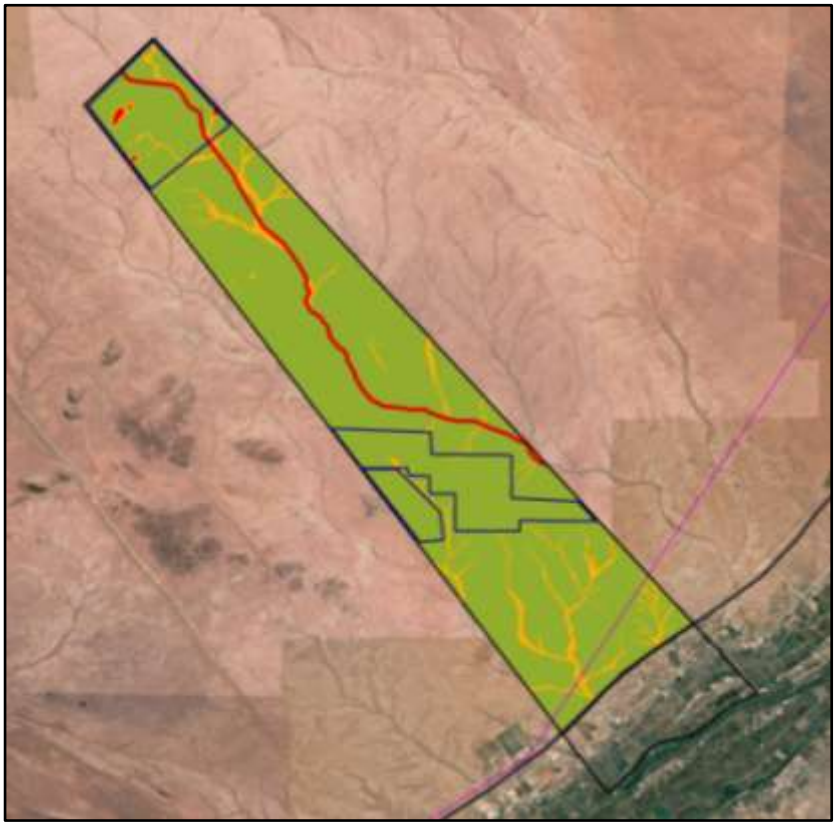
ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED RE CAPITAL 3 SOLAR ENERGY FACILITY AND ASSOCIATED GRID CONNECTION INFRASTRUCTURE, DYASON'S KLIP, NORTHERN CAPE.

FAUNA & FLORA SPECIALIST SCOPING REPORT



PRODUCED FOR CAPE EAPRAC

BY

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JULY 2013

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DECLARATION OF CONSULTANTS' INDEPENDENCE

- I Simon Todd, as the appointed independent specialist hereby declare that I:
- act/ed as the independent specialist in this application;
- 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, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Note: The terms of reference must be attached.

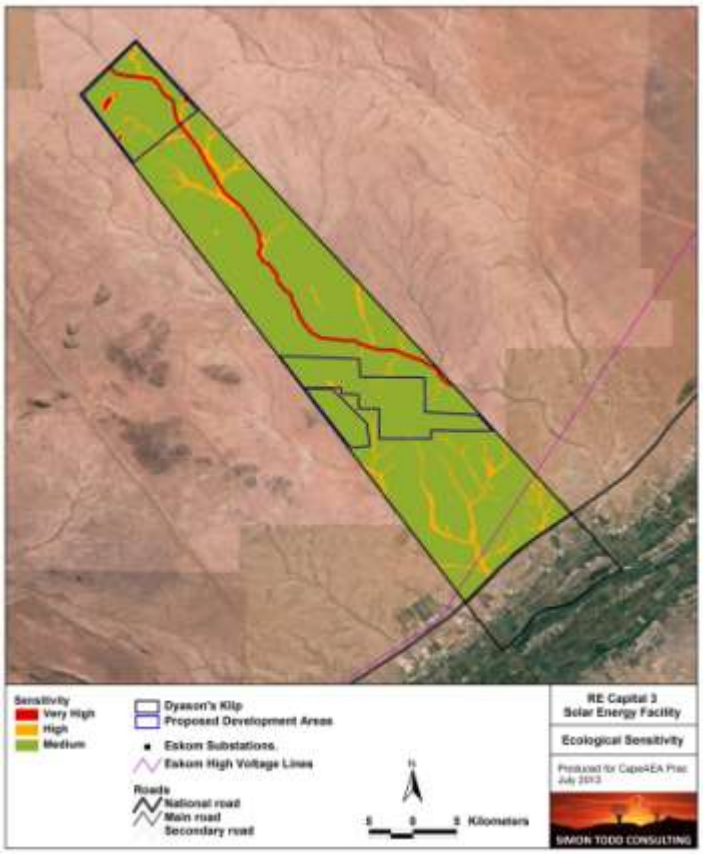
Simon Todd Pr.Sci.Nat 400425/11.
July 2013

EXECUTIVE SUMMARY

RE Capital 3 (Pty) Ltd is an Independent Power Producer (IPP) proposing the establishment of a commercial solar energy facility of 225 MW on the property Dyason's Klip located near Upington in the Northern Cape. The facility will be known as the Re Capital 3 Solar Energy Development and will be developed in three 75MW phases.

The development is currently in the Scoping Phase and this scoping report details the ecological features of the proposed site, provides a preliminary assessment of the ecological sensitivity of the site and identifies the likely impacts that may be associated with the development. A desktop review of the available ecological information for the area is conducted in order to identify and characterize the ecological features of the site and develop a draft ecological sensitivity map for the site, which is depicted below.

Draft Sensitivity Map



Two vegetation types occur within the affected area; Kalahari Karroid Shrubland dominates the northern half of the site and Bushmanland Arid Grassland the southern half. Both vegetation types are classified as Least Threatened and there is little to differentiate the sensitivity of the site at this level. There are however likely to be a number of listed or protected plant species present including *Acacia erioloba* and *Hoodia gordonii*. The possible presence of plant communities of conservation concern associated with quartz outcrops or calcrete patches will need to be evaluated during the EIA-phase field assessment of the site.

In terms of fauna, the site is not likely to be highly diverse on account of the low habitat diversity of the site. Although several listed mammals and one listed amphibian may occur at the site, the extent of the development is not very large in relation to the surrounding landscape and any impacts on such species are likely to be local in nature. At least seven listed bird species are known from the area, the majority of which are vulnerable to electrocution or collisions with power line infrastructure. The grid connection

for the development would therefore pose a long-term threat to these species, but given that the required power line will be less than 10 km long and that effective mitigation can be applied, this threat can be reduced to a low level.

