ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED STRAUSSHEIM CHARLIE SOLAR POWER PLANT AND ASSOCIATED GRID CONNECTION INFRASTRUCTURE, KENHARDT, NORTHERN CAPE:

FAUNA & FLORA SPECIALIST SCOPING REPORT

PRODUCED FOR CAPE EAPRAC

BY

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DECLARATION OF CONSULTANTS' INDEPENDENCE

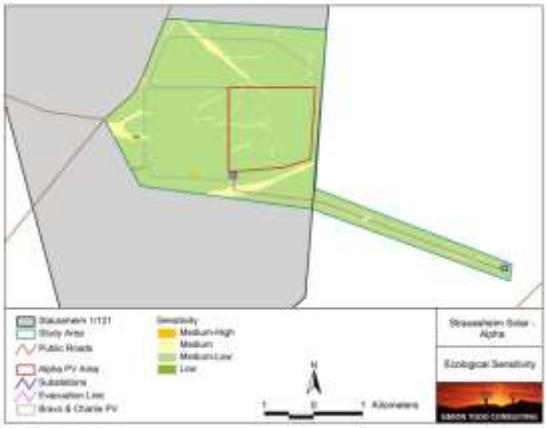
- I Simon Todd, as the appointed independent specialist hereby declare that I:
- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial 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, 2014 (specifically in terms of regulation 12 of GN No. R. 982) 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 48 of GN No. R. 982.

Note: The terms of reference must be attached.

Simon Todd Pr.Sci.Nat 400425/11.
May 2016

EXECUTIVE SUMMARY

AMDA is proposing the establishment of a commercial Solar Energy Facility of 75MW near Kenhardt in the Northern Cape. As part of the required EIA process, this Ecological Scoping report provides a preliminary characterisation of the ecological features of the site and identifies the likely impacts that may be associated with the development which will be assessed during the EIA phase. A site visit and a desktop review of the available ecological information for the area were used to identify and characterize the ecological features of the site and develop a draft ecological sensitivity map for the site, which is depicted below.



The site is restricted to a single vegetation type, Bushmanland Arid Grassland. This is a very extensive vegetation type that has been little impacted by transformation and classified as Least Threatened. No features of high sensitivity were identified within the Straussheim site. The site consists of low shrubland of medium-low sensitivity with few species or habitats of conservation present. Similarly, faunal diversity at the site is relatively low, largely as a result of the low diversity of habitats present and there are few listed species present and the development would not impact significantly on listed fauna. In addition, the site is not within a CBA or NPAES Focus area and impacts on broad-scale ecological processes are likely to be low.

Overall, there do not appear to be any impacts that are likely to be associated with the development of the Straussheim Charlie Power Plant that cannot be mitigated to a relatively low level and most impacts are likely to be of moderate to low significance and of local extent. As such, the site is considered a favourable site for the development of the PV plant.

A number of activities are planned for the EIA phase in order to characterise the features of the site and assess the impact of the Straussheim Charlie Power Plant on the receiving environment. This includes detailed plant and faunal surveys within the development footprint to ascertain the abundance of listed species within the affected area, as well as consideration of cumulative impact resulting from the various developments at the site and in the broader area.

1 INTRODUCTION

AMDA Charlie (Pty) Ltd is proposing the establishment of a PV and/or concentrated PV plant with fixed, single or double axis tracking technology. The proposed site is located near Kenhardt on Portion 1 of N'Rougas Zuid No 121 and would be approximately 250ha in extent.

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. 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 site visit and field assessment as well as desktop review of the available ecological information for the area was 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 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 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 (2014) 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 RELEVANT ASPECTS OF THE DEVELOPMENT

The proposed development site is located east of Kenhardt on Portion 1 of N'Rougas Zuid No 121 with a total farm area of 5233 ha.

The development will consist of the following:

- The proposed facility is planned and designed with a net generating capacity (AC) of 75MWp, with an installed capacity (DC) of +/-85MWp.
- The facility will occupy approximately 250 ha.

Infrastructure associated with the facility is likely to include:

» PV and/or concentrated PV with fixed, single or double axis tracking technology. The actual technology to be used will be decided at a later date.

» A single 132 kV grid connection option to the Eskom Nieuwehoop MTS is included.

