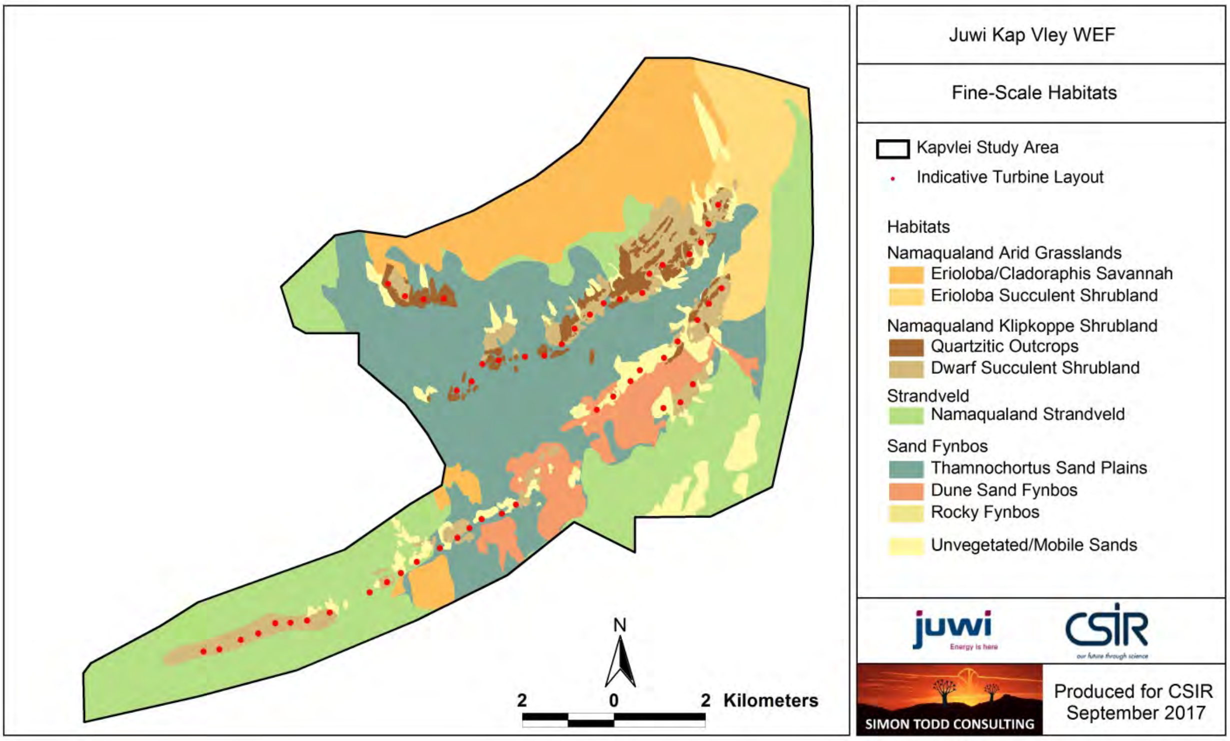
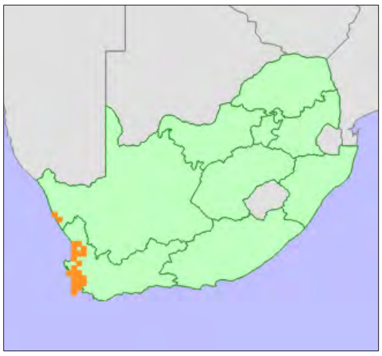


Figure 3. Fine-Scale habitat map for the Kap Vley study area, based on high resolution aerial photography and field-based information.

1.3.3. Listed and Protected Plant Species

Based on the fieldwork that has been conducted at Kap Vley there are a number of endemic and species of conservation concern present at the site (Table 1) and which would potentially be affected by the development. These are summarised below, showing their distribution according to the SANBI Red List, as well as the potential significance of impacts on each species. It is clear from the field assessment that some impact on these species is unavoidable and even with the fine-scale mapping that has been conducted at the site, some residual impact on plant species of conservation concern is certain to occur. While some degree of impact on most of the SCC present is likely unavoidable, avoidance and mitigation should strive to reduce these impacts as far as possible. Ultimately, the acceptability of the development will to a large degree hinge on the degree to which these impacts can be reduced to acceptable levels.

Table 1. *Species of Conservation Concern (SCC) confirmed present at the Kap Vley site, with maps of their distribution taken from the Red List of South African Plants (see http://redlist.sanbi.org/redcat.php) and a short consideration of their likely significance for the development of the site.*

Species & Image	IUCN Status & Abundance on-site	Significance for Kap Vley development
Aspalathus albens 	Recently downgraded from Vulnerable to Least Concern 	Populations are localised and so avoidance would be effective and a significant impact on this species is not likely. Residual impact on this species would likely have low significance.
Metalasia adunca 	Near Threatened Common on dunes and sandy slopes 	Common within the affected areas and even with avoidance, a relatively large number of individuals would be affected. This would however constitute a small proportion of the local population. As this is fairly widespread species, the likely impact on this species is not considered highly significant.
Muraltia obovata 	Vulnerable Common and widespread across most habitats with sandy soils 	Very common at the site and avoidance will not be possible, but impact on local population not likely to be highly significant as it is very common within favourable habitat. Implications for the development are low.

Agathosma elata 	Endangered Locally abundant on sandy slopes 	Scattered but healthy populations can probably be avoided. Impact on this species would have high significance but avoidance is likely to be effective at minimising impact. .
Argyrolobium velutinum 	Endangered Occasional on sandy slopes 	Occasional scattered plants that can probably be avoided. Significant impact on this species is not likely.
Caesia sabulosa 	Vulnerable Uncommon 	Not common at the site and significant impact is not likely. Implications for the development is low.
Lampranthus procumbens	Vulnerable	Locally common on favourable slopes. Impact on this species would have high significance but populations are localised and

	Confined to favourable slopes where it can be locally common 	it is likely that most local populations can be avoided.
Phyllobolus tenuiflorus 	Vulnerable Uncommon on rocky soils 	Not common at the site and it is not likely that a significant impact would be generated. Low significance for the development.
Leucospermum praemorsum 	Vulnerable Localised but common along parts of the affected ridges 	Although this species is localised, the favoured habitat coincides with target areas for turbines and some impact on this species is likely. Impact on this species is of high potential significance and specific avoidance will need to be implemented to reduce impacts to an acceptable level.

1.3.4. Faunal Communities

1.3.4.1. Mammals

As many as 45 different mammals are known from the broad area around the site. Of these four are red-listed and of conservation concern. This includes the Leopard *Panthera pardus* (Vulnerable), Littledale's Whistling Rat *Parotomys littledalei* (Near Threatened), African Clawless Otter *Aonyx capensis* (Near Threatened) and Grants' Golden Mole *Eremitalpa granti granti* (Vulnerable). It is not likely that either the Leopard or Otter are present at the site on account of human disturbance or lack of suitable habitat. Golden Moles were observed at the site, but it is not clear if these are the more common Cape Golden Mole or Grants' Golden Mole. These subterranean animals 'swim' through the soft sand and hardened surfaces such as roads would pose a significant obstacle for movement. In addition, they also use subtle vibrations in the soil to detect their prey and it is possible that noise and vibration transferred from the turbines to the soil would have a negative impact on the local populations of golden moles. There have however been no studies to date on the impacts of vibration and noise on golden moles and so this remains an unknown.

Species observed at the site to date include Steenbok, Common Duiker, South African Ground Squirrel, Suricate, Yellow Mongoose, Namaqualand Rock Mouse, Rock Hyrax, South African Molerat, Black-backed Jackal, Caracal, Baboon, Aardvark and Smith's Red Rock Hare. Camera traps have been put out at the site to better characterise the faunal community of the site as well as establish patterns of habitat use.

It is likely that the major impact of development on most mammals would be habitat loss equivalent to the footprint of the facility. Some species may however be wary of the turbines or negatively affected by the noise generated and may avoid them to the greater degree. It is however unlikely that the local or regional populations of any species would be compromised by the development and long-term impacts on mammals are likely to be low to moderate after mitigation.

1.3.4.2. Reptiles

Although more than 40 reptiles are known from the broad area around the site, the area has not been well investigated and it is likely that fieldwork at the site will return some new distribution records for the area, especially of sand-associated species. Although there are a number of Namaqualand endemics likely or confirmed present at the site such as Austen's Gecko *Pachydactylus austeni*, Namaqua Day Gecko *Phelsuma ocellata*, Namaqua Gecko *Pachydactylus namaquensis* and Peers' Girdled Lizard *Namazonurus peersi*, these are all currently classified as Least Concern and are relatively widespread on the coastal plain of Namaqualand. No species of conservation concern have been recorded from the area although it is possible that the Speckled Padloper *Chersobius signatus* (Vulnerable) is present at the site as it is widespread in Namaqualand and the habitat at the site is suitable.

The most important habitat for reptiles at the site are the rocky outcrops, which provide an array of microsites and suitable refuges for a variety of reptiles. Overall, impacts of the development on reptiles are likely to be of local significance only as there are no species with a very narrow distribution range or of high conservation concern present at the site.

1.3.4.3. Amphibians

Not surprisingly, given the aridity of the study area, there are not a lot of amphibians which may occur at the site. Since there is no natural permanent water on the site, only species which are independent of water are likely to be present. This includes species such as the Cape Sand Frog *Tomopterna delalandii*, Namaqua Rain Frog *Breviceps namaquensis* and the Desert Rain Frog *Breviceps macrops* which is classified as Vulnerable. The Desert Rain Frog is however restricted to the coastline and is not known to occur so far inland and as a result is unlikely to occur at the site, although this cannot be discounted as the area has not been well investigated.

Given the paucity of important amphibian habitats at the site and the low likely density of amphibians, a significant impact on frogs is not likely.

1.3.5. Critical Biodiversity Areas

The Kap Vley site lies within a Tier 1 and Tier 2 Critical Biodiversity Area (CBA), indicating that the site occurs within an area of recognised biodiversity significance. Development within such areas can have negative impacts on biodiversity pattern and process and is generally considered undesirable. Although the total footprint (approximately 150ha) of the development is not very large, it must be considered in context of the currently intact and relatively undisturbed receiving environment and the implications that the development may have for future land use options in the area.

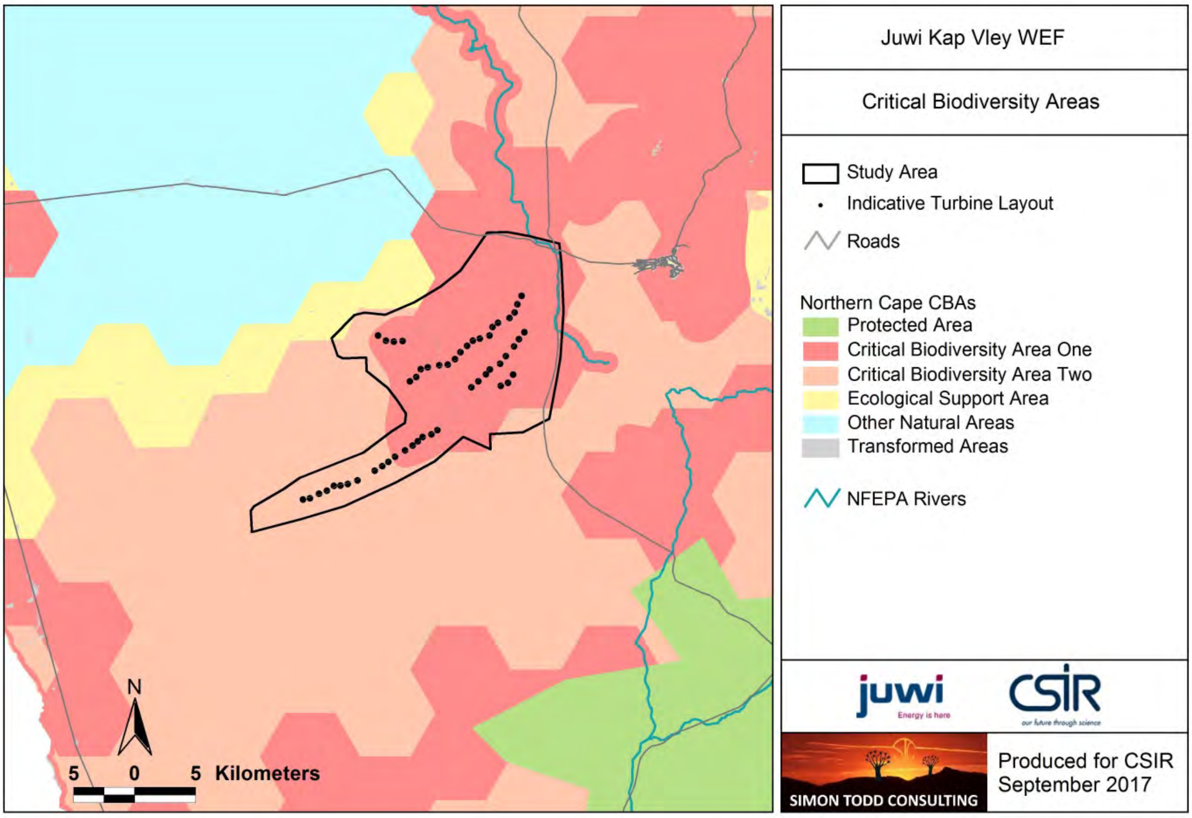


Figure 4. Critical Biodiversity Areas map for the study area, showing that the site lies within a Tier 1 and Tier 2 CBA.

The site also falls within a Northern Cape Protected Area Expansion Strategy (NCPAES) Focus Area (2017), which further highlights the significance of the area for conservation purposes (Figure 5). Development of the site would certainly place some limitations on the future expansion of traditional formalised conservation into the affected area. However, in principle, there would not be any hindrance on other forms of conservation expansion into this area, such as through stewardship. In addition, provided that the development can reduce impacts to an acceptable level, the site would retain significant biodiversity value and the development would not be likely to compromise the vast majority of biodiversity features and components. Currently, the major impact on biodiversity at the site is land use and especially overgrazing from livestock. Significant differences in vegetation composition and condition between land owners are visible in the area, with significant negative impact on some species and habitats.

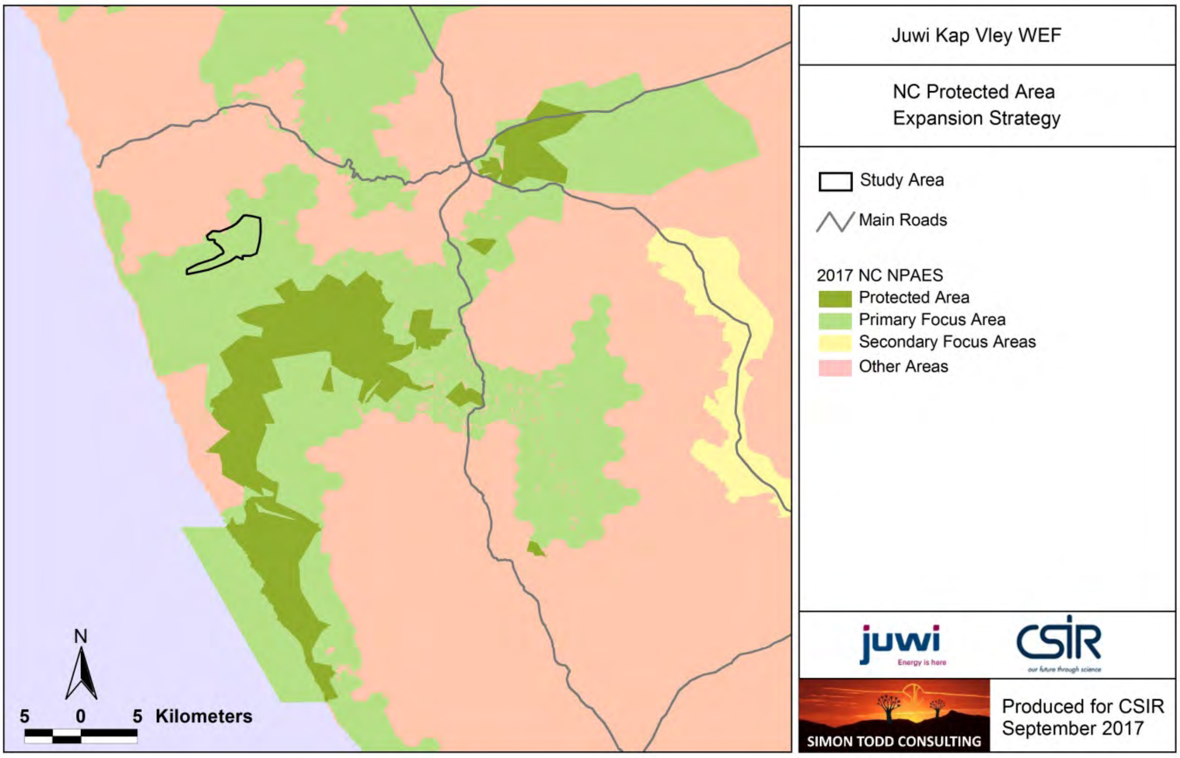


Figure 5. Northern Cape Protected Area Expansion Strategy map for the broader study area, showing the Kap Vley site falling within a Primary Focus Area.

1.3.6. Cumulative Impacts

Although there are a number of the different proposed renewable energy facilities in the broad area around the Kap Vley site (**Figure 6**), not all of these are within a similar environment and would not affect the same range of habitats as present at the Kap Vley site. Those developments to the east of Kap Vley above the escarpment are considered to be in a different environment and the Kap Vley development would not significantly affect cumulative impacts in that area. As such, the consideration of cumulative impact in the area should be focused on other developments on the coastal plain. This includes the 300 MW Eskom (Brazil)wind energy facility west of the site as well as the 140 MW Project Blue wind energy facilities north west of the site. There is also the 7.2MW Koingnaas Wind Energy Facility to the south of the site. These projects are generally closer to the coastline and largely restricted to the Namaqualand Strandveld vegetation type. It is estimated that the total footprint of these developments is approximately 1 000 ha. Within the context of the coastal plain and the affected vegetation types, this is a relatively low total extent. Existing impact in the area is largely restricted to the coastal forelands where diamond mining has had a significant impact on this environment. There are also a number of diamond mines along the Buffels River north of the site as well. Overall, existing impact on the coastal plain away from the actual coastline is relatively low and the contribution of the anticipated 150 ha footprint of the Kap Vley WEF is not considered highly significant. This does not however take the specific features present or the CBA status of Kap Vley into account. As the nature and combination of features present at Kap Vley are relatively rare in the area, the impact on these features would be more significant.

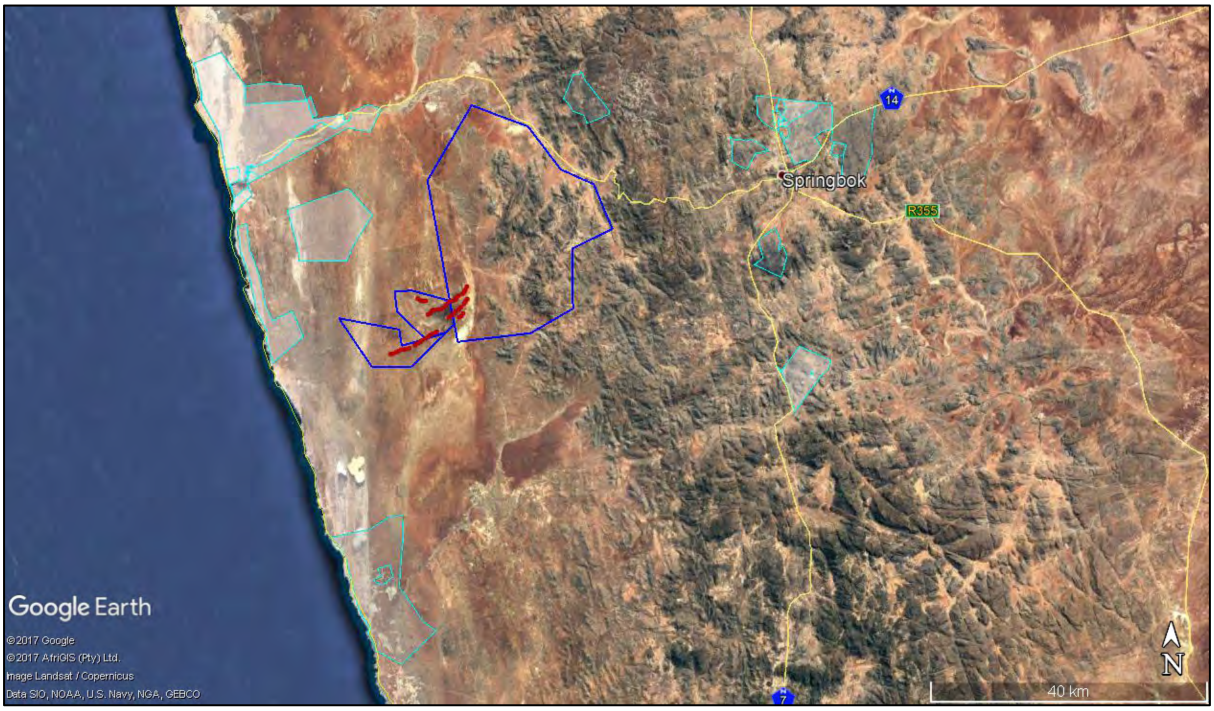


Figure 6. Map of other renewable energy developments in the wide area around the affected Kap Vley properties indicated in blue.

1.4. LEGISLATION AND PERMIT REQUIREMENTS

A summary of the environmental legislation and permitting requirements that would be triggered by the development of the site is outlined below.

The following relevant listing activities for this study are triggered in terms of Listing Notice 2 (GN R325) and 3 (GN R324) of the NEMA Environmental Impact Assessment Regulations 2014 (as amended):

GN R325:

Activity 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for PV installations and occurs

(a) within an urban area;

(b) on existing infrastructure

Activity 15: The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for:

(i) the undertaking of a linear activity; or

(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

GN R324

Activity 4: The development of a road wider than 4 metres with a reserve less than 13,5 metres.

(g) In the Northern Cape
(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
(ii) Within critical biodiversity areas identified in bioregional plans;

Activity 12: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance plan.

(g) In the Northern Cape
(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;

(ii) Within critical biodiversity areas identified in bioregional plans;

Activity 18: (g)(ii):The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometre:

g) Northern Cape
ii) Outside Urban Areas:

National Forests Act (No. 84 of 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: “no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated”.

Two protected tree species have been observed at the site, *Aloe dichotoma* and *Acacia erioloba*. Although the numbers of affected individuals is low, a permit from DAFF would be required for any impacts to these species. This would be obtained at the preconstruction phase and the number of individuals affected clarified by a preconstruction walk-through of the final development footprint.

Conservation of Agricultural Resources Act (Act 43 of 1983):

The Conservation of Agricultural Resources Act provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants and those listed under Category 1 are prohibited and must be controlled while those listed under Category 2 must be grown within a demarcated area under permit. Category 3 plants includes ornamental plants that may no longer be planted but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the floodline of water courses and wetlands.

The predominant alien of concern at the site *Acacia cyclops*, which is listed as Category 1b.

1.5. IDENTIFICATION OF KEY ISSUES

1.5.1. Identification of Potential Impacts

The development would result in the loss of approximately 150 ha of currently intact habitat. This would impact plant species of conservation concern as well as impact fauna directly though mortality and indirectly through habitat loss. The area is also falls within a Critical Biodiversity Area and Northern Cape Protected Area Expansion Strategy Focus Area. The following potential impacts are identified as possibly resulting from the development:

- Impacts on vegetation and plant species of conservation concern
- Direct and indirect faunal impacts
- Increased erosion
- Increased alien plant invasion
- Impacts on Critical Biodiversity Areas
- Cumulative impacts on habitat loss and broad-scale ecological processes
- Decreased ability to meet future conservation targets

The potential impacts which will be assessed during the EIA phase of the assessment are outlined as follows:

1.5.1.1. Construction Phase

- Impacts on vegetation and plant species of conservation concern
- Direct and indirect faunal impacts

1.5.1.2. Operational Phase

- Increased soil erosion
- Increased alien plant invasion
- Impacts on Fauna
- Impacts on Critical Biodiversity Areas

1.5.1.3. Decommissioning Phase

- Increased alien plant invasion
- Increased soil erosion
- Direct and indirect impacts on fauna

1.5.1.4. Cumulative impacts

- Cumulative impacts on habitat loss and broad-scale ecological processes
- Decreased ability to meet conservation targets

1.6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

1.6.1. Results of the Field Study

The draft sensitivity map for the study area is illustrated below in Figure 7. The target ridges are generally considered to have High to Very High sensitivity, largely on account of the high abundance of plant species of conservation concern as well as the high value that some of these areas have for fauna. There are also certain areas that are considered vulnerable to disturbance on account of the loose sands and the strong winds which characterise the area, which leave them vulnerable to wind erosion. Apart from these confirmed on-site sensitivities, the area is a recognised area of high biodiversity and falls within a Tier 1 CBA as well as a Primary Focus area for future conservation expansion. This brings the suitability of the site for development into question as it is clearly relatively sensitive and of significance on several levels.

In terms of the mitigation hierarchy, the first three measures are to avoid, minimize and rehabilitate/restore impacts. The potential of the current development to achieve these outcomes needs to be considered before considering the residual impact of the development and the overall acceptability of the development. With regards to on-site impacts on plant species of conservation concern, it is likely that these can be reduced to acceptable levels through avoidance and minimising the footprint in sensitive areas. Fine-scale habitat and SCC population mapping is currently underway and will be used to inform the final layout. Some of the areas currently mapped as Very High or High sensitivity will be identified as no-go areas and some turbines will certainly need to be dropped or moved from their current locations. The fine-scale mapping will also allow the size of the populations of SCC present on-site to be quantified and the impact of the development on the local populations of these species better evaluated. These avoidance measures will also significantly reduce the impact of the development on sensitive faunal habitats and it is not likely that there would be any very high residual impacts on fauna. Overall, it is therefore likely that on-site impacts on biodiversity can be reduced to moderate or lower levels. There will however be some residual impact on the CBA as well as future conservation options in the area. Although these impacts are not considered to be Very High after mitigation, the likely residual impact of the development warrants consideration of whether or not a Biodiversity Offset is appropriate. This is dealt with in detail in the Conclusions and Recommendations section of the report.

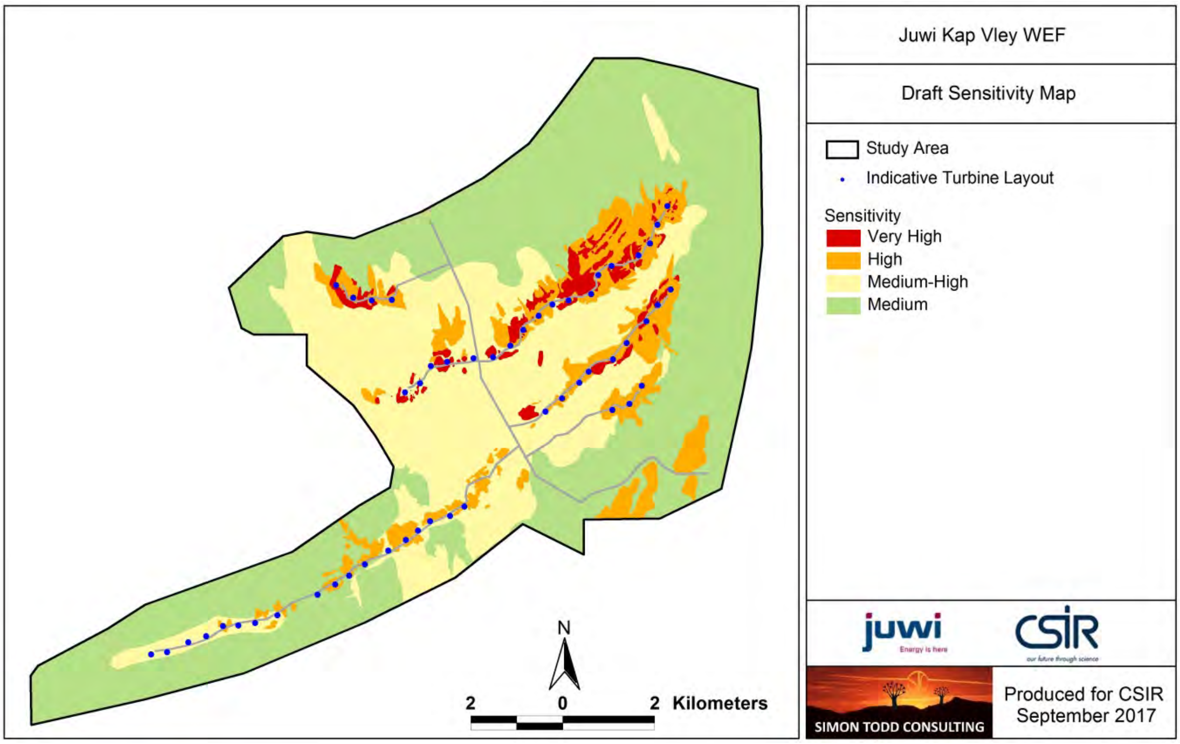


Figure 7. Draft sensitivity map for the study area, showing that the majority of the footprint of the development is in areas of high potential sensitivity.

1.6.2. Construction Phase Impact 1. Impacts on vegetation and plant species of conservation concern

The abundance of plant SCC at the site is high within the affected areas. As a result, there is a significant risk to the local populations of such species, which are seen to be of particular importance as these are the most-northerly known populations of many of the SCC. Although some of the SCC have localised populations that can likely be avoided by the development footprint, there are some species which occur across the site and which would certainly be affected by the development. The major impact would result from vegetation clearing for both the turbines with their associated hard stands as well as the access roads between turbines.

Without mitigation this impact would be of **Very High** potential significance.

Essential mitigation measures would include:

- Fine-scale habitat and SCC population mapping to inform the final layout to ensure that impact on these features can be minimised through avoidance at the design stage.
- No development of turbines, roads of other infrastructure within no-go areas.
- Preconstruction walk-through of the development footprint to further refine the layout and reduce impacts on SCC through micro-siting of the turbines and access roads.

With the implementation of the suggested mitigation the impact on vegetation and SCC can likely be reduced to a **Moderate** significance.

1.6.3. Construction Phase Impact 2. Direct and indirect faunal impacts

The construction of the development will result in significant habitat loss, noise and disturbance on site. This will lead to direct and indirect disturbance of fauna. Some slow-moving or retiring species such as many reptiles would likely not be able to escape the construction machinery and would be killed. There are also several species present at the site which are vulnerable to poaching and there is a risk that these species may be targeted. This impact would be cause the presence and operation of construction machinery and personnel on the site.

Without mitigation this impact is likely to be of **Moderate to High,** but local significance.

Essential mitigation measures would include:

- Avoidance of identified areas of high fauna importance at the design stage.
- Search and rescue for reptiles and other vulnerable species during construction, before areas are cleared.
- Limiting access to the site and ensuring that construction staff and machinery remain within the demarcated construction areas during the construction phase.
- Environmental induction for all staff and contractors on-site.

With the implementation of the suggested mitigation the construction phase impact on fauna can likely be reduced to a **Moderate Significance**.

1.6.4. Operational Phase Impact 1. Increased Soil Erosion

The site has sandy soils that are highly vulnerable to erosion, especially in the face of the strong winds that the area experiences. Once mobilised, the sands can be very difficult to arrest as the moving sand smothers new vegetation as it goes. There are already several areas at the site that are severely affected by wind erosion, which illustrates the potential significance of this problem. Some of these areas are however probably natural blow-outs and the natural movement of sand is clearly an important disturbance feature and ecological process operating in the area. The primary impact on these areas would likely be from the access roads which may impact on areas where there is already a lot of sand movement or on areas that are currently well-vegetated and where there would be a high risk of wind erosion being initiated.

Without mitigation, this impact would potentially be of **very high significance**.

Essential mitigation measures would include:

- Avoiding areas of high wind erosion vulnerability as much as possible.
- Using net barriers, active rehabilitation and other measures during and after construction to minimise sand movement at the site.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to an acceptable, **low significance**.

1.6.5. Operational Phase Impact 2. Increased Alien Plant Invasion

There are already several alien species present on the site such as *Acacia cyclops* and disturbance created during construction would leave the site highly vulnerable to further alien plant invasion, especially along the access roads and other areas which receive additional run-off from the hardened surfaces of the development.

Without mitigation this impact would likely be of **Moderate Significance**.

Essential mitigation measures would include:

- Alien management plan to be implemented during the operational phase of the development, which makes provision for regular alien clearing and monitoring.
- Rehabilitation of disturbed areas that are not regularly used after construction.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.6.6. Operational Phase Impact 3. Operational Impacts on Fauna

Operational activities as well as the presence of the turbines and the noise they generate may deter some sensitive fauna from the area. In addition, the access roads may function to fragment the habitat for some fauna, which are either unable to unwilling to traverse open areas. Subterranean species such as Golden Moles and burrowing snakes and skinks are particularly vulnerable to this type of impact as they are unable to traverse the hardened roads or become very exposed to predation when doing so. This is a low-level continuous impact which could have significant cumulative impact on sensitive species.

Without mitigation this impact would likely be of **Moderate to Low Significance**.

Essential mitigation measures would include:

- Open space management plan for the development, which makes provision for favourable management of the facility and the surrounding area for fauna.
- Limiting access to the site to staff and contractors only.
- Appropriate design of roads and other infrastructure where appropriate to minimise faunal impacts and allow fauna to pass through or underneath these features.
- No electrical fencing within 20cm of the ground as tortoises become stuck against such fences and are electrocuted to death.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.6.7. Operational Phase Impact 4. Impacts on Critical Biodiversity Areas

The development is located within an area that is a recognised area of biodiversity significance and has been classified as a Tier 1 CBA. The development will result in direct habitat loss equivalent to about 150 ha within the CBA as well as potentially affect broad-scale ecological processes operating in the area. There are also some localised specialised habitats present such as quartz patches, which have a high ecological value and which would potentially be affected by the development. Impact on the CBA would result from the transformation of currently intact habitat as well as the presence and operation of the facility.

Without mitigation this impact would likely be of **Moderate Significance**.

Essential mitigation measures would include:

- Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in previously disturbed areas.
- Avoid impact to restricted and specialised habitats such as quartz patches or wetlands.

With the effective implementation of the mitigation measures, it is likely that this impact will remain at a **Moderate Significance**. Effective and full mitigation is not likely to be possible because the main impact results from the presence and operation of the facility itself, which cannot be avoided should the development go ahead.

1.6.8. Cumulative Impact 1. Cumulative habitat loss and impact on broad-scale ecological processes

There are several other renewable energy developments in the wider area and along with the current development, these would potentially generate significant cumulative impacts on habitat loss and fragmentation and negative impact broad-scale ecological processes such as dispersal and climate change resilience. However, not all of the developments in the area would impact on the same features and environment and overall, the current levels of cumulative development impact within the affected areas of the current development are relatively low. Currently, the major impact in the area is from diamond mining along the coastline, which has had a significant impact on this environment. Areas further inland such as the vicinity of the current site have not been impacted to the same degree and are still largely intact.

Without mitigation, this impact is likely to be of **Moderate Significance.**

Essential mitigation measures would include:

- Avoid impact to restricted and specialised habitats such as quartz patches or wetlands.
- Ensure that there are no particular habitats affected within the various renewable energy development sites that are not more widely available or protected elsewhere in the area.

With the effective implementation of the mitigation measures, it is likely that this impact will be reduced to a **Moderate to Low Significance**.

1.6.9. Cumulative Impact 2. Decreased ability to meet conservation targets

Although the affected vegetation types at the site are all classified as Least Threatened, this does not provide an adequate measure of the impact of the development on the ability to meet conservation targets. The majority of the SCC that would be affected by the development are associated with Sand Fynbos, which has not been adequately mapped in the current revision of the National Vegetation Map. In addition, there are several different plant communities and habitat types present within the Namakwa Sand Fynbos vegetation unit. Currently, there are some areas of Sand Fynbos conserved within the Namakwa National Park, but the majority of this vegetation unit is still unprotected. In addition, some of the larger tracts such as inland of Hondeklip bay are under mining applications, with the result that the conservation status of this unit is likely to rise in the future as it becomes increasingly difficult to meet targets for this unit.

Without mitigation, this impact is likely to be of **Moderate Significance**

Essential mitigation measures would include:

- Investigate the potential for the development of an offset to mitigate the residual impact of the current development.
- Identify other areas with a similar range of habitats and features to the current site, that might be used as target for the offset.
- Engage with the provincial and national conservation authorities on the implications of the current development for future conservation expansion in the area.

With the effective implementation of the mitigation measures, it is likely that this impact can be reduced to a **Low Significance**.

1.7. IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in Table 2-1 to 2-4 below. It is important to note that this is a Scoping Phase preliminary assessment and the final impact ratings and recommended mitigation actions would be affected by the final development footprint that will be provided by the developer for assessment in the EIA phase. The current assessment highlights the impacts of most concern and the primary mitigation strategies required to reduce impacts to acceptable levels.

Table 2-1 Impact assessment summary table for the Construction Phase

Impact pathway	Status	Extent	Duration	Consequence	Probability	Reversibility o impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
CONSTRUCTION PHASE													
Direct impacts													
Impact on vegetation and plant species of conservation concern													
Habitat Loss	-	Local	Long-term	Severe	Very Likely	Low	Moderate	High Risk (2)	Partly	Partly	Moderate	3	High
Suggested Mitigation: • Fine-scale habitat and SCC population mapping to inform the final layout to ensure that impact on these features can be minimised through avoidance at the design stage. • No development of turbines, roads of other infrastructure within no-go areas. • Preconstruction walk-through of the development footprint to further refine the layout and reduce impacts on SCC through micro-siting of the turbines and access roads.													
Faunal Impacts due to construction													
Habitat Loss	-	Local	Long-term	Substantial	Very Likely	Moderate	Moderate	Moderate Risk (3)	Partly	Partly	Moderate	3	High
Suggested Mitigation: • Avoidance of identified areas of high fauna importance at the design stage. • Search and rescue for reptiles and other vulnerable species during construction, before areas are cleared. • Limiting access to the site and ensuring that construction staff and machinery remain within the demarcated construction areas during the construction phase. • Environmental induction for all staff and contractors on-site.													

Table 2-2 Impact assessment summary table for the Operational Phase

Impact pathway	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
OPERATIONAL PHASE													
Direct impacts													
Increased soil erosion													
Disturbance	-	Local	Long-term	Substantial	Very Likely	Moderate	Moderate	Moderate Risk (3)	Yes	Yes	Low	4	High
Suggested Mitigation: • Avoiding areas of high wind erosion vulnerability as much as possible. • Using net barriers, active rehabilitation and other measures during and after construction to minimise sand movement at the site.													
Increased alien plant invasion													
Disturbance	-	Local	Medium-term	Substantial	Very Likely	Moderate	Moderate	Moderate Risk (3)	Yes	Yes	Low	4	High
Suggested Mitigation: • Alien management plan to be implemented during the operational phase of the development, which makes provision for regular alien clearing and monitoring. • Rehabilitation of disturbed areas that are not regularly used after construction.													
Operational impacts on fauna													
Noise & Disturbance	-	Local	Long-term	Moderate	Likely	Moderate	Moderate	Moderate Risk (3)	Partly	Partly	Low	4	High
Suggested Mitigation: • Open space management plan for the development, which makes provision for favourable management of the facility and the surrounding area for fauna. • Limiting access to the site to staff and contractors only. • Appropriate design of roads and other infrastructure where appropriate to minimise faunal impacts and allow fauna to pass through or underneath these features. • No electrical fencing within 20cm of the ground as tortoises become stuck against such fences and are electrocuted to death.													
Impacts on Critical Biodiversity Areas													
Habitat loss and disturbance	-	Local	Long-term	Moderate	Likely	Moderate	Moderate	Moderate Risk (3)	Partly	Partly	Moderate	3	High
Suggested Mitigation: • Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in previously disturbed areas. • Avoid impact to restricted and specialised habitats such as quartz patches or wetlands.													