The sensitivity mapping suggests that the majority of the site consists of open plains considered to be of moderate sensitivity and which would be suitable for development without a very high risk of significant negative ecological impacts. The northern development option is seen as the least preferred option as there is a significant drainage line which traverses the area as well as several pans which are also considered ecologically sensitive. The alternative development area in the central part of the site appears to be significantly less sensitive and is identified as the preferred development option. As the Eskom MTS has yet to be built, the preferred route to the substation cannot be identified at this point but with suitable mitigation, is not likely to generate significant impact

The following impacts were identified as being likely to be associated with the development of the site as a renewable energy facility and will be assessed during the EIA phase of the development:

- Impacts on vegetation and protected plant species
- Soil erosion and associated degradation of ecosystems
- Direct Faunal impacts
- Avifaunal Impacts
- Impacts on Broad-Scale Ecological Processes and Loss of Landscape Connectivity

1 INTRODUCTION

RE Capital 3 (Pty) Ltd is an Independent Power Producer (IPP) proposing the establishment of a commercial solar energy facility of 225 MW on the property Dyason's Klip located near Upington in the Northern Cape. The facility will be known as the Re Capital 3 Solar Energy Development and will be developed in three 75MW phases. In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998), the development requires authorisation from the National Department of Environmental Affairs (DEA) before it can proceed. RE Capital 3 has appointed Cape EAPrac to conduct the required EIA process, which is currently in the Scoping Phase. As part of the specialist studies required for the EIA, Cape EAPrac has appointed Simon Todd Consulting to provide a specialist fauna and flora Scoping Study of the development site as part of the EIA process.

The purpose of the Ecological 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. A desktop review of the available ecological information for the area is conducted in order to identify and characterize the ecological features of the site. This information is used to derive a draft ecological sensitivity map that presents the presumed ecological constraints and opportunities for development at the site, which can then be verified and refined during the EIA. 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 minimized. 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 SCOPE OF STUDY

The specific terms of reference for the scoping study includes the following:

- a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project;
- a description and evaluation of potential environmental issues and potential impacts (including direct, indirect and cumulative impacts) that have been identified;
- Direct, indirect and cumulative impacts of the identified issues are evaluated within the Scoping Report in terms of the following criteria:
    - the nature, which includes a description of what causes the effect, what will be affected and how it will be affected;

  - the extent, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international;
- a statement regarding the potential significance of the identified issues based on the evaluation of the issue/impacts;
- Identification of potentially significant impacts to be assessed within the EIA phase and the details of the methodology to be adopted in assessing these impacts. This should be detailed enough to include within the Plan of Study for EIA and include a description of the proposed method of assessing the potential environmental impacts associated with the project

1.2 ASSESSMENT APPROACH & PHILOSOPHY

The assessment will be conducted according to the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989 as well as within the best-practice guidelines and principles for biodiversity assessment as outlined by Brownlie (2005) and De Villiers et al. (2005).

This includes adherence to the following broad principles:

- That a precautionary and risk-averse approach be adopted towards 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 (as identified by systematic conservation plans, Biodiversity Sector Plans or Bioregional Plans) and Freshwater Ecosystem Priority Areas.

- Demonstrate how the proponent intends complying with the principles contained in section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (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;
    - 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.

These principles serve as guidelines for all decision-making concerning matters that may affect the environment. As such, it is incumbent upon the proponent to show how proposed activities would comply with these principles and thereby contribute towards the achievement of sustainable development as defined by the NEMA.

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 will include 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

- Red Data Book species (giving location if possible using GPS)
- The viability of an estimated population size of the RDB species that are present (include 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 Environmental Management Plan (EMP) 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 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.

1.3 LIMITATIONS & ASSUMPTIONS

The current study is a desktop study and as such this imposes some limitations on the study. The study relies on existing information as available in the various spatial databases and coverages. 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 obtained for the site do not always adequately reflect the actual

fauna and flora present at the site. Furthermore, the condition of the vegetation and the impact of land use on the site cannot always be adequately judged from satellite imagery or aerial photography. Such influences can have a large impact on the sensitivity and composition of the fauna and flora present. In order to counter the likelihood that the area has not been well sampled in the past and in order ensure a conservative approach, the species lists derived for the site were obtained from an area significantly larger (quarter degree squares 2820 BD, DB and 2821 AC and CA) than the study area and are likely to include a much wider array of species than actually occur at the site. This is a cautious and conservative approach which takes the study limitations into account. In addition, the consultant has worked on several renewable energy facilities on the immediate vicinity of the current project and as such is familiar with the area and the local sensitivities and issues likely to be encountered by the development.

1.4 DATA SOURCING AND REVIEW

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) as well as the National List of Threatened Ecosystems (2011), where relevant.
- No Critical Biodiversity Areas (CBA) mapping or systematic conservation planning has been conducted for the area with the result that no detailed conservation priority area information is available for the area.
    - Information on plant and animal species recorded for the Quarter Degree Square (QDS) 2820 BD, DB and 2821 AC and CA was extracted from the SABIF/SIBIS database hosted by SANBI. This is a considerably 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 probably not been well sampled in the past.
- The IUCN conservation status (Table 1) 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 (2013).
- Freshwater and wetland information was extracted from the National Freshwater Ecosystem Priority Areas assessment, NFEPA (Nel et al. 2011).
- Important catchments and protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).

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 various spatial databases (SANBI's SIBIS and BGIS databases).
- Literature consulted includes Branch (1988) and Alexander and Marais (2007) for reptiles, Du Preez and Carruthers (2009) for amphibians, Friedmann and Daly (2004) and Skinner and Chimimba (2005) for mammals.
- Apart from the literature sources, additional information on reptiles were extracted from the SARCA web portal, hosted by the ADU, http://vmus.adu.org.za
- 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 each species is also listed, based on the IUCN Red List Categories and Criteria version 3.1 (2012) (See Table 1) and where species have not been assessed under these criteria, the CITES status is reported where possible. These lists are adequate for mammals and amphibians, the majority of which have been assessed, however the majority of reptiles have not been assessed and therefore, it is not adequate to assess the potential impact of the development on reptiles, based on those with a listed conservation status alone. In order to address this shortcoming, the distribution of reptiles was also taken into account such that any narrow endemics or species with highly specialized habitat requirements occurring at the site were noted.