» Auxiliary buildings of approximately 2ha. The functions within these buildings include (but is not limited to) to ablution, workshops, storage areas and site offices. Fencing height shall be below 5m, but expected to be below 3m.
» Access roads are expected to be 6m in width, but less than 8m in width.
» Approximately 2-5ha of laydown area will be required, but will not exceed 5ha.

Figure 1. Satellite image of the Straussheim site, illustrating the proposed development footprint of Straussheim Charlie Power Plant, with the grid connection in blue.

2 METHODOLOGY

2.1 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) 2921 AA and AB 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 or the immediate area has 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 (2014).
- 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 2014.2 (See Figure 2) 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.

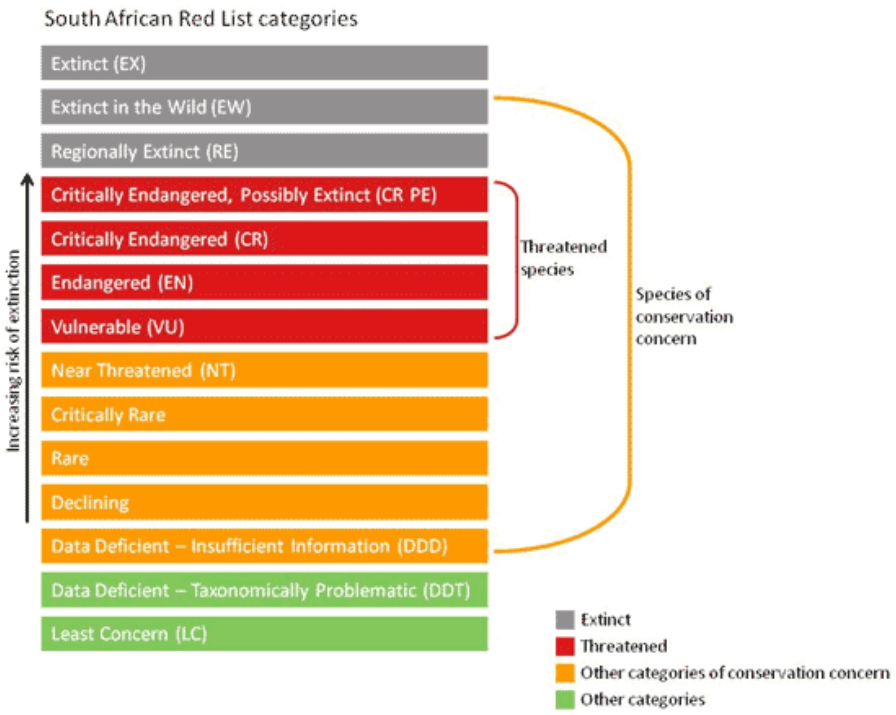


Figure 2. Schematic representation of the South African Red List categories. Taken from http://redlist.sanbi.org/redcat.php

2.2 SENSITIVITY MAPPING & ASSESSMENT

An ecological sensitivity map of the site was produced by integrating the available ecological and biodiversity information available in the literature and various spatial databases with mapping based on the satellite imagery of the site as well as personal knowledge of the site. This includes delineating different habitat units identified on the satellite imagery and assigning likely sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Areas of natural or transformed habitat with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. Most types of development can proceed within these areas with little ecological impact.
- **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. These areas usually comprise the bulk of habitats within an area. 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. These areas may contain or be important habitat for faunal species or provide important ecological services such as water flow regulation or forage provision. 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 were also classified between the above categories, such as Medium-High, where it was deemed that an area did not fit well into a certain category but rather fell most appropriately between two sensitivity categories.

2.3 SAMPLING LIMITATIONS AND ASSUMPTIONS

The current study is based on a desktop analysis, as well as a preliminary site visit. As such, the results provided and the description of features present and the sensitivity map are validated by field data. However, detailed plant surveys were not conducted and the purpose of the site visit was to identify and delineate sensitive features within the development footprint that should be avoided where present and to obtain an overall indication of the sensitivity of the broader area and any protected and listed species that are present at the site. The lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. This represents a sufficiently conservative and cautious approach which takes the study limitations into account.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT- BASELINE