Table 2-3 Impact assessment summary table for the Decommissioning Phase

Impact pathway	Status	Extent	Duration	Consequence	Probability	Reversibility o impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
DECOMMISSIONING PHASE													
Direct impacts													
Increased soil erosion													
Habitat loss and disturbance	**-**	**Local**	**Long-term**	**Severe**	**Very Likely**	**Low**	**Moderate**	**High Risk (2)**	**Yes**	**Yes**	**Low**	**4**	**High**
Suggested Mitigation: • The use of net barriers, active rehabilitation and other measures after decommissioning to minimise sand movement and enhance revegetation at the site. • Monitoring of rehabilitation success at the site for at least 5 years after decommissioning.													
Increased alien plant invasion													
Habitat loss and disturbance	**-**	**Local**	**Long-term**	**Severe**	**Very Likely**	**Low**	**Moderate**	**High Risk (2)**	**Yes**	**Yes**	**Low**	**4**	**High**
Suggested Mitigation: • Alien management plan to be implemented during the decommissioning phase of the development, which makes provision for regular alien clearing and monitoring for at least 5 years after decommissioning. • Active rehabilitation and revegetation of previously disturbed areas with indigenous species selected from the local environment.													

Table 2-4 Impact assessment summary table for Cumulative Impacts

<table>
<tr><th>Impact pathway</th><th>Status</th><th>Extent</th><th>Duration</th><th>Consequence</th><th>Probability</th><th>Reversibility of impact</th><th>Irreplaceability of receiving environment/ resource</th><th>Significance of impact/risk = consequence x probability (before mitigation)</th><th>Can impact be avoided?</th><th>Can impact be managed or mitigated?</th><th></th><th>Significance of residual risk/impact (after mitigation)</th><th>Ranking of impact/ risk</th><th>Confidence level</th></tr>
<tr><td colspan="15">Cumulative Impacts</td></tr>
<tr><td colspan="15">Cumulative habitat loss and impact on broad scale ecological processes</td></tr>
<tr><td>Habitat loss and disturbance</td><td>-</td><td>Regional</td><td>Long-term</td><td>Substantial</td><td>Very Likely</td><td>Low</td><td>Moderate</td><td>Moderate Risk (3)</td><td>Partly</td><td>Partly</td><td></td><td>Moderate</td><td>3</td><td>High</td></tr>
<tr><td colspan="15">Suggested Mitigation:
• Avoid impact to restricted and specialised habitats such as quartz patches or wetlands.
• Ensure that there are no particular habitats affected within the various renewable energy development sites that are not more widely available or protected elsewhere in the area.</td></tr>
<tr><td colspan="15">Impaired ability to meet conservation targets</td></tr>
<tr><td>Habitat loss and disturbance</td><td>-</td><td>Regional</td><td>Long-term</td><td>Substantial</td><td>Very Likely</td><td>Low</td><td>Moderate</td><td>Moderate Risk (3)</td><td>Partly</td><td>Partly</td><td></td><td>Low</td><td>4</td><td>High</td></tr>
<tr><td colspan="15">Suggested Mitigation:
• Investigate the potential for the development of an offset to mitigate the residual impact of the current development.
• Identify other areas with a similar range of habitats and features to the current site, that might be used as target for the offset.
• Engage with the provincial and national conservation authorities on the implications of the current development for future conservation expansion in the area.</td></tr>
<tr><td colspan="15"></td></tr>
</table>

1.8. CONCLUSIONS AND RECOMMENDATIONS

The Kap Vley site is located within an area that is a recognised area of biodiversity significance. This is reflected in the inclusion of the area as a Tier 1 CBA as well as a Primary Focus Area for future conservation expansion. The fieldwork that has been conducted at the site confirms the presence of numerous plant species and habitats of conservation concern at the site. It is likely that these will be impacted to some degree by the development and while avoidance can mitigate the impacts on features of conservation concern to some degree, moderate residual impact is likely to remain for certain species and features. Negative impacts on plant SCC and impacts on CBAs and future conservation expansion options are highlighted as significant potential concerns associated with the development. These impacts bring the suitability of the site for development into question. Although the residual impacts on SCC, CBAs and future conservation expansion options are likely to be Moderate after mitigation, the overall sensitivity of the site warrants detailed consideration of a Biodiversity Offset to counter the residual impact of the development. It is however important to note that an offset is not a form of mitigation in itself and the implementation of an offset does not release the requirement or need to implement the full array of mitigation and avoidance options at the impacted site.

The Draft National Biodiversity Offset Policy is currently out for comment and provides a framework for the implementation of Biodiversity Offsets. The National Biodiversity Framework, 2009 (NBF) states that "In some cases, following avoidance and mitigation, there is still residual damage to biodiversity as a result of a development. In such cases, if the development is socially and economically sustainable, ecological sustainability may be achieved through a biodiversity offset. A biodiversity offset involves setting aside land in the same or a similar ecosystem elsewhere, at the cost of the applicant, to ensure no net loss of important biodiversity. Biodiversity offsets are particularly important in securing threatened ecosystems and critical biodiversity areas." The implementation of an offset at the Kap Vley site would therefore be motivated on the following grounds:

- The site lies within a Tier 1 CBA
- The site lies within a NCPEAS Primary Focus Area
- The presence of numerous SCC on site
- Regional significance of the site

In anticipation of the above recommendation, the developer has initiated an offset study for the Kap Vley site. This includes communication in this regard with the national and provincial conservation authorities and the identification of potential offset areas that could be targeted for formal conservation expansion as an offset. The offset study will be conducted in parallel to the EIA process and the results included into the EIA as appropriate.

The impacts associated with the development of the Kap Vley WEF are likely to be of moderate to low significance after mitigation. While it is clear that the site has a variety of sensitive species and habitats present, specific actions are being taken to minimise and reduce these impacts as far as possible. While on-site impacts can be reduced to acceptable levels through such avoidance, it is the broader-scale impacts on CBAs and future conservation options that cannot be well mitigated and which warrant consideration of an offset. The Draft National Biodiversity Offset Policy provides a framework for the implementation of a Biodiversity Offset at the site and the proximity of the site to the Namakwa National Park also provides an opportunity for the effective implementation and integration of an offset into the National Park. With the inclusion of the offset study, there is no reason that the development should not proceed to the EIA stage. A plan of study for the EIA phase is provided below and outlines the additional studies and information that will be collected to inform the EIA.

1.9. PLAN OF STUDY FOR THE EIA PHASE

Based on the results of the current study and the features of the site, the following activities and outputs are planned to inform the EIA phase of the development:

- Fine-scale habitat and SCC population mapping is currently underway and will be used to refine the ecological sensitivity map of the site. This will be used to inform the final layout of the development to ensure that impacts on SCC can be minimised. The fine-scale mapping will also allow the size of the populations of SCC present on-site to be quantified and the impact of the development on the local populations of these species better evaluated.

- The fine scale mapping will be used to map the presence of any unique and sensitive habitats at the site such as quartz patches, mobile dunes and other localised habitats.

- Characterise the faunal communities at the site in greater detail. Camera traps have been deployed at the site and the information on faunal distribution and abundance at the site collected will be included in the EIA. This will be complemented with small mammal trapping and reptile surveys.

- Evaluate, based on the site attributes and final layout of the development, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.

- Further develop and integrate the Offset Study into the EIA process. This includes the evaluation of an appropriate offset ratio for the development and more detailed characterisation of the overall impact of the development.

- Assess the impacts identified above in light of the site-specific findings and the final layout for assessment in the EIA Phase to be provided by the developer.

1.10. REFERENCES

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1.11. APPENDICES

1.11.1. Appendix 1. List of Mammals

List of Mammals know from the broad area around the Kap Vley site, based on the MammalMap Database (http://vmus.adu.org.za).

Family	Genus	Species	Common name	Red list category
Bathyergidae	*Bathyergus*	*janetta*	Namaqua Dune Mole-rat	Least Concern
Bathyergidae	*Bathyergus*	*suillus*	Cape Dune Mole-rat	Least Concern
Bathyergidae	***Cryptomys***	***hottentotus***	**Southern African Mole-rat**	**Least Concern**
Bovidae	*Antidorcas*	*marsupialis*	Springbok	Least Concern
Bovidae	*Oreotragus*	*oreotragus*	Klipspringer	Least Concern
Bovidae	***Raphicerus***	***campestris***	**Steenbok**	**Least Concern**
Bovidae	***Sylvicapra***	***grimmia***	**Bush Duiker**	**Least Concern**
Canidae	***Canis***	***mesomelas***	**Black-backed Jackal**	**Least Concern**
Canidae	*Otocyon*	*megalotis*	Bat-eared Fox	Least Concern
Canidae	*Vulpes*	*chama*	Cape Fox	Least Concern
Cercopithecidae	***Papio***	***ursinus***	**Chacma Baboon**	**Least Concern**
Felidae	*Caracal*	*caracal*	Caracal	Least Concern
Felidae	*Felis*	*silvestris*	African Wildcat	Least Concern
Felidae	*Panthera*	*pardus*	Leopard	Vulnerable
Herpestidae	***Cynictis***	***penicillata***	**Yellow Mongoose**	**Least Concern**
Herpestidae	*Herpestes*	*pulverulentus*	Cape Gray Mongoose	Least Concern
Herpestidae	***Suricata***	***suricatta***	**Meerkat**	**Least Concern**
Hyaenidae	*Proteles*	*cristata*	Aardwolf	Least Concern
Hystricidae	***Hystrix***	***africaeaustralis***	**Cape Porcupine**	**Least Concern**
Leporidae	*Lepus*	*capensis*	Cape Hare	Least Concern
Leporidae	***Lepus***	***saxatilis***	**Scrub Hare**	**Least Concern**
Leporidae	***Pronolagus***	***rupestris***	**Smith's Red Rock Hare**	**Least Concern**
Macroscelididae	***Elephantulus***	***rupestris***	**Western Rock Elephant Shrew**	**Least Concern**
Macroscelididae	*Macroscelides*	*proboscideus*	Short-eared Elephant Shrew	Least Concern
Muridae	***Aethomys***	***namaquensis***	**Namaqua Rock Mouse**	**Least Concern**
Muridae	*Desmodillus*	*auricularis*	Cape Short-tailed Gerbil	Least Concern
Muridae	*Gerbilliscus*	*paeba*	Paeba Hairy-footed Gerbil	Least Concern
Muridae	*Otomys*	*auratus*	Southern African Vlei Rat	Least Concern
Muridae	*Otomys*	*unisulcatus*	Karoo Bush Rat	Least Concern
Muridae	*Parotomys*	*brantsii*	Brants's Whistling Rat	Least Concern
Muridae	*Parotomys*	*littledalei*	Littledale's Whistling Rat	Near Threatened
Muridae	*Rhabdomys*	*pumilio*	Xeric Four-striped Grass Rat	Least Concern
Mustelidae	*Aonyx*	*capensis*	African Clawless Otter	Near Threatened
Mustelidae	*Ictonyx*	*striatus*	Striped Polecat	Least Concern
Mustelidae	*Mellivora*	*capensis*	Honey Badger	Least Concern
Orycteropodidae	***Orycteropus***	***afer***	**Aardvark**	**Least Concern**
Petromuridae	*Petromus*	*typicus*	Dassie Rat	Least Concern

Procaviidae	***Procavia***	***capensis***	**Rock Hyrax**	**Least Concern**
Sciuridae	***Xerus***	***inauris***	**South African Ground Squirrel**	**Least Concern**
Soricidae	*Crocidura*	*cyanea*	Reddish-gray Musk Shrew	Least Concern
Soricidae	*Suncus*	*varilla*	Lesser Dwarf Shrew	Least Concern
Viverridae	*Genetta*	*genetta*	Common Genet	Least Concern

1.11.2. Appendix 2. List of Reptiles

List of Reptiles known from the vicinity of the Kap Vley site, based on records from the Reptile Map database. Conservation status is from Bates et al. 2013.

Family	Genus	Species	Subspecies	Common name	Red list category
Agamidae	*Agama*	*atra*		Southern Rock Agama	Least Concern
Agamidae	*Agama*	*hispida*		Spiny Ground Agama	Least Concern
Chamaeleonidae	*Bradypodion*	*occidentale*		Western Dwarf Chameleon	Least Concern
Chamaeleonidae	*Chamaeleo*	*namaquensis*		Namaqua Chameleon	Least Concern
Colubridae	*Dipsina*	*multimaculata*		Dwarf Beaked Snake	Least Concern
Colubridae	*Telescopus*	*beetzii*		Beetz's Tiger Snake	Least Concern
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern
Elapidae	*Aspidelaps*	*lubricus*	*lubricus*	Coral Shield Cobra	Not listed
Elapidae	*Naja*	*nivea*		Cape Cobra	Least Concern
Gekkonidae	*Chondrodactylus*	*angulifer*	*angulifer*	Common Giant Ground Gecko	Least Concern
Gekkonidae	*Chondrodactylus*	*bibronii*		Bibron's Gecko	Least Concern
Gekkonidae	*Goggia*	*lineata*		Northern Striped Pygmy Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*austeni*		Austen's Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*barnardi*		Barnard's Rough Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*labialis*		Western Cape Gecko	Least Concern
Gekkonidae	*Pachydactylus*	*weberi*		Weber's Gecko	Least Concern
Gekkonidae	*Phelsuma*	*ocellata*		Namaqua Day Gecko	Least Concern
Gekkonidae	*Ptenopus*	*garrulus*	*maculatus*	Spotted Barking Gecko	Least Concern
Gerrhosauridae	*Cordylosaurus*	*subtessellatus*		Dwarf Plated Lizard	Least Concern
Gerrhosauridae	*Gerrhosaurus*	*typicus*		Karoo Plated Lizard	Least Concern
Lacertidae	*Meroles*	*ctenodactylus*		Giant Desert Lizard	Least Concern
Lacertidae	*Meroles*	*knoxii*		Knox's Desert Lizard	Least Concern
Lacertidae	*Meroles*	*suborbitalis*		Spotted Desert Lizard	Least Concern
Lacertidae	*Nucras*	*tessellata*		Western Sandveld Lizard	Least Concern
Lamprophiidae	*Lamprophis*	*guttatus*		Spotted House Snake	Least Concern
Lamprophiidae	*Prosymna*	*frontalis*		Southwestern Shovel-snout	Least Concern
Lamprophiidae	*Psammophis*	*crucifer*		Cross-marked Grass Snake	Least Concern
Lamprophiidae	*Psammophis*	*namibensis*		Namib Sand Snake	Least Concern
Lamprophiidae	*Psammophis*	*notostictus*		Karoo Sand Snake	Least Concern
Lamprophiidae	*Psammophylax*	*rhombeatus*	*rhombeatus*	Spotted Grass Snake	Least Concern
Lamprophiidae	*Pseudaspis*	*cana*		Mole Snake	Least Concern
Scincidae	*Acontias*	*litoralis*		Coastal Dwarf Legless Skink	Least Concern
Scincidae	*Acontias*	*tristis*		Namaqua Dwarf Legless Skink	Least Concern
Scincidae	*Scelotes*	*caffer*		Cape Dwarf Burrowing Skink	Least Concern
Scincidae	*Scelotes*	*sexlineatus*		Striped Dwarf Burrowing Skink	Least Concern
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern
Scincidae	*Trachylepis*	*variegata*		Variegated Skink	Least Concern
Scincidae	*Typhlosaurus*	*vermis*		Pink Blind Legless Skink	Least Concern
Testudinidae	*Chersina*	*angulata*		Angulate Tortoise	Least Concern

Testudinidae	*Psammobates*	*tentorius*	*trimeni*	Namaqua Tent Tortoise	Not listed
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern

1.11.3. Appendix 3. List of Amphibians

List of Amphibians known from the vicinity of the Kap Vley site, based on records from the FrogMap database. Conservation status is from Minter et al. 2004.

Family	Genus	Species	Subspecies	Common name	Red list category
Brevicepitidae	*Breviceps*	*macrops*		Desert Rain Frog	Vulnerable
Brevicepitidae	*Breviceps*	*namaquensis*		Namaqua Rain Frog	Least Concern
Bufonidae	*Vandijkophrynus*	*gariepensis*	*gariepensis*	Karoo Toad (subsp. gariepensis)	Not listed
Bufonidae	*Vandijkophrynus*	*robinsoni*		Paradise Toad	Least Concern
Pipidae	*Xenopus*	*laevis*		Common Platanna	Least Concern
Pyxicephalidae	*Amietia*	*fuscigula*		Cape River Frog	Least Concern
Pyxicephalidae	*Tomopterna*	*delalandii*		Cape Sand Frog	Least Concern

SCOPING INPUTS FROM SPECIALIST:

BIRD IMPACT ASSESSMENT FOR THE KAP VLEY WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE

SCOPING REPORT

On behalf of

juwi Renewable Energies (Pty) Ltd

September 2017

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1 INTRODUCTION

juwi Renewable Energies (Pty) Ltd ('juwi') are proposing to develop the Kap Vley Wind Energy Facility (WEF) on a site approximately 35 km south east of Kleinzee, in the Northern Cape Province ('the WEF site') (Figure 1).

juwi have appointed Arcus Consultancy Services South Africa (Pty) Limited ('Arcus') to provide avifaunal specialist input in the form of a specialist Impact Assessment Report for this Project. Arcus have also been appointed to conduct the required pre-construction bird monitoring for the WEF site, the results of which will feed in to and advise the Environmental Impact Assessment (EIA) process. Three seasonal surveys of the pre-construction monitoring programme have been completed to date, the results of which are considered in this scoping report.

1.1 Purpose and Aims

The purpose and aims of this report are to provide:

- A confirmation of the terms of reference adopted for the avifaunal study;
- Feedback on the scoping exercise adopted for avifauna which led to the development of a monitoring programme;
- Description of the monitoring programme as part of the impact assessment;
- Main findings of the monitoring survey undertaken thus far;
- A description of the avifaunal status quo (i.e the avifaunal baseline), including a description of avifaunal microhabitats available on site; and
- A description of potential predicted impacts to avifauna as well as a preliminary significance rating and impact assessment, cumulative impact assessment and potential mitigations.

1.2 The WEF Site and Project Description

The proposed Kap Vley WEF is located south east of Kleinzee in the Namakhoi Local Municipality in the Northern Cape. The predominant land use associated with the study area is agriculture, particularly grazing and subsistence farming. The proposed Kap Vley WEF will be constructed on the following land portions: Remainder (RE) Kamaggas Farm 200 Portion 5, RE Kap Vley Farm 315, Portion 1 of Kap Vley Farm 315, Portion 2 of Kap Vley Farm 315, Portion 3 of Kap Vley Farm 315, Portion 3 of Platvley Farm 314, RE Kourootjie Farm 316 and RE Gra'water Farm 331. While these land portions cover a very large area, the total footprint of the Kap Vley WEF will be less than 150 ha.

The proposed Kap Vley WEF ('the project') will consist of up to 56 turbines. Each turbine will have a maximum hub height of 150 m and a maximum rotor diameter of 160 m. Each turbine will have a crane platform of 1.4 ha and 20 x 20 m x 1 m depth reinforced concrete foundation. The project will also include up to 50 km of internal access roads, a concrete batching plant, operations and maintenance buildings, fencing, an on-site substation, and temporary hard stand areas. The proposed project will also include a new overhead power line to connect the WEF to the national grid. This infrastructure is included in the project description for the bird study, and the potential impacts of both the WEF site and the grid connection are considered.

The planned overhead power line (132 kV) will feed into Eskom's electricity grid. Three alternatives are being considered:

- Alternative 1: From the on-site substation to Gromis Substation. The transmission line is approximately 36 km long;
- Alternative 2: From the on-site substation to Gromis Substation. The transmission line is approximately 36 km long; and

- Alternative 3: Directly to the Gromis substation from the on-site substation. The transmission line is approximately 32 km long.

2 TERMS OF REFERENCE

The following terms of reference were utilised for the preparation of this report:

- Describe the site baseline with regard to avifauna for the study area, focussing on the characteristics which may be impacted upon by the proposed project during construction and operation;
- Describe the sensitivity of the baseline environment with regard to avifauna specifically with regard to the conservation status of species;
- Identify the Regional Red Data and priority species[1] present and potentially present on the project site;
- Identify the nature of potential impacts (positive and negative, including cumulative impacts if relevant) of the proposed project on avifauna during construction and operation;
- Conduct a preliminary significance rating and impact assessment of identified impacts;
- Identify information gaps and limitations;
- Identify potential mitigation or enhancement measures to minimise impacts to avifauna or deliver enhancement from the proposed project; and
- Propose a plan of study for EIA.

3 METHODOLOGY

The approach to the study followed that which was required by the Best Practice Guidelines applicable at the time of the surveys (Jenkins *et al.* 2015) ('the guidelines') and those of the National Environment Management Act, 1998 (Act No 107 of 1998), as amended and the EIA Regulations (GNR 326 of 4 December 2014, as amended 7 April 2017).

The following terminology is used:

- Priority species = all species occurring on the Birdlife South Africa (BLSA) and Endangered Wildlife Trust (EWT) Avian Sensitivity Map priority species list (Retief *et al.* 2014).This list consists of 107 species with a priority score of 170 or more, and most likely to be affected negatively by WEFs. The priority score was determined by BLSA and EWT after considering various factors including bird families most impacted upon by WEFs, physical size, species behaviour, endemism, range size and conservation status;
- Red Data species: Species whose regional conservation status is listed as Near-Threatened, Vulnerable, Endangered or Critically Endangered in the Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor *et al.* 2015);
- Endemic or Near-endemic: Endemic or near endemic (i.e. ~70% or more of population in RSA) to South Africa (not southern Africa as in field guides) or endemic to South Africa, Lesotho and Swaziland. Taken from BirdLife South Africa Checklist of Birds in South Africa, 2014.

3.1 Defining the Baseline

The baseline avifauna environment for the WEF site was defined utilising a desk-based study and informed by three seasons of on-site pre-construction bird monitoring conducted to date. This information was examined to determine the potential location

[1] All species occurring on the Birdlife SA and EWT Avian Sensitivity map list of priority species (Retief *et al.*, 2011 updated 2014)

and abundance of avifauna which may be sensitive to development, and to understand their conservation status and sensitivity.

3.2 Sources of Information

- Bird distribution data of the Southern African Bird Atlas Project (SABAP-1) (Harrison *et al.* 1997) and Southern African Bird Atlas Project 2 (SABAP-2) obtained from the Avian Demography Unit of the University of Cape Town (Brooks 2017);
- Co-ordinated Water-bird Count (CWAC) project (Taylor *et. al.* 1999);
- The Important Bird Areas of southern Africa (IBA) project (Barnes 1998);
- Publically available satellite imagery;
- The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor *et al.* 2015);
- Results of the first three seasonal surveys (summer, autumn and winter) conducted for the pre-construction avifaunal monitoring programme for Kap Vley WEF.
- A summary of post-construction results from eight operational wind farms in South Africa published by Birdlife SA (Ralston Paton *et al.* 2017);
- Proposed Kleinzee 300MW Wind Energy, South of Kleinsee Environmental Impact Assessment Process Final Environmental Impact Assessment Report (Savannah Environmental 2015);
- Proposed Koingnaas Wind Energy Facility Environmental Basic Assessment Process, Final Basic Assessment Report (Savannah Environmental 2011);
- Proposed Project Blue Wind Energy facility (Phase 1-3), North of Kleinsee Environmental Impact assessment Process Draft Impact Assessment Report (Savannah Environmental 2012);
- Springbok Wind Energy Facility Final Environmental Impact Assessment: Birds (Simmons 2010); and
- Publically available peer reviewed literature as referenced below on the effects of wind energy developments on birds.

3.3 Limitations and Assumptions

- The SABAP-1 data covers the period 1986 – 1997. Bird distribution patterns fluctuate continuously according to availability of food and nesting substrate. (For a full discussion of potential inaccuracies in SABAP data, see Harrison *et al.* 1997);
- There is still limited information available on the environmental effects of wind energy facilities in South Africa. Only a summary of the results of post-construction monitoring from eight wind farms in South Africa is available (Ralston Paton *et al.* 2017). Estimates of impacts are therefore also based on knowledge gained internationally, which should be applied with caution to local species and conditions; and
- While sampling effort was conducted as recommended in the guidelines, to achieve statistically powerful results it would need to be increased beyond practical possibilities. The data was therefore interpreted using a precautionary approach.

3.4 Pre-Construction Bird Monitoring Survey Design

The monitoring programme was developed by Arcus to be in line with the latest best practice guidelines (Jenkins *et al.* 2015). Adherence to these guidelines is a requirement of the Department of Environmental Affairs (DEA) for assessment of proposed WEFs. Furthermore, BirdLife South Africa (BLSA) recently released species specific Verreauxs' Eagle Guidelines (BirdLife SA 2017). These were considered in the design of the monitoring programme.

An arbitrary boundary was used to define the WEF site, within which all monitoring activities occurred, and species were recorded. To obtain data for accurate 'before-after' comparison, the monitoring programme included data collection in a control area, at least 3.5 km from the nearest proposed turbines, and where there are no future known plans for renewable energy development. An arbitrary boundary was also created to define the 'control site', around the locations of the control site monitoring methods.

Prior to the first survey, the avifaunal specialists visited the WEF site and surrounding areas between 20 and 23 February 2017 for the 'site set up' to confirm survey locations and effort. This visit confirmed that the locations and methods (as described below) were accessible and suitable.

The first seasonal survey was conducted between 22 February and 01 March 2017 (summer). It followed the sampling effort of the Verreauxs' Eagle guidelines, in order to establish if the site is an "important Verreauxs' Eagle habitat", as required by these guidelines.

A dedicated cliff nest survey was then conducted by an avifaunal specialist and assistant from 18 – 21 April 2017. The survey methodology broadly followed the methods recommended in Malan (2009), and involved an initial desk-based screening using satellite imagery, to identify the location of possible cliffs. The specialist also utilised his knowledge of the site from the monitoring set up, prior to the summer survey, to identify cliffs that required surveying. The aim was to locate Verreauxs' Eagle nests (which are typically large), however the presence of any cliff nest (active or inactive) was noted if observed.

Due to low activity of Verreauxs' Eagle during the summer survey, and the results of the cliff nest survey, the vantage point (VP) sampling effort was reduced to the standard best practice guidelines (Jenkins *et al.* 2015) protocol for the autumn and winter surveys. The sampling effort was reviewed after each seasonal survey, in case it needed to be adjusted if deemed necessary by the specialists. Bird monitoring comprised flight activity surveys from various Vantage Points (VPs), as well as walked transects, driven transects, and focal site surveys (Figure 1). Relevant species were also recorded incidentally in the course of travelling the length of the site en route to survey locations.

The following definitions apply:

- Target species: those particular bird species that are to be recorded by a specific survey method. Target species per survey method:
  - Vantage Point (VP) Surveys: all raptors; all large (non-passerine) priority species; all waterfowl (e.g. ducks and geese);
  - Walked Transects (WT): all birds;
  - Driven Transects (DT): all raptors; all large (non-passerine) priority species;
  - Incidental Observations: all raptors; all large (non-passerine) priority species; and
  - Focal Sites (FS): all species associated, utilising or interacting at/with the focal site.

The target species per method were recorded using the following methods, as described in more detail below.

3.4.1 Vantage Points

Five vantage points were surveyed on the WEF site, and one in the control site (CVP) (Figure 1). The location of the VPs was designed to maximise coverage of the preliminary turbine layout, taking into account accessibility.

Observer pairs monitored a viewshed of 360 degrees with a radius of 2 km from each VP. These viewsheds were the focus of observation, however if target species were noted beyond these (or if a species being recorded flew out of the viewshed but was still visible), they would also be recorded. For each flight of a target species the flight path was recorded on a large scale map along with data on the number/species of bird(s) and type of flight, flight duration and flight height. Flight heights were recorded through five height bands: 1: 0-20 m; 2: 20-40 m; 3: 40-120 m; 4: 120 - 200 m and 5: >200 m.

Vantage Points in the WEF were surveyed for 18 hours each in summer, and for 12 hours in autumn and winter. The control VP was surveyed for 12 hours in all three seasons. To maximise coverage over time, all VPs were surveyed in 3 hours sessions per day if possible, or 6 hour sessions, at different times of day if possible. The locations and sampling times are presented in Appendix III.

3.4.2 Walk Transects

To sample abundances and species richness of small terrestrial species, four walked transects of 1 km each in length were established on the project site (Figure 1). WT2 was conducted once in summer, while WT3, WT4, and WT5 were each conducted twice. All walked transects were conducted twice in autumn and winter. One transect was established the control site and conducted twice each during each seasonal survey.

Two observers walked between the start and end points of the transects whilst recording all birds seen or heard up to 150 m on either side of the transect. Beyond 150 m, only priority species were noted and were recorded as incidental sightings.

The coordinates and sampling dates of the walked transects are presented in Appendix III.

3.4.3 Drive Transects

To sample abundances of large terrestrial birds and raptors, three drive transect routes were established within the WEF site (DT1, DT2 and DT3) and one at the control site (CDT) (Figure 1). Each transect was sampled twice per seasonal survey. Target species were recorded by driving slowly (+- 25 km/h) with all windows open, and stopping occasionally to listen and scan the surrounding environment. When a target species was located, a GPS co-ordinate was recorded along with the distance and direction from the vehicle to the observed bird and additional information such as weather conditions and habitat type and biological information about the recorded individual. The coordinates and sampling dates of the driven transects are presented in Appendix III.

3.4.4 Focal Sites

Focal Sites (FS) may include cliff-lines, quarry faces, power lines, and stands of large trees, nest sites, dams, water points, marshes and wetlands. Additional focal sites may be added to the monitoring programme, as and when they are discovered. In the summer survey only one focal site (a livestock water point) was identified (Figure 1), and was surveyed twice (for 15 minutes per survey) during the summer seasonal survey. Following the cliff nest survey an additional two focal sites (suspected Verreauxs' Eagle nest sites found during the cliff nest survey) were added. In the winter survey an additional suspected Verreauxs' Eagle nest was added as a focal site. The locations and sampling dates are presented in Appendix III.

3.4.5 Incidental Observations

All other incidental sightings of priority species on the WEF site, control site and within the broader area were recorded and geo-referenced, along with additional relevant information such as weather and habitat type.

3.5 Identification of Potential Impacts

After collation of the baseline data from the source of information listed above the potential impacts of the project were identified, for both the construction and operational phases.

The key potential impact types on avifauna from WEFs and associated infrastructure are:

- Collision with turbines;
- Electrocution;
- Collision with power lines;
- Disturbance and displacement;
- Disruption of bird movements; and
- Habitat destruction.

3.6 Impact Assessment Methodology

Each of the potential impacts identified above, on the baseline environment presented in Section 5, is assessed in Section 6 using the methodology provided by the Environmental Assessment Practitioner (Appendix I). For each direct, indirect or cumulative impact, the significance was determined by identifying the nature, status, spatial extent, duration, reversibility of the impact and irreplaceability of resource loss, it's severity and probability of occurrence, in the absence of any mitigation ('without mitigation'). Mitigation measures were identified and the significance was re-rated, assuming the effective implementation of the mitigation ('with mitigation').

The assessment 'without mitigation' assumes the worst case scenario in which all proposed 56 turbines are constructed. The assessment 'with mitigation' assumes that all turbines are constructed outside of avifaunal no-go areas to be identified after the completion of 12 months of monitoring, and all additional mitigations described in the Section 6 are also adequately implemented.

The specialists' confidence in the accuracy of the rating is also given. Cumulative impacts were assessed as the incremental impact of the proposed activity on the baseline presented in Section 5, when added to the impacts of other past, present or reasonably foreseeable future activities in a 50 km radius.

The following proposed or approved developments within 50 km of the site boundary were identified (and included five wind projects, eight solar projects and one power line project) for consideration in the cumulative assessments:

- 300 MW Eskom Kleinzee Wind Energy Facility (Brazil WEF)
- 55.5 MW Springbok Wind Power Generation Facility
- 7.2 MW Koingnaas Wind Energy Facility
- Project Blue Wind Energy Facility, North of Kleinzee
- Project Blue Wind Energy Facility (Phase 2 and 3), near Kleinzee
- Nigramoep PV Solar Energy Facility
- Proposed Phase 2 Construction of a 75 MW solar PV on farm 134/17 Klipdam.
- 19 MW PV Solar Energy Facility on portion 1 and 3 Melkboschkuil 132.
- 20 MW PV Solar Energy Facility on farm 132/26 Melkbokskuil.
- O'Kiep 15 MW PV Solar Energy Facility
- O'Kiep 2 PV Solar Energy Facility
- Kokerboom PV Solar Power Facility
- 10 MW Baobab PV Solar Energy Facility
- Deviation of the Eskom Juno-Gromis 400kV transmission line.

Any publically available specialist, EIA or BA reports were obtained and reviewed in terms of avifaunal impacts, and included in the cumulative assessment.

4 POLICY AND LEGISLATIVE CONTEXT

The legislation relevant to this specialist field and the proposed project is as follows:

4.1 The Convention on Biological Diversity (CBD), 1993

A multilateral treaty for the international conservation of biodiversity, the sustainable use of its components and fair and equitable sharing of benefits arising from natural resources. The convention prescribes that signatories identify components of biological diversity important or conservation and monitor these components in light of any activities that have been identified which are likely to have adverse impacts on biodiversity. The CBD is based on the precautionary principle which states that where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat and that in the absence of scientific consensus the burden of proof that the action or policy is not harmful falls on those proposing or taking the action.

4.2 The Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention), 1983

An intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. The fundamental principles listed in Article II of this treaty state that signatories acknowledge the importance of migratory species being conserved and agree to take action to this end "whenever possible and appropriate", "paying special attention to migratory species the conservation status of which is unfavourable and taking individually or in cooperation appropriate and necessary steps to conserve such species and their habitat".

4.2.1 The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), 1999

An intergovernmental treaty developed under the framework of the Convention on Migratory Species (CMS), concerned the coordinated conservation and management of migratory waterbirds throughout their entire migratory range. Signatories of the Agreement have expressed their commitment to work towards the conservation and sustainable management of migratory waterbirds, paying special attention to endangered species as well as to those with an unfavourable conservation status.

4.3 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – Threatened or Protected Species List (TOPS)

Amendments to the TOPS Regulations and species list were published on 31 March 2015 in Government Gazette No. 38600 and Notice 256 of 2015. The amended species list excluded all species threatened by habitat destruction and which are not affected by other restricted activities, but included the following potentially relevant target species for this study:

Endangered – Martial Eagle, Ludwig's Bustard; *Protected* – Kori Bustard

4.4 Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)

Developed to protect both animal and plant species within the province which warrant protection. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for the issuing of permits in terms of this legislation.

4.5 The Civil Aviation Authority Regulations, 2011

These are relevant to the issue of lighting of wind energy facilities, and to painting turbine blades, both of which are relevant to bird collisions with turbine blades.

4.6 The Equator Principles (EPs) III, 2013

The principles applicable to the project are likely to include:

- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Environmental and Social Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 8: Covenants.

These principles, among various requirements, include a requirement for an assessment process (e.g. EIA process), an Environmental and Social Management Plan (ESMP) to be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards, and the appointment of an independent environmental expert to verify monitoring information.

5 BASELINE AVIFAUNAL ENVIRONMENT

There are no Co-ordinated Avifaunal Road-count (CAR) routes on the WEF site or within 300 km of the WEF site, and therefore data from this source is not considered relevant to this study. The proposed WEF site is not situated within an IBA and there are no IBA's within 120 km of the proposed project site, and therefore data from this source is not considered relevant to this study.

5.1 Southern African Bird Atlas Project 1

The SABAP1 data (Harrison *et al.* 1997) was collected over an 11 year period between 1986 and 1997 and remains the best long term data set on bird distribution and abundance available in South Africa at present. This data was collected in quarter degree squares, with the WEF site situated in square 2917CD. The proposed grid connection alternatives also traverse squares 2917CC, 2917CA and 2917CB, and data from these have been considered as well. Table 1 indicates the reporting rate for all regional red data species, raptors and priority species recorded by the SABAP1 data within these squares, as well as giving a total number of species recorded in each square which varied from 64 to 128. The SABAP1 project recorded a total of 147 species. The two coastal squares (2917CC and 2917CA) had higher counting efforts (the latter having the town of Kleinzee within it), and it is likely that counts focussed on the marine environment, as is evident by the high numbers of marine species recorded. While some of these species may venture slightly inland, it is highly unlikely that species such as Cape Gannet, Damara Tern or the three cormorant species will be affected by the proposed developments. At its closest point the grid connection would be 15 km from the ocean, while the closest proposed turbine position is approximately 17 km from the ocean.

Important species within this data set that may occur within the WEF site and or on the grid connection alternatives, and which have relatively high reporting rates are: Secretarybird, Martial Eagle, Black-chested Snake Eagle, Jackal Buzzard, Pale Chanting Goshawk, Lanner Falcon, Greater Kestrel, Rock Kestrel, Southern Black Korhaan and Ludwig's Bustard. The record of the latter species in each square, and its associated report rates, are probably the most significant information to come from this data set.

Table 1: Raptors and Priority Species Recorded by SABAP1 in the Quarter Degree Squares covering the Project Site (Harrison et al. 1997)

Species	Regional Red Data Status	Report rate (%) **			
		2917CD	2917CC	2917CA	2917CB
Total species		*65*	*90*	*128*	*64*
Number of cards submitted		*7*	*17*	*43*	*8*
African Penguin	EN	-	6	5	-
Great White Pelican	VU	-	-	23	-
Cape Gannet	VU	-	12	7	-
Cape Cormorant	EN	-	82	33	-
Bank Cormorant	EN	-	6	30	-
Crowned Cormorant	NT	-	71	65	--
Marabou Stork	NT	-	-	2	-
Greater Flamingo	NT	-	-	23	-
Lesser Flamingo	NT	-	6	53	-
Secretarybird	VU	-	12	37	-
Black-shouldered Kite	-	-	-	2	-
Booted Eagle	-	-	-	-	13
Martial Eagle	EN	-	6	51	13
Black-chested Snake Eagle	-	-	53	16	-
African Fish Eagle	-	-	6	-	-
Verreauxs' Eagle	V	14	-	2	-
Jackal Buzzard	-	29	-	5	38
Pale Chanting Goshawk	-	29	88	86	50
Black Harrier	EN	-	6	-	25
Lanner Falcon	VU	14	-	40	25
Greater Kestrel	-	14	53	9	63
Rock Kestrel	-	-	59	86	75
Western Barn Owl	-	-	-	23	-
Spotted Eagle Owl	-	-	-	49	-
Ludwig's Bustard	EN	29	35	30	25
Southern Black Korhaan	VU	-	35	53	-
Damara Tern	CR	-	6	2	-

** Priority species (Retief et al. 2014).*
*CR = Critically Endangered; EN = Endangered; V = Vulnerable; NT = Near-threatened. **Report rates are essentially percentages of the number of times a species was recorded in the square, divided by the number of times that square was counted. It is important to note that these species were recorded in the entire quarter degree square in each case and may not actually have been recorded on the proposed WEF site or along the grid connection alternatives.*

5.2 Southern African Bird Atlas Project 2

This project is part of an ongoing study by the Animal Demography Unit (ADU), a research unit based at the University of Cape Town (UCT). SABAP2 data was examined for the five out of six pentads covering the site for which data exists. These were pentads 2945_1715, 2945_1720, 2945_1725, 2950_1715, 2950_1720 and 2950_1720. Pentads are roughly 8 km x 8 km squares, and are smaller than the squares used in SABAP1.

A total of 34 full protocol cards have been submitted for these five pentads, in addition to 22 ad hoc protocol cards. This represents a relatively low counting effort and low amount of data for this area, and the data should be interpreted with caution. A total of 77 species have been recorded, including eleven priority species. These are presented in the Table 2.

Table 2: Raptors and Priority Species recorded in the SABAP2 Pentad Squares covering the Project Site

Species	Regional Red Data Status *	Endemic or Near Endemic	Priority score **	Reporting rate (%) ***
Verreauxs' Eagle	VU		360	2.94
Black Harrier	EN	x	345	2.94
Ludwig's Bustard	EN		320	14.71
Lanner Falcon	VU		300	2.94
Southern Black Korhaan	VU	x	270	20.59
Jackal Buzzard	-	x	250	17.65
Booted Eagle	-		230	2.94
Grey-winged Francolin	-	x	190	2.94
African Harrier Hawk	-		190	2.94
Greater Kestrel	-		174	5.88

** EN = Endangered; VU = Vulnerable; NT = Near-threatened (Taylor et al. 2015)*
*** (Retief 2014).*
**** Reporting rates are percentages of the number of times a species was recorded in the pentad, divided by the number of times that pentad was counted. It is important to note that these species were recorded in the entire pentad in each case and may not actually have been recorded on the proposed WEF site.*

5.3 Coordinated Waterbird count (CWAC) data

There are two CWAC sites within 40 km of the proposed WEF site, both located near the town of Kleinzee.