Table 1. The IUCN Red List Categories for fauna and flora. Species which fall within the categories in red and orange below, are of conservation concern.

IUCN Red List Category
Critically Endangered (CR)
Endangered (EN)
Vulnerable (VU)
Near Threatened (NT)
Critically Rare
Rare
Declining
Data Deficient - Insufficient Information (DDD)
Data Deficient - Taxonomically Problematic (DDT)
Least Concern

1.5 SENSITIVITY MAPPING & ASSESSMENT

A draft ecological sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in the literature and various spatial databases as described above. As a starting point, mapped sensitive features such as wetlands, drainage lines and water bodies were collated and buffered where appropriate to comply with legislative requirements or ecological considerations. Additional sensitive areas where then identified from the satellite imagery of the site and delineated. All the different layers created were then merged to create a single coverage. Features that were specifically captured in the sensitivity map include drainage features, wetlands and dams, as well as rocky outcrops and steep slopes. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within these areas with little ecological impact. Due to the large amount of transformation that has occurred in the area, this is the dominant sensitivity category within the study area.
- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible.
- In some situations, areas where also categorized between the above categories, such as Medium-High, where an area appeared to be of intermediate sensitivity with respect to the two defining categories.

1.6 RELEVANT ASPECTS OF THE DEVELOPMENT

The proposed development site is located on the Remainder of Farm 454, Dyason's Klip, which is situated within the jurisdiction of the Khai Garib local Municipality in the Northern Cape Province.

The development will consist of the following:

- The proposed facility is planned and designed for the generation of approximately 225 MW.
- The project will consist of and be developed in three phases, consisting each of 75MW, which will be fed into the national electricity grid.
- The proposed development area required to meet the proposed capacity will cover an area of approximately 500 hectares.
- Two areas are currently under investigation as options for the location of the facility, an area towards the northern boundary of the site and an area within the central part of the site.
- The site is located 5-10 km from the planned new Eskom MTS Substation, for which an EIA is still underway. The exact location of the MTS is still to be made known to the public.

Infrastructure associated with the solar energy facility is likely to include:

» Photovoltaic (PV) panels on a mounting structure with inverter stations;
» A new on-site substation to facilitate the connection between the solar energy facility and the electricity grid. Auxiliary buildings including buildings for control, equipment and maintenance;
» Cabling between the above mentioned infrastructures, to be laid underground where practical;
» A 6m wide access road from the N14 to the facility.
» Internal access roads (4m wide) and fencing;

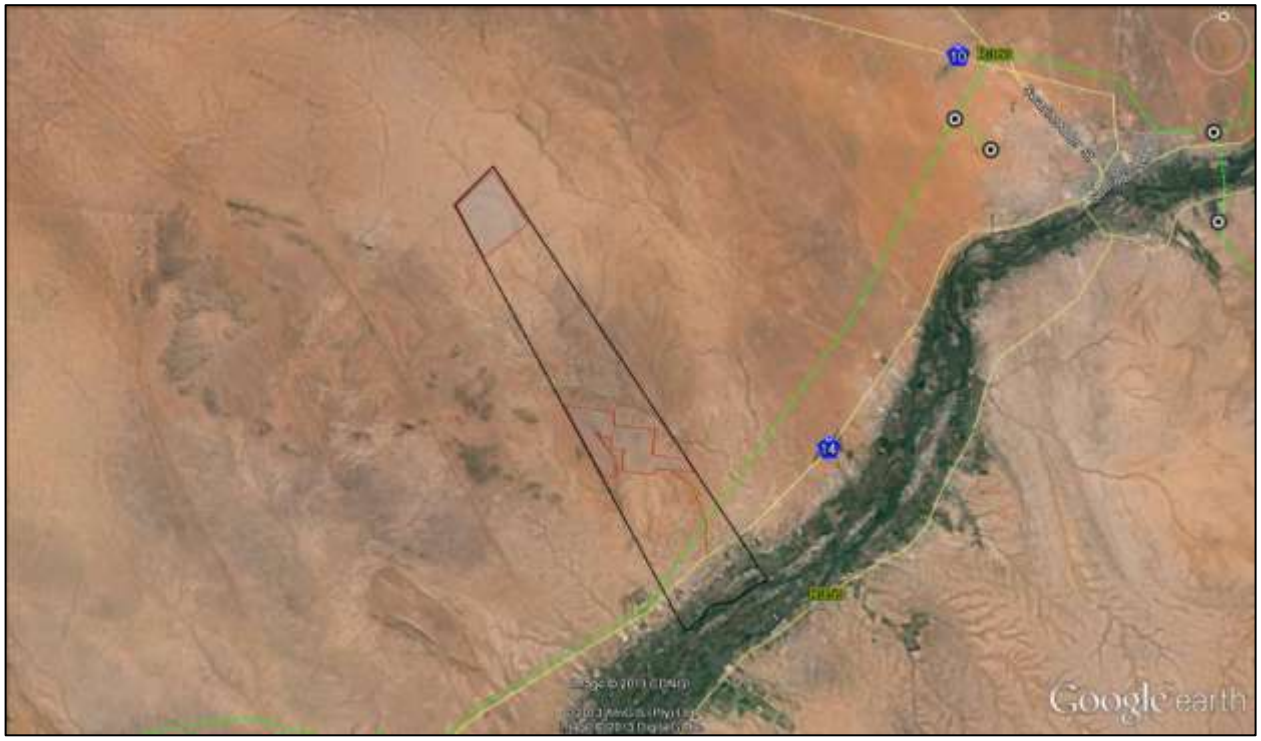


Figure 1. Satellite image of the RE Capital 3 Renewable Energy Project study site, illustrating the Dyason's Klip boundary in black and the northern and central proposed development areas in red. The various grid connection options are not illustrated as they are contingent on the location of the Eskom MTS, which has yet to be settled.

2 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

2.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina& Rutherford 2006), there are three vegetation types within the boundaries of the site, and an additional two which are common in the area, but which do not occur within the site (Figure 2). Within the area affected by the proposed development, only two vegetation types occur, namely Kalahari Karroid Shrubland and Bushmanland Arid Grassland. In terms of the conservation status of the various vegetation types of the area, only Lower Gariep Alluvial Vegetation which is listed as Endangered is of concern. This vegetation type is however associated with the alluvium along the Orange River and would not be impacted by the current development which is some distance from the river itself. Furthermore, within the study area the majority of the Lower Gariep Alluvial Vegetation has been transformed by intensive agriculture, which along with alien plant invasion, form the major threats to this vegetation type.