3.1 BROAD-SCALE VEGETATION PATTERNS

According to the national vegetation map (Mucina & Rutherford 2006), the site falls entirely within a single vegetation type, Bushmanland Arid Grassland. Bushmanland Arid Grassland is the second most extensive vegetation type in South Africa and occupies an area of 45 478 km^2 and extends from around Aggeneys in the west to Prieska in the east. It is associated largely with red-yellow apedal (without structure), freely drained soils, with a high base status and mostly less than 300 mm deep. Due the arid nature of the unit which receives between 70 and 200 mm annual rainfall, it has not been significantly impacted by intensive agriculture and more than 99% of the original extent of the vegetation type is still intact and its' conservation status is classified as Least Threatened. Mucina & Rutherford (2006) list 6 endemic species for the vegetation type which is relatively few given the extensive nature of the vegetation type.

The site consists of stony plains with occasional areas on deeper soils in lower-lying areas and run-on sites. Despite being classified as Bushmanland Arid Grassland, the site is largely dominated by woody shrubs, which is typical on stony soils of the area. Typical species include *Zygophyllum lichtensteinianum*, *Lycium cinereum*, *Hermannia spinosa*, *Pteronia sordida*, *Pteronia inflexa*, *Osteospermum armatum* and *Aristida adscensionis*. On deeper soils *Phaeoptilum spinosum*, *Lycium horridum*, *Pentzia incana*, *Ruschia spinosa*, *Aptosimum marlothii*, *Rosenia humilis*, *Pegolettia retrofracta*, *Stipgrostis obtusa*, *Enneapogon desvauxii*, *Stipagrostis ciliata* and *Eragrostis lehmanianna.*