5.3.1 Kleinzee AK3 Dam

A fairly large sludge dam situated on a mine property, this CWAC site was last counted in 2008 and has been discontinued. Species recorded in relatively high numbers in counts between 2007 and 2008 included Pied Avocet, Greater Flamingo, Lesser Flamingo, Black-necked Grebe, Hartlaub's Gull, White-fronted Plover, Curlew Sandpiper, Little Stint, Cape Teal and Swift Tern. Records of a single Bank Cormorant and two Caspian Tern are also noted.

5.3.2 Buffels River Mouth

A small lagoon is present at the mouth, which is seldom breached, and the count section of the river stretches from the back of the Kleinzee golf course down to the beach. This CWAC site is discontinued and was last counted in 2008. Species recorded in relatively high numbers in counts between 2007 and 2008 included Red-knobbed Coot, Black-necked Grebe, Egyptian Goose, Hartlaub's Gull, Kelp Gull and Common Tern. During 2017, the Arcus specialist recorded 3 Greater Flamingos at this site.

5.4 Bird Microhabitats

In order to determine which bird species are more likely to occur on the proposed project site, it is important to understand the habitats available to birds at a smaller spatial scale, i.e. micro habitats. Micro habitats are shaped by factors other than vegetation, such as topography, land use, food sources and man-made factors.

The WEF site is not overly diverse in terms of available bird habitats, with generally similar vegetation types found throughout. The dominant vegetation type around the proposed turbine ridges is Namaqualand Klipkoppe Shrubland. The lower lying areas consist of Namaqualand Strandveld and Namaqualand Sand Fynbos. There are no wetlands or rivers of any importance for birds on the site. The following bird micro-habitats have been identified to date: natural shrubland; natural thornveld/strandveld; rocky ridges and slopes; livestock water points; camel thorn forest; stands of alien trees and farmsteads.

The natural shrubland, sandveld and fynbos occurring in the area can host terrestrial priority species such as Southern Black Korhaan and Ludwig's Bustard, Black Harrier and Grey-winged Francolin as well as endemic passerine species such as Cape Long-billed Lark.

Rocky ridges and slopes are potentially important habitat for raptors such as Verreauxs' Eagle, African Harrier-hawk, Booted Eagle, Jackal Buzzard, Greater Kestrel and Rock Kestrel, which may use the slopes for soaring and to gain lift. Rocky outcrops may also provide nesting habitat for smaller cliff-nesting birds such as Lanner Falcon and Rock Kestrel, as well as prey animals such as dassies, the main prey item of Verreauxs' Eagle.

A camel thorn forest to the north of the site could provide important nesting and foraging habitat for a variety of passerines, corvids, doves and raptors.

Farmsteads and feeding kraals and watering points are mainly frequented by a large variety of small passerines but can also provide important habitat for smaller raptors and their rodent prey.

Alien trees such as blue gums, mostly found around farmsteads, can be utilised as roosting and nesting sites by raptors, corvids and passerines.

5.5 Kap Vley WEF Pre-construction Monitoring

For the purposes of advising the scoping report a high level summary of the monitoring results to date is presented in the following sections.

5.5.1 Combined Flight Activity Summary

Flight activity levels of target species recorded at VPs was similar in summer and autumn. In summer 17 flights (totalling 17 birds) were recorded in 90 hours (an average of 0.18 target birds per hour) while in autumn 10 flights (totalling 10 birds) in 60 hours were recorded (an average 0.17 target birds per hour of observations). These figures are low compared to other sites in the specialists' experience. There was more flight activity recorded in winter when 25 flights were recorded (totalling 27 birds) over 60 hours of VP observations on the WEF site (an average of 0.45 target birds per hour). Across the three seasons to date, the average number of target species birds recorded per hour of observation was 0.26 target bird per hour. Again, this figure is low in the specialist's experience.

After three seasonal surveys a total of 52 flight paths of from target species, have been recorded, totalling 54 individual birds[2]. Flight paths of all target species are shown in Figure 2. Table 3 shows a summary of the VP flights recorded for each target species to date, as well as an indication of the flights potentially at Rotor Swept Height (RSH).

Forty-two (81%) of the recorded flights were by raptors and the most frequently recorded species was Jackal Buzzard with 12 flights (23% of all flights), followed by Rock Kestrel and Southern Black Korhaan with 8 flights each and Verreauxs Eagle with 7 flights.

A total of 18 flights (35%) were made by Red Data species, one by Black Harrier (*Endangered*), two by Ludwig's Bustard (*Endangered*), eight by Southern Black Korhaan (*Vulnerable*) and seven by Verreauxs Eagle (*Vulnerable*). It is likely that the majority of flights recorded for Verreauxs Eagle were of the same individual adult bird.

Preliminary analyses of flight paths indicate that while target species utilised various height categories, 75% of flights included at least some time at RSH (height bands two (20-40 m), three (40-120 m) and four (120-200 m). This is a moderate to high amount of flights in the potential risk zone, and may be indicative of the species recorded, as raptors do tend to fly at risk height while soaring, hovering, and gliding and change heights regularly.

Table 3: Flight Path Target Species

Species	**Species Priority Score**	**Red List Status (Taylor *et al.* 2015)**	**Total no. of Flight paths**	**Total no. of birds recorded***	**Estimated minimum number individuals**	**Flights with a portion at RSH (% at RSH)**
African Harrier Hawk	190	-	2	2	1	2 (100%)
Black-chested Snake Eagle	230	-	2	2	1	2 (100%)
Black Harrier	-	EN	1	1	1	1 (100%)
Booted Eagle	230	-	3	3	2	3 (100%)
Greater Kestrel	174	-	5	5	2	5 (100%)
Jackal Buzzard	250	-	12	12	3	10 (83%)
Ludwig's Bustard	320	EN	2	2	2	2 (100%)
Pale Chanting Goshawk	200	-	1	1	1	0 (0%)
Rock Kestrel	-	-	8	8	5	6 (75%)
Southern Black Korhaan	270	VU	8	10	6	0 (0%)
Verreauxs' Eagle	360	VU	7	7	2	7 (100%)
Unidentified Raptor	-	-	1	1	1	1 (100%)
Total			**52**	**54**	**NA**	**39 (75%)**

[2] A flock of birds flying together is recorded as a single flight path. However, the majority of flight paths to date were of a single bird, with two flights (both by Southern black Korhaan) recording 2 birds each.

5.5.2 *Species Summary and Discussion*

A total of 78 positively identified species (including 14 priority species) have been recorded across both the WEF site and the control site after three seasonal surveys (Table 4). Five regional Red Data species (Taylor *et al.* 2015) have been recorded including two classified as *Endangered* (Black Harrier and Ludwig's Bustard), and three as *Vulnerable* (Verreauxs' Eagle, Lanner Falcon and Southern Black Korhaan).

A total of 76 species were observed in the WEF site, while 57 species were recorded at the control site. This lower number can be attributed to less time spent at the control site versus the WEF site, and is not necessarily a reflection of local diversity. Two species (Lanner Falcon and Capped Wheatear) were observed only on the control site, and 21 species only in the WEF site to date.

Table 4: Priority Species and Regional Red Data Species Recorded During the Surveys on the Control and WEF Sites

Full Name	Regional Red Data Status	Priority Species Score	summer		autumn		winter	
			WEF	Control	WEF	Control	WEF	Control
African Harrier-Hawk		190			x		x	
Black-chested Snake Eagle		230					x	
Black Harrier	EN	345					x	
Booted Eagle		230	x					
Cape Eagle-Owl		250	x					
Greater Kestrel		174					x	
Grey-winged Francolin		190					x	
Jackal Buzzard		250	x	x	x	x	x	x
Lanner Falcon	VU	300						x
Ludwig's Bustard	EN	320					x	x
Pale Chanting Goshawk		200	x	x	x	x	x	x
Southern Black Korhaan	VU	270	x		x		x	
Spotted Eagle-Owl		170	x					
Verreauxs' Eagle	VU	360	x		x	x		

The full species list (of positively identified species) indicating their conservation status and endemism are provided in Appendix IV. This reporting table will be expanded as further data become available through subsequent surveys. Appendix IV shows that 21 endemic or near-endemic species[3] have been recorded on the WEF site, and one (Cape Long-billed Lark) is a restricted-range species. However, none of these species were overly abundant.

Generally the diversity and abundance of small passerine species was low to moderate, although a relatively high number (16) of these species were endemic or near-endemic, and may be at risk from displacement impacts. Possibly of most concern regarding these species is the range-restricted Cape Long-billed Lark. This recently recognised species is confined to a narrow strip on the west coast littoral, preferring short coastal scrub

[3] Endemic or near-endemic (i.e. ~70% or more of population in RSA) to South Africa (not southern Africa as in field guides) or endemic to South Africa, Lesotho and Swaziland. Taken from BirdLife South Africa Checklist of Birds in South Africa, 2014.

including Renosterveld and Strandveld (Taylor *et al*. 2015). The population has not been quantified, but is believed to be decreasing, possibly due to disturbance and degradation of coastal habitats. The project site may include important habitat for this species, however this will be restricted to certain areas with suitable habitat, which can be buffered.

Two large terrestrial species have been recorded, the *Vulnerable* Southern Black Korhaan and the *Endangered* Ludwig's Bustard. Southern Black Korhaan is generally known to fly mostly at low heights, yet may be susceptible to collision impacts with both turbines (at the lower blade tip point) and over-head powerlines. However, it is more likely to be at threat from disturbance and/or displacement impacts.

Ludwig's Bustard was not recorded during the first two seasonal surveys and was only recorded in winter, following good rains in the area. This was predicted after the first and second survey, as generally very hot and dry conditions had only been experienced up until that point. Ludwig's Bustard is known to be nomadic and to have seasonal movements in line with rainfall patterns, and considering historical records from the area and the habitats available, it presence in winter was expected. The WEF site falls within the potential range of Kori Bustard and Secretarybird, although neither of these two species have been recorded on the site to date.

Verreauxs' Eagle was occasionally recorded on the WEF site in summer and autumn, but not in winter. It is strongly suspected that all records of this species on the WEF in summer were of the same individual bird, and this may also be the case with the autumn sightings (which included only one flight). Verreauxs' Eagles are territorial and their territories surround their nest sites, but their nests are not necessarily in the centre of their territory (Gargett 1990). Although identified as an adult, this bird may be a young adult without an established territory (territorial adults are usually observed in pairs), termed a 'floater' that is searching for a territory. Furthermore, the WEF site does not hold any suitable nesting habitat (i.e. cliffs). Nests are usually built on cliffs and ledges (Gargett 1990), although they have been recorded nesting on power lines and occasionally in trees or on telephone poles (pers. obs.). Verreauxs' Eagle are predominantly found in mountainous, rocky habitat (Davies & Allan 1997), and the regional population (i.e. for South Africa, Lesotho and Swaziland) has been estimated to be between 3 500 and 3 750 mature individuals, but confidence in these figures is low (Taylor *et al.* 2015). Verreauxs' Eagle is an apex predator which plays an important ecological role. Suitable foraging habitat is present on the WEF site, and prey species such as Rock Hyrax ('Dassie') and Red Rock Rabbit have been observed. Furthermore a review of the first eight wind farms to share post-construction monitoring data with BirdLife South Africa (BirdLife SA 2017) indicates that Verreauxs' Eagle mortalities have occurred at two of those wind farms. A total of five Verreauxs' Eagle collisions have been reported; four fatalities occurred at one wind farm within a three-month period (Smallie 2015).

5.5.3 Nest Survey

A dedicated search for cliff nests was conducted by the specialist at the end of April 2017. Selected nest sites were subsequently revisited and surveyed in August 2017 to confirm activity. Six cliff nest sites have been found (Table 5). It must be noted that no nests were found closer than 6.8 km from the nearest proposed turbines. Therefore, the current recommended turbine exclusion buffers shown in Table 5, will have no impact on the current preliminary layout of the Kap Vley WEF.

Table 5: Cliff Nest Survey Results

Nest	Approximate nest location	Approximate distance from nearest turbine	Species	Description	Turbine exclusion buffer
N1	29.769719°S 17.467132°E	6.8 km	Unidentified Raptor	Large nest on cliff. No clear evidence of use. No white-wash seen. Suspect inactive Verreauxs' Eagle nest.	3 km
N2	29.800851°S 17.501511°E	8.5 km	Unidentified Raptor	Medium size nest on cliff. No white-wash seen. Adult Jackal Buzzard observed in vicinity. Suspect active Jackal Buzzard nest.	1.5 km
N3	29.803182°S 17.502349°E	8.5 km	White-necked Raven	Pair of ravens observed in vicinity. Goat/sheep fur and rope observed in messy stick nest.	NA
N4	29.817942°S; 17.496148°E	7.8 km	Verreauxs' Eagle	Large stick nest on cliff. Adult Verreauxs' Eagle observed sitting on nest. Assumed adult is a separate bird to the pair at N5 (2.8 km away).	3 km
N5	29.836030°S; 17.516480°E	9.75 km	Verreauxs' Eagle	Active nest site with pair observed flying above. Very large stick nest on cliff in a deep Kloof. Lots of evidence of use including prey items, feathers and whitewash.	3 km
N6	29.901507°S; 17.464862°	8.2 km	Unidentified Raptor	Medium sized stick nest on cliff in Kloof. No clear evidence of recent use. Adult Jackal Buzzard observed in vicinity on two occasions. Suspect Jackal Buzzard nest.	1.5 km

6 IDENTIFICATION OF IMPACTS, POSSIBLE MITIGATION MEASURES AND PRELIMINARY IMPACT ASSESSMENT

The possible impacts arising from the construction and operation of the WEF site and the grid connection have been identified and are described in the following sections. A preliminary significance rating and impact assessment was done for each impact and mitigation measures for each of the identified impacts are also provided.

6.1 Background to Interactions between Wind Energy Facilities and Birds

South Africa has experienced an increase in the number of wind energy developments in the past five years, but still lacks some information about the effects that these developments have on certain aspects of the environment. To date only eight operational wind farms have conducted post-construction monitoring and made the results available to Birdlife South Africa (Ralston Paton *et al*. 2017).

International experience, and preliminary results from South Africa have shown that birds can be impacted negatively by wind farms, and that the severity of these impacts can differ drastically from site to site. Overall, it appears that severe impacts, such as the high mortality numbers of Golden Eagle observed at Altamont Pass in California (Orloff & Flannery 1992; Hunt 1995; Hunt *et al.* 1998) seem to be the exception rather than the rule, with the majority of facilities recording relatively low mortalities (Erickson *et al.* 2001; de Lucas *et al.* 2008; Strickland *et al.* 2011). The effects of one poorly placed facility, or some poorly sited turbines within a facility, can however affect the population of certain species at a regional, national or even global level (Bellebaum *et al*. 2013; Carrete 2009; Dahl *et al.* 2012). Hence, it is important to assess the impacts of wind energy facilities, and to base this assessment on a thorough investigation of the local avifauna prior to construction, which is being done for the proposed development.

The main impacts of wind energy facilities and their associated infrastructure have been identified as (a) displacement through disturbance and habitat destruction and (b) mortality through collisions with turbines and/or powerlines and (c) electrocution on live power infrastructure (Drewitt & Langston 2006; Percival 2005; van Rooyen 2000).

6.2 Construction Phase Impacts

6.2.1 Habitat Destruction

During the construction of the WEF and grid connection infrastructure, some habitat destruction and alteration will take place. This happens with the construction of access roads, the clearing of servitudes and areas for tower/pylon placements, and the levelling of substation yards, development of laydown areas and turbine bases. The removal of vegetation which provides habitat for avifauna and food sources may have an impact on birds breeding, foraging and roosting.

This habitat destruction is a direct impact that is restricted to the site. If no mitigation (rehabilitation) occurs the impact can be permanent.

The scale of direct habitat loss resulting from the construction of a wind farm and associated infrastructure depends on the size of the project but, generally speaking, is likely to be small per turbine base. Typically, actual habitat loss amounts to 2 – 5 % of the total development area (Drewitt & Langston 2006) of a WEF although it is likely less in the case of the Kap Vley WEF. Therefore the consequence of the impact is considered as moderate as the environment will continue to function in a modified manner. This impact is unavoidable if development takes place, as some habitat destruction will have to occur in order to construct roads, pylons and turbines, and is therefore determined as very likely. The impact is partially reversible through rehabilitation.

The significance of the impact is rated as **Low (4)** prior to the application of mitigation measures, and as **Low (4)** following mitigation.

6.2.1.1 Potential Mitigation Measures

- High traffic areas and buildings such as offices, batching plants, storage areas etc. should where possible be situated in areas that are already disturbed;
- Existing roads and farm tracks should be used where possible;
- The minimum footprint areas of infrastructure should be used wherever possible, including road widths and lengths;
- Sensitive zones and no-go areas (e.g. nesting areas) are to be avoided;
- No off-road driving;
- Environmental Control Officers to oversee activities and ensure that the site specific construction environmental management plan (CEMP) is implemented and enforced;
- Prior to construction, the avifaunal specialist should conduct a site walkthrough, covering the final road and power line routes as well as the final turbine positions, to identify any nests/breeding activity of sensitive species, as well as any additional sensitive habitats within which construction activities may need to be excluded; and

- Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and to this end a habitat restoration plan is to be developed by a specialist and included within the Construction Environmental Management Plan (CEMP).

6.2.2 Disturbance and Displacement

Disturbances and noise from staff and construction activities can impact on certain sensitive species particularly whilst feeding and breeding, resulting in effective habitat loss through a perceived increase in predation risk (Frid & Dill 2002; Percival 2005). There are various potentially sensitive species occurring on the WEF site including Cape Long-billed Lark, Southern Black Korhaan and Verreauxs' Eagle. This can cause these species to be displaced, either temporarily (i.e. for some period during the construction activity) or permanently (i.e. they do not return), into less suitable habitat which may reduce their ability to survive and reproduce.

This is a negative impact restricted to the construction site and duration (~2 years). The impact will cease as soon as construction is completed (highly reversible), and irreplaceability of the receiving environment is low. The severity of the impact can be mitigated partially, but some disturbance is likely to occur. The consequence of this impact is moderate as the environment will continue to function in a modified manner.

The significance of the impact is rated as **Low (4)** prior to the application of mitigation measures, and as **Low (4)** following mitigation.

6.2.2.1 Potential Mitigation Measures

- A site specific Construction Environmental Management Plan (CEMP) must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMP and should apply good environmental practice during construction;
- Prior to construction, the avifaunal specialist should conduct a site walkthrough, covering the final road and power line routes as well as the final turbine positions, to identify any nests/breeding/roosting activity of sensitive species, as well as any additional sensitive habitats. The results of which may inform the final construction schedule, including abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise;
- Sensitive zones and no-go areas are to be designated by the specialist (e.g. nesting sites) and must be avoided; and
- Environmental Control Officers to oversee activities and ensure that the site specific construction environmental management plan (CEMP) is implemented and enforced.

6.3 Operational Phase

6.3.1 Collisions with Wind Turbines

WEFs can cause bird mortalities through the collision of birds with moving turbine blades. A number of factors influence the number of birds impacted by collision, including:

- Number of birds in the vicinity of the WEF;
- The species of birds present and their flying patterns and behaviour;
- The design of the development including the turbine layout, height and size of the rotor swept area.

It is important to understand that not all birds that fly through the WEF at heights swept by rotors automatically collide with blades. In fact avoidance rates for certain species have proven to be extremely high. In a radar study of the movement of ducks and geese in the vicinity of an off-shore wind facility in Denmark, less than 1% of bird flights were close enough to the turbines to be at risk, and it was clear that the birds avoided the turbines effectively (Desholm and Kahlert 2005). Whilst avoidance rates for SA species are currently unknown due to the lack of data, comparisons can be drawn between functionally similar species, for example Verreauxs' Eagle with Golden Eagle, in order to inform an assessment.

The majority of studies on collisions caused by wind turbines have recorded relatively low mortality levels (Madders & Whitfield 2006). This is perhaps largely a reflection of the fact that many of the studied wind farms are located away from large concentrations of birds. It is also important to note that many records are based only on finding carcasses, with no correction for carcasses that were overlooked or removed by scavengers (Drewitt & Langston 2006). Relatively high collision mortality rates have been recorded at several large, poorly-sited wind farms in areas where large concentrations of birds are present (including IBAs), especially among migrating birds, large raptors or other large soaring species, e.g. in the Altamont Pass in California, USA (Thelander and Smallwood 2007), and in Tarifa and Navarra in Spain (Barrios and Rodrigues 2004).

Although large birds with poor manoeuvrability (such as cranes, korhaans, and bustards) are generally at greater risk of collision with structures (Jenkins *et al.* 2015), it is noted that these classes of birds (unlike raptors) do not feature prominently in literature as wind turbine collision victims. It may be that they avoid wind farms, resulting in lower collision risks, or that they are not distracted and focussed on hunting and searching the ground while flying, as is the case for raptors.

A minimum of 271 birds have been killed by turbines in South Africa to date (Ralston Paton *et al.* 2017). Mortality estimates for the eight studied wind farms range from 2.1 to 8.6 birds per turbine per year, which is within range of average estimates from Europe (6.5) and North America (1.6) (Rydell *et al.* 2012). Raptors and passerines are the groups most affected by collisions in South Africa to date. Six listed Red Data species (Taylor *et al.* 2015) have been affected, including fatalities of three Blue Crane (Near Threatened), five Verreauxs' Eagle (Vulnerable), two Martial Eagle (Endangered) and five Black Harrier (Endangered). Notably, a large number of the not red listed, but endemic Jackal Buzzard (24) have been killed (Ralston Paton *et al.* 2017).

Some of these fatalities were unexpected as they occurred in areas not identified as sensitive during pre-construction monitoring. Therefore it is important to consider that collisions may not necessarily occur where predicted, and that they can occur away from areas perceived to be preferred use areas. On the other hand, no fatalities have been reported to date for several species predicted to be susceptible to collisions. Due to these uncertainties a pre-cautionary approach was adapted in the assessment of the impact of collisions with turbines.

Bird mortality is a direct, negative effect that can occur for the duration of the project's lifespan (long-term). It can affect regional populations if for example dispersing eagles continue to collide with turbines as they attempt to populate an available territory (sinkhole effect). The consequence of this impact is potentially severe and recent data from wind farms in South Africa (Ralston Paton *et al.* 2017) demonstrates that mortalities are very likely to occur, and irreversible in terms of the deceased individual and possibly also irreversible at a population level.

The significance of the impact is rated as **High (2)** prior to the application of mitigation measures, and as **Moderate (3)** following mitigation.

6.3.1.1 Potential Mitigation Measures

- Turbines must not be constructed within any High Sensitivity Zones to be identified after pre-construction monitoring is concluded;

- The hierarchy of sensitivity zones to be identified should be considered where possible;
- Develop and implement a carcass search programme for birds during the first two years of operation, in line with the applicable (i.e. at the start of operations at the wind farm) South African monitoring guidelines;
- Develop and implement a 24 month post-construction bird activity monitoring program that mirrors the pre-construction monitoring surveys completed by Arcus and is in line with the applicable South African post-construction monitoring guidelines. This program must include thorough and ongoing nest searches and nest monitoring;
- Frequent and regular review of operational phase monitoring data (activity and carcass) and results by an avifaunal specialist. This review should also establish the requirement for continued monitoring studies (activity and carcass) throughout the operational and decommissioning phases of the development;
- The above reviews should strive to identify sensitive locations at the development including turbines and areas of increased collisions with power lines that may require additional mitigation. If unacceptable impacts are observed (in the opinion of the bird specialist and independent review), the specialist should conduct a literature review specific to the impact (e.g. collision and/or electrocution) and provide updated and relevant mitigation options to be implemented. As a starting point for the review of possible mitigations, the following may need to be considered:
  - Assess the suitability of using deterrent devices (e.g. DT Bird and ultrasonic/radar/electromagnetic deterrents for bats) to reduce collision risk.
  - Identify options to modify turbine operation (e.g. temporary curtailment or shut-down on demand) to reduce collision risk if absolutely necessary and other methods have not had the desired results.

6.3.2 Collisions with Power Lines

Collisions with large (132 kV or above) power lines are a well-documented threat to birds in southern Africa (van Rooyen 2004), while smaller lines pose a higher threat of electrocution but can still be responsible for collisions. In addition to their grid connections, wind energy facilities may have overhead lines between turbine strings and substations that pose a collision threat.

Collisions with overhead power lines occur when a flying bird does not see the cables, or is unable to take effective evasive action, and is killed by the impact or impact with the ground. Especially heavy-bodied birds such as bustards, cranes and waterbirds, with limited manoeuvrability are susceptible to this impact (van Rooyen 2004). Many of the collision and electrocution sensitive species are also considered threatened in southern Africa. The Red Data (Taylor *et al.* 2015) species vulnerable to power line collisions are generally long living, slow reproducing species. Some require very specific conditions for breeding, resulting in very few successful breeding attempts, or breeding might be restricted to very small areas. These species have not evolved to cope with high adult mortality, with the results that consistent high adult mortality over an extensive period could have a serious effect on a population’s ability to sustain itself in the long or even medium term. Species that may be affected on the WEF site include Ludwig’s Bustard and Southern Black Korhaan. Ludwig’s Bustard is known to be particularly prone to collision (pers. Com R. Simmons, J. Smallie, M. Martins and BARESG) (Shaw *et al.* 2010).

Mortality through collisions with powerlines is a direct, negative impact that can affect regional populations over the course of the projects lifespan. The consequence of this impact is considered severe, very likely to occur and the effects are irreversible in terms of mortality. It can be mitigated, but is unlikely to be avoided completely.

The significance of the impact is rated as **High (2)** prior to the application of mitigation measures, and as **Moderate (3)** following mitigation.

6.3.2.1 Potential Mitigation Measures

- Electrical infrastructure should not be constructed in 'no-go areas' and construction of infrastructure must consider avifaunal sensitivity zones and avoid areas of higher sensitivities where possible;
- Place new power lines on the WEF site underground where possible;
- Place new overhead power lines adjacent to existing power lines or linear infrastructure (e.g. roads and fence lines);
- Attach appropriate marking devices [Bird Flight Diverters (BFDs)] on all spans of all new overhead power lines to increase visibility;
- Develop and implement a carcass search programme for birds during the first two years of operation, in line with the South African monitoring guidelines (Jenkins *et al*. 2015). This program must include monitoring of overhead power lines, including the new grid connection line.

6.3.3 Electrocution

Electrocution of birds from electrical infrastructure including overhead lines is an important and well documented cause of bird mortality, especially for raptors and storks (APLIC 1994; van Rooyen and Ledger 1999). Electrocution may also occur within newly constructed substations. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). With regard to the grid connection infrastructure, overhead power line infrastructure with a capacity of 132 kV or more does not generally pose a risk of electrocution due to the large size of the clearances between the electrical infrastructure components. Electrocutions are therefore more likely for larger species whose wingspan is able to bridge the gap such as eagles or storks. A few large birds (such as Verreauxs' Eagle and Martial Eagle), susceptible to electrocution (particularly in the absence of safe and mitigated structures) occur in the area. Electrocution is also possible on electrical infrastructure within the substation particularly for species such as crows and owls.

Mortality through electrocution on power lines is a direct, negative impact that can affect populations at a regional level and can occur throughout the existence of the powerlines (long-term). The consequence of this impact is considered to be potentially substantial, but the probability is unlikely due to the development of bird friendly power line structures in recent years which are now constructed as a standard.

The significance of the impact is rated as **Moderate (3)** prior to the application of mitigation measures, and as **Very low (5)** following mitigation.

6.3.3.1 Potential Mitigation Measures

- Electrical infrastructure should not be constructed in 'no-go areas' and construction of infrastructure must consider avifaunal sensitivity zones and avoid areas of higher sensitivities where possible;
- Place new power lines on the WEF underground where possible;
- Any new overhead power lines must be of a design that minimizes electrocution risk by using adequately insulated 'bird friendly' structures, with clearances between live components of 1.8 m or greater and which provides a safe bird perch.

6.3.4 *Disturbance and Displacement*

Disturbance and displacement by operational activities such as power line and turbine maintenance, fencing, and noise can lead to birds avoiding the area for feeding or breeding, and effectively leading to habitat loss and a potential reduction in breeding success (Larsen & Madsen 2000; Percival 2005). Turbines can also be disruptive to bird flight paths, with some species altering their routes to avoid them (Dirksen *et al.* 1998, Tulp *et al.* 1999, Pettersson & Stalin 2003). While this reduces the chance of collisions it can also create a displacement or barrier effect, for example between roosting and feeding grounds and result in an increased energy expenditure and lower breeding success (Percival 2005).

Disturbance distances (the distance from wind farms up to which birds are absent or less abundant than expected) can vary between species and also within species with alternative habitat availability (Drewitt & Langston 2006). Some international studies of various species have recorded disturbance distances of 80 m, 100 m, 200 m and 300 m (Larsen & Madsen 2000, Shaffer & Buhl 2015) from turbine positions, but distances of 600 m (Kruckenberg & Jaehne 2006) and up to 800 m have been recorded (Drewitt & Langston 2006).

Leddy *et al.* (1999) found increased densities of breeding grassland passerines with increased distance from wind turbines, and higher densities in the reference area than within 80 m of the turbines, indicating that displacement did occur, at least in this case. A comparative study of nine wind farms in Scotland (Pearce-Higgens *et al.* 2009) found seven of the 12 species studied exhibited significantly lower frequencies of occurrence close to the turbines, after accounting for habitat variation, with evidence of turbine avoidance in a further two. No species were more likely to occur close to the turbines. Raptors are generally fairly tolerant of wind farms, and continue to use the area for foraging (Thelander *et al.* 2003, Madders & Whitfield 2006, Ralston Paton *et al.* 2017), and may not be affected by displacement, however this increases their collision risk.

In South Africa the results available thus far have shown little evidence that displacement and disturbance of priority species has occurred. However, due to the limited number of operational wind farms in South Africa and short monitoring efforts, the precautionary principle should be applied, and disturbance and displacement must still be regarded as a potential impact.

It is expected that some species potentially occurring on the WEF site will be susceptible to disturbance and displacement, for example smaller passerines such as larks, warblers, flycatchers and chats, as well as large terrestrial Red Data species such as Southern Black Korhaan and Ludwig's Bustard. Priority species nesting on the project site (including on new infrastructure e.g. powerline pylons) may be disturbed during routine maintenance.

During operation of the grid connections, servitudes for the power lines will have to be cleared of excess vegetation at regular intervals. This is done to allow access to the power line for maintenance, to prevent vegetation from intruding into the prescribed clearance gap between the ground and the conductors, and to minimize the risk of fire under the line which can result in electrical flashovers. These and other maintenance activities can disturb sensitive species occurring on site.

This negative impact is of potentially moderate consequence and will continue throughout the operational phase of the project. Disturbance is likely to occur and but is restricted to local populations and is moderately reversible once the activity ceases.

The significance of the impact is rated as **Low (4)** prior to the application of mitigation measures, and as **Low (4)** following mitigation.

6.3.4.1 Potential Mitigation Measures

- A site specific Operational Environmental Management Plan (OEMP) must be implemented, which gives appropriate and detailed description of how operational and maintenance activities must be conducted to reduce unnecessary disturbance. All contractors are to adhere to the OEMP and should apply good environmental practice during all operations.
- The on-site WEF manager (or a suitably appointed Environmental Manager) must be trained by an avifaunal specialist to identify the potential priority species and Red Data species as well as the signs that indicate possibly breeding by these species. If a priority species or Red Data species is found to be breeding (e.g. a nest site is located) on the operational Wind Farm, the nest/breeding site must not be disturbed and an avifaunal specialist must be contacted for further instruction;
- Operational phase bird monitoring, in line with applicable guidelines, must be implemented and must include monitoring of all raptor nest sites for breeding success;
- No turbines should be placed in no-go areas to be identified through pre-construction monitoring, while associated infrastructure should be avoided where possible in these areas.

6.3.5 Disruption of Local Bird Movement Patterns

Wind energy facilities may form a physical barrier to movement of birds across the landscape, this may alter migration routes and increase distances travelled and energy expenditure or block movement to important areas such as ephemeral wetlands or prey sources altogether. This potential impact is not yet well understood, is likely to be more significant as a cumulative impact with surrounding developments, is difficult to measure and assess, and therefore mitigation measures are difficult to identify. Some mitigation may be possible by avoiding turbine placement in obvious flyways and making turbines more visible through lighting, but this will not change the significance of this impact.

This impact is a direct potentially negative regional effect which continues throughout the lifespan of the facility. It will cease as soon as the turbines are removed (highly reversible) and is unlikely to occur. The consequence of this impact is considered moderate.

The significance of the impact is rated as **Low (4)** prior to the application of mitigation measures, and as **Low (4)** following mitigation.

6.3.5.1 Potential Mitigation Measures

- Turbines must not be constructed within any high sensitivity zones identified through pre-construction monitoring and impact assessment;
- The lowest feasible number of turbines should be constructed for the required MW output. Therefore, fewer larger (i.e with a higher MW output) turbine models should be favoured where possible.
- Preferred turbine placement in areas of low sensitivity, and decreasing preference through to high sensitivity zones identified through pre-construction monitoring; and
- Lighting on turbines to be of an intermittent and coloured nature rather than constant white light to reduce the possible impact on the movement patterns of nocturnal migratory species.

6.4 Decommissioning Phase

6.4.1 Disturbance and Displacement

Activities such as, noise and traffic associated with the decommissioning of the facility can impact species in the same way as construction activities. In addition, any nesting birds utilising the electrical infrastructure are vulnerable to disturbance impacts, especially if nests are disturbed or removed during the removal/take down of structures (e.g. pylons). Particularly Martial Eagle (Endangered) is known to utilise pylons for nesting and could be susceptible to disturbance, and experience a resulting reduced breeding success. Martial Eagle has been recorded by SABAP2 in the Kleinzee area, not far from the proposed grid connection routes, and could be attracted to nest on the new pylons in the area. Lanner Falcon (Vulnerable) and Greater Kestrel are two other priority species that may nest on pylons.

This direct impact is restricted to the site to be decommissioned and will last for the length of the decommissioning phase (medium-term). It is likely to occur but mitigation is possible. The consequence of this impact is considered to be medium.

The significance of the impact is rated as **Low (4)** prior to the application of mitigation measures, and as **Low (4)** following mitigation.

6.4.1.1 Potential Mitigation Measures

- A site specific Environmental Management Plan (EMP) must be implemented, which gives appropriate and detailed description of how decommissioning activities must be conducted. All contractors are to adhere to the EMP and should apply good environmental practice during decommissioning;
- Environmental Control Officers to oversee activities and ensure that the site specific environmental management plan (CEMP) is implemented and enforced;
- The appointed Environmental Control Officer (ECO) must be trained by an avifaunal specialist to identify the potential priority species and Red Data species as well as the signs that indicate possible breeding by these species. The ECO must then, during audits/site visits, make a concerted effort to look out for such breeding activities of Red Data species, and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species. If any of the Red Data species are confirmed to be breeding (e.g. if a nest site is found), decommissioning activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed;
- Prior to decommissioning, an avifaunal specialist should conduct a site walkthrough, covering the entire power line routes as well as the turbine areas, to identify any nests/breeding/roosting activity of sensitive species, as well as any additional sensitive habitats. The results of which may inform the final decommissioning schedule in close proximity to that specific area, including abbreviating activity times, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise.

6.5 Cumulative Impacts

Five wind energy and eight solar energy developments are proposed or approved within a 50 km radius of the proposed site, which could lead to cumulative impacts on birds. All of the above mentioned impacts, and particularly those associated with the operational phase of the proposed project, could be intensified due to potential cumulative effects.

The Kleinzee WEF avifaunal specialist concludes in the Final EIA report (Simmons 2011) that the species to be most likely impacted on are flamingos, cormorants, pelicans, bustards, korhaans, eagles and ducks. Of these groups only bustards, korhaans and eagles occur on the Kap Vley WEF site and could potentially be impacted on cumulatively, as the others are birds associated with the shoreline habitat and are unlikely to be influenced by the Kap Vley WEF. In addition Verreauxs' Eagle, which occurs at Kap Vley WEF site was not recorded or identified as a target species at Kleinzee WEF.

Similarly, the Koingnaas WEF avifaunal specialist assessment identified flamingos, raptors, shelduck and Ludwig's Bustard as species likely to be impacted on, with particular emphasis on Ludwig's Bustard. Of these only Ludwig Bustard and some smaller raptors are likely to be impacted on by the Kap Vley WEF.

At Springbok WEF Verreauxs' Eagle, which also occurs at Kap Vley WEF site, was identified as the species that will potentially be impacted on. However, Verreauxs' Eagle was only recorded sporadically at Kap Vley WEF site, and is not considered a species of high concern there at present. Therefore the cumulative impact of the Kap Vley WEF on Verreauxs' Eagle is expected to be low.

The Project Blue Wind Energy Facility avifaunal specialist report mentions Black Harrier, Secretarybird, Jackal Buzzard and two kestrels (Greater and Rock Kestrel) as species of concern. Of these Jackal Buzzard and the kestrels were recorded at a low frequency at the Kap Vley WEF site and only one flight path of Black Harrier was recorded to date with no record of Secretarybird. Therefore the cumulative impact of the Kap Vley WEF on Jackal Buzzard and kestrels was considered in the assessment.

Eight solar PV projects are planned within a 50 km radius. The main impact of solar PV facilities on birds is habitat destruction and collision impacts associated with the grid connection lines. Due to the relatively small footprint and resulting low significance of the habitat destruction impact at the Kap Vley WEF, the cumulative habitat destruction impact for these developments is concluded to be of low significance. Details regarding the routes and lengths of the grid connection power lines for all eight solar PV facilities were not all available, and therefore a precautionary approach has been adopted and the cumulative impact of power line collisions (particularly involving Ludwig's Bustard) is currently rated as moderate-high. Detailed information regarding the grid connections for these projects will be sought and considered in the EIA phase.

In summary the cumulative effect of Kap Vley WEF on the impacts of the proposed five wind farms and eight solar facilities has the potential to affect Ludwig's Bustard and to a lesser degree Southern Black Korhaan, Jackal Buzzard, Verreauxs' Eagle and Black Harrier. Ludwig's Bustard and Southern Black Korhaan are most prone to impacts from collisions with power lines and wind turbines, while Jackal Buzzard and Verreauxs' Eagle are prone to impacts from collisions with wind turbines. There may be some effect on other small raptors and passerines, but this is not considered to be of concern.