Both Kalahari Karroid Shrubland and Bushmanland Arid Grassland are classified as Least Threatened and have been little impacted by transformation and more 99% of their original extent is still intact (Table 2). Both Kalahari Karroid Shrubland and Bushmanland Arid Grassland are Hardly Protected within formal conservation areas, while Gordonia Duneveld is Moderately Protected. Mucina & Rutherford (2006), list 6 endemic species for Bushmanland Arid Grassland, while no vegetation-type endemic species are known from either Kalahari Karroid Shrubland or Gordonia Duneveld. The biogeographically important and endemic species known from these vegetation types tend to be widespread within the vegetation type itself and local-level impacts are not likely to be of significance for any of these vegetation types or species concerned. Both Bushmanland Arid Grassland and Gordonia Duneveld are widely distributed and represent some of the most extensive vegetation types in South Africa. Kalahari Karroid Shrubland is less extensive, but represents a transitional vegetation type between the northern Nama Karoo and Kalahari (Savannah) vegetation types. At this point, there is little basis to differentiate between the different vegetation types of the potentially affected area in terms of botanical sensitivity. Therefore, the sensitivity of the different parts of the site are likely to be related to local ecological features and the presence of species and habitats of conservation concern, rather the broad distribution of vegetation types.

Table 1. Vegetation types that occur within or near the site with their basic conservation statics and status according to the National List of Threatened Ecosystems (2011).

Name	Extent km^2	Remaining	Conservation Target	Protected	Status
Kalahari Karroid Shrubland	8284	99.2%	21%	0.1%	Least threatened
Gordonia Duneveld	36772	99.8%	16%	14.2%	Least threatened
Lower Gariep Alluvial Vegetation	752	50.3%	31%	5.8%	Endangered
Lower Gariep Broken Veld	4538	99.5%	21%	3.9%	Least threatened
Bushmanland Arid Grassland	45479	99.4%	21%	0.4%	Least threatened

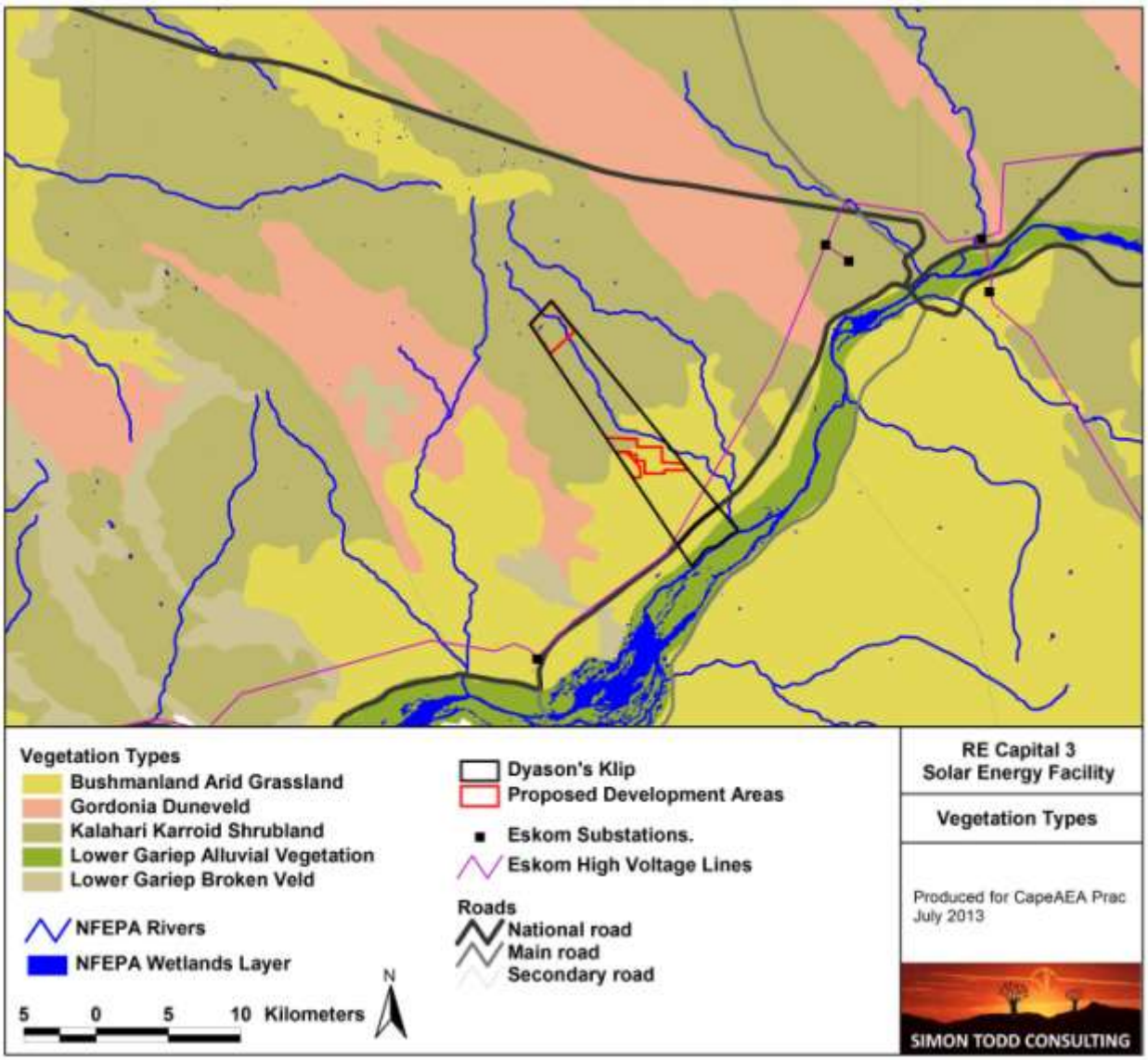


Figure 2. Broad-scale overview of the vegetation in and around the RE Capital 3 Solar Energy Development. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

In the vicinity of the study area, the areas of Bushmanland Arid Grassland generally comprise extensive open plains with greater or lesser amounts of scattered taller woody species and trees present, especially along drainage courses. Typically, this vegetation unit is dominated by grasses such as *Stipagrostis ciliata*, *S.uniplumis*, *S.amabilis* and *Schmidtia kalahariensis*. Trees and shrubs of the open plains include *Boscia foetida*, *Boscia albitrunca*, *Parkinsonia africana*, *Phaeoptilum spinosum*, *Rhigozum trichotomum* and *Aptosimum albomarginatum*. It is not likely that there are many habitats of conservation concern

within this vegetation type as it tends to be very homogenous and locally usually has a relatively low species richness.