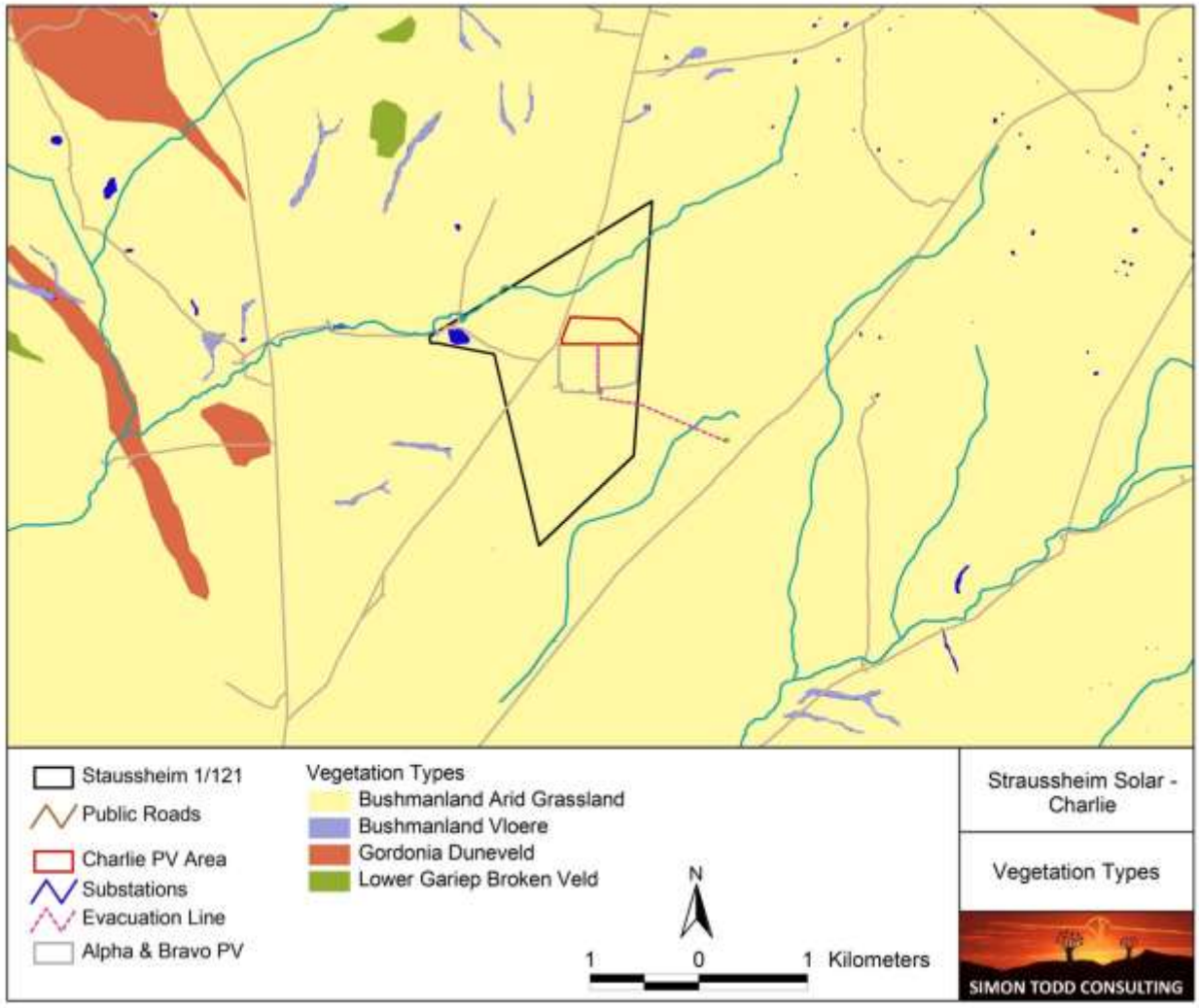


Figure 3. Broad-scale overview of the vegetation in and around the Straussheim site. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment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

Figure 4. Typical open plains habitat at Straussheim, showing the general lack of features at the site and broadly homogenous nature of the vegetation

Figure 5. Example of a run-on area at the Straussheim site, with a higher density of vegetation than the surrounding area. Typical species in these areas include *Phaeoptilum spinosum*, *Lycium pumilum*, *Salsola tuberculata*, *Aristida congesta*, *Stipagrostis obtusa* and *S.ciliata*.

3.2 LISTED AND PROTECTED PLANT SPECIES

According to the SIBIS database, only thee red data-listed plant species are known from the area, *Hoodia officinalis* subsp. *officinalis* (NT), *Aloe dichotoma* (VU) and *Haworthia venosa* subsp. *venosa* (VU). Of these *Aloe dichotoma* can be confirmed present at low density and might be impacted by the development. Although the total number of individuals affected would be low and the affected trees can be transplanted to a safe site outside of the footprint to partly mitigate this impact. There is also a variety of provincially protected species which may be present at the site which would potentially be impacted by the development such as *Boscia foetida* subsp. f*oetida*. However the density and abundance of such species at the site is low and significant impact on any protected species is highly unlikely.

3.3 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 studies, 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.

As there are a number of other renewable energy developments in the wider area, it is important to consider the potential for cumulative impact on the area. A map of all the DEA-registered renewable energy developments in the area is depicted in Figure 6 below and illustrates that there is currently not a lot of the renewable energy development in the area. As a result, the potential for cumulative impact in the area is still relatively low and a significant impact on broad-scale ecological processes is not likely.