6.6 Impact Assessment Summary Table

Table 6: Impact Assessment Table

Impact pathway	Nature of potential impact/risk	Status[4]	Extent[5]	Duration[6]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
CONSTRUCTION PHASE															
Clearing of vegetation	Habitat destruction	Negative	Site	Long-term	Moderate	Very Likely	Moderate	Moderate	**Low (4)**	No	Yes	Where feasible, construct minimum number of turbines required to meet project MW output. Implement CEMP	**Low (4)**	4	Medium
Noise and disturbance from construction activities	Habitat loss through perceived increased predation risk (Displacement). Reduced breeding success.	Negative	Site	Medium-term	Moderate	Likely	High	Moderate	**Low (4)**	No	Yes	Buffer nest sites. Amend construction schedule. No turbines in No-go areas. Implement CEMP	**Low (4)**	4	Medium
OPERATIONAL PHASE															
Collisions with operational wind turbines	Bird mortality	Negative	Regional	Long-term	Severe	Very Likely	Non-reversible	Moderate	**High (2)**	No	Yes	Where feasible, construct minimum number of turbines required to meet project MW output. Adherence to no-go area buffers for turbine placement. Operational monitoring in line with applicable guidelines. Further operational mitigation measures to be researched, by appointed bird specialist, and the appropriate selected mitigation implemented, if post construction monitoring reveal high levels of impacts.	**Moderate (3)**	3	Medium
Collisions with overhead powerlines	Bird mortality	Negative	Regional	Long-term	Severe	Very Likely	Non-reversible	Moderate	**High (2)**	No	Yes	Where possible route new line along existing roads and/or power line servitudes. BFD's must be installed on new overhead power line spans identified during a pre-construction walkthrough.	**Moderate (3)**	3	Medium
Electrocution from overhead powerlines	Bird mortality	Negative	Regional	Long-term	Severe	Unlikely	Non-reversible	Moderate	**Moderate (3)**	Yes	Yes	New powerline to be buried where possible. Use only a bird-friendly pylon structure. Ensure all clearance between live components are 1.8 m or greater.	**Very Low (5)**	5	High

[4] Status: Positive (+) ; Negative (-)
[5] Site; Local (<10 km); Regional (<100); National; International
[6] Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 yrs); Long-term (project duration); Permanent (beyond project decommissioning)

Impact pathway	Nature of potential impact/risk	Status[7]	Extent[8]	Duration[9]	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
Disturbance and noise from maintenance activities	Habitat loss through perceived increased predation risk (Displacement)	Negative	Site	Long-term	Moderate	Likely	Moderate	Moderate	**Low (4)**	No	Yes	Reduce disturbance by adhering to OEMP; on-site manager / ECO to be trained to ID priority species and signs of breeding; monitor raptor nest breeding success and conduct post-construction monitoring; No turbines in No-go areas.	**Low (4)**	4	Medium
Avoidance of turbines	Disruption of local bird movement patterns	Negative	Regional	Long-term	Moderate	Unlikely	High	Moderate	**Low (4)**	No	No	Intermittent coloured lighting on turbines; No turbines in high sensitivity areas; Where feasible, construct minimum number of turbines required to meet project MW output.	**Low (4)**	4	Low
DECOMMISSIONING PHASE															
Noise and disturbance from decommissioning activities	Habitat loss through perceived increased predation risk (Displacement). Reduced breeding success.	Negative	Site	Medium-term	Moderate	Likely	High	Moderate	**Low (4)**	No	Yes	Adhere to Decommissioning Phase EMP. Amendments to decommissioning schedule required if any of the Red Data species are confirmed to be breeding decommissioning activities within 500 m of the breeding site must cease, and an avifaunal specialist may advise changes to the schedule.	**Low (4)**	4	Medium
CUMULATIVE IMPACTS															
Collisions with overhead powerlines	Bird mortality	Negative	Regional	permanent	Extreme	Very Likely	Non-reversible	Moderate	**Very High (1)**	No	Yes	Where possible route new lines along existing roads and/or power line servitudes. BFD's must be installed on new overhead power line spans identified during a pre-construction walkthrough	**High (2)**	2	Medium
Collisions with operational wind turbines	Bird mortality	Negative	Regional	Permanent	Severe	Very Likely	Non-reversible	Moderate	**High (2)**	No	Yes	Where feasible, construct minimum number of turbines required to meet project MW output .Adherence to no-go area buffers for turbine placement. Operational monitoring in line with applicable guidelines. Further operational mitigation measures to be researched, by the appointed bird specialist and the appropriate selected mitigation implemented, if post construction monitoring reveal high levels of impacts.	**Moderate (3)**	3	Medium
Clearing of vegetation	Habitat destruction	Negative	Site	Long-term	Moderate	Very Likely	Moderate	Moderate	**Low (4)**	No	Yes	Implement CEMP. Where feasible, construct minimum number of turbines required to meet project MW output	**Low (4)**	4	Medium

7 Status: Positive (+) ; Negative (-)
8 Site; Local (<10 km); Regional (<100); National; International
9 Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 yrs); Long-term (project duration); Permanent (beyond project decommissioning)

7 PLAN OF STUDY FOR EIA AND CONCLUSION

The following activities will take place during the EIA Phase of the project:

- The final season (spring) of pre-construction monitoring will be conducted in October 2017 according to the methodology presented in Section 3. The results will be combined with the first three seasons and reanalysed.
- The avifaunal sensitivity of the WEF site and grid connection will be determined using the collected data, which identifies areas of high, medium and low sensitivity to inform turbine placement and assist in producing a revised and preferred turbine layout, if required.
- The data collected from the above surveys will be analysed by the avifaunal specialists and incorporated into an avifaunal impact assessment report (AIAR). The significance of the abovementioned impacts will be re-rated taking into consideration the results of the full 12 month pre-construction monitoring programme, as well as the preferred layout using the method described below. It shall provide further detail regarding the baseline conditions at the WEF and grid connection sites, confirm the anticipated impacts documented in this scoping report, and provide an avifaunal sensitivity map, constraints shapefile and an updated impact assessment and significance rating. The AIAR will include an impact statement and specialists' opinion including rationale if the impacts of the proposed development are deemed acceptable and development should proceed.

7.1 EIA Assessment Methodology

The assessment of potential impacts on avifauna will be done through the following stages:

- Describing the avifaunal baseline environment through survey (as described above) and desk study.
- Determining the value of the avifaunal receptors. This will be done primarily though the compilation of a list of focal species by considering factors such as abundance, behaviour on site, breeding and flight activity (i.e by considering the survey results) as well as priority species status (as per Retief *et al.* 2014), Regional Red Data status (Taylor 2014) and whether the species is endemic or not.
- Identifying and characterising the potential impacts on the focal species. Potential avifaunal impacts will be assessed to determine significance using a standard methodology as presented in Section 3.6 and Appendix I, both before and after mitigation.
- Describing mitigation, compensation, enhancement and monitoring measures associated with the proposed project to be included in the EMPr.
- Alternative layouts and grid connection routes investigated by the applicant will be assessed by the avifaunal specialist.
- The assessment will include a comprehensive assessment of cumulative impacts using the assessment methodology described above.

7.2 Stakeholder Consultation

Stakeholders will be consulted accordingly. BirdlifeSA have been consulted and are aware of the preconstruction monitoring methodologies and results, and will be consulted again prior to the compilation of the final AIAR.

7.3 Conclusion

Impacts at this stage are not viewed as being of an extent or significance so as to preclude development and it is the specialists' opinion that the project may proceed to the EIA phase. The level of priority species activity at the proposed project site is regarded as low to very low. The level of Verreauxs' Eagle activity is regarded as low, and it is unlikely that the development would pose a highly significant risk to this or any other species, except for a potentially moderate risk to Ludwig's Bustard. This will be further assessed in the EIA Phase.

All proposed grid connection alternatives are acceptable, but Alternative 3 is the more preferred route from an avifaunal perspective as it is the shortest route.

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APPENDIX I: SPECIALIST IMPACT ASSESSMENT CRITERIA

The identification of potential impacts and risks includes impacts that may occur during the construction, operational and decommissioning phases of the activity. The assessment of impacts includes direct, indirect, as well as cumulative impacts.

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts includes:

- Determination of the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determination of future changes to the environment that will occur if the activity does not proceed;
- An understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

As per DEA *Guideline 5: Assessment of Alternatives and Impacts* the following methodology is applied to the prediction and assessment of impacts. Potential impacts are rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- **Nature of impact** - this reviews the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?"
- **Status** - Whether the impact on the overall environment (social, biophysical and economic) will be:
  - Positive - environment overall will benefit from the impact;
  - Negative - environment overall will be adversely affected by the impact; or
  - Neutral - environment overall will not be affected.
- **Spatial extent** – The size of the area that will be affected by the risk/impact:
  - Site;
  - Local (<10 km from site);
  - Regional (<100 km of site);
  - National; or
  - International (e.g. Greenhouse Gas emissions or migrant birds).
- **Duration** – The timeframe during which the risk/impact will be experienced:
  - Very short term (instantaneous);
  - Short term (less than 1 year);

  - Medium term (1 to 10 years);
  - Long term (the impact will occur for the project duration); or
  - Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (*i.e.* the impact will occur beyond the project decommissioning).

- **Reversibility** of impacts -

  - High reversibility of impacts (impact is highly reversible at end of project life, i.e. this is the most favourable assessment for the environment. For example, the nuisance factor caused by noise impacts associated with the operational phase of an exporting terminal can be considered to be highly reversible at the end of the project life);
  - Moderate reversibility of impacts;
  - Low reversibility of impacts; or
  - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment. The impact is permanent. For example, the loss of a palaeontological resource on the site caused by building foundations could be non-reversible).

- **Irreplaceability** of resource loss caused by impacts –

  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment. For example, if the project will destroy unique wetland systems, these may be irreplaceable);
  - Moderate irreplaceability of resources;
  - Low irreplaceability of resources; or
  - Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

Using the criteria above, the impacts will further be assessed in terms of the following:

- **Probability** – The probability of the impact occurring:

  - Extremely unlikely (little to no chance of occurring);
  - Very unlikely (<30% chance of occurring);
  - Unlikely (30 – 50% chance of occurring)
  - Likely (51 – 90% chance of occurring); or
  - Very likely (>90% chance of occurring regardless of prevention measures).

- **Consequence**–The anticipated severity of the impact:

  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
  - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
  - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).

- **Significance** – To determine the significance of an identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure A below). The approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, very high) against a predefined set of criteria (as shown in Figure A below).

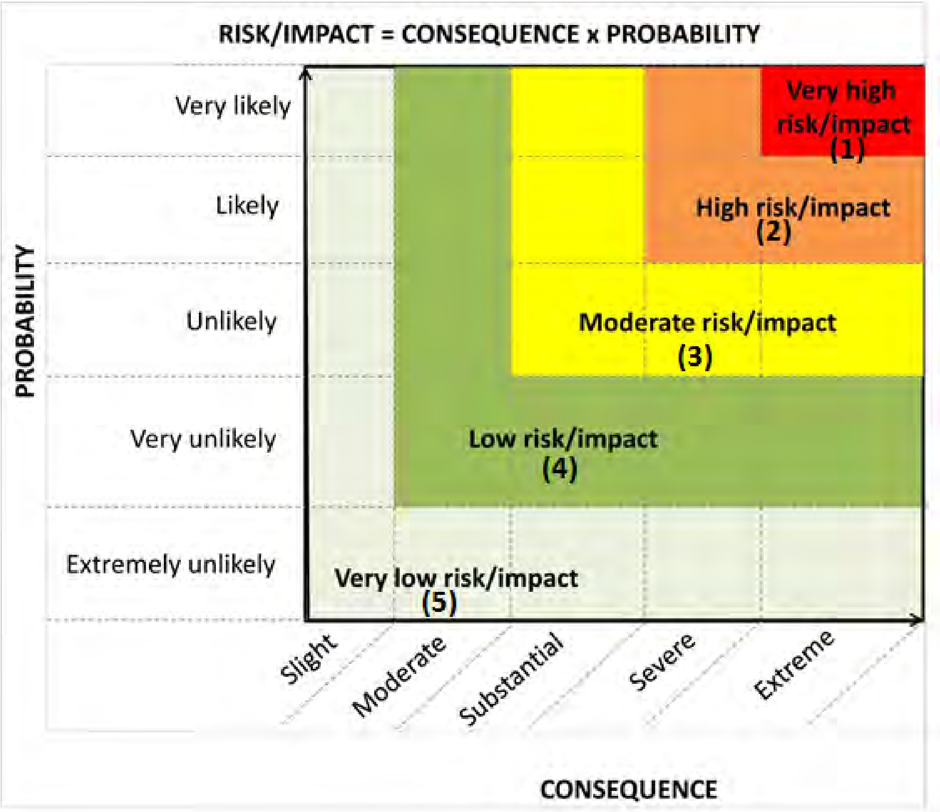

Figure A: Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
  - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or

- High (the risk/impacts will result in a considerable alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).
- Very high (the risk/impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

The above assessment must be described in the text (with clear explanation provided on the rationale for the allocation of significance ratings) and summarised in an impact assessment Table in a similar manner as shown in the example below (Table 1).

With the implementation of mitigation measures, the residual impacts/risks must be ranked as follows in terms of significance:

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Impacts will then be collated into an EMPr and these will include the following:

- Management actions and monitoring of the impacts;
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts; and
- Positive impacts will be identified and enhanced where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction, operational and decommissioning phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact;
- Impacts should be assessed for all layouts and project components;
- <u>IMPORTANT NOTE FROM THE CSIR</u>: IMPACTS SHOULD BE DESCRIBED BOTH BEFORE AND AFTER THE PROPOSED MITIGATION AND MANAGEMENT MEASURES HAVE BEEN IMPLEMENTED. THE ASSESSMENT OF THE POTENTIAL IMPACT “BEFORE MITIGATION” SHOULD TAKE INTO CONSIDERATION ALL MANAGEMENT ACTIONS THAT ARE ALREADY PART OF THE PROJECT DESIGN (WHICH ARE A GIVEN). THE ASSESSMENT OF THE POTENTIAL IMPACT “AFTER MITIGATION” SHOULD TAKE INTO CONSIDERATION ANY ADDITIONAL MANAGEMENT ACTIONS PROPOSED BY THE SPECIALIST, TO MINIMISE NEGATIVE OR ENHANCE POSITIVE IMPACTS.

APPENDIX II: AVIFAUNAL SPECIALIST CV

CURRICULUM VITAE

Andrew Pearson
Ecology Specialist (Avifauna)
Email: andrewp@arcusconsulting.co.za Tel: +27 (0) 21 412 1529

Specialisms

- Avifauna Impact Assessment
- Pre-construction Avifauna Monitoring
- Construction Phase and Operational Phase Avifauna Monitoring
- Survey Design and Management
- Environmental Management Process

Summary of Experience

Andrew is an Avifauna Specialist with nine years of environmental management experience. He has worked as an avifaunal specialist for six years. Andrew has gained a strong level of experience in avifauna assessments across a multitude of sectors, including various powerline assessments and walk-downs. To date, Andrew has provided avifaunal specialist services on over 27 solar, power line and wind farm projects in Southern Africa. Andrew provides specialist input into the design of projects and environmental management plans, assesses environmental due diligence and compliance with international environmental policies (World Bank, IFC, Equator Principles) and peer reviews avifaunal specialist reports. Andrew is a professional natural scientist registered with SACNASP, and is a selected member of the Birds and Renewable Energy Specialist Group (BARESG). Andrew has been bird watching for 25 years, has worked as a birding field guide in 2006 and 2007, and attended bird identification training at the Lawson's Birding Academy in 2007.

Professional History

January 2014 to Present - Avifauna Specialist, Arcus Consultancy Services Ltd:

- Specialist Bird Impact Assessment Studies for energy infrastructure;
- Design of high quality bird surveys in line with applicable guidance and legal requirements;
- Design and implementation of operational carcass search programme including the training and management of locally based observers; and
- Specialist raptor nest surveys.

March 2011 to December 2013 - Environmental Impact Assessment & Avifaunal Specialist, Endangered Wildlife Trust

- Specialist Bird Impact Assessment Studies for energy infrastructure;
- Extensive work in the Wind Energy Sector to reduce possible impacts on birds and bats;
- 12 month Bird Monitoring on WEF sites - compilation of monitoring protocol, recruitment, management and co-ordination of observers, on-site bird observation and compilation of final monitoring reports; and
- Presentations and Environmental Training.

January 2008 to March 2011 - Group Environmental Manager, Basil Read (Pty) Ltd

- Environmental management of roads and civil construction projects;
- Implementation and certification of an ISO 14001:2004 Environmental Management System;
- Group Internal Environmental Audits;
- Compilation of EMPs and Environmental site inspections;
- Assistance in ENV authorisations and applications;
- Environmental Awareness Training; and
- Compilation of Group Carbon Footprint.

February 2006 to January 2008 - Game Ranger and Walking Guide, CC Africa (now *&BEYOND*), Phinda Private Game Reserve

- Game drives and walks in a Big 5 reserve;
- Hosting guests and sharing environmental and wildlife knowledge; and
- Environmental management, waste management.

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CURRICULUM VITAE

Qualifications and Professional Interests

- **University of Stellenbosch, 2005.**
  Bachelor of Science (Hons.): Conservation Ecology.
- August 2010 - Hazard Identification and Risk Assessment (HIRA) Course, IRCA Global.
- April 2010 - SAMTRAC, NOSA, East Rand Office.
- April 2009 - Green Star Accredited Professional Exam, (GBCSA), PROMETRIC.
- May 2008 - Environmental Auditing: ISO 14001:2004, Lead Auditors' Course (SAACTA approved), Centre for Environmental Management at North West University (NWU), Potchestroom.
- February 2008 - Environmental Law for Managers, Centre for Environmental Management at NWU.
- February 2008 - Implementing Environmental Management Systems - ISO 14001:2004, Centre for Environmental Management at NWU.
- August 2007 - Bird Identification Course, Lawson's Birding Academy, Intensive training in Makuleke, Kruger National Park.

Professional Membership

- South African Council for Natural Scientific Professions (SACNASP), "Ecological Science". Professional Natural Scientist (Pr. Sci. Nat.), Reg. no 400423/11.

Recent Conferences and Seminars

- Windaba 2013, 2014, 2015 and 2016; Solar Indaba 2013; Africa Utility Week 2014, 2015 and 2016.
- IAIA SA National Conference 2011, 2013 and 2016.
- March 2011 Endangered Wildlife Trust (EWT) Wildlife and Energy Symposium.

Additional Skills

- ArcGIS, Google GEO Tools and Google Earth.
- Computer Skills: Office 2013 including Microsoft Word, Excel, Outlook and PowerPoint.
- Field work skills involving various sampling methods, data capturing & analysis.
- Excellent knowledge of fauna (especially birds) and flora.
- 4x4 driving skills.

Project Experience

- **Due Diligence**
  Due Diligence of bird work conducted at the Kangnas WEF (ERM); Due Diligence of Bird Work conducted at the Excelsior WEF (ERM); Due Diligence of Bird Work conducted at the Golden Valley WEF (ERM); Due Diligence of Bird Work at the Roggeveld Wind Farm (IBIS Consulting).

- **Peer Review**
  Peer Review of Operational Monitoring at the Jeffreys Bay Wind Farm (Globeleq South Africa Management Services (Pty) Ltd); Review and design mitigation strategies for birds at the Kinangop Wind Park, Kenya (African Infrastructure Investment Managers).

- **Feasibility Studies**
  Assessment of the Feasibility of a Wind Farm in the Eastern Cape near Somerset East (WKN Windcurrent SA (Pty) Ltd).

- **Pre-Construction Monitoring and/or Impact Assessment - Wind Energy Facility (WEF) Projects:**
  Kouga WEF; Aberdeen WEF; Hidden Valley WEF; Middleton WEF; Springfontein WEF, Moorreesburg WEF; Grassridge WEF; Ukomeleza WEF; Chaba WEF; Waainek WEF; Vryheid WEF; Kouga Western Cluster WEF; Hopefield WEF; DNA Elliot WEF; Confidential WEF near Elliot; Umsinde Emoyeni WEF; Grassridge II WEF; Komsberg East WEF; Komsberg West WEF; Gouda WEF; Confidential WEF near Touws River; Confidential WEF near Kleinsee.

- **Operational Monitoring - WEF Projects:**
  Hopefield WEF; Gouda WEF.

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CURRICULUM VITAE

- **Impact Assessment - Powerline Projects:**
  St Francis Bay Kouga 66kV; Ncwane Okuku 88kV; Vulcan Ekangala 132kV; Merapi Everest 400kV; Mathibestad Majaneng 132kV; Majaneng Themba Main-Babelegi 132kV; Ngoma Pandamatenga 400kV (ZIZABONA Phase 2); Estancia Thuli 132kV; Estancia Zamokuhle 132kV; Gumeni Bosloop 132kV; Mbumbu Tsakani 132kV; Normandie Heyshope 132kV; Mookodi Integration Project; Wildebees Bethal 132kV; Zaaifontein Mathondwane 88kV; Hlabisa Nongoma 88kV; Mandeni Gingindlovu 132kV; Tabor Nzhelele 400kV; Leksand St James 88kV; Emondlo St James 88kV; Randfontein Mine 132kV; Droogfontein CSP 132kV; Mtubatuba St Lucia 132kV; Ndumo Gezisa 132kV; Ermelo Uitkoms 88kV; TCTA Spring Grove 88kV; Springfontein 132kV.
- **Pre-construction Monitoring and/or Impact Assessment - Concentrated Solar Power (CSP) Plants and Solar Photovoltaic (PV) Plants:**
  Humansrus 100MW CSP; Arriesfontein 100MW CSP; Arriesfontein 225MW PV; Eenzaamheid PV; Vaal Dam PV; Mokopole PV; Kalkaar CSP and PV; Droogfontein PV; Bokpoort II CSP; Metsimatala CSP.
- **Other:**
  Expansion of Hendrina Power Station Ash Disposal Facilities; Expansion of Majuba Power Station Ash Disposal Facilities; Expansion of Tutuka Power Station Ash Disposal Facilities; Eskom Distribution Cedarville Upgrade; Eskom Limpopo Operating Unit (LOU) Head Office, Polokwane.

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APPENDIX III: PRE-CONSTRUCTION BIRD MONITORING SURVEY DETAILS

Table A: Vantage Point Locations and Survey Dates with Hours Surveyed

VP	Co-ordinates		Dates surveyed (Session length)			
	South	East	Summer	Autumn	Winter	Total Hours
1	-29.822514°	17.401152°	24/02/2017 (3 h) 25/02/2017 (3 h) 27/02/2017 (6 h) 28/02/2017 (6 h)	17/05/2017 (3 h) 19/05/2017 (3 h) 20/05/2017 (3 h) 19/05/2017 (3 h)	01/08/2017 (3 h) 03/08/2017 (3 h) 04/08/2017 (3 h) 06/08/2017 (3 h)	42
2	-29.841478°	17.361940°	24/02/2017 (6 h) 25/02/2017 (6 h) 26/02/2017 (6 h)	17/05/2017 (3 h) 18/05/2017 (3 h) 20/05/2017 (3 h) 21/05/2017 (3 h)	02/08/2017 (3 h) 03/08/2017 (3 h) 05/08/2017 (3 h) 07/08/2017 (3 h)	42
3	-29.844505°	17.393906°	24/02/2017 (3 h) 25/02/2017 (3 h) 27/02/2017 (6 h) 28/02/2017 (3 h) 01/03/2017 (3 h)	17/05/2017 (3 h) 19/05/2017 (3 h) 20/05/2017 (3 h) 22/05/2017 (3 h)	01/08/2017 (3 h) 03/08/2017 (3 h) 04/08/2017 (3 h) 06/08/2017 (3 h)	42
4	-29.875842°	17.353799°	24/02/2017 (6 h) 25/02/2017 (6 h) 26/02/2017 (6 h)	17/05/2017 (3 h) 18/05/2017 (3 h) 20/05/2017 (3 h) 21/05/2017 (3 h)	01/08/2017 (3 h) 02/08/2017 (3 h) 04/08/2017 (3 h) 05/08/2017 (3 h)	42
5	-29.893285°	17.312513°	26/02/2017 (6 h) 27/02/2017 (6 h) 01/03/2017 (6 h)	18/05/2017 (3 h) 19/05/2017 (3 h) 19/05/2017 (3 h) 22/05/2017 (3 h)	01/08/2017 (3 h) 02/08/2017 (3 h) 04/08/2017 (3 h) 05/08/2017 (3 h)	42
CVP	-29.763502°	17.442609°	28/02/2017 (6 h) 01/03/2017 (6 h)	18/05/2017 (3 h) 19/05/2017 (3 h) 21/05/2017 (3 h) 23/05/2017 (3 h)	02/08/2017 (3 h) 03/08/2017 (3 h) 05/08/2017 (3 h) 07/08/2017 (3 h)	36

Table B: Walked Transect Locations and Survey Dates

Ref	Transect Co-ordinates (Start)		Transect Co-ordinates (Finish)		Dates Surveyed		
	South	East		East	Summer	Autumn	Winter
WT2	-29.804304°	17.382200°	-29.801195°	17.391889°	28/02/2017	20/05/2017 23/05/2017	04/08/2017 05/08/2017
WT3	-29.834881°	17.395963°	-29.840944°	17.388608°	24/02/2017 25/02/2017	19/05/2017 23/05/2017	03/08/2017 06/08/2017
WT4	-29.878162°	17.349255°	-29.873356°	17.357927°	25/02/2017 26/02/2017	18/05/2017 21/05/2017	01/08/2017 05/08/2017
WT5	-29.898949°	17.295032°	-29.896796°	17.305128°	26/02/2017 01/03/2017	18/05/2017 21/05/2017	02/08/2017 05/08/2017
CWT	-29.764588°	17.441543°	-29.762218°	17.450770°	28/02/2017 01/03/2017	19/05/2017 23/05/2017	03/08/2017 05/08/2017

Table C: Driven Transect Locations and Survey Dates

Ref	Co-ordinates (Start)		Co-ordinates (Finish)		Survey Date		
	South	East	South	East	Summer	Autumn	Winter
DT1	-29.834820°	17.395940°	-29.790450°	17.430000°	24/02/2017 25/02/2017	17/05/2017 20/05/2017	01/08/2017 03/08/2017
DT2	-29.783020°	17.397370°	-29.843280°	17.360040°	23/02/2017 24/02/2017	17/05/2017 20/05/2017	03/08/2017 07/08/2017
DT3	-29.824780°	17.297370°	-29.898740°	17.294830°	23/02/2017 26/02/2017	18/05/2017 20/05/2017	01/08/2017 06/08/2017
CDT	-29.757700°	17.427410°	-29.696790°	17.423810°	23/02/2017 28/02/2017	19/05/2017	02/08/2017 05/08/2017

Table D: Focal Site Locations, Descriptions and Survey Dates

Focal Site	Co-ordinates		Description	Survey Date		
	South	East		Summer	Autumn	Winter
FS1	-29.870674°	17.379208°	Artificial water point for live-stock and reservoir.	22/02/2017 24/02/2017	17/05/2017 23/05/2017	04/08/2017 06/08/2017
FS2	-29.769719°	17.467132°	Verreauxs' Eagle Nest (N1)	-	23/05/2017	04/08/2017 07/08/2017
FS3	-29.817942°	17.496148°	Verreauxs' Eagle Nest (N4)	-	23/05/2017	07/08/2017 08/08/2017
FS4	-29.836030°	17.516480°	Verreauxs' Eagle Nest (N5)	-	-	07/08/2017

APPENDIX IV: PRE-CONSTRUCTION BIRD MONITORING SPECIES LIST

Full Name	Red Data	Endemism	Priority Score	Season 1 (Summer)		Season 2 (Autumn)		Season 3 (Winter)		SABAP2
				WEF Site	Control	WEF Site	Control	WEF Site	Control	
Acacia Pied Barbet				x	x	x	x	x	x	x
African Harrier-Hawk			190			x		x		x
African Sacred Ibis						x	x	x	x	
African Stone Chat				x		x	x	x	x	x
Alpine Swift				x		x	x	x	x	
African Pipit										x
Alpine Swift										x
Ant-eating Chat				x		x	x			
Barn Swallow				x						x
Black-chested Snake Eagle			230					x		
Black Harrier	EN	x	345					x		x
Black-headed Canary										x
Bokmakierie				x	x	x	x	x	x	x
Booted Eagle			230	x						x
Bradfield's Swift				x	x	x				x
Brown-throated Martin				x	x	x	x	x	x	
Cape Bulbul		x		x	x	x	x	x	x	x
Cape Bunting				x	x	x	x	x	x	x
Cape Canary				x		x	x	x	x	
Cape Clapper Lark		x (RR)		x		x		x	x	x

Full Name	Red Data	Endemism	Priority Score	Season 1 (Summer)		Season 2 (Autumn)		Season 3 (Winter)		SABAP2
				WEF Site	Control	WEF Site	Control	WEF Site	Control	
Cape Crow				x	x	x	x	x	x	x
Cape Eagle-Owl			250	x						
Cape Long-billed Lark		x		x		x	x	x	x	x
Cape Sparrow				x	x	x	x	x	x	x
Cape Teal										x
Cape Turtle Dove				x	x	x	x	x	x	
Cape Wagtail						x	x		x	x
Cape Weaver		x				x	x	x	x	x
Capped Wheatear									x	x
Chat Flycatcher				x	x	x	x	x	x	x
Chestnut-vented Tit-Babbler				x		x				
Cinnamon-breasted Warbler		x		x		x				x
Common Fiscal				x		x	x	x	x	
Dusky Sunbird				x		x		x		x
Fairy Flycatcher		x				x				x
Familiar Chat				x		x	x	x	x	x
Greater Kestrel			174					x		x
Grey Penduline-Tit										x
Greater Striped Swallow				x	x					x
Grey Tit		x			x	x		x	x	x
Grey-backed Cisticola				x	x	x	x	x	x	x
Grey-winged Francolin		x	190					x		x

Full Name	Red Data	Endemism	Priority Score	Season 1 (Summer)		Season 2 (Autumn)		Season 3 (Winter)		SABAP2
				WEF Site	Control	WEF Site	Control	WEF Site	Control	
Ground Woodpecker		x		x	x	x	x	x	x	x
House Sparrow										x
Jackal Buzzard		x	250	x	x	x	x	x	x	x
Indian Peafowl										x
Karoo Chat				x	x	x	x	x	x	x
Karoo Eremomela										x
Karoo Lark		x		x	x	x	x	x	x	x
Karoo Long-billed Lark										x
Karoo Prinia		x		x	x	x	x	x	x	x
Karoo Scrub Robin				x	x	x	x	x	x	x
Karoo Thrush		x						x		x
Lanner Falcon	VU		300						x	x
Large-billed Lark		x		x		x		x	x	x
Laughing Dove						x	x	x	x	x
Layard's Tit-Babbler		x		x	x	x	x	x	x	x
Little Swift				x		x	x	x	x	x
Long-billed Crombec				x		x	x	x	x	x
Long-billed Pipit										x
Ludwig's Bustard	EN		320					x	x	x
Malachite Sunbird						x	x	x	x	x
Mountain Wheatear				x	x	x	x	x	x	x
Namaqua Dove				x		x				x

Full Name	Red Data	Endemism	Priority Score	Season 1 (Summer)		Season 2 (Autumn)		Season 3 (Winter)		SABAP2
				WEF Site	Control	WEF Site	Control	WEF Site	Control	
Namaqua Sandgrouse					x	x	x			x
Namaqua Warbler		x		x		x		x		
Pale-winged Starling										x
Pale Chanting Goshawk			200	x	x	x	x	x	x	
Red-capped Lark										x
Pied crow				x		x	x	x	x	
Pied Starling		x				x		x	x	
Red-eyed Dove					x	x	x			
Red-faced Mousebird								x		x
Red-winged Starling						x	x	x	x	
Rock Kestrel				x	x	x		x		x
Rock Martin				x	x	x	x	x	x	x
Rufous-eared Warbler						x	x	x	x	x
Sickle-winged Chat		x		x						
South African Shelduck										x
Southern Black Korhaan	VU	x	270	x		x		x		x
Southern Double-collared Sunbird		x		x		x	x	x	x	x
Speckled Pigeon				x		x	x		x	
Spike-heeled Lark				x	x	x	x	x	x	x
Spotted Thick-knee										x
Spotted Eagle-Owl			170	x						
Three-banded Plover										x

Full Name	Red Data	Endemism	Priority Score	Season 1 (Summer)		Season 2 (Autumn)		Season 3 (Winter)		SABAP2
				WEF Site	Control	WEF Site	Control	WEF Site	Control	
Tractrac Chat						x				
Verreauxs' Eagle	VU		360	x		x	x			x
White-backed Mousebird				x		x		x	x	x
White-necked Raven										x
White-throated Canary				x		x	x	x	x	x
Yellow Canary				x		x	x	x	x	x
Yellow-bellied Eremomela					x	x		x		
Yellow-billed Kite				x						

SCOPING INPUTS FROM SPECIALIST:

BAT IMPACT ASSESSMENT FOR THE KAP VLEY WIND ENERGY FACILITY, NORTHERN CAPE PROVINCE

SCOPING REPORT

On behalf of

juwi Renewable Energies (Pty) Ltd

September 2017

Prepared By:

Arcus Consultancy Services South Africa (Pty) Limited

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Registered in South Africa No. 2015/416206/07

TABLE OF CONTENTS

CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a *curriculum vitae*;	Appendix 4; Appendix 5
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix 4
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 2
(cA) an indication of the quality and age of base data used for the specialist report;	Section 3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4.1; Section 5.4
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 5
(g) an identification of any areas to be avoided, including buffers;	Section 4; Figure 1
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 1
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.2
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment, or activities;	Section 4
(k) any mitigation measures for inclusion in the EMPr;	Section 5
(l) any conditions for inclusion in the environmental authorisation;	Section 5
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 5
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	Section 4.4
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	None received
(p) any other information requested by the competent authority	None received
Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

1 INTRODUCTION

juwi Renewable Energies (Pty) Ltd ('juwi') are proposing to develop the Kap Vley Wind Energy Facility (WEF) on a site approximately 35 km south east of Kleinzee, in the Northern Cape Province ('the WEF site').

juwi have appointed Arcus Consultancy Services South Africa (Pty) Ltd ('Arcus') to provide bat specialist input in the form of a specialist Impact Assessment Report for the proposed development. Arcus have been appointed to conduct the required pre-construction bat monitoring for the WEF site, the results of which will feed into and advise the Environmental Impact Assessment (EIA) process for the proposed development.

1.1 Project Description

The proposed Kap Vley WEF is located south east of Kleinzee in the Namakhoi Local Municipality in the Northern Cape. The predominant land use associated with the study area is agriculture, particularly grazing and subsistence farming. The WEF will be constructed on the following land portions: Remainder (RE) Kamaggas Farm 200 Portion 5, RE Kap Vley Farm 315, Portion 1 of Kap Vley Farm 315, Portion 2 of Kap Vley Farm 315, Portion 3 of Kap Vley Farm 315, Portion 3 of Platvley Farm 314, RE Kourootjie Farm 316 and RE Gra'water Farm 331. While these land portions cover a very large area, the total footprint of the Kap Vley WEF will be less than 150 ha.

The proposed Kap Vley WEF will consist of up to 56 turbines each with a maximum hub height of 150 m and a maximum rotor diameter of 160 m. Each turbine will have crane platform of 1.4 ha and 20 x 20 m x 1 m deep reinforced concrete foundation. The project will also include up to 50 km of internal access roads, a concrete batching plant, operations and maintenance buildings, fencing, an on-site substation and temporary hard stand areas. The proposed WEF will also include a new overhead power line to connect the WEF to the national grid. The potential impacts of both the WEF site and the grid connection are considered.

The planned overhead power line (132 kV) will feed into Eskom's electricity grid. Three alternatives are being considered:

- Alternative 1: From the on-site substation to Gromis Substation. The transmission line is approximately 36 km long.
- Alternative 2: From the on-site substation to Gromis Substation. The transmission line is approximately 36 km long.
- Alternative 3: Directly to the Gromis substation from the on-site substation. The transmission line is approximately 32 km long.

2 SCOPE OF STUDY

2.1 Terms of Reference

The aim of this scoping study is to describe the baseline environment with respect to bats that may be influenced by the development of the WEF and its grid connection. This will also include a description and evaluation of the potential impacts the project may pose to bats. The following terms of reference were utilised for the preparation of this report:

- Describe the baseline environment of the project and its sensitivity with regard to bats;
- Identify the nature of potential impacts (positive and negative, including cumulative impacts) of the proposed project on bats during construction, operation and decommissioning;
- Conduct a preliminary significance rating and impact assessment of identified impacts;
- Identify information gaps and limitations;

- Identify potential mitigation or enhancement measures to minimise impacts to bats; and
- Propose a Plan of sSudy for the EIA phase.

2.2 Assumptions and Limitations

The following assumptions and limitations relevant to this study are noted:

- The knowledge of certain aspects of South African bats including natural history, population sizes, local and regional distribution patterns, spatial and temporal movement patterns (including migration and flying heights) and how bats may be impacted by wind energy is very limited for many species.
- Bat echolocation calls (i.e. ultrasound) operate over ranges of metres therefore acoustic monitoring samples only a small amount of space (Adams et al. 2012). Recording a bat using sound is influenced by the type and intensity of the echolocation call produced, the species of bat, the bat detector system used, the orientation of the signal relative to the microphone and environmental conditions such as humidity. One must therefore be cautious when extrapolating data from echolocation surveys over large areas because only small areas are actually sampled.
- There can be considerable variation in bat calls between different species and within species. The accuracy of the species identification is also very dependent on the quality of the calls used for identification. Species call parameters can often overlap, making species identification difficult.
- Bat activity recorded by bat detectors cannot be used to directly estimate abundance or population sizes because detectors cannot distinguish between a single bat flying past a detector multiple times or between multiple bats of the same species passing a detector once each (Kunz et al. 2007a). This is interpreted using the specialists' knowledge and presented as relative abundance.
- There is no standard scale to rate bat activity as low, medium or high. A qualitative assessment is given based on the specialists experience and on data collected from other locations. Data from this study were compared to data from other similar locations to rate the levels of bat activity recorded.
- The potential impacts of wind energy on bats presented in this report represent the current knowledge in this field. New evidence from research and consultancy projects may become available in future, including during the EIA process, meaning that impacts presented and discussed in this scoping report may be adjusted.

2.3 Legislative Context

The following legalisation, policies, regulations and guidelines are all relevant to the project and the potential impact it may have on bats and habitats that support bats:

- Convention on the Conservation of Migratory Species of Wild Animals (1979)
- Convention on Biological Diversity (1993)
- Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (NEMA, Act No. 107 of 1998)
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
- Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)
- The Equator Principles (2013)
- The Red List of Mammals of South Africa, Swaziland and Lesotho (2016)
- National Biodiversity Strategy and Action Plan (2005)
- South African Good Practise Guidelines for Surveying Bats in Wind Energy Facility Developments – Pre-Construction (2016)
- South African Good Practise Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (2014)

3 METHODOLOGY

The baseline environment for bats was investigated by using acoustic monitoring to document bat activity on the WEF site. Bats emit ultrasonic echolocation calls for orientation, navigation and foraging. These calls can be recorded by bat detectors enabling bat species to be identified and their activity patterns quantified.

The monitoring was undertaken in accordance with the South African Good Practice Guidelines for Surveying Bats in Wind Energy Facility Developments[1] ('the guidelines). The survey approach focused on the use of passive acoustic monitoring to record bats at seven locations at the WEF site. The size of the developable area, proposed turbine locations, topography, vegetation types, land use, landscape features important for bats (e.g. linear features, potential roosts and water) and road access were used to determine the number and locations of bat detectors.

Six bat detectors were installed on temporary aluminium masts with ultrasonic microphones mounted at 12 m (Figure 1). At the seventh bat detector microphones were mounted at 12 m and 80 m above ground level on a lattice meteorological mast (Figure 1). The detectors were installed and commissioned on 1 and 2 March 2017 and sampled bat activity until 5 September 2017. The data presented in this report therefore span autumn, winter and the start of spring.

Potential structures that bats could use as roosts were investigated during the day for the presence or evidence of roosting bats (e.g. guano and culled insect remains, etc.) whenever the Arcus team was on site. These included buildings, rocky outcrops and trees.

Acoustic data from each bat detector were analysed using Kaleidoscope (Version 3.1.3, Wildlife Acoustics). Bat species were automatically identified from their echolocation calls using the embedded echolocation call library in the software. The results were vetted by manually identifying and checking several recordings. Most files contained only a single bat pass[2] and therefore the total number of files was used as a proxy for bat passes. This would underestimate bat activity if any files contained more than one bat pass.

4 BASELINE ENVIRONMENT

4.1 Habitats

The topography at the site consists of a series of low ridges running across a generally flat terrain. The dominant vegetation type around the proposed turbine ridges is Namaqualand Klipkoppe Shrubland. The lower lying areas consist of Namaqualand Strandveld and Namaqualand Sand Fynbos. There are no major wetlands or rivers of any importance for bats on the site but there are non-perennial drainage systems and farms dams which will be attractive to bats. Micro-habitats available to bats for foraging include natural shrubland, natural thornveld/Duneveld, livestock water points, camel thorn woodland, stands of alien trees and farmsteads. Roosting micro-habitats include rocky outcrops, trees and buildings. Grazing is the only current land use on the site and there are no other existing impacts to bats.

[1] Sowler, S., Stoffberg, S., MacEwan, K., Aronson, J., Ramalho, R., Potgieter, K., Lötter, C. 2016. South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments - Pre-construction: 4th Edition. South African Bat Assessment Association.

[2] A sequence of calls is called a bat pass defined as two or more echolocation calls separated from other calls by more than 500 milliseconds Hayes, J.P., 1997. Temporal Variation in Activity of Bats and the Design of Echolocation-Monitoring Studies. Journal of Mammalogy 78, 514-524, Thomas, D.W., 1988. The distribution of bats in different ages of Douglas-Fir forests. The Journal of Wildlife Management 52, 619-626.

4.2 Bat Species

The project falls within the actual or predicted distribution range of approximately eleven species of bat (African Chiroptera Report 2013; Monadjem et al. 2010). However, the distributions of some bat species in South Africa, particularly rarer species, are poorly known so it is possible that more (or fewer) species may be present. Analysis of the acoustic monitoring data suggests that at least five species of bat are present (Table 1). The sensitivity of each of these species to the project is a function of their conservation status and the likelihood of risk to these species from WEF development. The likelihood of risk to impacts of wind energy was determined from the guidelines and is based on the foraging and flight ecology of bats and migratory behaviour.