Species commonly observed within the areas of Kalahari Karroid Shrubland include shrubs such as *Leucosphaera bainesii*, *Hermannia spinosa*, *Monoechma genistifoilium*, *Salsola rabieana*, *Aptosimum albomarginatum*, *A.spinecens*, *Kleinia longiflora*, *Limeum argute-carinatum*, *Phyllanthus maderaspatensis*, *Zygophyllum dregeanum* and grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana*, *S.uniplumis* and *Schmidtia kalariensis*. As this habitat occurs on the more exposed parts of the topography, areas of exposed calcrete or quartz outcrops are often present and it is in these areas that species of conservation concern are usually located. It is however not possible identify such areas from satellite imagery and their presence would need to be assessed during the site visit for the EIA study. Species of conservation concern that are often present within such areas include *Adenium oleifolium*, *Aloe claviflora* and *Hoodia gordonii*.

It is not likely that the Bushmanland Arid Grassland and Kalahari Karroid Shrubland within the study area are as well differentiated as the national vegetation map suggests. These two vegetation types tend to intermingle in the area at a relatively fine scale with areas of Bushmanland Arid Grassland occurring on deeper sandy soils usually associated with the lower lying parts of the landscape while Kalahari Karroid Shrubland occurs on the shallow soils and exposed stony soils of the upper slopes and crests of the gently undulating landscape.

The drainage lines within the vicinity of the study site are generally broad and flat, often without a distinct drainage channel. These areas generally contain similar grass species to the surrounding plains but contain a greater proportion of woody trees and shrubs, particularly *Acacia erioloba*, *A.mellifera*, *Boscia albitrunca*, *B.foetida*, *Rhigozum trichotomum* and *Lycium oxycarpum*.

2.2 LISTED AND PROTECTED PLANT SPECIES

According to the SANBI SIBIS database, 286 indigenous plant species have been recorded from the quarter degree squares 2820 BD, DB and 2821 AC and CA (Table 3). This includes 7 species of conservation concern as listed below in Table 3. Although not all the listed species would occur at the site, there is a high probability that at least some of these species occur at the site. There are also likely to be additional species present which are either protected under the National Forests Act such as *Boscia albitrunca* or protected under the Northern Cape Nature Conservation Act of 2009, which includes all *Mesembryanthemacea*, *Boscia foetida*, all species within the *Euphorbiaceae*. *Oxalidaceae*, *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. Apart from the above species there may also be other listed species present as the area has probably not been

well sampled in the past. Habitats likely to harbour such species will be searched for species of conservation concern during the EIA phase site visit.

Table 3. Listed species which may occur within the RE Capital 3 Solar Energy Development, including their IUCN status and the likelihood that they occur at the site.

Family	Species	IUCN Status	Likelihood
ASPHODELACEAE	*Aloe dichotoma*	VU	Low
MESEMBRYANTHEMACEAE	*Dinteranthus wilmotianus*	NT	Moderate
AMARYLLIDACEAE	*Crinum bulbispermum*	Declining	Low
FABACEAE	*Acacia erioloba*	Declining	High
APOCYNACEAE	*Hoodia gordonii*	DDD	High
ASTERACEAE	*Felicia deserti*	DDD	High
ASTERACEAE	*Senecio glutinarius*	DDT	Low

2.3 Critical Biodiversity Areas & Broad-Scale Processes

No fine-scale conservation planning has been conducted for the region and as a result, no Critical Biodiversity Areas have been defined for the study area. In terms of other broad-scale planning processes, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region. In terms of the NFEPA wetland assessment, a few small pans within the northern extent of the site were identified as wetlands and there appear to be several other similar smaller pans at the site as well. The smaller pans are usually little more than small depressions which hold water occasionally and do not usually contain any species associated with mesic conditions.

2.4 Faunal Communities

Mammals

The site falls within the distribution range of 46 terrestrial mammals, indicating that the mammalian diversity at the site is potentially moderate. Given the relative homogenous nature of the site and the lack of rocky outcrops and other forms of habitat diversity, actual mammalian diversity at the site is likely to be low. No species associated with rocky outcrops are likely to occur within the proposed development areas, which would significantly reduce the number of the species that would be directly affected. As the affected habitat is widely available in the local area, as well as at a broader scale, impacts on mammals would be local in nature. Three listed terrestrial mammals may occur at the

site, the Honey Badger *Mellivora capensis* (Endangered), Brown Hyaena *Hyaena brunnea* (Near Threatened) and Black-footed cat *Felis nigripes* (Vulnerable). Although the area is used for livestock production, human activity in the area is currently low and it is possible that all three listed species occur in the area. As these species have a wide national distribution, the development would not create a significant extent of habitat loss for these species, a single individual of which has a home range far exceeding the extent of the current development.

The site lies within the distribution range of 6 bat species, indicating that the richness of bats at the site is probably quite low. Bat activity is probably focused along the Orange River, where there is ample food as well as an abundance of natural and artificial shelter. The lack of wetlands and large drainage lines away from the Orange River suggests that bat activity patterns within the site are likely to be low. The pans would also be areas that would attract bats when they had water, but this is likely to be infrequently and so the pans are not likely to be significant in terms of providing long-term habitat and foraging grounds for bats.

Overall there do not appear to be any highly significant issues regarding mammals and the development of the site. In general the major impact associated with the development of the site for mammals would be habitat loss and potentially some disruption of the broad-scale connectivity of the landscape.

Reptiles

The site lies within the distribution range of 34 reptile species, suggesting that the reptile diversity in the area is likely to be quite low. Within the affected plains habitat of the site, the reptile composition is likely to be dominated by species which inhabit open areas, such as Horned Adders, Sand Lizards, Ground and Barking Geckos. There do not appear to be any large rocky outcrops within the proposed development areas with the result that species associated with such habitats are not likely to be affected by the development. As with mammals, the development is likely to result in local habitat loss for reptiles but as there are no listed or range-restricted reptiles that are likely to occur at the site the impacts are not likely to be of broader significance.