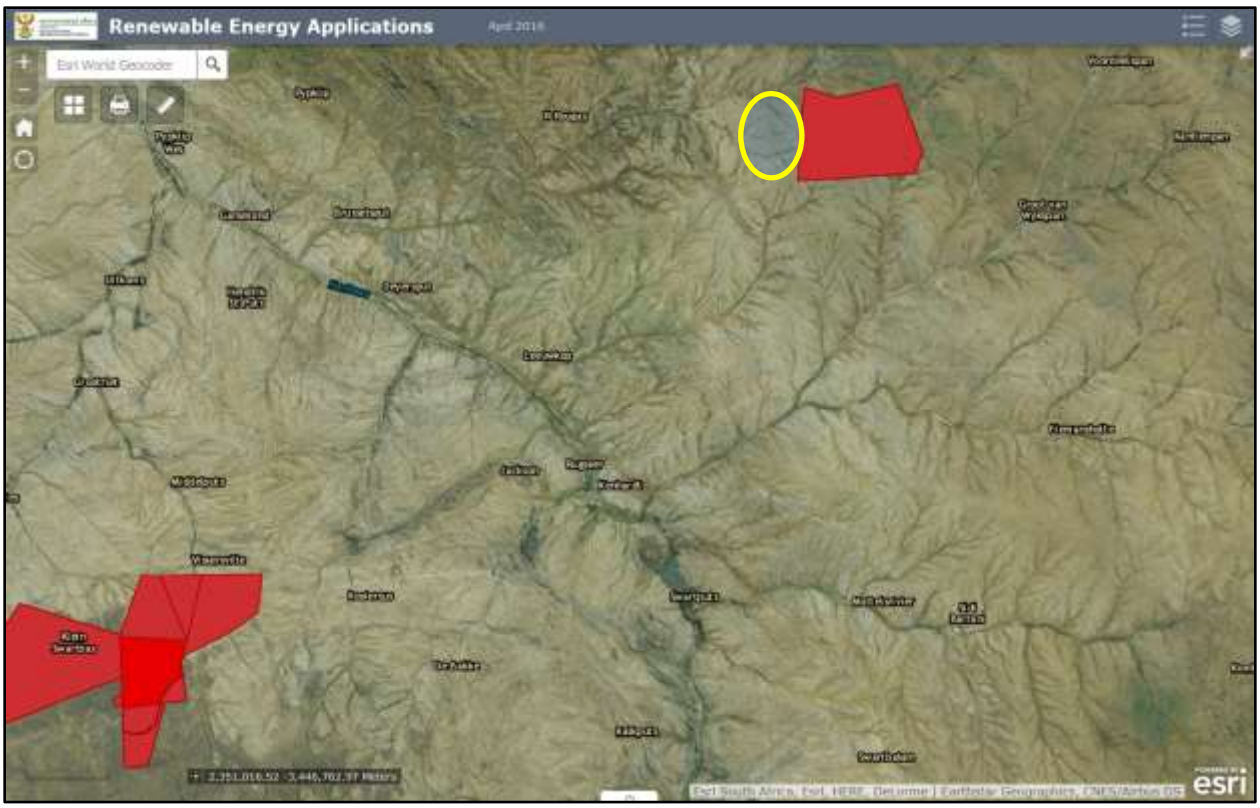


Figure 6. Map of DEA-registered renewable energy projects around the Straussheim site indicated by the yellow circle, showing other renewable energy developments in the area around Kenhardt.

3.4 FAUNAL COMMUNITIES

Mammals

According to the MammalMap database approximately 31 terrestrial mammals are known from the area. Listed species which may occur in the area include the Black-footed cat *Felis nigripes* (VU) Brown Hyaena *Hyaena brunnea* (NT) and Littledale's Whistling Rat *Parotomys littledalei* (NT). All of these species have a wide distribution in South Africa and the loss of about 240 ha of habitat would not result in significant habitat loss for these species.

The diversity of habitats at the site is low and consists largely of open low shrubland on shallow stony soils, with no rocky outcrops or large drainage lines. As a result, the species present would be those that are associated with open plains and includes species such as Cape Porcupine *Hystrix africaeaustralis*, Steenbok *Raphicerus campestris*, Springbok *Antidorcas marsupialis*, Aardvark *Orycteropus afer*, Cape Hare *Lepus capensis*, South African Ground Squirrel *Xerus inauris*, Black-backed Jackal *Canis mesomelas*, Bat-eared Fox *Otocyon megalotis* and African Wild Cat *Felis silvestris*.

Potential impacts on mammals are likely to be restricted largely to disturbance during the construction phase and habitat loss during the operational phase. Given the largely intact nature of the area, cumulative impacts are likely to be relatively low and overall impacts on fauna are likely to be low and local in nature.

Reptiles

The site lies in or near the distribution range of approximately 40 reptile species but given the low habitat diversity at the site, the actual reptile diversity present is likely to be significantly lower. Species either observed or likely to be present confirmed at the site include the Namaqua Sand Lizard *Pedioplanis namaquensis*, Ground Agama *Agama aculeata* and Cape Skink *Mabuya capensis*. No species which may occur in the area are listed as endangered, but the Bushmanland Tent Tortoise is protected under provincial ordinance and is also listed under Appendix II of Cites which regulates trade in these species.

In terms of the likely impact of the development on reptiles, habitat loss is likely to be of local significance only due to the relatively low footprint of the development and the relatively low reptile diversity of the site. Furthermore, many species would be able to use the vegetation under the panels and some species would take advantage of the buildings and structures present. Some transient disturbance of reptiles during construction is likely due to disturbance and vegetation clearing. Overall, as there are few range-restricted or listed reptile species at the site, impacts on reptiles from the development is likely to be local in nature and not of broader significance.