Table 1: Bat Species Recorded at the Project and their Sensitivity to WEFs

Species	Species Code	# of Bat Passes	Conservation Status[3]		Likelihood of Risk
			National	International	
Egyptian free-tailed bat *Tadarida aegyptiaca*	EFB	4,541	Least Concern	Least Concern	High
Roberts's flat-headed bat *Sauromys petrophilus*	RFB	209	Least Concern	Least Concern	High
Natal long-fingered bat *Miniopterus natalensis*	NLB	2,962	Least Concern	Least Concern	High
Cape serotine *Neoromicia capensis*	CS	3,649	Least Concern	Least Concern	Medium-High
Long-tailed serotine *Eptesicus hottentotus*	LTS	387	Least Concern	Least Concern	Medium

4.3 Spatio-Temporal Bat Activity Patterns

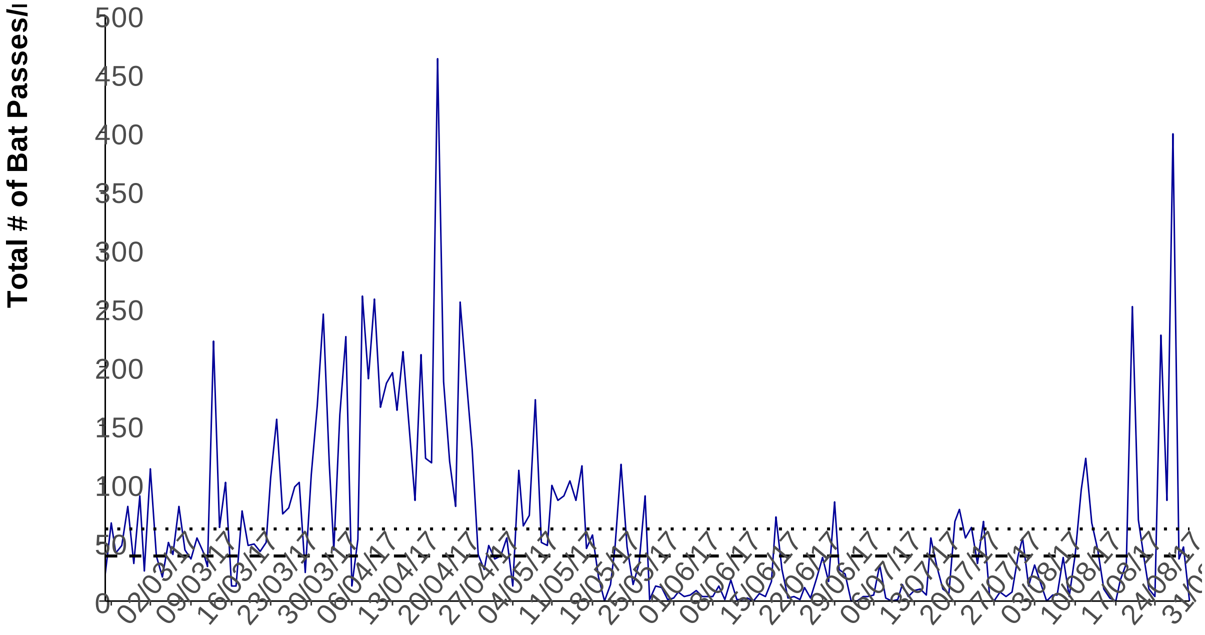
A total of 11,748 bat passes were recorded from 190 sample nights across the five species and across all bat detectors. Overall, the levels of bat activity were low to moderate based on the experience of the specialist and compared to other sites within a similar biome. The percentage of nights with bat activity ranged from a high of 90.5 % at KAP5 to a low of 16.9 % at KAPHIGH (Table 2). Across the site, bats were detected on all but nine sampling nights and total nightly activity varied between 0 and 462 bat passes (Graph 1). Mean and median bat activity per night was 61.8 and 38.5 bat passes respectively (Graph 1).

Table 2: Acoustic Monitoring Summary

Monitoring Location (Figure 1)	Altitude (masl)	# of Sample Nights	% of Sample Nights with Bat Activity	Total number of Bat Passes
KAP1	254	112	67.9	676
KAP2	302	188	76.6	2,810
KAP3	360	189	71.4	1,774
KAP4	431	155	38.7	189
KAP5	281	169	90.5	5,432
KAP6	388	189	42.3	316
KAPLOW	463	154	56.5	487
KAPHIGH	543	154	16.9	64

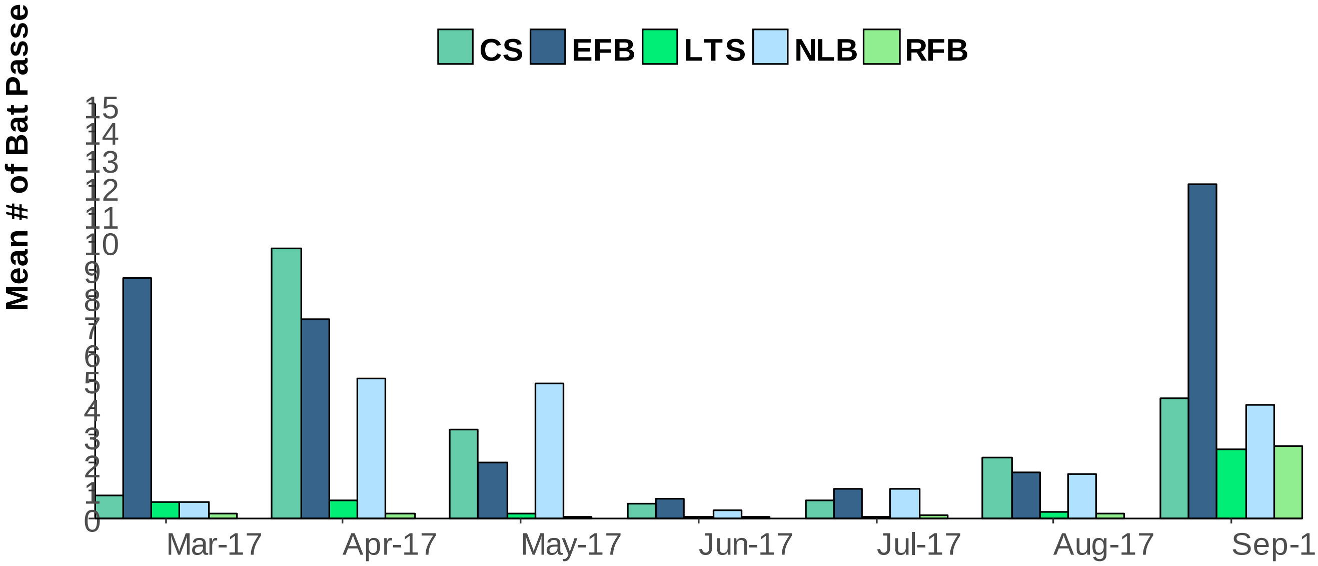
Bat activity varied seasonally with peaks in autumn and spring (Graph 1), although only six nights have been sampled in spring thus far. Median numbers of bat passes were significantly higher in autumn (77.5 bat passes/night) and spring (65.6 bat passes/night) compared to winter (10 bat passes/night).

[3] Child, M.F., Roxburgh, L., Do Linh San, E., Raimondo, D., Davies-Mostert, H.T. eds., 2016. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

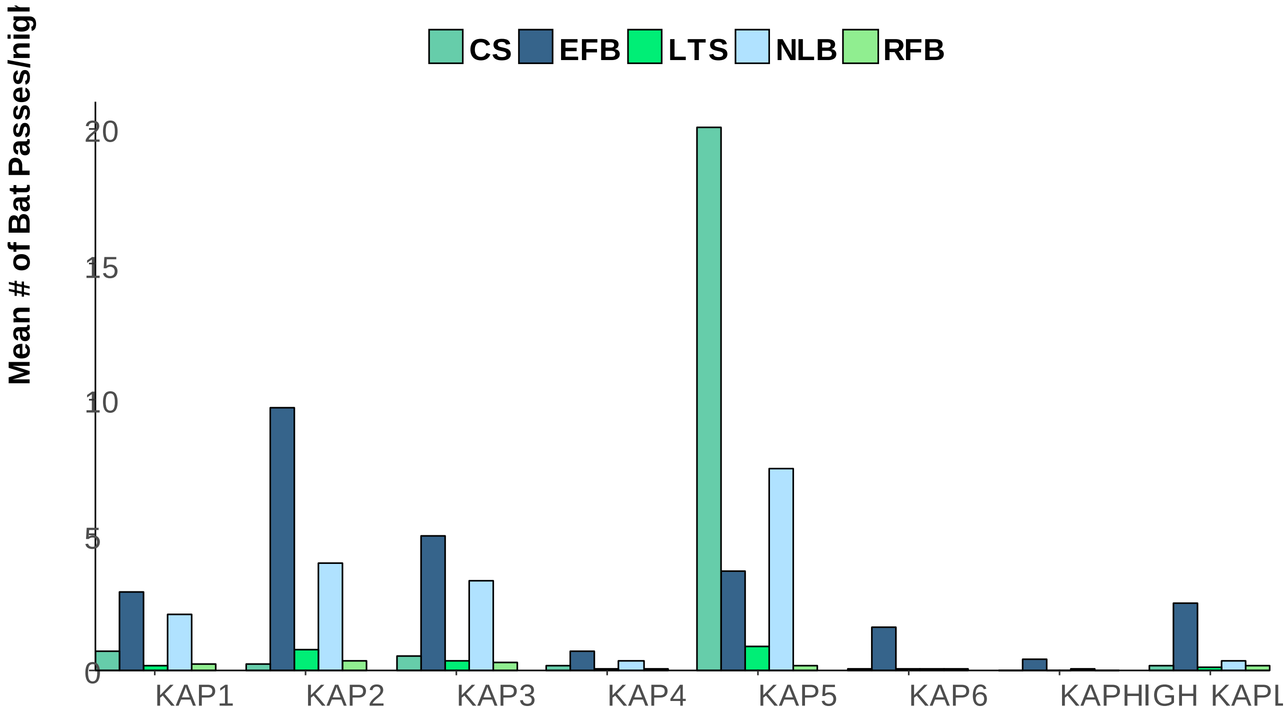


Graph 1: The total number of bat passes/night across all detectors during the sampling period. The dotted and dashed lines show the mean (61.8) and median (38.5) number of bat passes per night respectively.

All five species were recorded in each month and at each location. The only exception was that only three species, the Egyptian free-tailed bat, the Cape serotine and the Natal long-fingered bat, were recorded at 80 m on the met mast (KAPHIGH). Overall, these were the most frequently recorded species with the remaining two species recorded very infrequently (Table 1). The activity of each of these species peaked in different months (Graph 2) and varied across the site (Graph 3). The Egyptian free-tailed bat was most active at KAP2 in March (autumn) and September (spring), the Cape serotine was most active at KAP5 in April (autumn) and the Natal long-fingered bat was most active at KAP5 in April (autumn).

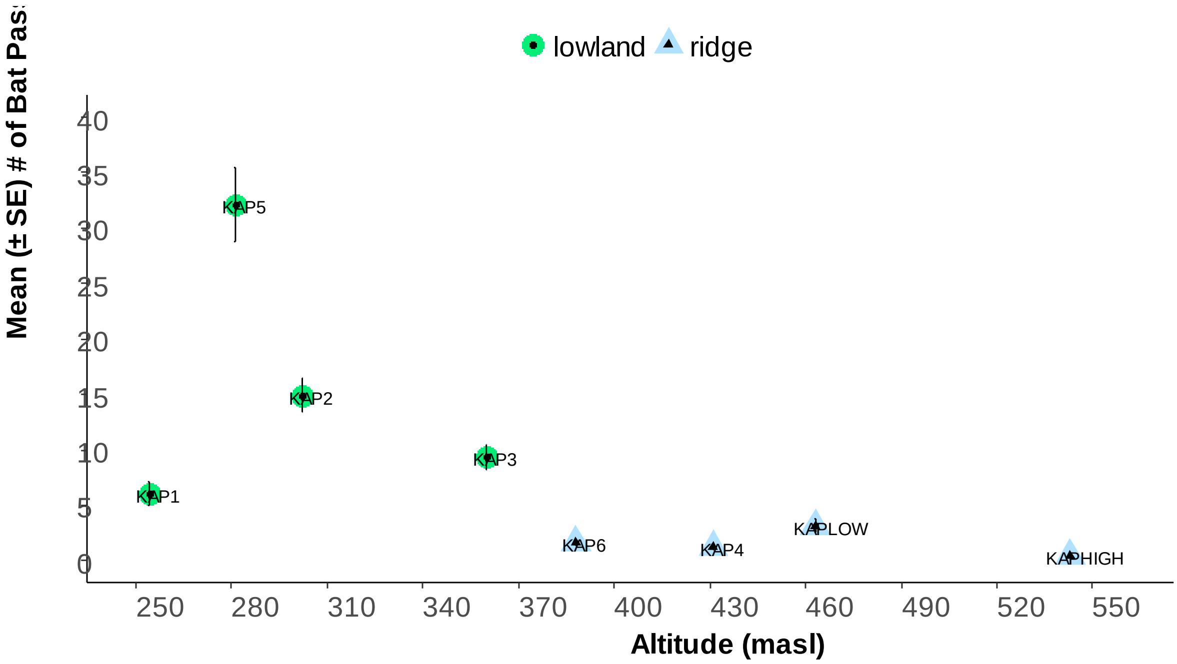


Graph 2: The mean number of bat passes/night per species for each month sampled.



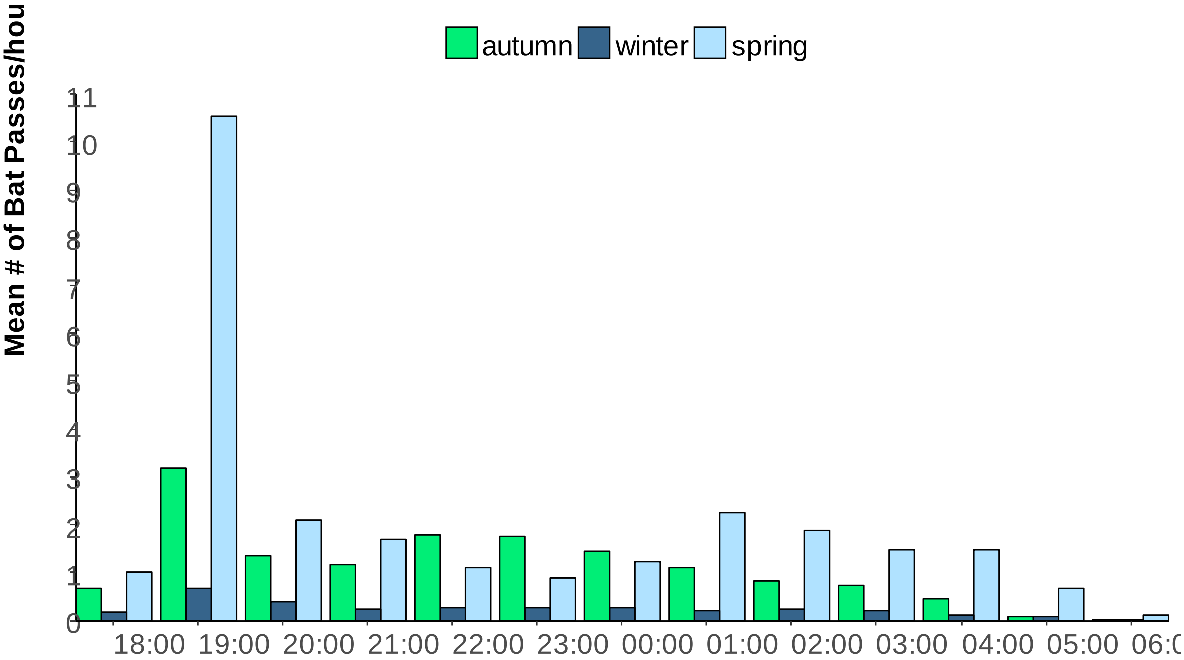
Graph 3: The mean number of bat passes/night per species at each monitoring location.

Highest activity occurred at KAP5, driven by the activity of the Cape serotine and the Natal long-fingered bat, followed by KAP2, due to dominant activity of the Egyptian free-tailed bat (Graph 3). The range in bat activity was also notably higher at KAP5 compared to the other locations (Graph 4) which saw between 0 and 198 passes per night, the highest total number of passes for any night during the study period. There was a clear decrease in bat activity with altitude resulting in higher bat activity in lowland areas compared to on ridges (Graph 4). In addition, at the meteorological mast, bat activity was higher at the lower microphone (KAPLOW) compared to the microphone at 80 m (KAPHIGH).



Graph 4: The mean (±SE) number of bat passes/night at different altitudes.

Bats were active at the WEF site between 18:00 and 07:00 with peak activity levels occurring between 19:00 and 20:00 across all seasons (Graph 5). The significantly higher mean number of bat passes in the early evening in spring is due to activity at KAP5. This detector is located at a farmstead and during a site visit it was confirmed that bats roost in some of the buildings here.



Graph 5: The mean number of bat passes / hour across all species and locations during the study period.

4.4 Discussion

A key finding of the bat monitoring to date is that the vast majority, almost 80 %, of the bat activity that has been recorded thus far has been in areas away from the current turbine positions. Further, at the meteorological mast bat activity was higher at the lower monitoring height suggesting lower risk to bats in the potential rotor swept zone. Bats were much more active in the lower altitude areas of the site (Graph 4). In particular, activity was highest at KAP5 which is situated at a farmstead at an altitude of 281 masl. This site was deliberately chosen because the presence of trees, buildings and water are favourable for bats and monitoring here could give a good indication of bat activity in the area. At KAP2 and KAP3, although also situated in lowland areas, activity was much lower possibly because there are no trees, buildings or water at these locations – although there are some scattered trees near KAP2. The Cape serotine was principally responsible for the high activity at KAP5 (Graph 2). This species is known to roost in buildings and site work has confirmed that bats are roosting in a building near KAP5. Future site work will attempt to identify the species emerging from the roost and to estimate the numbers of bats inside the roost. At this stage it is assumed that at least between 1 and 50 Cape serotine bats are likely to be using the buildings and according the best practise[4] this would require a 1 km buffer (Figure 1).

Among the high risk species recorded were two free-tailed bats; the Egyptian free-tailed bat and Roberts's flat-headed bat, which is endemic to South Africa. Free-tailed bats are high-flying species whose morphology and echolocation enable fast flight in open areas and these bats are therefore at risk of encountering wind turbine blades across most of

[4] Sowler, S., Stoffberg, S., MacEwan, K., Aronson, J., Ramalho, R., Potgieter, K., Lötter, C. 2016. South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments - Pre-construction: 4th Edition. South African Bat Assessment Association.

the rotor-swept zone. Monitoring of operational WEFs in South Africa has confirmed that Egyptian free-tailed bats have suffered mortality by wind turbines (Aronson et al. 2013; Doty and Martin 2012). Both species had their highest activity at KAP2 which is situated in the Namaqualand sand vegetation type approximately 1 km to the nearest turbine. Both are known to roost in, among other types of roosts, rock crevices (Monadjem et al. 2010) and additionally Roberts's flat-headed bat appears to be adapted for roosting under slabs of exfoliated rock or narrow crevices and cracks (Jacobs and Fenton 2001). While these geological features are present around KAP2, they are some distance away and not very pronounced. In contrast there is highly suitable roosting space available for these two species on the ridges amongst KAP4 and KAP6. It is therefore unclear why the activity of these two high risk species was higher at KAP2. Egyptian free-tailed bats also roost under tree bark and the scattered trees and open woodland might be attracting these bats to the area of the site.

The third high risk species, the Natal long-fingered bat, was mainly recorded in lower risk areas of the proposed site and away from proposed turbine positions. This is a migratory species (Monadjem et al. 2010) and is protected under the Convention on the Conservation of Migratory Species of Wild Animals (1979). The majority of bat mortalities at Wind Energy Facilities (WEFs) in North America and Europe are migratory species (Baerwald and Barclay 2011; Cryan 2011; Kunz et al. 2007b) therefore it may be assumed that the Natal long-fingered bat is at risk from wind turbines in South Africa. This species migrates during autumn (April and May) and spring (September and October) between summer maternity roosts and winter hibernating sites generally located at higher latitudes, and is reported to migrate distances from approximately 150 km to 560 km (Miller-Butterworth et al. 2003; Monadjem et al. 2010). Although this species had higher activity during these periods, based on the magnitude of their activity it is unlikely that they are migrating through the site. It is more likely that there is a local population of the Natal long-fingered bat at the project and surrounding region.

Activity was generally restricted to low levels for most of the study period with isolated peaks in autumn and spring at moderate levels (Graph 1). Apart from some increased activity in the early evening between 19:00 and 20:00, which is typical for many insectivorous bats (Hayes 1997; Kunz 1973; Taylor et al. 2013), less than two bat passes per hour were recorded on average during the night at each monitoring location. Additional data from summer and spring will help to put these results in a better context but at this stage the impact of the proposed development to bats is low and no major mitigation measures are required.

5 IMPACT ASSESSMENT

WEFs have the potential to impact bats directly through collisions and barotrauma resulting in mortality (Horn et al. 2008; Rollins et al. 2012), and indirectly through the modification of habitats (Kunz et al. 2007b). Direct impacts pose the greatest risk to bats and, in the context of the project, habitat loss and displacement should not pose a significant risk because the project footprint (i.e. turbines, roads) is small.

Direct impacts to bats will be limited to species that make use of the airspace in the rotor-swept zone of the wind turbines. Of the five species of bat that were recorded on site, at least four exhibit behaviour that may bring them into contact with wind turbine blades and they are potentially at risk of negative impacts if not properly mitigated, although the magnitude of these impacts are unknown at this stage. The impact assessment methodology is given in Appendix 1 and a summary of the impact assessment is given in Appendix 2.

5.1 Construction Phase Impacts

5.1.1 Roost Disturbance

WEFs have the potential to impact bats directly through the disturbance of roosts during construction. Relevant activities include the construction of Operation and Maintenance (O&M) buildings, sub-station(s), grid connection transmission line and installation of wind turbines. Excessive noise and dust during the construction phase could result in bats abandoning their roosts, depending on the proximity of construction activities to roosts. This impact will vary depending on the species involved; species that roost in trees are likely to be impacted more (e.g. Cape serotine and Egyptian free-tailed bats; Monadjem et al. 2010) because tree roosts are less buffered against noise and dust compared to roosts in buildings and rocky crevices.

Reducing roosting opportunities for bats will have negative impacts. Before mitigation this impact is likely to have a moderate consequence because roosts are limiting factors in the distribution of bats and their availability is a major determinant in whether bats would be present in a particular location. However, it is unlikely that this impact will occur as there are low numbers of roosting spaces at the site. Therefore, the significance of this impact would be low. After mitigation, both the consequence and probability could decrease resulting in a very low impact.

Mitigation measures:

- Avoid construction activities near confirmed roosts which include buildings, trees and rocky crevices.
- A confirmed roost has been found at the project which has been buffered by 1 km (Figure 1). Trees in woodland areas and other buildings on or bordering the site have been buffered by 200 m as a precaution but these should be surveyed to confirm presence of bats to determine if these buffers are necessary. No construction activities should take place within these buffers if any roosts are identified during the EIA phase.
- It is recommended that a bat specialist surveys the confirmed turbine locations and all other proposed site infrastructure for the presence of roosts during the EIA phase.
- The power line alternative 2 is the preferred route as the other two routes could require the removal of more habitat (Figure 1).

5.1.2 Roost Destruction

WEFs have the potential to impact bats directly through the physical destruction of roosts during construction. Relevant activities include the construction of O&M buildings, sub-station(s), grid connection transmission line and installation of wind turbines. Potential roosts that may be impacted by construction activities include trees, crevices in rocky outcrops and buildings. Roost destruction can impact bats either by removing potential roosting spaces which reduces available roosting sites or, if a roost is destroyed while bats are occupying the roost, this could result in bat mortality.

Reducing roosting opportunities for bats or killing bats during the process of destroying roosts will have negative impacts. Before mitigation this impact is likely to have a moderate consequence because roosts are limiting factors in the distribution of bats and their availability is a major determinant in whether bats would be present in a particular location. It is likely that roost destruction will occur if construction activities require the removal of trees, buildings and blasting rocky outcrops. If bats are occupying such roosts at the time they are destroyed it is likely this could result in mortality. In such cases the duration of the impact will be permanent. Despite this, the consequence should be moderate as low numbers of roosts will likely need to be destroyed resulting in the significance of this impact being low. After mitigation, this could decrease to very low because the consequence would reduce to slight.

Mitigation measures:

- The WEF can be designed and constructed in such a way as to avoid the destruction of potential roosts, particularly trees, rocky crevices (if blasting is required) and buildings.
- No construction activities with the potential to physically affect any bat roosts will be permitted without the express permission of a suitably qualified bat specialist following appropriate investigation and mitigation.
- It is recommended that a bat specialist surveys the confirmed turbine locations and all other site infrastructure for the presence of occupied roosts among the potential roosts identified in Figure 1 before any construction activities commence and once the preliminary design and layout of the site is complete, during the EIA phase.
- If occupied roosts are confirmed these should be buffered based on best practise guidance[5], which includes a minimum of a 200 m buffer (Figure 1).
- A site-specific Construction Phase Environmental Management Plan (CEMP) must be implemented, which gives appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the CEMP and should apply good environmental practice during construction.
- During construction, laydown areas and temporary access roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation, while designated no-go areas must be enforced i.e. no off road driving.
- Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and a habitat restoration plan must be developed by a specialist and included within the Construction Environmental Management Plan (CEMP).
- The power line alternative 2 is the preferred route as the other two routes could require the removal of more habitat (Figure 1).

5.1.3 Habitat Modification

Bats can be impacted indirectly through the modification or removal of habitats (Kunz et al. 2007b). The removal of vegetation during the construction phase will impact bats by removing vegetation cover and linear features that some bats use for foraging and commuting (Verboom and Huitema 1997). The modification of habitat could create linear edges which some bats to commute or forage along. This modification could also create favourable conditions for insects upon which bats feed which would in turn attract bats. The footprint of the facility is small relative to the remaining habitat available in the surrounding area and as such the removal of vegetation is not likely to result in a significant impact. This impact can be reduced even further by limiting the removal of vegetation as far as possible.

The consequence of this impact is moderate as it could result in altered foraging and commuting patterns for bats which would persist for the duration of the project. It is likely to occur and before mitigation would result in low significance. Implementing mitigation measures would reduce the significance of residual impacts to very low.

[5] Sowler, S., Stoffberg, S., MacEwan, K., Aronson, J., Ramalho, R., Potgieter, K., Lötter, C. 2016. South African Good Practice Guidelines for Surveying Bats at Wind Energy Facility Developments - Pre-construction: 4th Edition. South African Bat Assessment Association.

Mitigation measures:

- This impact must be reduced by limiting the removal of vegetation as far as possible. A site-specific Construction Environmental Management Plan (CEMP) must be implemented, which gives appropriate and detailed description of how construction activities must be conducted to reduce unnecessary destruction of habitat. All contractors are to adhere to the CEMP and should apply good environmental practice during construction.
- During the design and EIA phases, the bat specialist should conduct a site walkthrough, covering the final road and power line routes as well as the final turbine positions, to identify any roosts/activity of sensitive species, as well as any additional sensitive habitats.
- During construction laydown areas and temporary access roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation, while designated no-go areas must be enforced i.e. no off-road driving.
- Following construction, rehabilitation of all areas disturbed (e.g. temporary access tracks and laydown areas) must be undertaken and a habitat restoration plan must be developed by a specialist and included within the Construction Environmental Management Plan (CEMP).
- The power line alternative 2 is the preferred route as the other two routes could require the removal of more habitat (Figure 1).

5.2 Operational Phase Impacts

5.2.1 Bat Mortality During Commuting and/or Foraging

The major potential impact of wind turbines on bats is direct mortality resulting from collisions with turbine blades and/or barotrauma. These impacts will be limited to species that make use of the airspace in the rotor-swept zone of the wind turbines. At least four species of bat that were recorded at the project thus far exhibit behaviour that may bring them into contact with wind turbine blades and so they are potentially at risk of negative impacts.

Bat fatalities have occurred at all wind farms where it has been investigated and it is therefore very likely that mortality will occur at the Kap Vley WEF. The consequence of bat mortality would be severe and result in a impact of high significance before mitigation. Mitigation would decrease the consequence of bat mortality to moderate with an unlikely probability of occurring resulting in a low risk.

Mitigation measures:

- There are several mitigation options available to reduce the potential for bat mortality to occur or to reduce bat mortality. Designing the layout of the project to avoid areas that are more frequently used by bats may reduce the likelihood of mortality and should be the primary mitigation measure. For the Kap Vley WEF, low lying areas should be avoided. Continuous pre-construction monitoring may help to refine such areas which can form exclusion zones which must be adhered to as a primary form of mitigation.
- Operational acoustic monitoring and carcass searches for bats must be performed to monitor mortality levels. Acoustic monitoring should include monitoring at height and at ground level.
- If mortality does occur, the level of mortality should be considered by a bat specialist to determine if this is at a level where further mitigation needs to be considered. Mitigation options may include using ultrasonic deterrents, raising the cut-in speeds of turbines and turbine blade feathering. Any operational minimization strategy (i.e. curtailment) should be targeted during specific seasons and time periods for specific turbines coincident with periods of increased bat activity.

- It is advised that both pre-construction and operational monitoring data are used to confirm the need for above mentioned mitigation measures such as curtailment and to determine at what stage of the development such mitigation needs to be implemented, if at all.

5.2.2 Bat Mortality During Migration

It has been suggested that some bats may not echolocate when they migrate (Baerwald et al. 2009) which could explain the higher numbers of migratory species suffering mortality in WEF studies in North America and Europe. Therefore, the direct impact of bat mortality may be higher when they migrate compared to when they are commuting or foraging. This has therefore been considered as a separate impact on the Natal long-fingered bat, which is the only current species of the five recorded during pre-construction monitoring thus far known to exhibit migratory behaviour.

The majority of bat mortalities at WEFs in North America and Europe are migratory species. However, evidence from the pre-construction monitoring does not suggest migratory behaviour through the Kap Vley WEF although only nine nights during the migratory season have been sampled and data from the remained of spring will be needed to confirm this. It is therefore unlikely that mortality will occur during migration periods but this can only be confirmed after the 12 months of monitoring during the EIA phase. The consequence of any bat mortality would be severe which will result in a moderate impact before mitigation. Mitigation would decrease the consequence of bat mortality to moderate with an unlikely probability of occurring resulting in a low risk.

Mitigation measures:

- There are several mitigation options available to reduce the potential for bat mortality to occur or to reduce bat mortality. Designing the layout of the project to avoid areas that are more frequently used by bats may reduce the likelihood of mortality and should be the primary mitigation measure. For the Kap Vley WEF, low lying areas should be avoided. Continuous pre-construction monitoring may help to refine such areas which can form exclusion zones which must be adhered to as a primary form of mitigation.
- Operational acoustic monitoring and carcass searches for bats should be performed to monitor mortality levels. Acoustic monitoring should include monitoring at height and at ground level.
- If mortality does occur, the level of mortality should be considered by a bat specialist to determine if this is at a level where further mitigation needs to be considered. Mitigation options may include using ultrasonic deterrents, raising the cut-in speeds of turbines and turbine blade feathering. Any operational minimization strategy (i.e. curtailment) should be targeted during specific seasons and time periods for specific turbines coincident with periods of increased bat activity.
- It is advised that both pre-construction and operational monitoring data are used to confirm the need for above mentioned mitigation measures such as curtailment and to determine at what stage of the development such mitigation needs to be implemented, if at all.

5.2.3 Habitat Creation in High Risk Locations

The construction of a WEF and associated building infrastructure may inadvertently provide new roosts for bats, attracting them to the area and indirectly increasing the risk of negative mortality impacts. It has been suggested that some bats may investigate wind turbines for their potential roosting spaces (Cryan et al. 2014; Horn et al. 2008; Kunz et al. 2007b) and bats could therefore be attracted to WEFs, increasing the chance of wind turbine-induced mortality. Bats may also be attracted to roosting opportunities in new buildings at WEFs (J. Aronson, personal observation).

The probability of large numbers of bats roosting in infrastructure at the project is very unlikely. However, if any bats do manage to do so, they would be at greater risk of mortality due to the proximity to wind turbines. Therefore the consequence of this impact is severe but the significance is low. After mitigation, the consequence would reduce to moderate and the overall significance would be very low.

Mitigation measures:

- Bats should be prevented from entering any possible artificial roost structures (e.g. roofs of buildings, road culverts and wind turbines) by ensuring that they are sealed in such a way as to prevent bats from entering. If bats colonise WEF infrastructure, a suitably qualified bat specialist should be consulted before any work is undertaken on that infrastructure and before attempting to remove any bats. Ongoing maintenance and inspections of buildings must be carried out to ensure no access to bats.

5.2.4 Light Pollution

Currently the local region experiences very little light pollution from anthropogenic sources and the construction of a WEF will marginally increase light pollution. This excludes turbine aviation lights which do not appear to impact bats (Baerwald and Barclay 2011; Horn et al. 2008; Jain et al. 2011; Johnson et al. 2003). During the operation of the WEF, it is assumed that the only light sources would be motion sensor security lighting for short periods and lighting associated with the substation.

This artificial lighting would impact bats indirectly via the mortality of their insect prey thereby reducing foraging opportunities for certain bat species. Lighting attracts (Blake et al. 1994; Rydell 1992; Stone 2012) and can cause direct mortality of insects. These local reductions in insect prey may reduce foraging opportunities for bats, particularly for species that avoid illuminated areas. This impact is likely to be low before mitigation because, relative to the large area in the region that would not be developed that likely supports large numbers of insects, the prey resource for bats is likely to be sufficient. The consequence of this impact will be moderate before and after mitigation but the probability of the impact would reduce to unlikely.

Other bat species actively forage around artificial lights due to the higher numbers of insects which are attracted to these lights (Blake et al. 1994; Rydell 1992; Stone 2012). This may bring these species into the vicinity of the project and indirectly increase the risk of collision/barotrauma particularly for species that are known to forage around lights. These include the Cape serotine and the Egyptian free-tailed bat (Fenton et al. 2004; J. Aronson, personal observation). This impact is likely to be very low with mitigation but must be carefully considered because the consequence could be severe without mitigation. Lighting at the project should be kept to a minimum and appropriate types of lighting should be used to avoid attracting insects, and hence, bats.

Mitigation measures:

- This impact can be mitigated by using as little lighting as possible. Where lights need to be used, these should have low attractiveness for insects such as low pressure sodium and warm white LED lights (Rydell 1992; Stone 2012). High pressure sodium and white mercury lighting is attractive to insects (Blake et al. 1994; Rydell 1992; Svensson and Rydell 1998) and should not be used as far as possible. Additional considerations and mitigation options are provided in Stone (2012).

5.3 Decommissioning Phase Impacts

5.3.1 Roost Disturbance

Decommissioning activities could result in excessive noise and dust which could result in bats abandoning their roosts, depending on the proximity of these activities to roosts.

This impact will vary depending on the species involved; species that roost in trees are likely to be impacted more (e.g. Cape serotine and Egyptian free-tailed bats; Monadjem et al. 2010) because tree roosts are less buffered against noise and dust compared to roosts in buildings and rocky crevices.

Reducing roosting opportunities for bats will have negative impacts. Before mitigation this impact is likely to have a moderate consequence because roosts are limiting factors in the distribution of bats and their availability is a major determinant in whether bats would be present in a particular location. However, it is unlikely that this impact will occur as there are low numbers of roosting spaces at the site. Therefore, the significance of this impact would be low. After mitigation, both the consequence and probability could decrease resulting in a very low impact.

Mitigation measures:

- Avoid decommissioning activities near roosts which include buildings, trees and rocky crevices.
- Limit decommissioning activities to daylight hours.

5.4 Cumulative Impacts

It is important to consider cumulative impacts across the entire scale that potentially affected animals are likely to move, especially mobile animals like bats. Impacts at a local scale could have negative consequences at larger scales if the movement between distant populations is impacted (Lehnert et al. 2014; Voigt et al. 2012). For example, Lehnert et al. (2014) demonstrated that among Noctule bats collected beneath wind turbines in eastern Germany, 28% originated from distant populations in the Northern and North-eastern parts of Europe. The cumulative impacts could be lower for species that do not migrate over such large distances or resident species that are not known to migrate. The sphere of the cumulative impact would then likely be restricted to the home ranges and foraging distances of different species, which can range from 1 km to at least 15 km for some insectivorous bats (Jacobs and Barclay 2009; Serra-Cobo and Sanz-Trullen 1998).

The cumulative impact for each issue was considered by searching for current and future development of WEFs within a 50 km radius of the project. Five onshore wind facilities are approved within this radius. However, for migratory bats such as the Natal long-fingered bat (Miller-Butterworth et al. 2003) the cumulative impacts region might be significantly higher. This species is known to migrate over hundreds of kilometres between winter and summer roosts (Miller-Butterworth et al. 2003). This was taken into consideration when undertaking the cumulative impact assessment (Appendix 3).

Cumulative impacts on bats could increase as new facilities are constructed but are difficult to accurately predict or assess without baseline data on bat population size and demographics (Arnett et al. 2011; Kunz et al. 2007b) and these data are lacking for many South African bat species. It is possible that cumulative impacts could be mitigated with the appropriate measures applied to wind farm design and operation. The significance of impacts in the cumulative impact assessment assumes that the mitigation measures in Appendix 3 are applied to all wind farms in the cumulative impact area. Cumulative impacts could result in declines in populations of even those species of bats currently listed as Least Concern, if they happen to be more susceptible to mortality from wind turbines (e.g. high-flying open air foragers such as free-tailed and fruit bats) even if the appropriate mitigation measures are applied.

6 PLAN OF STUDY FOR EIA

In line with best practise guidelines for environmental assessments at proposed WEFs, 12 months of bat monitoring will be undertaken for the project. This monitoring commenced in March 2017 and will be completed in February 2017 according to the methodology in

Section 3. Specific surveys that need to be carried out during the EIA are a roost survey of the buildings at KAP5 and surveys of trees mapped in Figure 1 to assess if any are occupied by bats.

An environmental impact assessment for the project will then be completed as per the requirements of the National Environmental Management Act, 1998 and the amended EIA Regulations. The impact assessment presented in this scoping report, as well as the bat sensitivity map (Figure 1) will be revised upon completion of the additional bat monitoring (i.e. acoustic and roost surveys). The outcome of the EIA study will be a description of bat activity at the project, an evaluation of potential risks/impacts to bats (including cumulative impacts), recommendations for the WEF layout and preferred grid route and design mitigation measures to reduce impacts, including an environmental management plan for the project. Operational mitigation measures will also be provided.

7 CONCLUSION

The bat monitoring data presented thus far suggest that the development of the proposed Kap Vley WEF can be achieved without unacceptable risks to bats. The majority of the proposed turbines are situated in areas where low levels of bat activity were recorded, on the ridges, and as such they are less sensitive to development with regards to impacts to bats.

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APPENDIX 1: IMPACT ASSESSMENT CRITERIA

The identification of potential impacts and risks includes impacts that may occur during the construction, operational and decommissioning phases of the activity. The assessment of impacts includes direct, indirect, as well as cumulative impacts.

In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed activity is well understood so that the impacts associated with the activity can be understood. The process of identification and assessment of impacts includes:

- Determination of the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determination of future changes to the environment that will occur if the activity does not proceed;
- An understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

As per DEA Guideline 5: Assessment of Alternatives and Impacts the following methodology is applied to the prediction and assessment of impacts. Potential impacts are rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

- **Nature of impact** - this reviews the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”

- **Status** - Whether the impact on the overall environment (social, biophysical and economic) will be:
  - Positive - environment overall will benefit from the impact;
  - Negative - environment overall will be adversely affected by the impact; or
  - Neutral - environment overall will not be affected.
- **Spatial extent** – The size of the area that will be affected by the risk/impact:
  - Site;
  - Local (<10 km from site);
  - Regional (<100 km of site);
  - National; or
  - International (e.g. Greenhouse Gas emissions or migrant birds).
- **Duration** – The timeframe during which the risk/impact will be experienced:

- Very short term (instantaneous);
- Short term (less than 1 year);
- Medium term (1 to 10 years);
- Long term (the impact will occur for the project duration); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning).