The construction of the solar panels with supporting structures and electrical connections would significantly alter the habitat structure within the development area as compared to the original open vegetation. This is likely to change the reptile composition within the affected area and species able to tolerate or utilise the novel conditions will increase at the expense of those species associated with the open vegetation. Functionally this is likely to represent an increase in geckos and other climbing species at the expense of diurnal ground-foraging species. This effect is likely to be of local extent and given that there are few listed species that might be affected, of relatively low significance as well.

Amphibians

The site lies within the distribution range of 10 amphibian species. The only listed species which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. The larger pans within the northern development option would represent the only potentially suitable breeding habitat for this species. As these pans are ecologically sensitive from an amphibian perspective as well as for other fauna, the development should avoid these areas including an appropriate buffer around the pans to maintain their ecological functioning. Those amphibians which require perennial water are likely to be restricted to the vicinity of the Orange River and the plains of the site are likely to contain low amphibian diversity and are not likely to be highly significant from an amphibian perspective. Apart from the pans, it is unlikely that there are any highly significant amphibian habitats at the site and impacts on amphibians are likely to be local in nature and of low magnitude.

Avifauna

According to the SABAP 1 and 2 data sets, 190 bird species are known from the broad area surrounding the site. This includes 7 IUCN listed species, detailed below in Table 4. All of the listed species are susceptible to some degree to either or both electrocution or collision from power-line infrastructure. Larger raptors are susceptible to both collision and electrocution, while storks and bustards are all vulnerable to collision with power lines. This is a potentially significant source of impact for these species. The new Eskom MTS substation is however likely to be in close proximity to the site and the length of the new transmission lines required for the development are likely to be less than 10km long. In addition, the use of mitigation measures such as fitting bird flight diverters can significantly reduce the impact of transmission lines and is a recommended standard practice for new transmission line infrastructure. Although the habitat loss resulting from the construction of the facility is the most obvious avifauna-related impact, power lines may generate a more significant long-term cumulative impact as slow breeding species are often affected and without mitigation, the impact persists for the lifetime of the power line.

Table 4. Listed bird species known to occur in the vicinity of the proposed RE Capital 3 Solar Energy Facility site, according to the SABAP 1 and 2 databases, and their risk of collision with or electrocution from power line infrastructure.

Species	Common Name	Status	Collision	Electrocution
Falco biarmicus	Lanner Falcon	NT	High	Moderate
Falco naumanni	Lesser Kestrel	VU	High	Moderate
Ciconia nigra	Black Stork	NT	High	
Falco peregrinus	Peregrine Falcon	NT	High	Moderate
Ardeotis kori	Kori Bustard	VU	High	
Neotis ludwigii	Ludwig's Bustard	VU	High	
Polemaetus bellicosus	Martial Eagle	VU	Moderate	High

2.5 SITE SENSITIVITY ASSESSMENT

The draft sensitivity map for the RE Capital 3 Solar Energy Development site is illustrated below in Figure 3. The majority of the site consists of open plains considered to be of moderate sensitivity and would be suitable for development without a very high risk of significant ecological impacts. The northern development option is seen as the least preferred option as there is a significant drainage line which traverses the area as well as several pans which are also considered ecologically sensitive. The alternative development area in the central part of the site appears to be significantly less sensitive and is identified as the preferred development option. Although there are also some minor drainage channels in this area, these are not likely to be highly ecologically significant. The vegetation structure and composition of these washes will be investigated during the EIA phase to evaluate their ecological value and sensitivity. Regardless, there appears to be sufficient space within this area to accommodate the facility with little need to encroach on the higher sensitivity areas. The area to the south of the N14 is considered sensitive as it forms part of the broader riparian corridor of the Orange River and impact to this area should be avoided.