Amphibians

Although the site lies within or near the range of nine amphibian species, several of these require more or less permanent water and would not occur at the site. In practice, probably only toad species which are able to tolerate extended dry periods such as the Karoo Toad *Vandijkophrynus gariepensis* occur at the site. There is no breeding habitat for frogs at the site and any frogs at the site would be likely to breed at man-made features present in the wider area. Given the low likely abundance of frogs at the site, impacts on frogs are likely to be low and apart from disturbance, pollution is highlighted as potential impact source for frogs.

3.5 SITE SENSITIVITY ASSESSMENT

The sensitivity map for the proposed development area of the Straussheim Charlie PV plant site is illustrated below in Figure 7. There are no highly sensitive features identified within the site that would be affected by the development. The site is homogenous and there are no rocky hills or large drainage systems of higher sensitivity status. There are not many trees on the site, which suggests that it is unlikely that the development will impact more

than a handful of any protected trees species, of which *Aloe dichtoma* would be of greatest significance. In terms of other listed or protected species, it is not likely that there many such species present at the site and overall impacts on such species would be low. There are no areas of specific importance identified for terrestrial fauna within the study area as it is generally homogenous

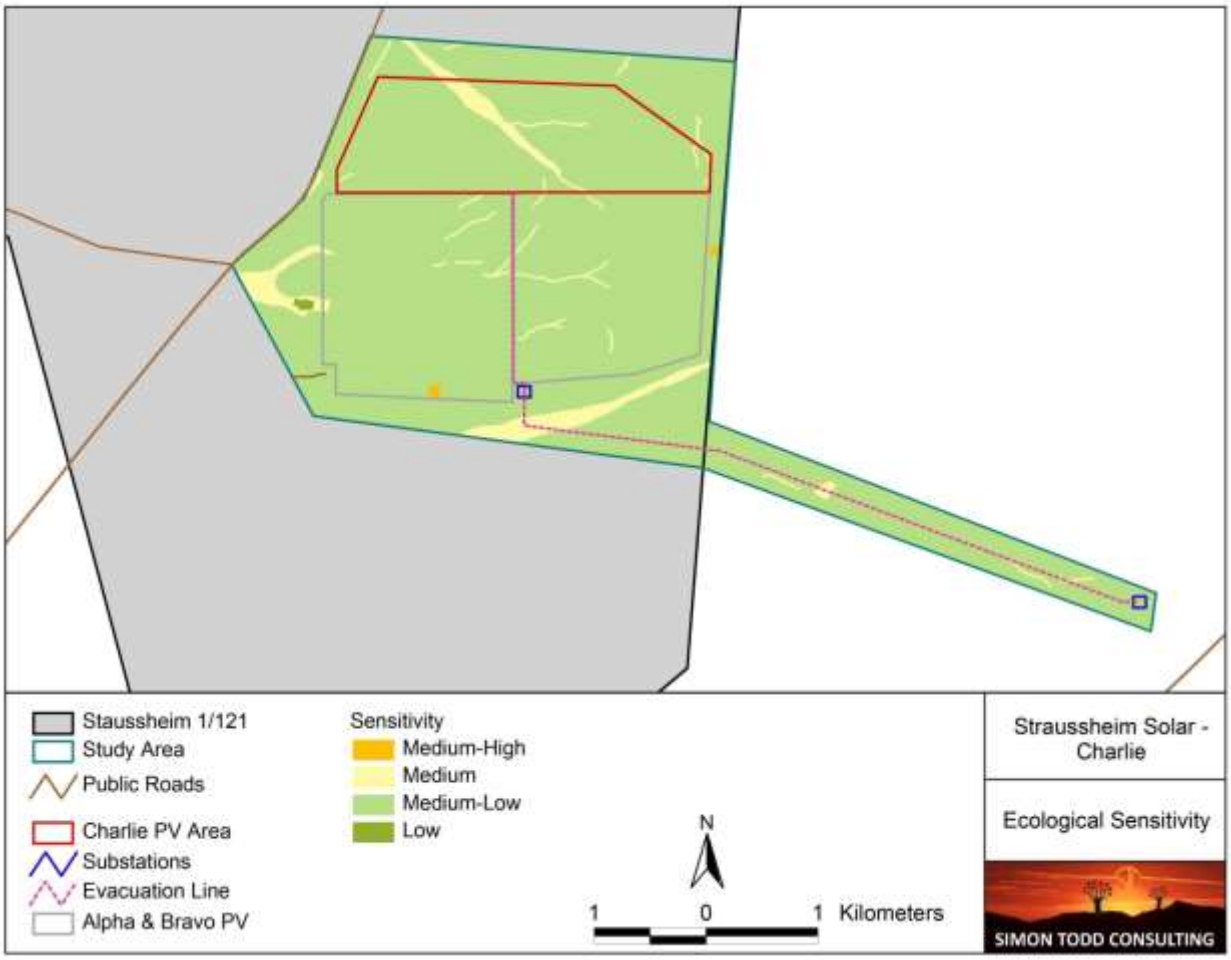


Figure 7. Ecological sensitivity map of the Straussheim Charlie PV Plant, showing that the majority of the site consists of the natural vegetation of low sensitivity.

4 IDENTIFICATION & NATURE OF IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the development are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the development are listed. The relevance and applicability of each potential impact to the current situation are then examined in more detail in the next section.

4.1 IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES

Potential ecological impacts resulting from the development of the Straussheim Charlie PV Power Plant would stem from a variety of different activities and risk factors associated with the preconstruction, construction and operational phases of the project including the following:

Preconstruction Phase

- Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purpose.
- Site clearing & exploration activities for site establishment would have a negative impact on biodiversity if this was not conducted in a sensitive manner.

Construction Phase

- Vegetation clearing for the reflector field, access roads, site fencing etc could impact listed plant species as well as high-biodiversity plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.
- Increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems.
- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.

Operational Phase

- The operation of the facility will generate noise and disturbance which may deter some fauna from the area.
- The areas inside the facility will requirement management and if this is not done appropriately, it could impact adjacent intact areas through impacts such as erosion, alien plant invasion and contamination from pollutants, herbicides or pesticides.