- **Reversibility of impacts** –
  - High reversibility of impacts (impact is highly reversible at end of project life, i.e. this is the most favourable assessment for the environment. For example, the nuisance factor caused by noise impacts associated with the operational phase of an exporting terminal can be considered to be highly reversible at the end of the project life);
  - Moderate reversibility of impacts;
  - Low reversibility of impacts; or
  - Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment. The impact is permanent. For example, the loss of a palaeontological resource on the site caused by building foundations could be non-reversible).
  - Irreplaceability of resource loss caused by impacts –
  - High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment. For example, if the project will destroy unique wetland systems, these may be irreplaceable);
  - Moderate irreplaceability of resources;
  - Low irreplaceability of resources; or
  - Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).

Using the criteria above, the impacts are assessed in terms of the following:

- **Probability** – The probability of the impact occurring:
  - Extremely unlikely (little to no chance of occurring);
  - Very unlikely (<30% chance of occurring);
  - Unlikely (30 – 50% chance of occurring)
  - Likely (51 – 90% chance of occurring); or
  - Very likely (>90% chance of occurring regardless of prevention measures).
- **Consequence** –The anticipated severity of the impact:
  - Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);
  - Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);
  - Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or
  - Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).
- **Significance** – To determine the significance of an identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure A below).

The approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, very high) against a predefined set of criteria (as shown in Figure A below).

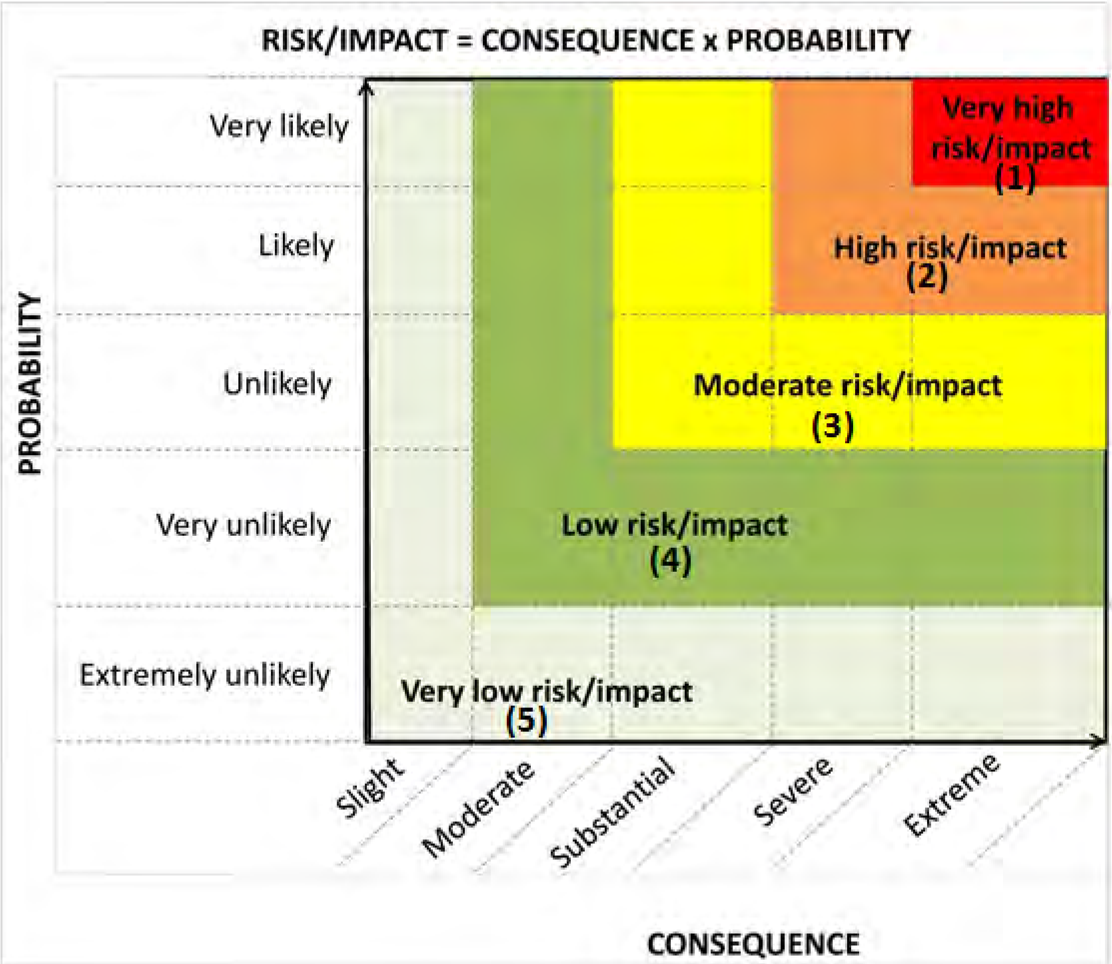

Figure A: Guide to assessing risk/impact significance as a result of consequence and probability.

- **Significance** – Will the impact cause a notable alteration of the environment?
  - Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
  - Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or

- High (the risk/impacts will result in a considerable alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making).
- Very high (the risk/impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating).

The above assessment must be described in the text (with clear explanation provided on the rationale for the allocation of significance ratings) and summarised in an impact assessment table.

- **Ranking** – With the implementation of mitigation measures, the residual impacts/risks must be ranked as follows in terms of significance:
  - Very low = 5;
  - Low = 4;
  - Moderate = 3;
  - High = 2; and
  - Very high = 1.
- **Confidence** – The degree of confidence in predictions based on available information and specialist knowledge:
  - Low;
  - Medium; or
  - High.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts will be evaluated for the construction, operational and decommissioning phases of the development. The assessment of impacts for the decommissioning phase will be brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;
- The impact evaluation will, where possible, take into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment will attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact;
- Impacts should be assessed for all layouts and project components;

- IMPORTANT NOTE FROM THE CSIR: IMPACTS SHOULD BE DESCRIBED BOTH BEFORE AND AFTER THE PROPOSED MITIGATION AND MANAGEMENT MEASURES HAVE BEEN IMPLEMENTED. THE ASSESSMENT OF THE POTENTIAL IMPACT “BEFORE MITIGATION” SHOULD TAKE INTO CONSIDERATION ALL MANAGEMENT ACTIONS THAT ARE ALREADY PART OF THE PROJECT DESIGN (WHICH ARE A GIVEN). THE ASSESSMENT OF THE POTENTIAL IMPACT “AFTER MITIGATION” SHOULD TAKE INTO CONSIDERATION ANY ADDITIONAL MANAGEMENT ACTIONS PROPOSED BY THE SPECIALIST, TO MINIMISE NEGATIVE OR ENHANCE POSITIVE IMPACTS.

APPENDIX 2: IMPACT ASSESSMENT SUMMARY

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
CONSTRUCTION PHASE															
Excessive noise, dust and blasting	Roost Disturbance	Negative	Site	Medium	Moderate	Unlikely	Moderate	Low	Low impact/risk	Yes	Yes	Avoid construction near roosts. Adhere to sensitivity map (Figure 1). Survey turbine locations and infrastructure for presence of roosts.	Very low risk/impact	5	Medium
Removal of buildings, trees or rocky outcrops (bat roosts)	Roost Destruction	Negative	Site	Permanent	Moderate	Likely	Moderate	Low	Low impact/risk	Yes	Yes	Avoid destroying roosts. Survey turbine locations and infrastructure for presence of roosts. Construction Phase EMP.	Very low risk/impact	5	Medium
	Bat Mortality	Negative	Site	Permanent	Moderate	Likely	Non-reversible	Low	Low impact/risk	Yes	Yes		Very low risk/impact	5	Medium
Removal of foraging and commuting habitat	Habitat Modification	Negative	Site	Long Term	Moderate	Likely	High	Low	Low impact/risk	No	Yes	Limiting the removal of vegetation. Construction Phase EMP. Rehabilitate disturbed areas.	Very low risk/impact	5	Medium
OPERATIONAL PHASE															
Collisions with Operational Wind Turbines	Bat Mortality during commuting and/or foraging	Negative	Regional	Long term	Severe	Very Likely	Non-reversible	moderate	High risk/impact	No	Yes	Avoid areas more frequently used by bats. Operational acoustic monitoring and carcass searches to advise operational minimization strategies.	Low impact/risk	4	Medium
	Bat Mortality during migration	Negative	National	Permanent	Severe	Unlikely	Non-reversible	Moderate	Moderate risk/impact	No	Yes		Low impact/risk	4	Medium
Habitat creation in high risk locations	Bat Mortality	Negative	Regional	Long term	Severe	Very Unlikely	Non-reversible	Moderate	Low impact/risk	Yes	Yes	Artificial roost (e.g. roofs of buildings, road culverts and wind turbines) must be sealed. Ongoing maintenance and inspections of buildings to ensure no access to bats.	Very low risk/impact	5	Medium
Light Pollution	Displacement and reduced foraging opportunities for bats	Negative	Local	Long term	Moderate	Likely	High	Low	Low impact/risk	Yes	Yes	Using as little lighting as possible. Low pressure sodium and warm white LED lights are favourable. High pressure sodium and white mercury lighting to be avoided.	Low impact/risk	4	Medium
	Bat Mortality	Negative	Regional	Long term	Severe	Very Unlikely	Non-reversible	Low	Low impact/risk	Yes	Yes		Very low risk/impact	5	Medium
DECOMMISSIONING PHASE															
Excessive noise and dust could result in bats abandoning their roosts	Roost Disturbance	Negative	Site	Medium	Moderate	Unlikely	Moderate	Low	Low impact/risk	Yes	Yes	Avoid decommissioning activities near roosts. Limit decommissioning activities to daylight hours.	Very low risk/impact	5	Medium

APPENDIX 3: CUMULATIVE IMPACT ASSESSMENT SUMMARY

Impact pathway	Nature of potential impact/risk	Status	Extent	Duration	Consequence	Probability	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/impact (after mitigation)	Ranking of impact/ risk	Confidence level
CONSTRUCTION PHASE															
Excessive noise, dust and blasting could result in bats abandoning their roosts	Roost Disturbance	Negative	Regional	Medium	Moderate	Likely	Moderate	Low	Low impact/risk	Yes	Yes	Avoid construction near roosts. Survey turbine locations and infrastructure for presence of roosts.	Very low risk/impact	5	Medium
Physically destroying or removing buildings, trees or rocky outcrops	Roost Destruction	Negative	Regional	Permanent	Moderate	Likely	Moderate	Low	Low impact/risk	No	Yes	Avoid destroying roosts. Survey turbine locations and infrastructure for presence of roosts. Construction Phase EMP.	Very low risk/impact	5	Medium
	Bat Mortality	Negative	Site	Permanent	Moderate	Likely	Non-reversible	Low	Low impact/risk	Yes	Yes		Very low risk/impact	5	Medium
Removal of foraging and commuting habitat	Habitat Modification	Negative	Regional	Long Term	Moderate	Likely	High	Low	Low impact/risk	No	Yes	Limiting the removal of vegetation. Construction Phase EMP. Rehabilitate disturbed areas.	Very low risk/impact	5	Medium
OPERATIONAL PHASE															
Collisions with Operational Wind Turbines	Bat Mortality during commuting and/or foraging	Negative	Regional	Long term	Severe	Very Likely	Non-reversible	Low	High risk/impact	No	Yes	Avoid areas more frequently used by bats. Operational acoustic monitoring and carcass searches to advise operational minimization strategies.	Moderate impact/risk	3	Low
	Bat Mortality during migration	Negative	National	Long term	Severe	Very Likely	Non-reversible	Low	High risk/impact	No	Yes		Moderate impact/risk	3	Low
Habitat creation in high risk locations – inadvertent provision of new roosts for bats attracting to the WEF	Bat Mortality	Negative	Regional	Long term	Severe	Very Unlikely	Non-reversible	Low	Low impact/risk	Yes	Yes	Artificial roost (e.g. roofs of buildings, road culverts and wind turbines) must be sealed. Ongoing maintenance and inspections of buildings to ensure no access to bats.	Very low risk/impact	5	Medium
Light Pollution	Displacement and reduced foraging opportunities for bats	Negative	Regional	Long term	Moderate	Likely	High	Low	Low impact/risk	Yes	Yes	Using as little lighting as possible. Low pressure sodium and warm white LED lights are favourable. High pressure sodium and white mercury lighting to be avoided.	Low impact/risk	4	Medium
	Bat Mortality	Negative	Regional	Long term	Severe	Very Unlikely	Non-reversible	Low	Low impact/risk	Yes	Yes		Very low risk/impact	5	Medium
DECOMMISSIONING PHASE															
Excessive noise and dust could result in bats abandoning their roosts	Roost Disturbance	Negative	Regional	Medium	Moderate	Unlikely	Moderate	Low	Low impact/risk	Yes	Yes	Avoid decommissioning activities near roosts. Limit decommissioning activities to daylight hours.	Very low risk/impact	5	Medium

APPENDIX 4 – BAT SPECIALIST CV

CURRICULUM VITAE

Jonathan Aronson MSc Pr.Sci.Nat
Ecology Specialist
Email:JonathanA@arcusconsulting.co.za Tel: +27 (0) 790 988 595

ARCUS

Specialisms

- Ecological Impact Assessments
- Pre-construction and Operational monitoring at wind energy developments
- Data analysis and statistical assessment of ecological data
- GIS mapping and Analysis

Summary of Experience

Research and extensive field surveys on insects, baboons, freshwater systems, savannah ecology, birds and bats have all contributed to Jonathan's experience as an ecologist. He combines this knowledge with key skills in quantitative data analysis, GIS and scientific writing to provide input into the ecology work at Arcus Consultancy.

Jonathan has 9 years of experience studying and researching bats and has presented at the International Bat Research Conference and local bat workshops. He has been at the forefront of bats and wind energy research in South Africa. He has contributed to the Good Practise Guidelines for Surveying Bats at Wind Energy Facilities in South Africa, is the lead author on the operational monitoring guidelines for bats and is a member of the South African Bat Assessment Advisory Panel (SABAAP). He has experience managing wind energy facility projects including developing survey strategies, implementing field surveys, data analysis and report writing. He can conduct reviews and assessments of Environmental Due Diligence and compliance with international environmental standards. He has provided input to Environmental Impact Assessments (EIA) and post-construction Environmental Management Plans (EMP) for bats.

Professional History

2013 to present - Ecology Specialist, Arcus Consultancy Services Ltd, Cape Town
2011 to 2013 - Director, Gaia Environmental Services Pty (Ltd), Cape Town
2008 to 2008 - Research Assistant, Percy Fitzpatrick Inst. of African Ornithology, Cape Town

Qualifications and Professional Interests

- **University of Cape Town, 2009-2010**
  Msc Zoology
- **University of Cape Town, 2007**
  BSc (Hons) Freshwater Biology
- **University of Cape Town, 2003-2006**
  BSc Zoology
- Member of Society for Conservation Biology (2011 to present)
- South African Bat Assessment Advisory Panel (2013 to present)
- Professional Natural Scientist (Ecological Science) – SACNASP Registration #400238/14

Project Experience

<u>Bat Monitoring and Environmental Impact Assessments</u>

- Highlands Wind Energy Facility. 12 months pre-construction bat monitoring study (WKN Windcurrent SA (Pty) Ltd).
- Kap Vley Wind Energy Facility. 12 months pre-construction bat monitoring study (juwi Renewable Energies (Pty) Ltd).
- Universal and Sonop Wind Energy Faculties. Pre-construction bat monitoring (JG Afrika).
- Kolkies and Karee Wind Energy Facility. 12 months pre-construction bat monitoring study (Mainstream Renewable Power South Africa).
- Komsberg East and West Wind Energy Facility. 12 months pre-construction bat monitoring study (African Clean Energy Developments Pty Ltd).
- Gouda Wind Energy Facility. 12 months of operational monitoring for bats including activity and fatality surveys. (Blue Falcon 140 (Rf) Pty Ltd).
- Hopefield Wind Farm. 12 months of operational monitoring for bats including activity and fatality surveys. (Umoya Energy)
- Elliot Wind Energy Facility. Pre-construction bat monitoring study. (Rainmaker).
- Pofadder Wind Energy Facility. 12 months pre-construction bat monitoring study (Mainstream Renewable Power South Africa).
- Spitskop West Wind Energy Facility. 12 months pre-construction bat monitoring study (RES Southern Africa/Gestamp).
- Spitskop East Wind Energy Facility. Analysis of 12 months of pre-construction bat

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monitoring data (RES Southern Africa).

- Patryshoogte Wind Energy Facility. Pre-construction bat monitoring study (RES Southern Africa).
- Swartberg Wind Energy Facility. 12 months pre-construction monitoring and surveys for the presence of bats roosting in farm buildings (CSIR).
- Clover Valley and Groene Kloof Wing Energy Facility. Arcus staff undertook 12 months of pre-construction bat monitoring which included acoustic surveys and mist-netting to catch bats. (Western Wind Energy).
- Spitskopvlakte Wind Energy Project. Arcus staff assisted with the implementation of a survey of bat activity on this site located near Laingsburg in the Western Cape. This work included acoustic monitoring at several locations including monitoring at height.

Ecological Surveys

- Killean Wind Farm. Bat acoustic surveys including a driven transect and commissioning of bat detectors for this proposed site in Scotland, UK. (Renewable Energy Systems Ltd).

Due Diligence

- Due Diligence of Bat Monitoring at the Kangas, Excelsior and Golden Valley Wind Farms (ERM).
- Due Diligence of Bat Monitoring at the Roggeveld Wind Farm (IBIS Consulting).

Peer Review

- Peer Review for Three Bat Monitoring Reports for the Bokpoort II Solar Developments (Golder Associates)
- Peer Review of Operational Monitoring at the Jeffreys Bay Wind Farm, including updating the operational mitigation strategy for bats (Globeleq South Africa Management Services (Pty) Ltd).
- Oyster Bay Wind Energy Facility. Reviewing a pre-construction bat monitoring study and providing input into a stand-alone study (RES Southern Africa).
- Review and design mitigation strategies for bats at the Kinangop Wind Park, Kenya (African Infrastructure Investment Managers).

Feasibility Studies

- Assessment of the Feasibility of a Wind Farm in the Northern Cape (juwi Renewable Energies (Pty) Ltd).
- Assessment of the Feasibility of a Wind Farm in the Eastern Cape (WKN Windcurrent SA (Pty) Ltd).

Research Projects

- Darling National Demonstration Wind Farm Project. Designed and implemented a research project investigating bat fatality in the Western Cape.

Publications

- **Aronson, J.B.** and Sowler, S. (2016). Mitigation Guidance for Bats at Wind Energy Faculties in South Africa.
- **Aronson, J.B.**, Richardson, E.K., MacEwan, K., Jacobs, D., Marais, W., Aiken, S., Taylor, P., Sowler, S. and Hein, C (2014). South African Good Practise Guidelines for Operational Monitoring for Bats at Wind Energy Facilities (1st Edition).
- Sowler, S. and S. Stoffberg (2014). South African Good Practise Guidelines for Surveying Bats in Wind Energy Facility Developments - Pre-Construction (3rd Edition). Kath Potgieter, K., MacEwan, K., Lötter, C., Marais, M., **Aronson, J.B.**, Jordaan, S., Jacobs, D.S, Richardson, K., Taylor, P., Avni, J., Diamond, M., Cohen, L., Dippenaar, S., Pierce, M., Power, J. and Ramalho, R (eds).
- **Aronson, J.B.**, Thomas, A. and Jordaan, S. 2013. Bat fatality at a Wind Energy Facility in the Western Cape, South Africa. *African Bat Conservation News* 31: 9-12.

CURRICULUM VITAE

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Workshops, Seminars and Courses

- The Ecosystem Approach and Systems Thinking Course, United Nationals Environment Programme, Currently undertaking.
- Why Carbon Footprinting Makes Business Sense, African Climate and Development Initiative Seminar, September 2016.
- The Age of Sustainable Development Course, The SDG Academy, 2016.
- Planetary Boundaries and Human Opportunities Course, The SDG Academy, 2015.
- Endangered Wildlife Trust (EWT) Bats and Wind Energy Training Course, October 2013.
- Ecological Networks Course, Kirstenbosch Botanical Gardens, July 2013.
- Social and Economic Network Analysis Course, online via Stanford University, 2013.
- Social Network Analysis Course, online via University of Michigan, 2013
- Introduction to Complexity Science Course, online via Santa Fe Institute, 2013.
- Introduction to Spatial Analysis using R, Kirstenbosch Botanical Gardens, May 2013.
- Google Geo Tools for Conservation, University of Cape Town, February 2013.
- Endangered Wildlife Trust (EWT) Bats and Wind Energy Training Course, January 2012
- Statistical Modelling Workshop for Biologists, University of Cape Town, September 2010.
- ESRI Virtual Campus Online GIS Courses, 2010.
- WAYS/ScholarShip IT Workshop: Remote Sensing and GIS Course, March 2009.

Arcus Consultancy Services South Africa (Pty) Limited
Registered in South Africa No. 2015/416206/07

SCOPING INPUTS FROM SPECIALIST FOR THE AQUATIC ECOLOGY ASSESSMENT FOR THE KAP VLEY WIND ENERGY FACILITY AND SUPPORTING ELECTRICAL INFRASTRUCTURE NEAR KLEINZEE, NORTHERN CAPE

Scoping Phase Input

Prepared by:

Council for Scientific and Industrial Research

Stellenbosch, South Africa

Contact person:

Luanita Snyman-van der Walt

Tel: +27 21 888 2490

Email: LvdWalt1@csir.co.za

October 2017

Scoping and Environmental Impact Assessment for the proposed development of the Kap Vley Wind Energy Facility and supporting electrical infrastructure near Kleinzee, Northern Cape	
Aquatic Impact Assessment: Scoping Phase Input	
CSIR Report Number	CSIR/IU/021MH/ER/2017/0014/A
Prepared by	Luanita Snyman-van der Walt (CSIR)
Version	Final
Date	October 2017

Contents

List of acronyms and abbreviations

CSIR	Council for Scientific and Industrial Research
EIA	Environmental Impact Assessment
MW	Megawatt
WEF	Wind Energy Facility
GIS	Geographic Information System
RE	Remainder
kV	Kilovolt

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1. Introduction

juwi Renewable Energies is proposing the development of a Wind Energy Facility (WEF) and associated electrical infrastructure (132 kilovolt (kV) overhead power line[1]) on the farms Remainder (RE) Kammagas Farm 200 Portion 5, RE Kap Vley Farm 315, Portion 1 of Kap Vley Farm 315, Portion 2 of Kap Vley Farm 315, Portion 3 of Kap Vley Farm 315, Portion 3 of Platvley Farm 314, RE Kourootjie Farm 316 and RE Gra'water Farm 331 near Kleinzee, Northern Cape. The affected farm portions will be referred to hereafter as the "project area".

This document constitutes the Scoping Phase input of the Aquatic Ecology Impact Assessment.

2. Baseline environmental description

2.1 Regional vegetation

The project area is situated in vegetation types of the Succulent Karoo and Fynbos biomes. However, some azonal inland vegetation (Mucina *et al.*, 2006) associated with salt pans and riparian vegetation exists and is of specific concern to this study as they are indicative of ephemeral waterbodies and aquatic features.

2.1.1 Namaqualand Salt Pans

Namaqualand Salt Pans are bare depressions, sometimes sparsely covered with salt-tolerant succulent shrubs. The pans are almost permanently dry, but can become intermittently moist or pools. In the Kleinzee area the depressions are often covered by a layer of sand transferred by the wind (Mucina *et al.*, 2006).

The Namaqualand Salt Pans are Least Threatened from a conservation perspective and have undergone minimal transformation (Mucina *et al.*, 2006), but are unique features of the landscape.

Important plant taxa associated with the Namaqualand Salt Pans are presented in Table 1.

Table 1: Important plant taxa associated with the Namaqualand Salt Pans ((d) - dominant).

Growth form	Species
Succulent shrubs	*Salsola aphylla* (d)
	Sarcocornia mossiana agg. (d)
	Atriplex cinerea subsp *bolusii*
	***Lycium tetrandrum* - Biographically important taxon, West Coast endemic**
Herbs	***Malephora purpurea-crocea* (d) - Biographically important taxon, Namaqualand endemic**
	***Limonium equisetum* - Biographically important taxon, Namaqualand endemic**
Succulent herbs	*Mesembryanthenun gueruchianum*
	Salicornia meyeriana
	***Psilocaulon dinteri* - Biographically important taxon, West Coast endemic**
Graminoids	*Juncus rigidus* (d)
	Sporobolus viginicus
	***Schoenoplectus scirpoides* - Biographically important taxon**

[1] Separate Environmental Impact Assessment processes area being undertaken for the Wind Energy Facility (Full Scoping and Environmental Impact Assessment) and the 132 kV powerline (Basic Assessment). However, this aquatic ecology scoping input considers and reports on both these project components in an integrative manner.

2.1.2 Namaqualand Riviere

The Namaqualand Riviere vegetation type is associated with dry riverbeds throughout Namaqualand, especially the Buffels River. The riverbed may sometimes carry torrential flood water, and is characterised by alluvial shrubland, patches of grass, and low woody thickets (Mucina *et al*., 2006).

The Namaqualand Riviere are Least Threatened from a conservation perspective, but are under pressure exotic invasive shrubs (Mucina *et al*., 2006), but are unique features of the landscape.

Important plant taxa associated with the Namaqualand Salt Pans are presented in

Table 2: Important plant taxa associated with the Namaqualand Riviere ((d) - dominant).

Habitat	Growth form	Species
Riparian thicket	Small trees	*Acacia karroo* (d)
	Tall shrubs	*Melianthus pectinatus*
		Searsia burchelli
		Tamarix usneoides
	Low shrubs	*Ballota africana* (d)
	Semiparasitic epiphytic shrubs	*Viscum capense*
Dry river bottoms	Tall shrubs	*Lebeckia sericea*
	Low shrubs	*Galenia africana* (d)
		Gomphocarpus fruticosus (d)
		Hermannia disermifolia
		Jamesbrittenia fruticosa
		Salvia dentata
	Succulent shrubs	*Suaeda fruticose* (d)
		Zygophyllym morgsana (d)
		Atriplex cinerea subsp. *bolusii*
		Didelta carnosa var. *carnosa*
		Lycium horridum
		Salsola tuberculata
		Tetragonia fruticosa
		T. pilansii
		Zygophyllum retrofractum
		***Sarcocornia terminalus* (d) – Endemic Taxon**
	Herbaceous climbers	*Didymodoxa capensis*
	Graminoids	*Cynodon dactylon* (d)
		Odyssea paucinervis (d)
		Cyperus marginatus
		Diplachne fusca
		Ehrharta longiflora
		Isolepsis antarctica
		Scirpus nodosus
	Herbs	*Limonium dregeanum* (d)
		Arcotheca calendula
		Cotula coronopifolia
		Galium tomentosum
	Geophytic herbs	*Crinum varuabile*
	Succulent herbs	*Conicosia elongate*
		Mesembryanthemum guerichianum

2.2 Quaternary catchments

The water resources of South Africa have been divided into quaternary catchments, which serve as water management units for the country (DWA, 2015). A Quaternary Catchment is a fourth order catchment in a hierarchical classification system in which the primary catchment is the major unit. The project area spans several quaternary catchments: F30D, F30F, F30G, F40A, F40B, F40D. The proposed layout entails that physical infrastructure would only be constructed in quaternary catchments F30G, F40A, F40B, F40D.

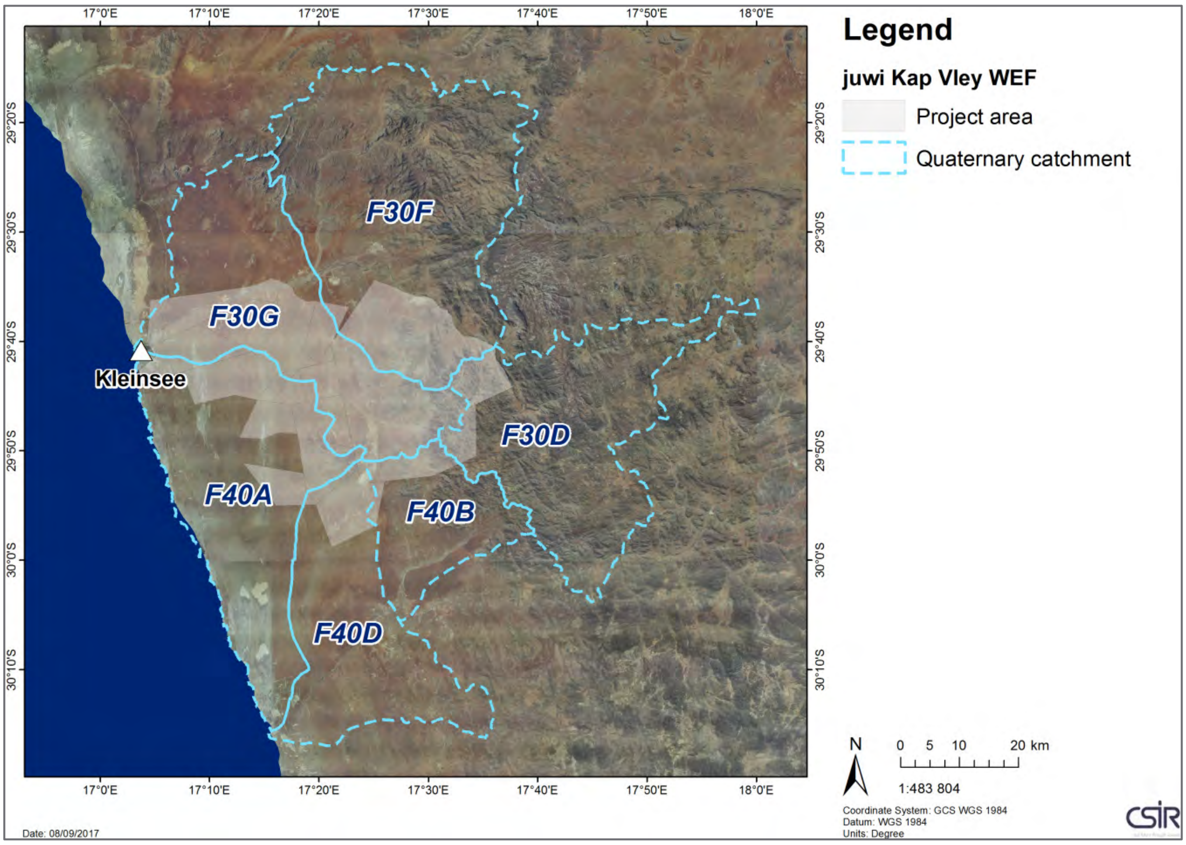

Figure 1: Quaternary catchments in the juwi Kap Vley WEF project area.

2.3 Aquatic features

Aquatic features in the project area consist of ephemeral rivers, wetlands and salt pans (Figure 2).

2.3.1 Rivers

Two ephemeral rivers are within the project area, namely the Buffels and Kommagas Rivers. Both these rivers are in a class C or moderately modified state (Kleynhans, 2000).

The Kommagas River is situated approximately 2 km east of the proposed juwi WEF infrastructure (wind turbines and roads). A section of the 132 kV power line (Alternative 1) is proposed within 500 m of the Kommagas River.

All three proposed alternative routings for the 132 kV power line must cross the Buffels River to reach the Eskom Gromis substation.

2.3.2 Wetlands

Natural wetlands (as delineated by the National Freshwater Ecosystem Priority Area (NFEPA) project (Nel *et al.*, 2011)) exist along the Buffels River at the northern end of the project area. All three proposed alternative routings for the 132 kV power line must cross the Buffels River to reach the Eskom Gromis substation.

2.3.3 Salt pans

Namaqualand salt pans are present in the project area. Namaqualand salt pans are nearly permanently dry. Seldomly the lowest depressions of these pans may contain pools of standing water. In the Kleinzee area these pans are often covered under wind-borne sand (Mucina *et al.*, 2006). A section of the 132 kV power line (Alternative 2) crosses a Namaqualand salt pan.

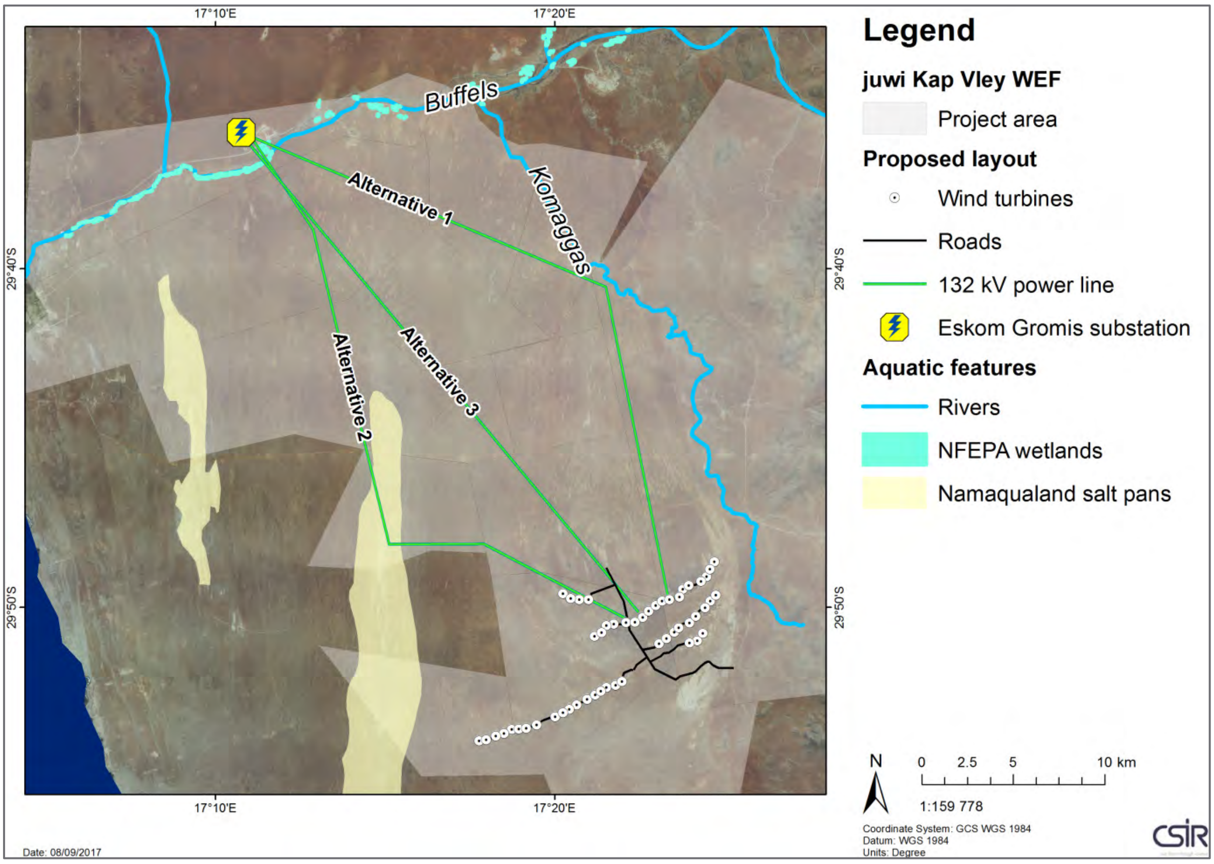

Figure 2: Aquatic features in the project area consist of ephemeral rivers, wetlands and Namaqualand salt pans.

3. Drainage line delineation

Drainage lines were delineated using existing spatial data, namely imagery on Google Earth Pro (Google Inc. 2014), the South African 50 cm imagery (CD:NGI, 2012), and 20 m contours (CS:SM, 2006). Drainage lines were digitised using ArcMap 10.4 software (ESRI Inc., 2014).

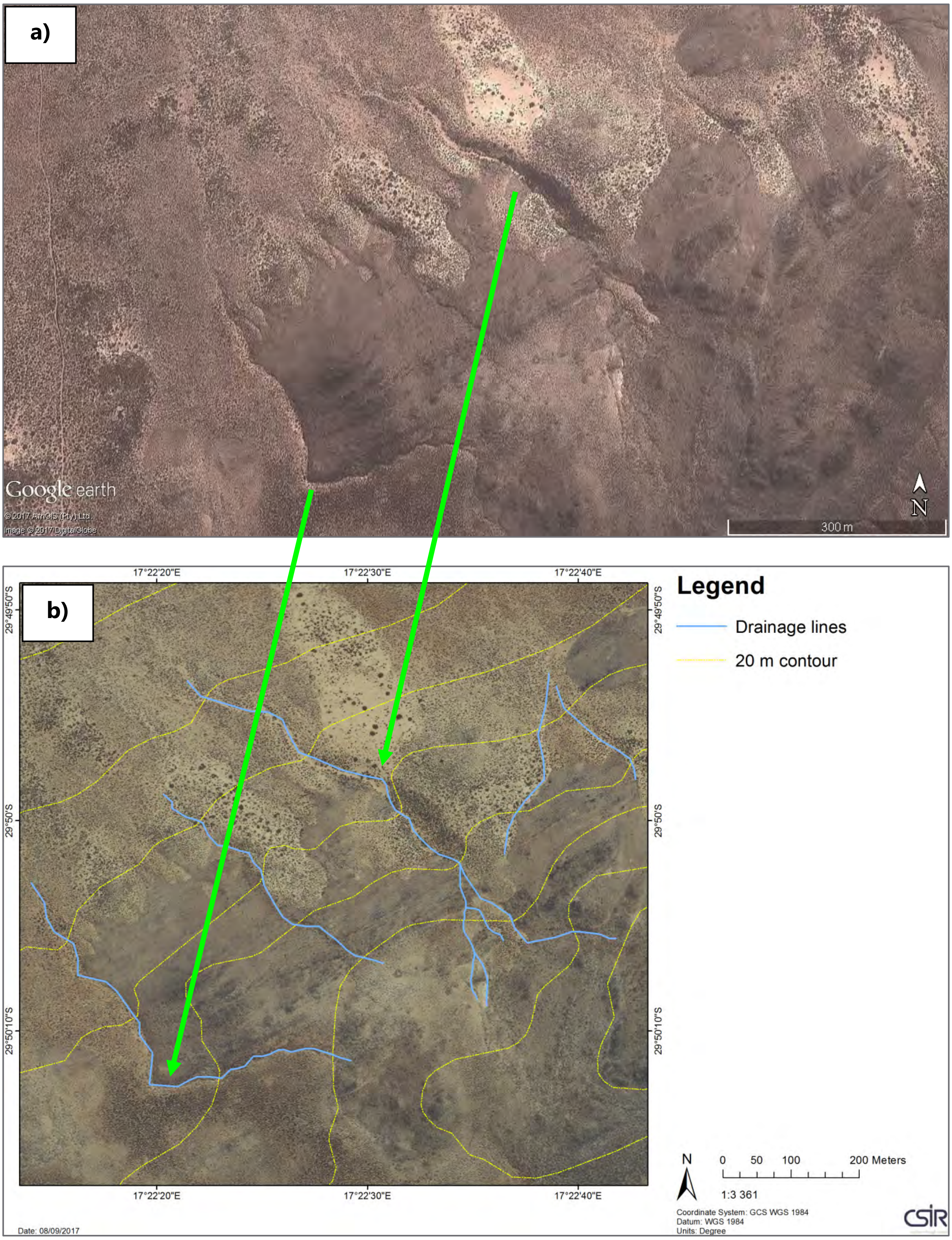

Figure 3: a) Imagery on Google Earth, as well as b) South African 50 cm imagery and 20 m contours were used to identify and delineate potential drainage lines.

Most drainage lines exist within the vicinity of the proposed WEF, as the turbines are often placed on elevated terrain to maximise wind efficiency (FIGURE 4).