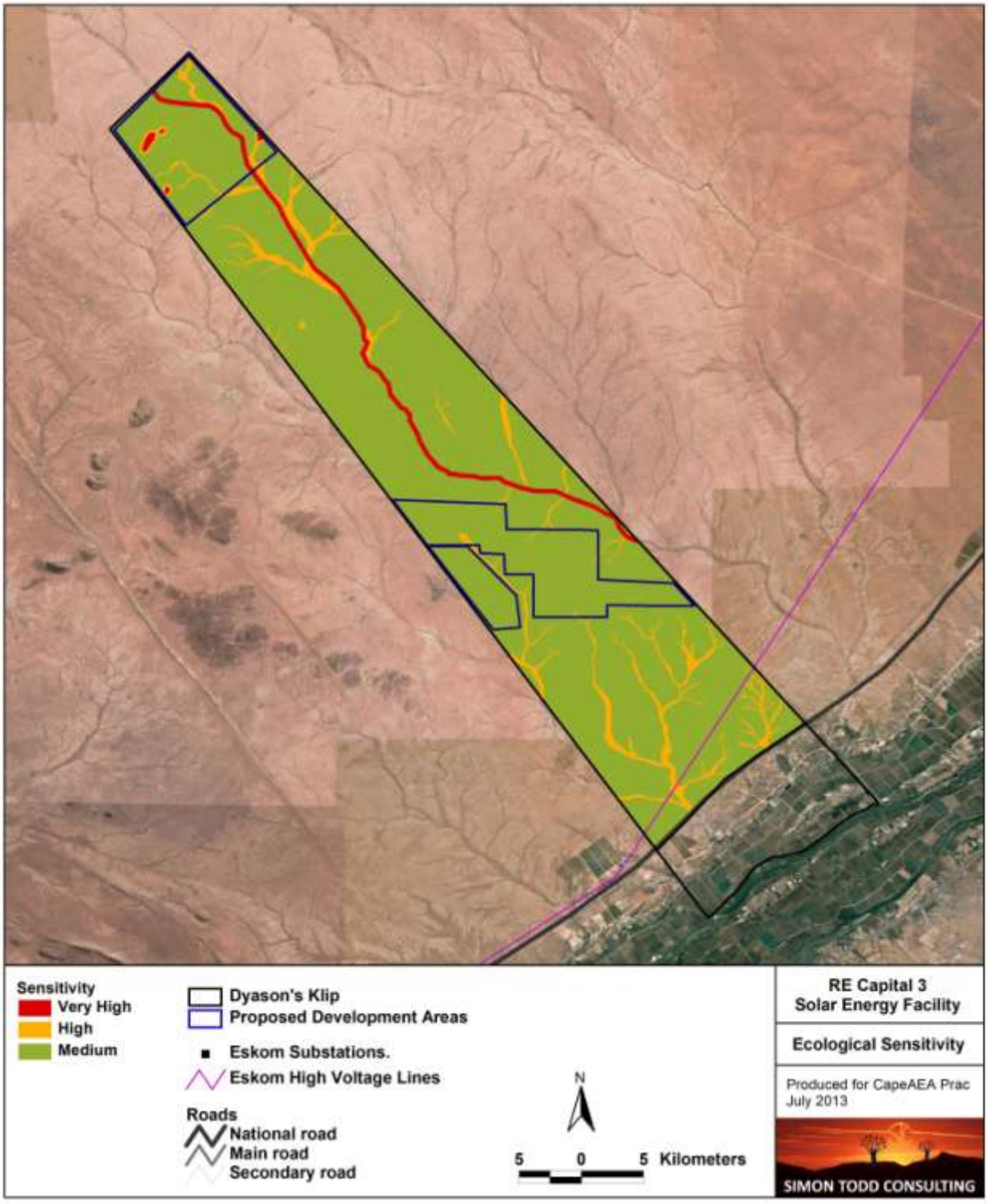


Figure 3. Draft ecological sensitivity map of the RE Capital 3 Solar Energy Development study area.

3 IDENTIFICATION & NATURE OF IMPACTS

3.1.1 Identified Impacts

The development will result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as PV arrays, roads, operations buildings etc. The following impacts are identified as the major impacts that are likely to be associated with the development and which will be assessed during the EIA phase of the development, for the preconstruction, construction and operational phases of the development.

Impacts on vegetation and protected plant species

It is highly likely that some listed plant species occur within the site and there is a probability that some of these would be affected by the development. Depending on the identity and status of the affected species, impacts on such species are likely to be of low to moderate significance given the relatively low footprint of the PV facility in relation to the extensive nature of the surrounding landscape. As PV developments generate a high local impact, the exact location of the PV facility in relation to the sensitive receptors is usually the most important factor determining the impact of this element of the development.

Soil erosion and associated degradation of ecosystems

The large amount of disturbance created during construction will leave the site vulnerable to alien plant invasion and soil erosion. On the one hand, the generally low slope at the site will to some extent reduce the likely severity of this impact, while the panels themselves will constitute several hectares of hardened surface which will generate a large amount of runoff with a high erosion capacity during large storm events. Therefore, runoff management will be a key factor in reducing the likely impact of the development on local vegetation, soils and hydrology.

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals or reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. However in the long term, operational phase impacts are likely to be relatively low.

Impacts on Broad-Scale Ecological Processes and Loss of Landscape Connectivity

As there are several other renewable energy developments in the area, the development of the site will contribute towards cumulative impacts, particularly the loss of landscape connectivity. The site is likely to be fenced and the cleared site is also likely to be hostile to many smaller fauna which will prevent or impede their movement across the landscape. The significance of this impact will need to be evaluated at the landscape level with consideration of the location and configuration of the other developments in the area.

Avifaunal Impacts

Large raptors and many larger bird species such as cranes and bustards are vulnerable to collisions with or electrocution from power line infrastructure. This can be a particular problem if the power line lies within the movement or migration pathway of the birds. As many of these species are long-lived slow-breeding species, collisions with power lines can be a major source of mortality for such species and may threaten the viability of local or regional populations. Insulating electrical components and fitting bird flight diverters can provide effective mitigation against such impacts and is recommended as standard practice for new power line infrastructure.

3.2 POTENTIAL SIGNIFICANCE OF IMPACTS

A preliminary assessment of the likely extent and significance of each impact identified above is made below for the PV facility itself including directly associated infrastructure and for the grid connection.

3.2.1 Solar PV Facility

The likely significance of the impacts associated with the solar energy component of the development are described below.

Impacts on vegetation and listed plant species

Nature: Site preparation and construction will result in a lot of disturbance which would impact indigenous vegetation and possibly listed species as well. For some species translocation may be a viable option, but this may not be a viable option for all species and translocation amounts only to partial mitigation as the habitat is generally lost in the long-term.

Extent: The total extent of the development is relatively low as the solar energy facility will result in a concentrated local impact up to several hundred hectares. Within this area, the impact is likely to be relatively high, but if an appropriate site is

chosen, then it is not likely that the development would have an impact on flora beyond the local on-site scale.

Potential Significance: The significance of this impact would depend largely on the location of the solar energy facility and the presence of sensitive vegetation features within the development area. With suitable avoidance and mitigation, the significance of this impact is likely to be of moderate to low significance.

Ecological Degradation (Erosion & Alien Plant Invasion)

Nature: Disturbance at the site during construction would leave the site vulnerable to alien species invasion as well as soil erosion. Invasion of the natural plant communities within the site would be undesirable and would impact diversity of fauna and flora as well as affect ecosystem processes. Similarly, erosion would also impact biodiversity through topsoil loss as well as through loss of ecological function (resource capture), resilience and decreased hydrological functional.

Extent: The extent of this impact would most likely be restricted to local area around the PV arrays.

Potential Significance: The site is fairly flat and so the risk of erosion is is likely to be fairly low and manageable with mitigation. The level of disturbance created during construction of PV facilities is however usually high and post-construction management will be required to keep alien plant abundance down. The significance of this impact is likely to be low to moderate.

Direct Faunal Impacts

Nature: Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

Extent: The extent of the impact would be largely restricted to the local area.

Potential Significance: Disturbance during the construction is likely to be high as a result of disturbance, noise and human presence. However, during the operational phase impacts are likely to be of relatively low significance, given the low activity levels which will occur at this time.

Impacts on Broad-Scale Ecological Processes and Loss of Landscape Connectivity

Nature: The development of the site will contribute towards the cumulative disruption of landscape connectivity as it will represent a hostile environment to many species which will be prevented from passing through the area.

Extent: The extent of the impact would be restricted to the local region.

Potential Significance: This impact is likely to be of moderate to low significance given the relatively limited extent of the current development in relation to the much larger projects in the area.

3.2.2 Grid Connection

The likely significance of the impacts associated with the grid connection required for the development are described below.

Impacts on vegetation and listed plant species

Nature: Some listed plant species are likely to occur along the chosen power line route and may be impacted by disturbance during the construction of the power line.

Extent: The footprint of the power line is low and in addition it is likely that most listed species can be avoided through micrositing of the pylons.

Potential Significance: The significance of this impact is likely to be low as avoidance measures would be able to reduce the majority of negative impact associated with the power lines.

Ecological Degradation (Erosion & Alien Plant Invasion)

Nature: Disturbance along the power line route during construction may lead to erosion as well as alien plant invasion. Disturbance along steep slopes during construction of power lines often leads to long-term erosion problems that are not usually rectified.

Extent: The extent of this impact would be restricted to vicinity of the power line route.

Potential Significance: This impact would be of low significance, provided that suitable mitigation to reduce erosion potential is implemented.

Avifaunal Impacts

Nature: The power line is likely to generate collision or electrocution mortalities of susceptible avifauna. Although this impact may be low at any one time, this is a long term cumulative impact that may be a major source of mortality for some species.

Extent: The extent of this impact would be largely local in nature although it is important to recognise that the affected bird species move widely in response to the availability of food and nesting requirements.

Potential Significance: This impact would be of low significance, provided that suitable mitigation to reduce collisions and electrocution are implemented and given the likely low length of the required power line.

4 ASSESSMENT METHODOLOGY

Direct, indirect and cumulative impacts of the issues identified above, will assessed during the Impact Assessment phase of the project according to the following standard methodology:

- The **nature** which shall include a description of what causes the effect what will be affected and how it will be affected.

- The **extent** wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):

- The **duration** wherein it will be indicated whether:

    - the lifetime of the impact will be of a very short duration (0- 1 years).
    - the lifetime of the impact will be of a short duration (2-5 years).
    - medium-term (5-15 years).
    - long term (> 15 years); or
    - permanent

- The **magnitude** quantified as small and will have no effect on the environment, minor and will not result in an impact on processes, low and will cause a slight impact on processes, moderate and will result in processes continuing but in a modified way, high (processes are altered to the extent that they temporarily cease) and very high and results in complete destruction of patterns and permanent cessation of processes.

- The **probability** of occurrence, which shall describe the (likelihood of the impact actually occurring. Probability will be estimated as very improbable (probably will not happen), improbable (some possibility, but of low likelihood), probable (distinct possibility), highly probable (most likely) and definite (impact will occur regardless of any prevention measures).

The **significance** which shall be determined through a synthesis of the characteristics described above and will be assessed as follows:

- **No significance**: the impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: the impacts will have a minor influence on the proposed

development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.

- **Moderate significance**: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment and will result in the "no-go" option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

and;
the status, which will be described as either positive, negative or neutral.
the degree to which the impact can be reversed.
the degree to which the impact may cause irreplaceable loss of resources.
the degree to which the impact can be mitigated.

5 PROPOSED ACTIVITIES FOR THE EIA PHASE

The current study is restricted to a desktop assessment and fieldwork during the EIA phase will be an important activity required to validate and refine the findings of this report. This will include the following studies and activities:

- Ground-truth and refine the ecological sensitivity map of the site. Particular attention will be paid to the pans within the northern parts of the site as well as the presence of quartz outcrops and other localised specialised habitats which are likely to occur across the site.
- Characterise the vegetation and plant communities present at the site. The SA vegetation map only provides a coarse picture of the vegetation present and on-site surveys will be conducted to generate a species list for the site as well as identify and where necessary map different plant communities present at the site if they are associated with different sensitivity classes.
- Identify and map the presence of any unique and special habitats at the site such as gravel patches, rock fields and other localised habitats.
- Locate, identify and map the location of significant populations of species of conservation concern, so that the final development footprint can be adjusted so as to avoid and reduce the impact on such species. Some species of concern may be widespread and others localised and the distribution of such species will be established during the site visit.

- Evaluate the likely presence of listed faunal species at the site such as the Giant Bullfrog, and identify associated habitats that should be avoided to prevent impact to such species.
- Evaluate, based on the site attributes, 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.
- Assess the impacts identified above in light of the site-specific findings and the final layout to be provided by the developer.

6 CONCLUSION & RECOMMENDATIONS FOR THE EIA PHASE

The site does not appear to be highly sensitive from a botanical perspective. The only listed vegetation type in the area is Lower Gariep Alluvial Vegetation which is restricted to the vicinity of the Orange River and will not be impacted by the development. The affected vegetation types have been little impacted by transformation and are still overwhelmingly intact. As these vegetation types are common in the local area as well as in the broader region, the loss of a relatively small extent of these vegetation types does not appear to be a significant concern. There is however likely to be a number of listed and protected species present within the site which may be impacted by the development. Although there are no indications at this stage that any of these are very abundant at the site, an important activity during the field assessment will be to locate and map the distribution of such species at the site, so that impact on such species can be reduced or avoided. It is likely that many of the species of conservation concern are associated with localised habitats containing plant communities of conservation concern such as quartz outcrops or calcrete patches.

Overall, the faunal diversity of the site is likely to be low with relatively few species of conservation concern present. The listed mammals which may occur at the site all have wide distribution ranges and the development would not constitute a significant loss of habitat for such species. The major impact associated with the development of the site for mammals would be habitat loss and potentially some disruption of the broad-scale connectivity of the landscape. No listed or range-restricted reptiles are likely to occur at the site the impacts on reptiles resulting from the development are not likely to be of broader significance. Site clearing and the construction of the panels will alter habitat structure within the affected area for reptiles and is likely to result in an increase in geckos and other climbing species at the expense of diurnal ground-foraging species. The Giant Bullfrog *Pyxicephalus adspersus* is the only listed amphibian which may occur at the site and is listed as Near Threatened. The larger pans within the northern development option would represent the only potentially suitable breeding habitat for this species. A number of listed avifauna are likely to be present and in the long-term, the overhead power line to connect

the facility to the Eskom grid is identified as the major threat to avifauna resulting from the development.

The sensitivity mapping suggests that the majority of the site consists of open plains considered to be of moderate sensitivity and which would be suitable for development without a very high risk of significant ecological impacts. The northern development option is seen as the least preferred option as there is a significant drainage line which traverses the area as well as several pans which are also considered ecologically sensitive. The alternative development area in the central part of the site appears to be significantly less sensitive and is identified as the preferred development option. As the Eskom MTS has yet to be built, the preferred route to the substation cannot be identified at this point but with suitable mitigation, is not likely to generate significant impact.

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SHORT CV OF CONSULTANT:

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- Profession: Ecological Consultant
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- Years of Experience: 15 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

- 1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute
- 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute
- 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town
- 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town.

General Experience & Expertise

- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa, including a large number of renewable energy facilities. Projects have ranged in extent from <50 ha to more then 50 000 ha.
- Involved in all phases of renewable energy development, from ecological prefeasibility studies to pre-construction walk-through.
- Widely-recognized 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:

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