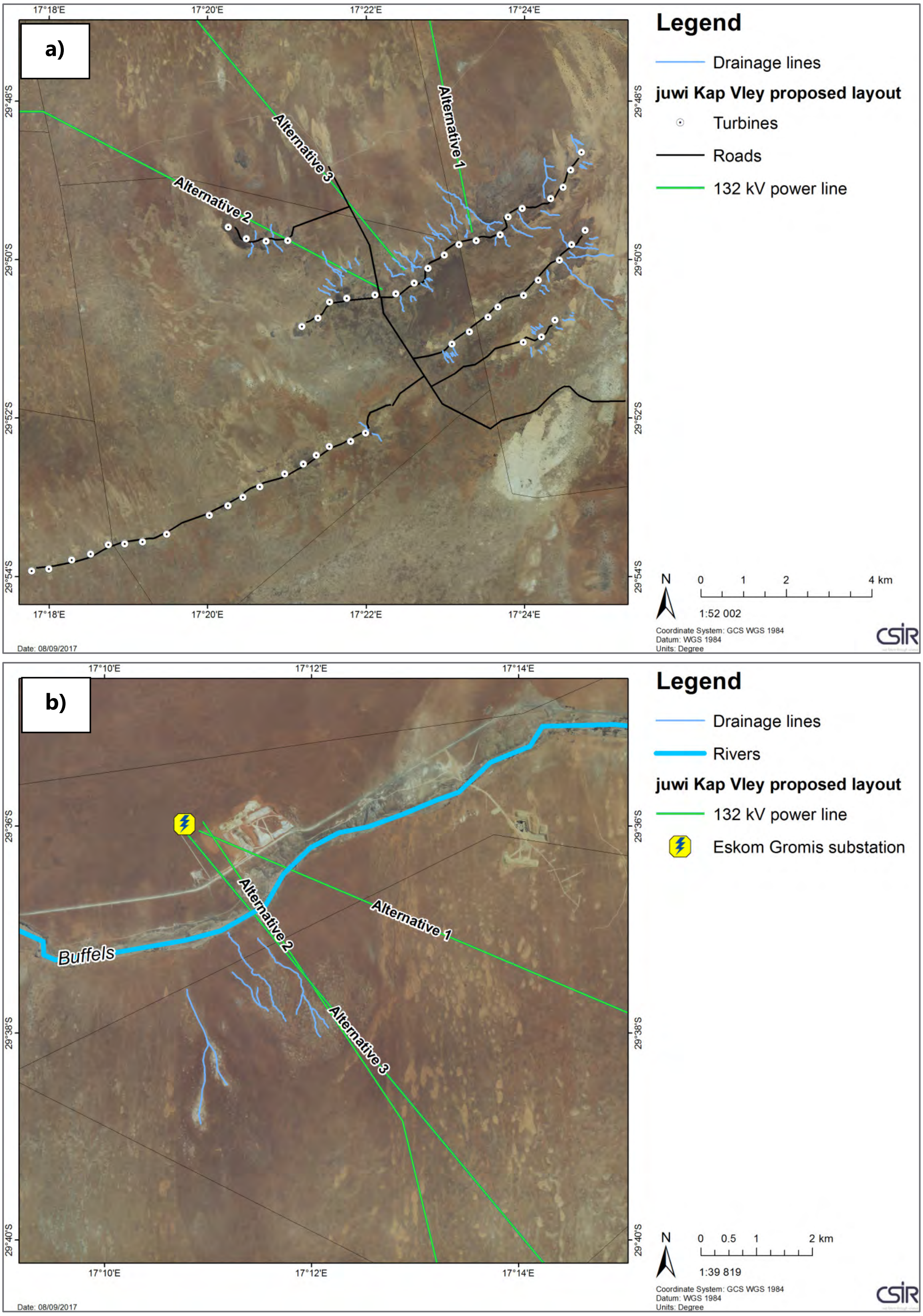

Figure 4: Drainage lines delineated a) in the area proposed for the juwi WEF infrastructure (wind turbines and roads), and where the 132 kV power line will connect to the WEF; and b) where the 132 kV power line approaches the Buffels River to connect to the Eskom Gromis substation.

4. Aquatic sensitivity

The ephemeral aquatic features in the juwi Kap Vley WEF project area were assigned sensitivities (Table 3). The features were also assigned buffer distances to ensure that they are not impeded and to secure ecological functioning.

Table 3: Aquatic ecology sensitivity.

Feature	Distance	Sensitivity
Rivers	Actual feature	High
River buffer	100 m	Moderate
Wetland	Actual feature	High
Wetland buffer	100 m	Moderate
Namaqualand Salt Pans	Actual feature	High
Namaqualand Salt Pans buffer	100 m	Moderate
Drainage lines	Actual feature	High
Drainage line buffer	50 m	Moderate
Remainder of landscape	-	Low

An aquatic ecology sensitivity layer was created (Figure 5).

The current layout of the WEF and roads do not extensively coincide with drainage lines (Figure 6).

The 132 kV power line routing alternatives cross identified drainage lines. It is recommended that the power line routings follow the proposed road routes as far as possible and avoid identified drainage lines. Proposed 132 kV power line routing Alternative 2 crosses a large Namaqualand Salt Pan (Figure 5). However, this routing follows the routing of the 400 kV Eskom Juno-Gromis transmission line (DEA ref: 12/12/20/720) (Nsovo Environmental Consulting, 2016). Powerline routings should, as far as possible, follow existing linear corridors, such as those of existing powerlines or roads.

In order to connect to the Eskom Gromis substation, the proposed 132 kV power line will have to cross the Buffels River and NFEPA wetlands associated with the river (Figure 7). It is recommended that the power line routing should cross the river in the least intrusive manner, avoiding the wetland and wetland buffer areas.

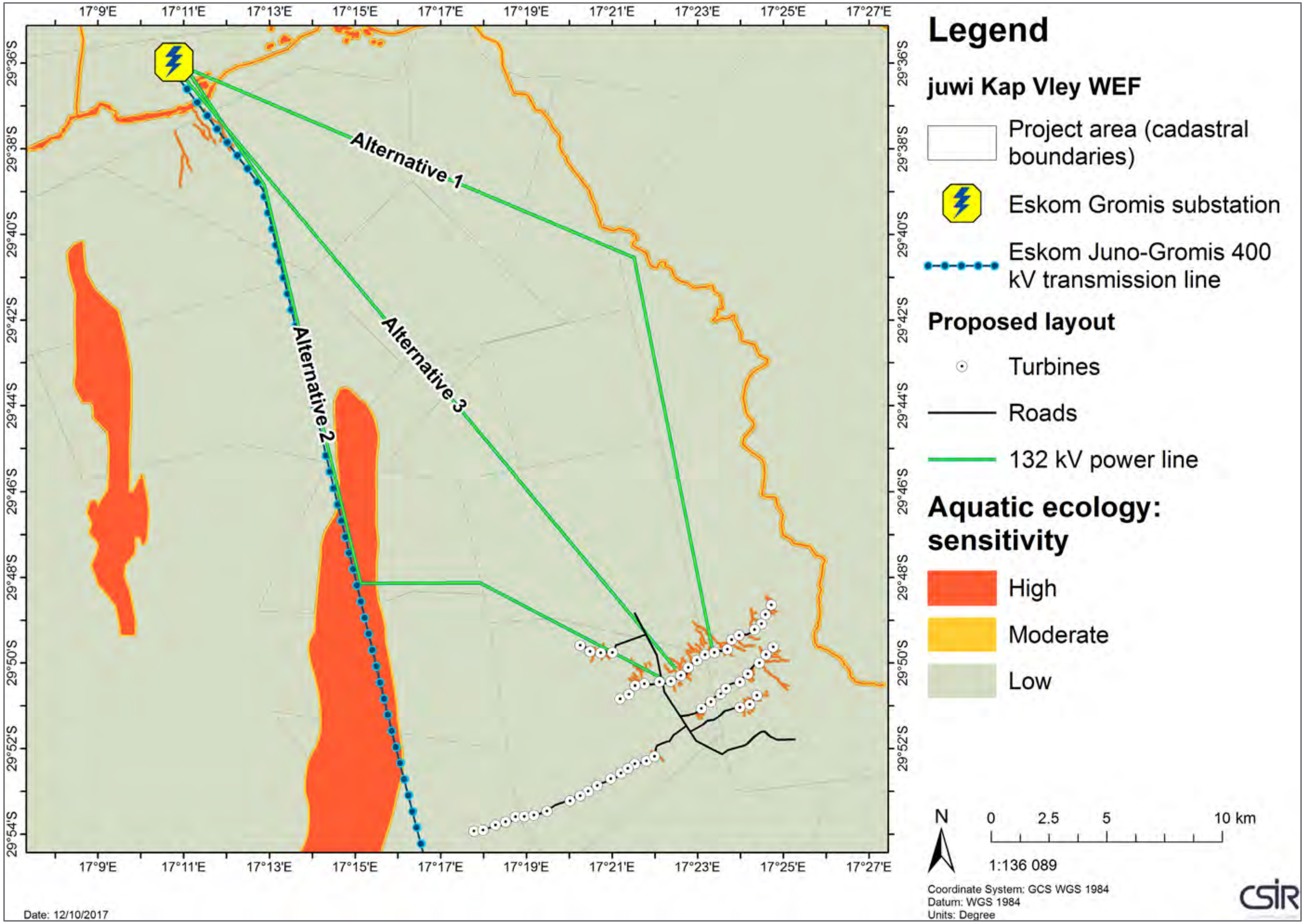

Figure 5: Aquatic ecology sensitivity map showing the proposed layout of the juwi Kap Vley WEF, as well as the proposed 132 kV power line routing alternatives to the Eskom Gromis substation.

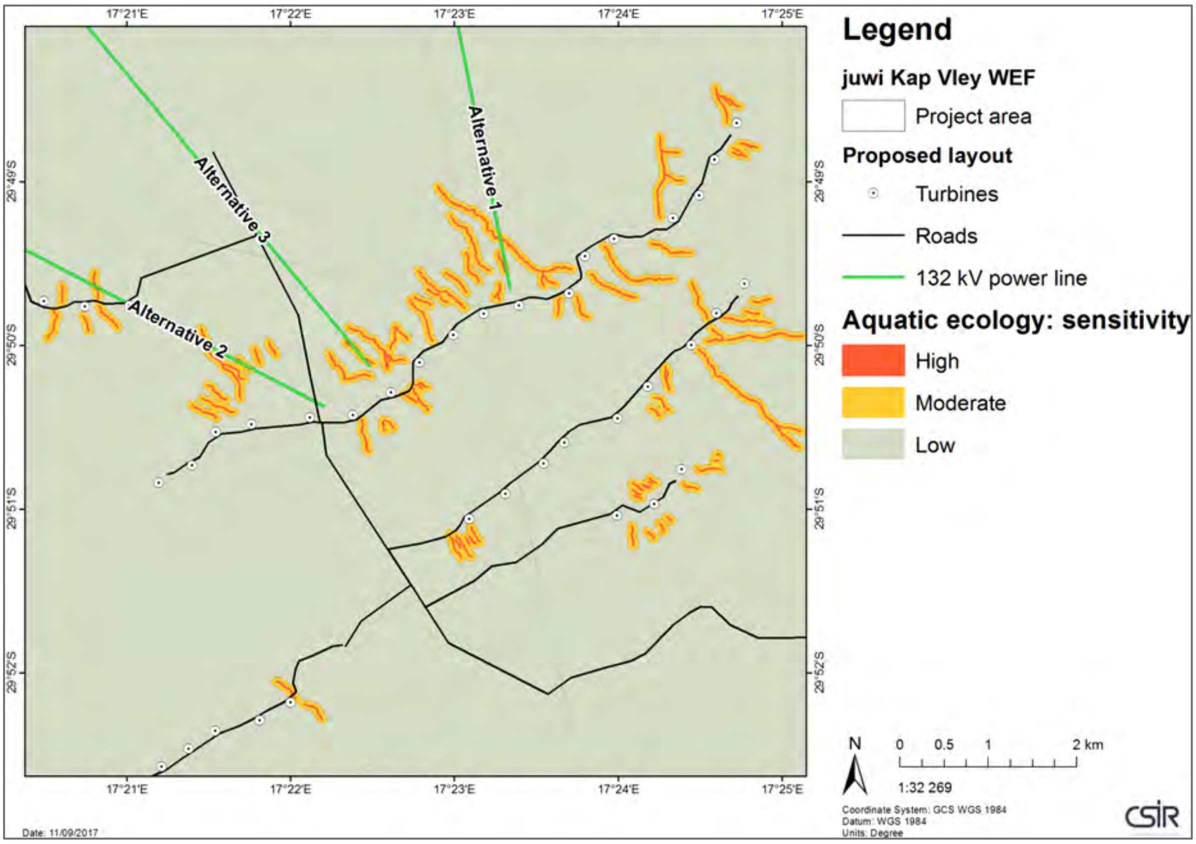

Figure 6: **Aquatic ecology sensitivity map showing the proposed layout of the juwi Kap Vley WEF, as well as the proposed 132 kV power line routing alternatives from the WEF.**

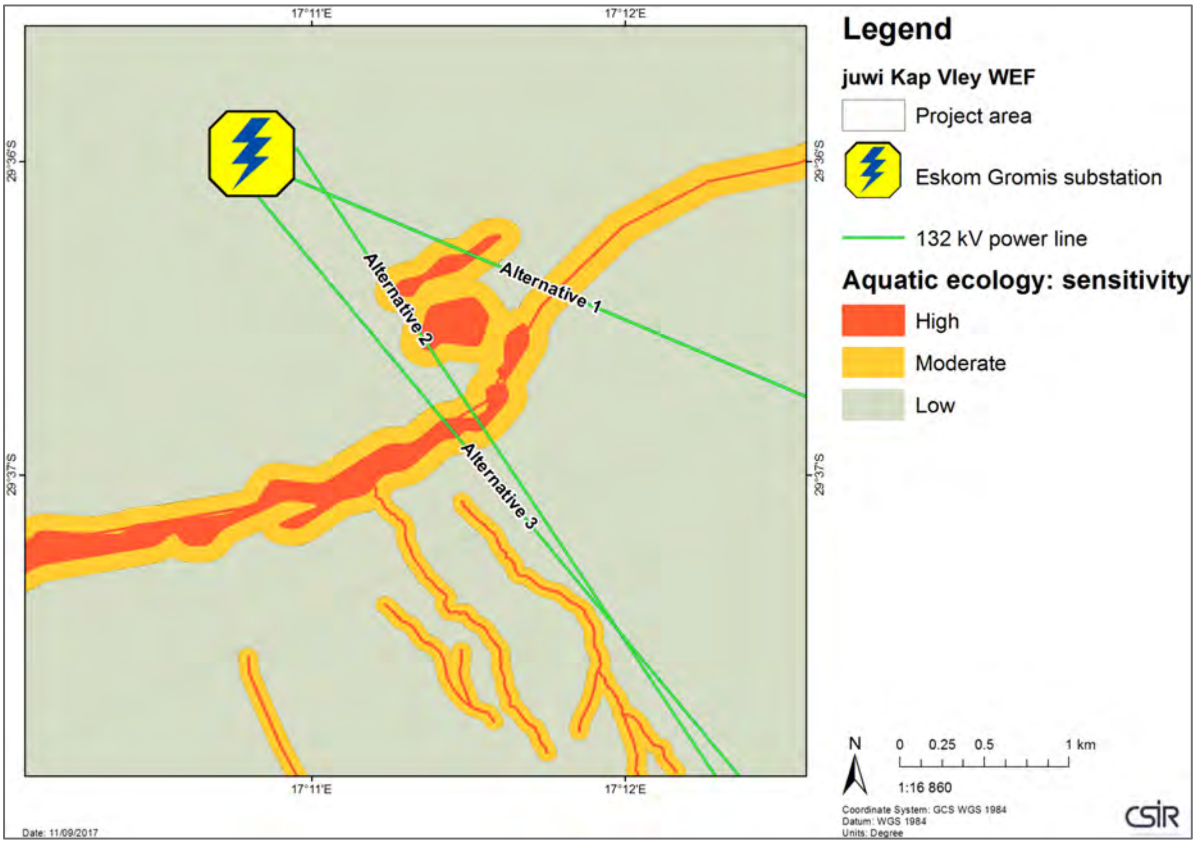

Figure 7: **Aquatic ecology sensitivity map showing the proposed 132 kV power line routing alternatives at the connection to the Eskom Gromis substation.**

5. Key Impacts

The potential impacts of the proposed project are most likely associated with surface and vegetation and land clearing during site preparation and construction. However, no rivers, wetlands, pans or major drainage lines exist where the juwi Kap Vley WEF infrastructure is proposed. The proposed 132 kV power line may impact on the aforementioned features, but it is anticipated that these can be mitigated through selecting an Alternative that poses least environmental risk and planning pylon placement to avoid sensitive aquatic features.

The construction phase – through the removal of top soil and vegetation – could indirectly impact waterbodies and aquatic features through increased sedimentation in the associated ecosystems. However, this is not expected to be a significant concern given the limited rainfall of the arid region (100 mm Mean Annual Precipitation) to stimulate damaging overland flow.

5.1 Preliminary assessment of potential impacts

Potential impact sensitive aquatic features associated with the juwi Kap Vley WEF project are anticipated to mainly be of low to very low negative significance after mitigation (Table 4). Cumulative impacts consider the proposed Eskom Brazil WEF and the Koingnaas WEF 60 km south of Kleinzee.

6. Assessment to be undertaken during the EIA Phase

A full aquatic ecology impact assessment will be conducted during the Environmental Impact Assessment (EIA) to assess the potential impacts to sensitive aquatic features and drainage lines. The aquatic ecology impact assessment will be conducted in accordance with the requirements of Appendix 6 of the 2014 National Environmental Management Act EIA Regulations.

Key components of the assessment include:

- Desktop review of existing literature (e.g. relevant planning documents, spatial development frameworks and EIAs of neighbouring WEFs).
- Consider and address concerns raised and comments made on the content of this document (Scoping Phase) by Interested and Affected Parties;
- Impact assessment and cumulative impact assessment; and
- Recommendations for mitigation, management and monitoring actions.

Table 4: Scoping level assessment of potential and residual risks/impacts, with high-level mitigation measures.

Nature of Potential Impact/ Risk	Aspect/ Impact Pathway	Status	Spatial Extent	Duration	Consequence	Probability	Reversibility of Impact	Irreplaceability	Potential Mitigation Measures	Significance of Impact and Risk: Without Mitigation/ Management	Significance of Impact and Risk: With Mitigation/ Management (Residual Impact/ Risk)	Can the impact be avoided?	Can the impact be managed or mitigated?	Ranking of Residual Impact/ Risk	Confidence Level
Physical disturbance and destruction of aquatic features (ephemeral rivers, wetlands, pans) and major drainage lines	Clearance of land and vegetation for the WEF and ancillary infrastructure.	Negative	Local	Long term	Substantial	Unlikely	Low	Moderate	• Avoid identified sensitive aquatic features (ephemeral rivers, wetlands, pans), major drainage lines and associated buffers	Low	Very low	No	Yes	5	Moderate
	Clearance of land and vegetation for the 132 kV power line	Negative	Local	Long term	Substantial	Likely	Low	Moderate		Moderate	Low	No	Yes	4	Moderate
	Cumulative Impacts	Negative	Regional	Long term	Moderate	Very Likely	Low	Moderate	• Adequate implementation of proposed mitigation measures and best practice by all WEFs in the vicinity.	Moderate	Low	No	Yes	4	Moderate
Altered drainage patterns, increased runoff and sedimentation of related ecosystems	Clearance of land and vegetation for the WEF and ancillary infrastructure.	Negative	Regional	Long term	Moderate	Likely	Low	Moderate	• Avoid identified aquatic features (ephemeral rivers, wetlands, pans), major drainage lines and associated buffers; • Limit hard surfaces on site to reduce runoff; • Keep the footprint of the disturbed area to the minimum and designated areas only. • Clear site only before a section is due to be constructed.	Moderate	Low	No	Yes	4	Moderate
	Clearance of land and vegetation for the 132 kV power line	Negative	Regional	Long term	Moderate	Unlikely	Low	Moderate		Low	Very low	No	Yes	5	Moderate
	Cumulative Impacts	Negative	Regional	Long term	Moderate	Likely	Low	Moderate	• Adequate implementation of proposed mitigation measures and best practice by all WEFs in the vicinity.	Moderate	Low	No	Yes	4	Moderate

7. References

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Google Inc. 2015. Google Earth Pro 7.1.4.1529. https://www.google.com/earth/download/ gep/agree.html.

Kleynhans, C.J., 2000. Desktop Estimates of the Ecological Importance and Sensitivity Categories (EISC), Default Ecological Management Classes (DEMC), Present Ecological Status Categories (PESC), Present Attainable Ecological Management Classes (Present AEMC), and Best Attainable Ecological Management Class (Best AEMC) for Quaternary Catchments in South Africa. DWAF report. Pretoria: Institute for Water Quality Studies, Department of Water Affairs and Forestry.

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Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R. and Smith-Adao, L.B., 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project (No. K5). WRC Report No. 1801/2/11. ISBN 978-1-4312-0149-5.

Nsovo Environmental Consulting. 2016. Draft Construction and Operation Environmental Management Programme for the proposed Eskom Juno - Gromis 400 kV Transmission Line in tThe Northern and Western Cape Provinces, Ref: 12/12/20/720. [Url] http://www.nsovo.co.za/Juno-Gromis Operation & Construction.html.

SCOPING INPUTS FROM SPECIALIST:

VISUAL BASELINE STUDY

Scoping and Environmental Impact Assessment for the Proposed Development of the 300 MW Kap Vley Wind Energy Facility near Kleinzee, Northern Cape Province: Scoping Report

Report prepared for:

CSIR – Environmental Management Services

P O Box 320
Stellenbosch
7600

Report prepared by:

Bernard Oberholzer
Landscape Architect / Environmental Planner

in association with

Quinton Lawson
MLB Architects / Urban designers

PO Box 471
Stanford
7210

September 2017

Version 1.1

SPECIALIST EXPERTISE

The visual baseline study was prepared by the following:

Bernard Oberholzer, Landscape Architect, and Principal at BOLA
Quinton Lawson, Architect, and Partner at MLB Architects.

Expertise

Bernard Oberholzer has a Bachelor of Architecture (UCT) and Master of Landscape Architecture (University of Pennsylvania), and has more than 20 years experience in undertaking visual impact assessments. He has presented papers on *Visual and Aesthetic Assessment Techniques*, and is the author of *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes,* prepared for the Dept. of Environmental Affairs and Development Planning, Provincial Government of the Western Cape, 2005.

Quinton Lawson has a Bachelor of Architecture Degree (Natal) and has more than 10 years experience in visual assessments, specializing in visual mapping, 3D modeling and photomontage visual simulations. He has previously lectured on visual simulation techniques in the Master of Landscape Architecture Programme at UCT.

The authors have been involved in visual assessments for a wide range of residential, industrial and renewable energy projects, including a number in the Namaqualand area. They prepared the 'Landscape Assessment' report for the *National Wind and Solar PV Strategic Environmental Assessment (SEA)*, in association with the CSIR, for the Department of Environmental Affairs (DEA) in 2014, as well as the 'Visual Specialist Report' for the *National Electricity Grid Infrastructure SEA* in 2015.

SPECIALIST DECLARATION

We, Bernard Oberholzer and Quinton Lawson, as the appointed independent specialists, in terms of the 2014 EIA Regulations, hereby declare that we:

- We act as the independent specialist in this application;
- we perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- we declare that there are no circumstances that may compromise my objectivity in performing such work;
- we have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- we will comply with the Act, Regulations and all other applicable legislation;
- we have no, and will not engage in, conflicting interests in the undertaking of the activity;
- we have no vested interest in the proposed activity proceeding;
- we undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- we have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- we have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- we realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signatures of the specialist:

Name of Specialist: Bernard Oberholzer, Quinton Lawson

Date: October. 2017

EXECUTIVE SUMMARY

This report is a visual baseline study, which forms part of the scoping phase of the proposed Kap Vley wind energy facility near Kleinzee in Namaqualand. Although the report provides a preliminary visual assessment for the project, this can only be accurately determined once a preferred layout of all the facilities, including the wind turbines, substation, operation / maintenance building, and powerlines have been finalised.

A preliminary layout by the Developer indicates that a maximum of 56 wind turbines would be located on the ridgeline of a low mountain range to the west of Komaggas. The range, which has an altitude of about 500m can be seen as a local feature within the larger landscape context. The turbines would be visible for some distance across the visually exposed coastal peneplain.

Other than the mountain ridge mentioned above there are no significant scenic features in the immediate area, which has been previously disturbed in places by diamond-mining, and which is currently used for grazing. Potential sensitive receptors in the area are the Komaggas settlement to the north-east, the Namaqualand National Park to the south, and the Houthoop guest farm to the north-west. Distance is, however, a mitigating factor. There are also a number of farmsteads in the sparsely populated surrounding area.

The potential visual impact of the proposed wind energy facility (WEF) during the operational phase ranges from **moderate to high** before mitigation for the wind turbines, because of their scale and the exposed nature of the surrounding landscape. The related building infrastructure and powerlines are expected to be **moderate** visual significance before mitigation.

Although it is difficult to reduce the visual effect of the large wind turbines, a number of visual mitigation measures have been recommended for the layout of the turbines and related infrastructure. The visual risk significance after mitigation is expected to be **moderate** for the turbines and powerlines, and **moderate to low** for the building infrastructure, taking into account that the potential visual impacts would be local in scale, and largely reversible after decommissioning.

The visual impact significance during the construction phase of the above facilities is expected to be slightly lower because it is of short-term duration, i.e. **moderate** for the wind turbines. At the decommissioning phase, most of the infrastructure could be removed, except possibly for some of the access roads, platforms and concrete slabs, and the expected residual impact significance is therefore expected to be **low**.

The potential cumulative visual impacts are difficult to determine without information on the actual number and layout of wind turbines for the other proposed wind energy facilities in the area. The proposed solar energy facilities, mainly located near Springbok, are not expected to have any cumulative visual significance. Provided the various energy facilities are 15 to 30km apart, the cumulative visual impacts would tend to be similar to those indicated above for the proposed Kap Vley facility.

LIST OF ABBREVIATIONS

DEA	Department of Environmental Affairs
DEM	Digital elevation model
ECO	Environmental control officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
O&M	Operations and Maintenance
SEA	Strategic Environmental Assessment
SRTM	Shuttle Radar Topography Mission
VIA	Visual Impact Assessment
WEF	Wind energy facility

GLOSSARY

Definitions	
Cultural landscapes	Human-modified landscapes, particularly those of aesthetic, historical or archaeological significance.
Cumulative impacts	The combined or incremental effects resulting from changes caused by a proposed development in conjunction with other existing or proposed activities.
Receptors	Viewers who would be affected by a proposed development, the viewers usually being residents, commuters, visitors or tourists.
Sense of place	The unique or special qualities found in a particular location, including the combined natural, cultural, aesthetic, symbolic and spiritual qualities.
View corridor	A linear geographic zone, usually along movement routes such as trails, roads and railways, visible to users of the routes.
View shadow	A zone within the view catchment area that is visually obscured from the proposed development by the topography, trees or structures.
Viewshed	A geographic zone encompassing a view catchment area, usually defined by ridgelines, similar to a watershed.
Visual buffer	A geographic zone of varying distance, indicating visual sensitivity or visual constraints for proposed development or activities.

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VISUAL BASELINE STUDY

1.1. INTRODUCTION AND METHODOLOGY

1.1.1. Scope and Objectives

The Visual Baseline Study, together with other specialist studies, forms part of the Environmental Scoping Report, and is aimed at informing the layout of the proposed Kap Vley Wind Energy Facility (WEF). The baseline study will be followed by a visual impact assessment (VIA) in the next phase of the project application.

The visual baseline includes a brief description of the project and the receiving environment, identifies visual / scenic informants, indicates possible visual impacts and risks associated with the project and provides recommended mitigations to minimise potential visual impacts.

1.1.2. Terms of Reference

The following form part of the Terms of Reference for the visual specialist study:

- A description of the regional and local landscape features;
- A field survey to identify landscape features and visually sensitive receptors;
- Mapping of the sensitive landscape features / sensitive receptors;
- Assessing (identifying and rating) potential visual impacts on the environment / receptors;
- Identification of relevant legislation and legal requirements; and
- Recommendations on possible mitigation measures and rehabilitation procedures / management guidelines.

1.1.3. Approach and Methodology

The visual baseline study method includes the following:

- Mapping of the study area in its landscape context, including surrounding land uses;
- Mapping of the projected viewsheds and distance radii of the proposed WEF to determine the possible zone of visual influence;
- Identification of important viewpoints and view corridors, together with a photographic survey from selected viewpoints, taking into account possible sensitive receptors;
- Identification of landscape characteristics, including topographical and geological features, vegetation cover, land use, cultural landscapes, protected areas and farmsteads;
- Identification and mapping of visual / landscape constraints, including no-go areas and visual buffers for the proposed project based on a range of criteria.
- Use of the above mapping and photographic survey to assess the visual effect of the proposed project.

A visit to the proposed Kap Vley project site and surroundings was carried out on 14 and 15 August 2017. The route taken on the field trip is indicated on Map 2. The season was not a major consideration for carrying out a visual assessment.

1.1.4. Assumptions and Limitations

The location of the proposed wind turbines, access roads, substations and powerlines have not been finalised at this stage, and a preferred layout will only be assessed as part of the EIA process.

Therefore the full visual implications are not known and only a preliminary assessment of potential visual impacts can be made as part of this Visual Baseline Study, which together with the guideline mitigations, are intended to inform the layout of the proposed WEF.

The assessment of potential visual impacts is dependent to some extent on the study of the photomontages, showing before and after visual effects. These would only be prepared once the preferred layout is available, and therefore the impact ratings at the scoping stage are only preliminary.

1.1.5. Sources of Information

The main sources of information for the visual assessment included the following:

- Project description of the proposed Kap Vley WEF provided by Juwi (undated).
- 1:1 000 000 Geological map of South Africa, Council for Geoscience, 2011.
- 1:500 000 and 1:250 000 topographical maps of South Africa, Surveys and Mapping.
- Google Earth satellite imagery, 2017.
- SRTM DEM data.

1.2. DESCRIPTION OF PROJECT ASPECTS RELEVANT TO VISUAL IMPACTS

The proposed WEF site is located on a number of land portions about 30 km south-east of Kleinzee and about 7 km south-west of Komaggas within Namaqualand, in the Northern Cape.

The WEF project comprises a generation capacity of 300 MW. It is envisaged that the WEF will connect to the Gromis Substation via a 132 kV powerline over a distance of approximately 28km.

A preliminary list of components for the proposed WEF, that have visual implications, is given in Table 1 below. A preliminary layout of the turbine positions has been provided by the Developer, but this will only be finalised during the EIA process.

Table 1: Description of Proposed Wind Energy Facilities at the Kap Vley Site

Facility	Extent/Footprint	Height	Comments
Kap Vley WEF area	±150 hectares	n/a	
No. of wind turbines:	Max. 56 turbines. Generation capacity 300 MW. Turbine capacity to be confirmed.	Hub height. 150m Rotor diameter: 160m	Colour: off-white / grey - TBC
Turbine pads	3.4 ha crane platform	n/a	Foundation 20 x 20m x 1m deep.
Temporary Hardstand area for assembly	15 ha	n/a n/a	
Internal access roads	50 km of internal road linking a maximum of 56 turbine locations.	n/a	8m width, and 13m in parts to accommodate crawler crane.
Electrical substation on site	150 x 150m	Single storey building	33 kV /132 kV capacity. Location to be determined.
Transmission line 132 kV	36 km from on-site substation to Gromis substation.	Height to be determined	3 alternative routes. Pylon type to be determined.
Operations and main-tenance structures	1 ha Workshop/office buildings, maintenance, storage, visitor facilities.	Single storey	Location to be determined. Includes parking, water tanks, storage yard, waste collection.
Security fencing	n/a	Up to 5m	Around substation and O&M buildings.
Security Lighting **Navigation lights**	To be confirmed. To be confirmed.	To be confirmed. At hub height.	At substation and O&M building. Flashing red light on selected tur-bines (to CAA requirements).
Construction Phase:			
Lay down area, temporary construction camp	10 ha Temporary site camp and laydown areas including access road, site offices.	Single storey structures	Temporary gravel hard standing and prefab structures. Location to be determined.
On-site concrete batching plant	50 x 50m		
Borrow pits	To be confirmed.	n/a	

1.3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Relevant landscape features of the receiving environment are described below, and the general character of the study area is illustrated in Plates 1 to 9.

Location (Map 1)

The project site is located in the Namakhoi Local Municipality within Namaqualand, in the Northern Cape. The nearest settlements are Komaggas, about 7 km away, and Kleinzee on the coast, about 30km away. The site can be accessed via the R355 Route and Spektakel Pass from Springbok, about 50km to the east, or via the newly tarred coastal route from Hondeklipbaai, about 70km to the south. The Namaqua National Park lies about 12km to the south of the project site.

Physical Landscape (Map 2 and 4)

The project is located on a low mountain range separated from the Komaggas Mountains further inland. The highest portion of this low range, the 'Brandberg', is 512m above mean sea level. The other highpoints are known as 'Byneskop' and 'Graafwater se Kop'. The range is surrounded by a vast, flat to gently undulating coastal peneplain, which, being visually exposed, tends to make the mountain ridge visible over long distances. Steep slopes are indicated on Map 4.

Geology (Map 3)

The low mountain range is composed of quartzite and schist of the Khurisberg Formation (Okiep Group of rocks), the resistant quartzite being responsible for the parallel ridges trending in a SW-NE direction. The surrounding coastal peneplain is mostly sand, calcrete and alluvium along the dry riverbeds. Augen gneiss occurs to the east around Komaggas. (Geological Survey, 1984, 1:1 000 000 Map).

Vegetation

The vegetation type of the rocky ridges is classified as Namaqualand Klipkoppe Shrubland (SKn1), being part of the Succulent Karoo Biome, and consisting of open shrubland and succulents. The surrounding coastal peneplain comprises Namaqualand Strandveld (SKs7), with low species-rich shrubland, both succulent and non-succulent, (Mucina and Rutherford, 2006).

Land Use

The predominant land use associated with the study area is agriculture, mainly extensive grazing, including dorper sheep, and subsistence farming where irrigation is available, particularly in the Komaggas settlement. Grazing farms tend to be large and farmsteads far apart in the semi-arid landscape. Diamond mining took place in the past and many excavated trenches still remain. The land-based mining in the immediate area appears to have largely ceased.

A tar road serves the Komaggas settlement, the other access roads around the site being gravel. The Namaqua National Park is some 12 km to the south of the site, with access by gravel road. The 'Houthoop' guest farm is about 15 km to the north-west of the site.

Visual Constraints Map (Map 7)

The main scenic resources and sensitive receptors are indicated on the Visual Informants Map. The buffers generally conform to those developed in previous studies, (Lawson and Oberholzer, 2014).

The Visual Informants Map includes the following:

- *Steep slopes* with gradients steeper than 1:5 have high visual sensitivity.
- *Topographic features,* mainly prominent landforms / ridgelines. The skylines of these are visually sensitive requiring careful siting of facilities.
- *Drainage courses,* although dry, are scarce scenic features and therefore visually sensitive.
- *Arterial / district roads* are sensitive visual corridors used by local residents, visitors and tourists.

Visual Sensitivity

The extensive open plain is visually exposed, with only gentle undulations that would screen the proposed WEF from roads and farms in the district. Any wind turbines would therefore generally be visible over long distances. The prominent ridgelines of the low mountain range tend to be visually sensitive in the exposed landscape.

The site is located in a fairly remote area with sparsely scattered farmsteads, and therefore low population. Affected receptors would include the farmsteads and guest accommodation, most of which are a considerable distance from the proposed WEF. The Namaqualand National Park lies to the south of the proposed WEF.

1.4. APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The National Environmental Management Act (NEMA) and the Regulations in terms of Chapter 5 of NEMA. (Act No. 107 of 1998). and NEMA EIA Regulations (2014) apply as the proposed wind energy facility is a listed activity requiring a scoping study and EIA. The need for a visual assessment has been identified.

The National Heritage Resources Act (NHRA) (Act No. 25 of 1999), and associated provincial regulations, provide legislative protection for natural, cultural and scenic resources, as well as for archaeological and paleontological sites within the study area. This report deals with visual considerations, including scenic resources. Archaeological, paleontological and historical sites are covered by the heritage specialists.

1.5. IDENTIFICATION OF KEY ISSUES

1.5.1. Key Issues Identified During the Scoping Phase

The potential visual issues identified by the specialists during the scoping phase of this EIA process include the following:

- Potential scarring in the landscape caused by earthworks for access roads and assembly platforms, particularly on the steeper slopes;
- Visual effect of wind turbines on the ridge skylines;
- Potential visual clutter in the landscape of on-site substation, O&M structures and connecting powerlines.
- Dust and noise during construction from heavy machinery and truck traffic.

Additional issues may be added during the public participation process.

1.5.2. Identification of Potential Impact

The potential impacts identified during the scoping phase of the visual assessment are outlined below:

1.5.2.1. Construction Phase

- Potential visual intrusion, dust and noise caused by heavy construction vehicles and cranes.
- Potential visual effect of construction camp and material stockpiles.
- Potential visual scarring caused by earthworks for roads and platforms, as well as borrow-pits.
- Potential visual pollution caused by littering and wind-blown packaging materials.

1.5.2.2. Operational Phase

- Potential visual intrusion caused by large-scale wind turbines on the skyline of the rural landscape.
- Potential visual clutter caused by substation and operations / maintenance structures and overhead powerlines.
- Potential visual intrusion of lights at the WEF, including navigation lights on the traditionally dark skies of the area at night.
- Potential visual effect on the Namaqualand National Park to the south.
- Potential visual effect on surrounding farmsteads and the Houthoop guest farm.

1.5.2.3. Decommissioning Phase

- Potential visual effect of remaining roads, platforms and concrete slabs on the landscape after decommissioning of the WEF.

1.5.2.4. Cumulative impacts

- Cumulative visual effect of the WEF caused by powerlines crossing the landscape, as well as by other proposed energy facilities in the area, the nearest being the proposed 300MW WEF for Eskom near Kleinzee, the Project Blue WEF Phases 2 and 3 at Kleinzee, and the proposed 7.2MW Koingnaas WEF 60km south of Kleinzee. A 20MW solar energy facility is proposed to the north-east of the site near Nababeep. A number of other solar energy facilities are proposed near Springbok, but these are not expected to have cumulative visual implications in relation to the proposed Kap Vley WEF. The various proposed WEFs are indicated on Map 1.

1.6. ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

1.6.1. Results of the Field Study

The field survey and study of the photographic panoramas indicated that the proposed WEF would be prominently visible on the skyline of the mountain ridgelines. However, the mountain range is fairly low (<500m above the surrounding plain), and only of local visual significance in the broader landscape context. A summary of the visual criteria and findings from the survey are given below.

Visibility (Map 2):
The proposed WEF would be visible from a number of farmsteads and a guest farm, most of which are some distance away. The WEF would be only marginally visible in the far distance from the Namaqualand National Park. Visibility from the Komaggas settlement is partly obscured by the topography, (see Table 2 below). Estimated degrees of visibility are indicated below:

High visibility:	Prominent feature within the observer's viewframe 0-2.5km
Mod-high visibility:	Relatively prominent within observer's viewframe 2.5-5km
Moderate visibility:	Only prominent with clear visibility as part of the wider landscape 5-10km
Marginal visibility:	Seen in very clear visibility as a minor element in the landscape 10-20km

Visual Exposure (Maps 5 and 6):
The viewshed extends fairly far in all directions over the open plain, but is partly restricted by the mountainous terrain to the east, which is in a view shadow.

Scenic Resources / sensitive receptors (Map 2):
There are few topographic or scenic features in the surrounding area. The general area is sparsely populated, the farmsteads being far apart, mostly some distance from the WEF. Potential sensitive receptors include the Komaggas settlement and the Namaqualand National Park, but distance is a mitigating factor.

Landscape Integrity:
The surrounding area has a combination of wilderness and rural qualities, the intactness of which has been partly altered by previous diamond mining activities.

Visual Absorption Capacity:
The area around the project site is generally flat, with low scrub vegetation and therefore visually exposed.

The above visual criteria are assessed and summarised in Table 3 below in order to determine overall visual sensitivity for the wind turbines, related infrastructure and connecting powerlines.

Table 2: Viewpoints, Sensitive Receptors and Potential Visibility

View-point	Location	Coordinates	Distance to WEF	Visibility
VP1	Tar road to Komaggas	29.747S, 17.527E	13.2km	Marginal visibility. Partly obscured by foreground topography.
VP2	Centre of Komaggas	29.795S, 17.486E	7.3km	Moderate visibility in the distance.
VP3	Western edge of Komaggas	29.797S, 17.466E	5.4km	Moderate visibility in the distance.
VP4	Gate near Witduin farmhouse	29.868S, 17.394E	1.95km	High visibility on the skyline.
VP5	Gate to Namaqualand National Park	29.931S, 17.487E	15.2km	Marginal visibility in far distance.
VP6	Namaqualand National Park boundary	29.956S, 17.473E	13.6km	Marginal visibility in far distance.
VP7	Vaalkol farmstead	29.799S, 17.341E	3.0km	High visibility on the skyline.
VP8	Sonnekwa farmstead	29.854S, 17.251E	6.6km	Moderate visibility in middle distance.
VP9	Rooivlei farmstead in valley	29.845S, 17.184E	12.4km	Marginal visibility in far distance.
VP10	(leave out)			
VP11	Rooivlei farmstead on hill	29.824S, 17.148E	16.5km	Marginal visibility in far distance.
VP12	Gromis substation on R355	29.603S, 17.180E	29.0km	Not visible
VP13	Gravel road near Steenvlei * and Hondevlei farmsteads	29.762S, 17.144E	20.0km	Practically not visible.
VP14	Gravel road near Lewies se Duin	29.758S, 17.210E	14.5km	Marginal visibility in far distance.
VP15	Gravel road near proposed powerline	29.756S, 17.239E	12.3km	Marginal visibility in far distance.

Table 3: Visual Impact Intensity

Visual Criteria	Comments	Wind Turbines	Related Infra-structure	Connecting powerlines
Visibility of facilities	Visible from a number of farmsteads, Komaggas, Houthoop guest farm, Namaqualand National Park.	High	Low-med	Medium
Visibility of lights at night	Navigation lights on turbines, security lighting at substation and O&M buildings.	Medium	Medium	n/a
Visual exposure	Viewshed extends across the plain, restricted by landforms to the east.	High	Low-med	Medium
Scenic resources and receptors	Low mountain ridgelines, dry river courses, farmsteads, guest farm.	Med-high	Low-med	Medium
Landscape integrity	wilderness / rural character, previous disturbance by diamond-mining.	Med-high	Low-med	Medium
Visual absorp. capacity	Visually exposed plain, partly undulating. Low scrub vegetation, low visual absorption capacity.	Med-high	Low-med	Medium
Impact intensity	Summary	**Med-high**	**Low-med**	**Medium**

1.6.2. Potential Visual Impact 1 (Construction Phase)

Nature of the impact:

Potential visual intrusion, dust and noise affecting the rural sense of place.

Significance of impact without mitigation measures:
Potential visual impact intensity is medium-high, but over the short term of the construction period.

Proposed mitigation measures:

- Location of the construction camp, batching plant and related storage/stockpile areas in unobtrusive positions in the landscape.
- Employment of dust suppression measures. Implementation of litter control measures. Formulation and adherence to an EMPr, monitored by an ECO.

Significance of impact with mitigation measures:

Visual impact intensity could potentially be reduced to medium.

1.6.3. Potential Visual Impact 2 (Operational Phase)

Nature of the impact:

Potential visual intrusion of proposed wind turbines on the skyline, visible to surrounding receptors, and visual clutter of related infrastructure and lights at night.

Significance of impact without mitigation measures:

Potential visual impact intensity for turbines is medium-high over the long term.

Proposed mitigation measures:

- Siting of wind turbines in a cohesive visual formation (avoiding individual outliers).
- Avoidance of significant highpoints (peaks) and steep slopes (>1:5 gradient).
- Use of visual buffers as per guidelines.
- Location of internal power lines underground.
- Location of substation and O&M buildings in unobtrusive, low-lying positions, avoiding ridgelines.
- Access roads kept as narrow as possible and existing roads used as far as possible.

Significance of impact with mitigation measures:

Visual impact intensity could potentially be reduced to medium.

1.6.4. Cumulative Visual Impacts

Nature of the impact:

Combined potential visual impact of several wind farms in the area.

Significance of impact without mitigation measures:

Subject to layout of other WEF proposals. Could be medium-high visual impact.

Proposed mitigation measures:

- Wind farms to ideally be 15 to 30km apart to achieve visual breaks between WEFs.

Significance of impact with mitigation measures:

Visual impact intensity could possibly be reduced to medium.

Recommended buffers for wind energy farms have been previously determined in recent local studies, which in turn were based on a survey of international guidelines. These are indicated in Table 4 below together with comments relating to the current Kap Vley WEF proposal. The buffers are also indicated on Map 7.

Table 4: Recommended buffers for Wind Turbines

Landscape features/criteria	**PGWC 2006 Guidelines** [1]	**Visual Guidelines (2014)** [2]	**Comments relating to proposed Kap Vley WEF**
Project area boundary	-	270m (subject to turbine specification)	This provides a visual buffer for neighbours, but is also a safety issue.
Ephemeral streams/ tributaries	-	-	Subject to freshwater assessment. 50m buffers indicated in the interim.
Prominent ridgelines and rock outcrops	500m	500m	The ridgelines on the site are local rather than regional topographic features.
Arterial / district gravel roads	500m	500m	District roads are used by local residents and tourists to the region.
Scenic routes, passes	2.5km	1km very sensitive 3km sensitive	Spektakel Pass is 25km from the proposed WEF and outside the viewshed.
National Parks, nature reserves / protected areas	2km	5km very sensitive 10km sensitive	The Namaqualand National Park is about 12km to the south of the proposed WEF.
Private nature reserves/ game farms/ guest farms/ resorts	500m	2km very sensitive 5km sensitive	The Houthoop guest farm is about 20km from the proposed WEF.
Farmsteads	400m (noise)	500m – 1km [3]	Affected farmsteads are indicated on Map 2.
Towns / settlements	800m	2km very sensitive 4km sensitive	Komaggas is about 7km from the proposed WEF.

[1] Provincial Government of the Western Cape, (2006).
[2] Lawson Q. and Oberholzer B. (2014).
[3] The general literature recommends a 500m to 2km buffer between wind turbines and residential buildings.

The consequence of a visual impact is determined by combining the nature (and intensity) of the visual impact with the spatial extent (site, local, regional or national scale), and the duration of the impact (short-term, medium-term, long-term or permanent). Reversibility of the visual impact as well as the irreplaceability of the scenic resource or amenity are further considerations, (CSIR, undated).

The calibration of consequence and probability are given in Tables 5 and 6 below. Significance (or risk) is then determined by combining consequence with probability as indicated in Figure 1 below. Finally, a summary of the visual impact assessment is given in Table 7 indicating potential residual risk.

Table 5: Calibration of Consequence

Slight	Moderate	Substantial	Severe	Extreme
Negligible alteration of scenic resources and where no sensitive receptors are affected.	Notable alteration of scenic resources, and where sensitive receptors are slightly affected.	Substantial alteration of scenic resources and where sensitive receptors are considerably affected.	Severe alteration of scenic resources, and where sensitive receptors are visibly compromised.	Extreme alteration of scenic resources, and where sensitive receptors are drastically affected.

Table 6: Calibration of Probability

Extremely unlikely	Very unlikely	Unlikely	Likely	Very likely
Little to no chance of scenic resources or visual receptors being affected.	Less than 25% chance of scenic resources or visual receptors being affected.	25 to 50% chance of scenic resources or visual receptors being affected.	50 to 75% chance of scenic resources or visual receptors being affected.	More than 75% chance of scenic resources or visual receptors being affected.

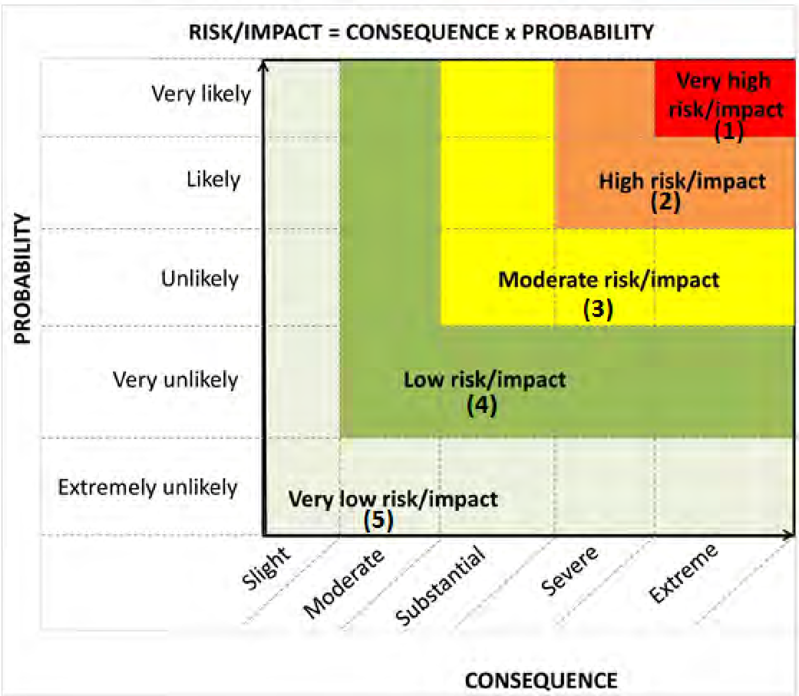

***Figure 1**: Assessment of Visual Risk Significance as a result of Consequence and Probability (Intergovernmental Panel on Climate Change, (2014).*

1.7. IMPACT ASSESSMENT SUMMARY

Table 7: Impact assessment summary table for the Construction, Operational and Decommissioning Phases

Impact pathway	Nature of potential impact/risk	Status[1]	Extent[2]	Duration[3]	Conse-quence	Proba-bility	Reversibility of impact	Irreplaceability of receiving environment/ resource	Significance of impact/risk = consequence x probability (before mitigation)	Can impact be avoided?	Can impact be managed or mitigated?	Potential mitigation measures	Significance of residual risk/ impact (after mitigation)	Ranking of impact/ risk	Confidence level
CONSTRUCTION PHASE															
Effect of construction activities	Visual intrusion, dust and noise	negative	local	short-term	substantial	very likely	high	Low	Moderate	No	Yes	Careful siting of construction camp. Implementation of EMPr.	moderate	3	Medium
OPERATIONAL PHASE															
Construction of wind turbines on ridgeline	Visual intrusion of turbines on skyline.	negative	local	long-term	severe	very likely	moderate-high	Low after decommissioning	Moderate-high	No	Yes	Relocation or micro-siting of wind turbines	moderate	3	Medium
Construction of related infrastructure.	Visual clutter of infrastructure on the open landscape.	negative	local	long-term	substantial	very likely	moderate-high	Low after decommissioning	Moderate	No	Yes	Careful siting of substation and alignment of powerline.	mod -low	4	High
Construction of powerline.	Visual intrusion of pylons and overhead power lines.	negative	local	long-term	substantial	very likely	moderate-high	Low after decommissioning	Moderate	No	No	Adjustments to the routing of the powerline.	moderate	3	High
Introduction of lighting at the WEF	Effect of lighting at night on dark skies.	negative	local	long-term	substantial	very likely	high	Replaceable	Moderate	Yes	Yes	Low-level lighting and use of reflectors.	mod-low	4	Medium
DECOMMISSIONING PHASE															
Removal of WEF structures	Remaining roads, platforms and slabs	negative	local	permanent	Moderate	very likely	moderate-high	Low after decommissioning	Low	Yes	Yes	Regrading, ripping and revegetation	Low	5	Medium

Note: For ranking see Figure 1 on previous page.

[1] Status: Positive (+) ; Negative (-)
[2] Site; Local (<10 km); Regional (<100); National; International
[3] Very short-term (instantaneous); Short-term (<1yr); Medium-term (1-10 yrs); Long-term (project duration); Permanent (beyond project decommissioning)

1.8. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Construction Phase Monitoring:

Ensure that visual management measures are included as part of the EMPr, monitored by an ECO, including siting of construction camp and stockpiles, dust suppression and litter control measures, as well as rehabilitation of borrow pits and haul roads, with regular reporting to an environmental management team.

Operation Phase Monitoring:

Ensure that visual mitigation measures are monitored by management on an on-going basis, including the control of signage, lighting and wastes on the site, with interim inspections by a delegated ECO.

Decommissioning Phase Monitoring:

Ensure that procedures for the removal of structures and stockpiles during decommissioning are implemented, including recycling of materials and rehabilitation of the site to a visually acceptable standard, and signed off by the delegated authority.

1.9. CONCLUSION AND RECOMMENDATIONS

The proposed site for the Kap Vley WEF consists of a low mountain range set in a broad, semi-arid coastal peneplain. The range, being less than 500 m above the surroundings, is considered to be a local rather than a regional landscape feature when seen in the context of the rugged mountains to the east.

The most important receptors are the Komaggas settlement about 7km to the north-east, the Houthoop guest farm about 20 km to the north-west and the Namaqualand National Park, about 12 km to the south of the proposed WEF. There are also a number of small farmsteads in the otherwise sparsely populated area. It was found that the potential visibility of the proposed WEF would be moderate to marginal for many of the receptors, and in some cases practically not visible.

The proposed wind turbines would be highly visible on the skyline of the mountain range and seen over a long distance of the surrounding plain. However the mountain range is a local feature within the district and the receptors are mostly at a considerable distance from the proposed WEF, resulting in a visual significance rating of **moderate to high** before mitigation. Elimination of some of the proposed turbines, and/or relocation and micro-siting could potentially reduce the significance to **moderate**, particularly as the scenic resource could be re-instated after decommissioning.

Related infrastructure, such as the substation and O&M buildings, are smaller in scale and therefore expected to have less visual effect. The location of these is not known at this stage, but recommended mitigations have been provided for the siting of these structures. The potential visual significance is expected to be **moderate** before mitigation and **moderate to low** after mitigation.

Three alternative routes for the connecting 132kV powerlines between the proposed WEF and the Gromis substation, about 28km to the north, have been provided. The type and height of the pylons is not known at this stage. The route that potentially affects the fewest farmsteads would be the one to the north-east, and therefore the preferred option. The expected visual significance of the proposed powerline would be **moderate** both before and after mitigation if the preferred route is used.

Cumulative visual impacts could arise from the proximity of the proposed Eskom 300MW wind energy facility about 12 km to the north-west of the site because of its proximity. The other proposed wind energy and solar energy facilities in the region would have a limited visual influence on the proposed Kap Vley WEF because of their distance from the site. Little can be done to mitigate potential cumulative visual impacts, but the current proposed WEFs are not expected to be of major cumulative visual significance based on the findings of this baseline study.

Given the remoteness of the proposed WEF site, the sparsely populated area, the previous disturbance by diamond-mining, and the local scale of the project, no potential fatal flaws from a visual perspective are expected. However, the visual mitigations outlined in this Report should be included in the authorisation and EMPr to minimise potential adverse visual impacts.

1.10. REFERENCES

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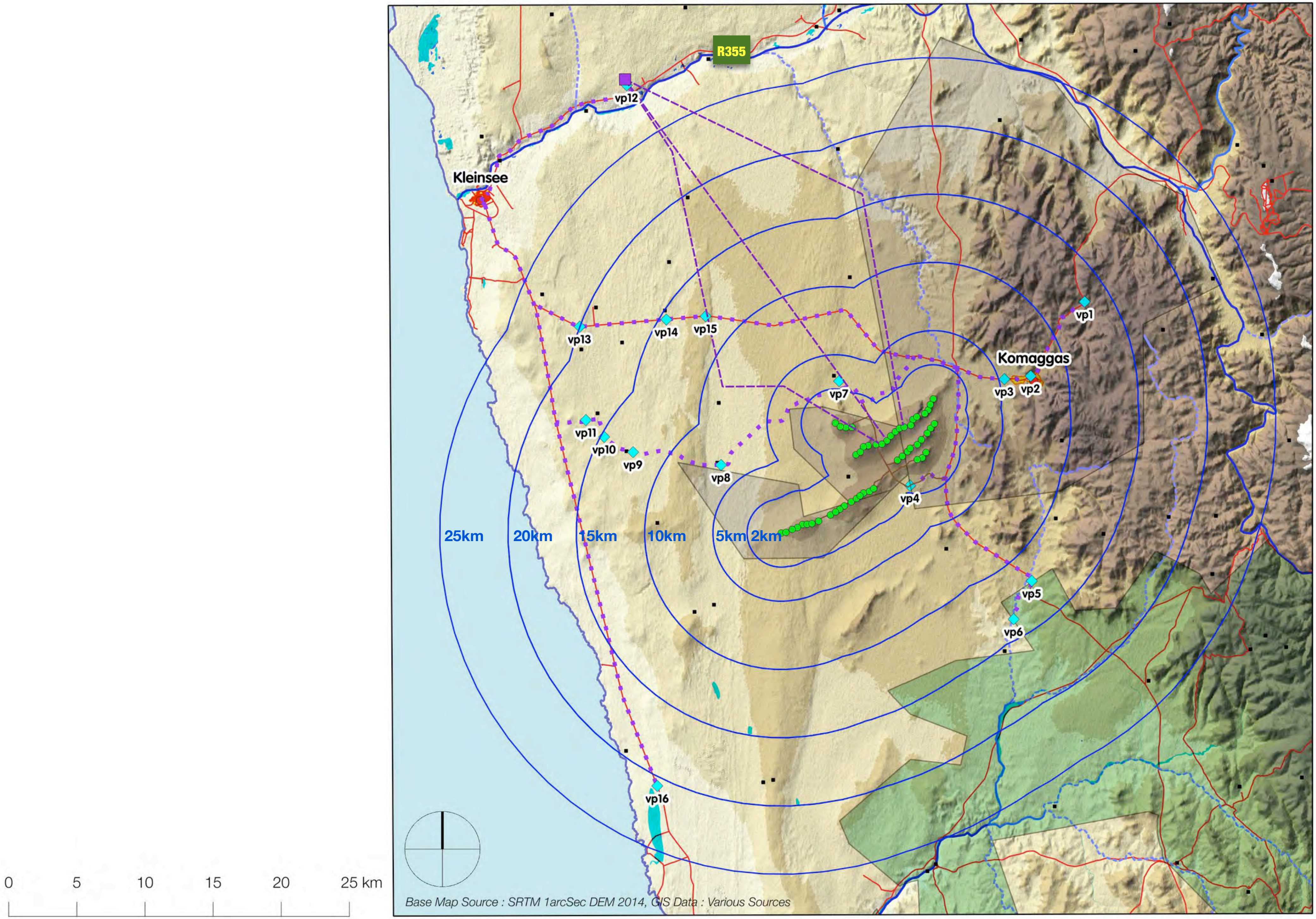
Provincial Government of the Western Cape / CNdV Africa, May 2006. Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape.

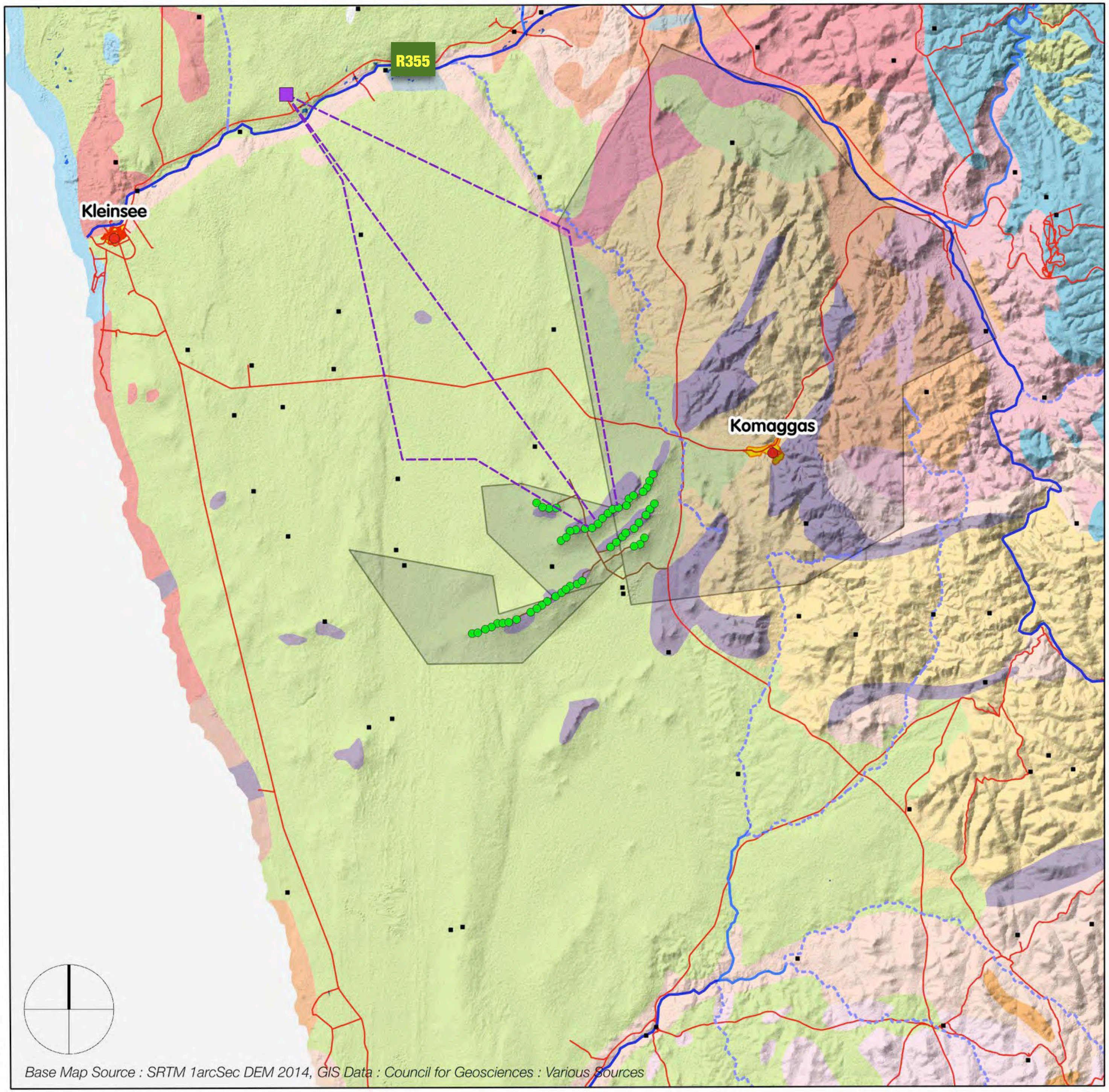
1.11. APPENDICES

Base Map Source : Google Maps 2017

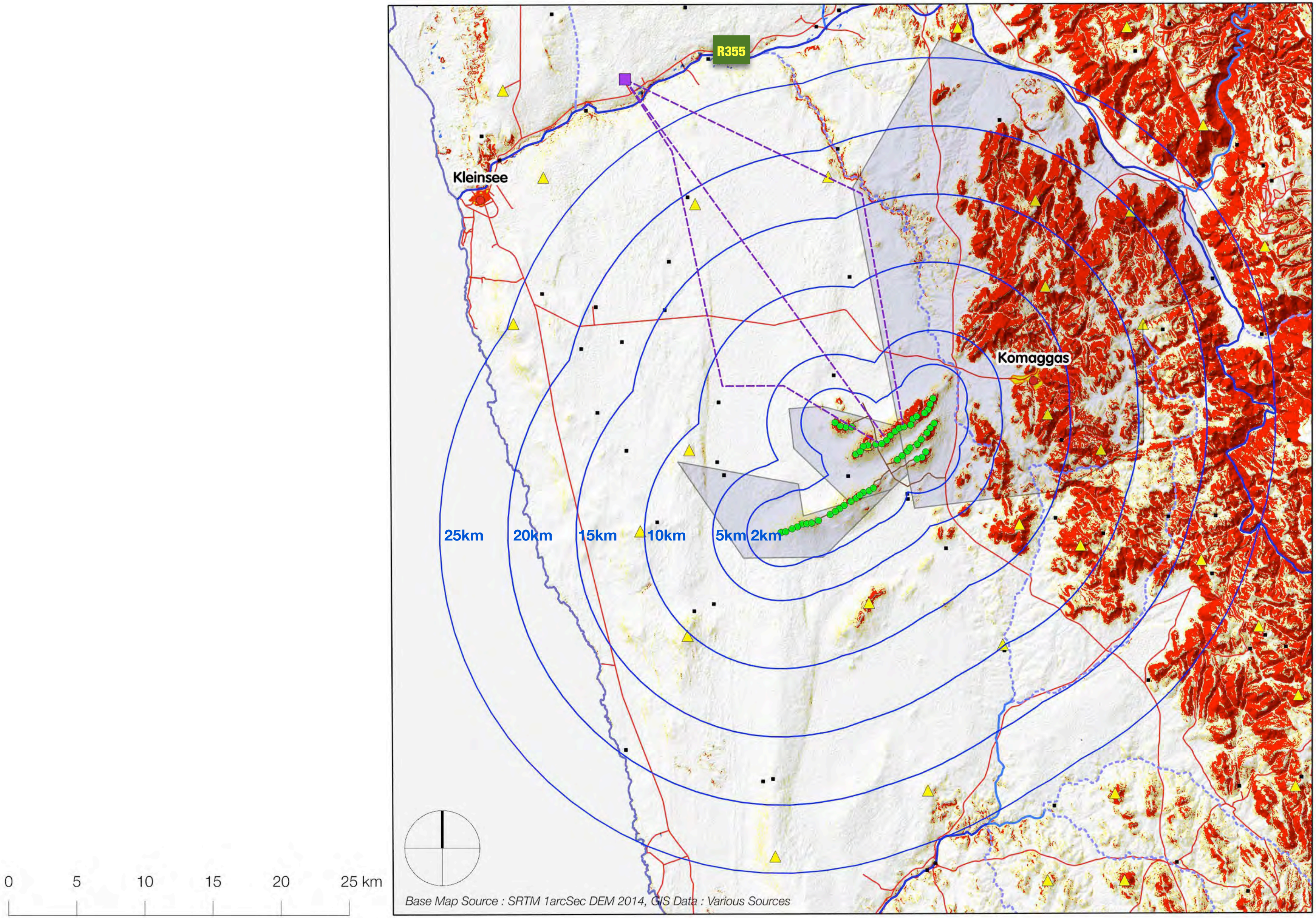
Map 1 • Locality Map



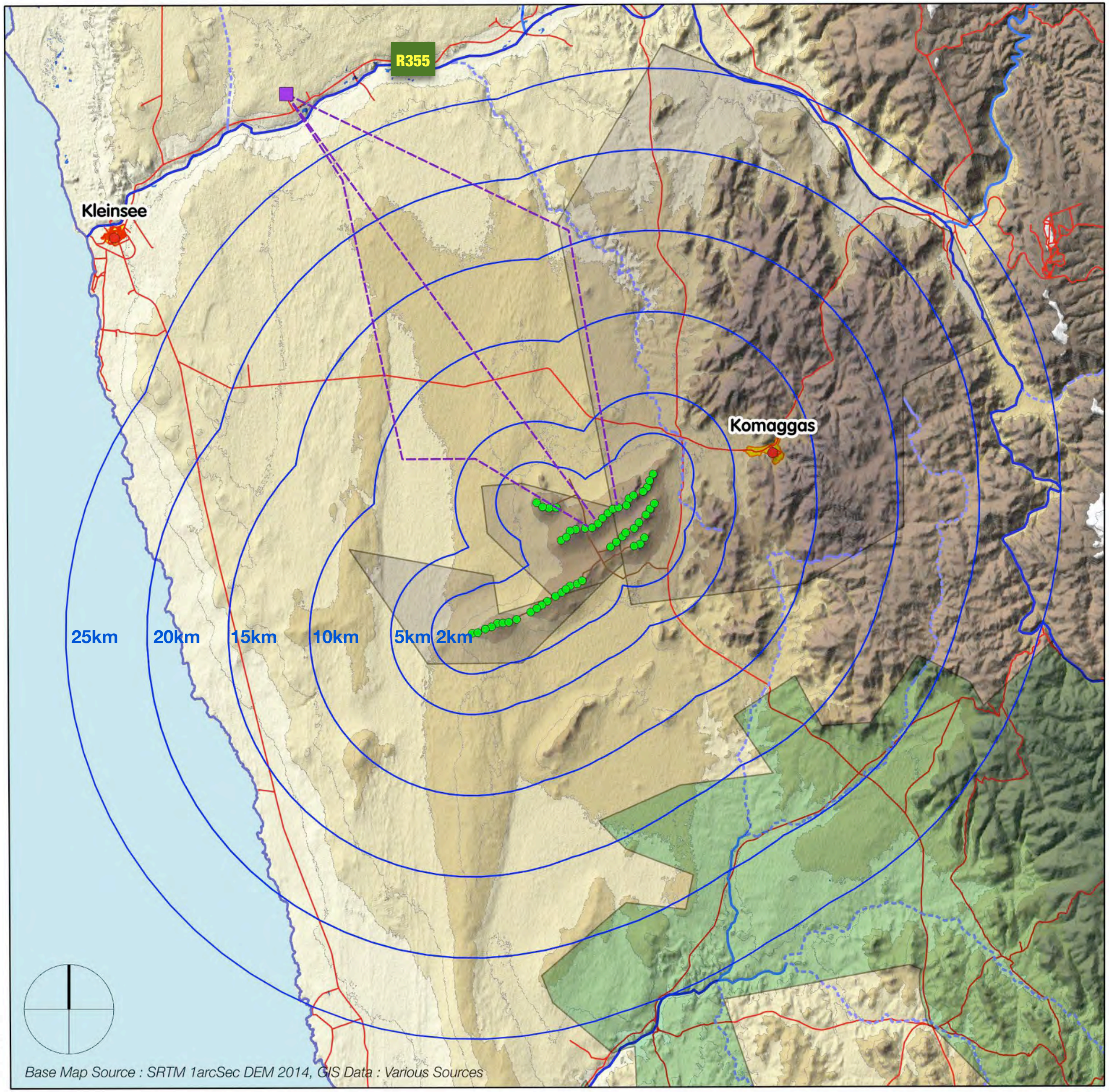
Map 2 • Fieldwork and Viewpoints



Map 3 • Geology

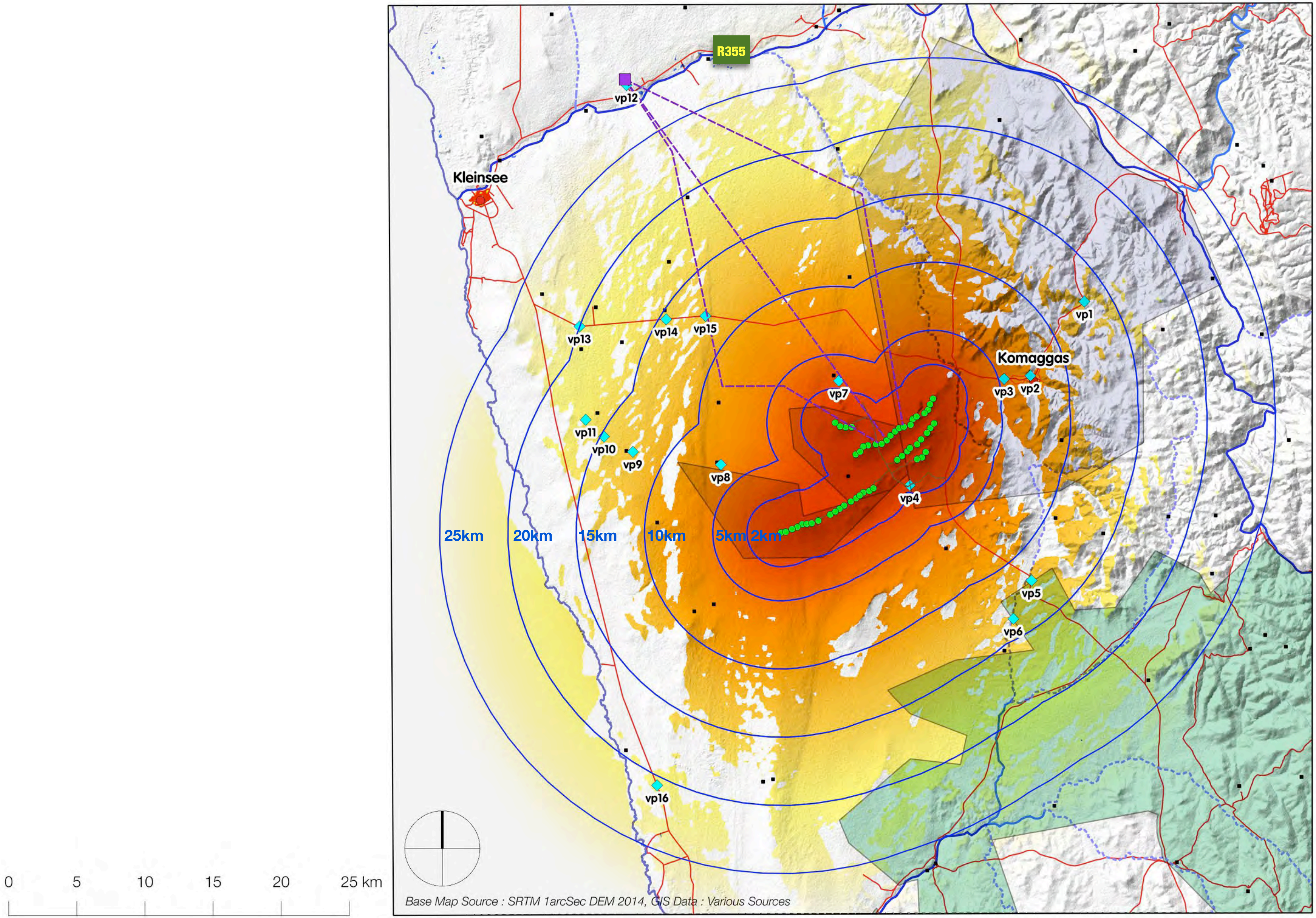


Map 4 • Steep Slopes, Peaks

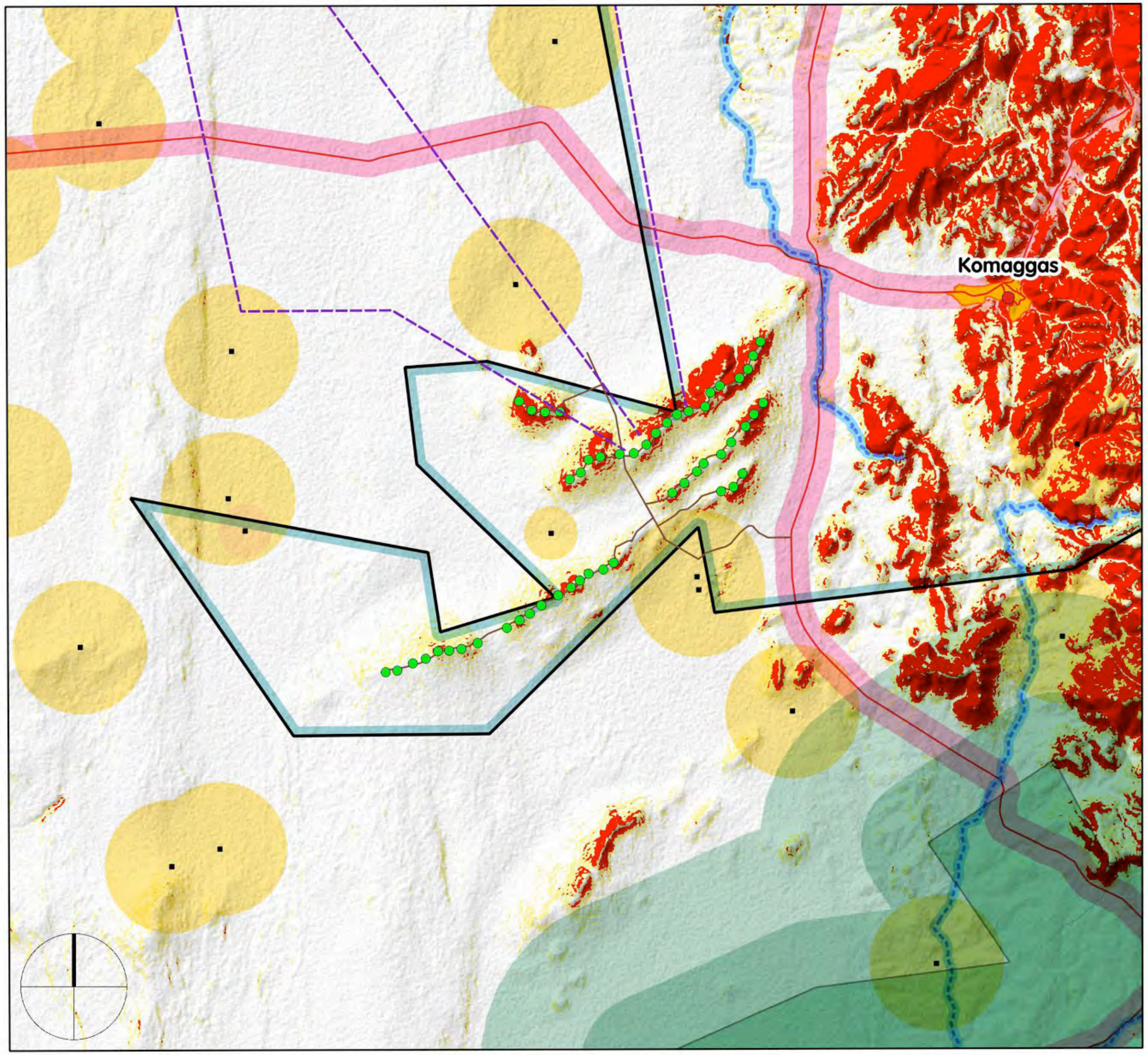


0 5 10 15 20 25 km

Map 5 • Physiography, 50m Contours



Map 6 • Viewshed, Distance Radii



Base Map Source : SRTM 1arcSec DEM 2014, GIS Data : Various Sources

0 5 10 15 20 25 km

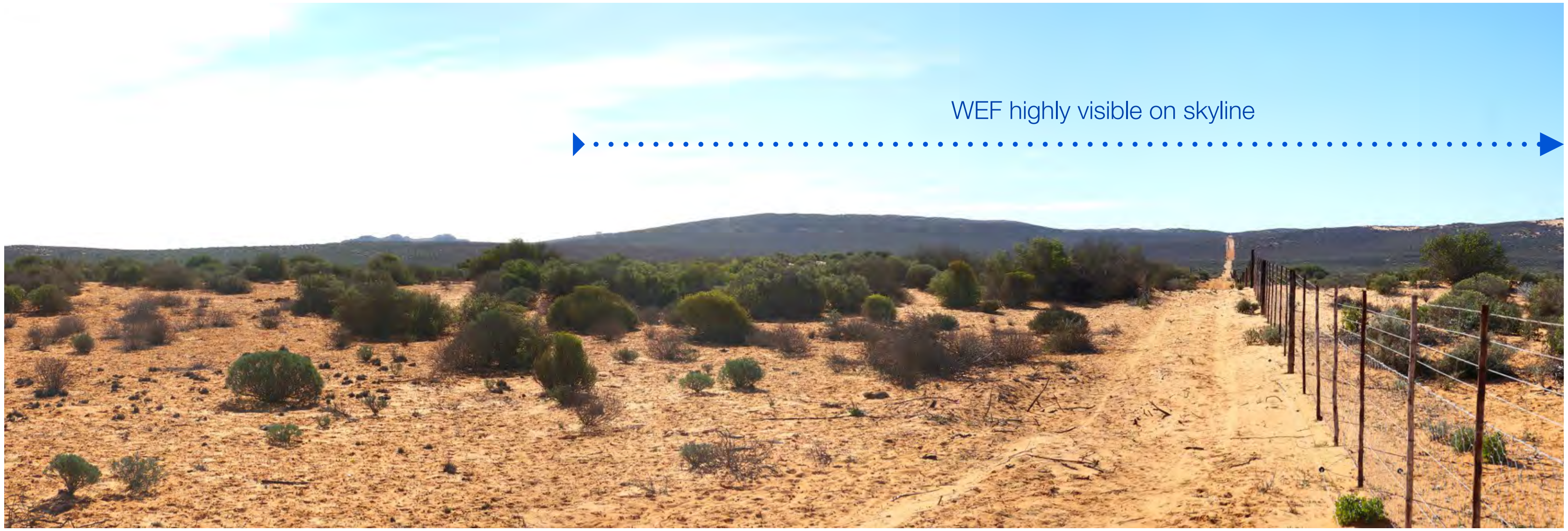
Map 7 • Visual Informants

viewpoint 1 • looking west from tar road to Komaggas • distance 13.2km

viewpoint 2 • looking west from the centre of Komaggas • distance 7.3km

photos : mlb/bola 2017

viewpoint 3 • looking west from the western edge of Komaggas • distance 5.4km



viewpoint 4a • looking north from the gate near Witduin farmhouse • distance 2km

photos : mlb/bola 2017

viewpoint 4b • looking north-east from the gate near Witduin farmhouse • distance 2km

viewpoint 5 • looking north from the gate to Namaqualand National Park • distance 12km

photos : mlb/bola 2017