- The associated overhead power lines will pose a risk to avifauna susceptible to collisions and electrocution with power line infrastructure.

Cumulative Impacts

- The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the country's ability to meet its conservation targets.
- Transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

4.2 IDENTIFICATION OF IMPACTS TO BE ASSESSED IN THE EIA PHASE

In this section each of the potential impacts identified above is explored in more detail with reference to the features and characteristics of the site and the likelihood that each impact would occur given the characteristics of the site and the extent and nature of the development.

Impacts on vegetation and protected plant species

Although their density would be low, there may be some protected species within the site that would be impacted by the development. Vegetation clearing during construction will lead to the loss of currently intact habitat within the development footprint and is an unavoidable consequence of the development. As this impact is certain to occur it will be assessed for the construction phase for the facility.

Soil erosion and associated degradation of ecosystems

The large amount of disturbance created during construction would potentially leave the site vulnerable to soil erosion, from both wind and water. Vegetation clearing, the panel arrays and access roads will all result in increased levels of runoff which will need to be managed and which would pose an erosion risk. Soil erosion is therefore considered a likely potential impact and will be assessed for the construction phase and operational phase.

Direct faunal impacts

Increased levels of noise, pollution, disturbance and human presence during construction 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 impact on fauna is highly likely to occur during construction as well as operation and this impact will therefore be assessed for the construction phase and operational phase.

Alien Plant Invasion

The disturbance created during construction is highly likely to encourage the invasion of the disturbed areas by alien species. Although there were not a lot of alien species present in the area, problem species such as *Prosopis* are present in the area and it is possible that species will colonise the disturbed areas if given the opportunity. This impact is deemed highly likely to occur and will be assessed as a likely impact associated with the development.

Reduced ability to meet conservation obligations & targets

The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets. The receiving vegetation type in the study area is classified as Least Threatened and is still more than 99% intact. As this is one of the most widespread and extensive vegetation types and there is no indication that there are any rare or restricted habitats within the development footprint, this is not likely to be a significant impact and will not be assessed unless the site visit suggests that this may be a potential problem.

Impact on broad-scale ecological processes

Transformation of intact habitat on a cumulative basis would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations. Due to the presence of a number of other renewable energy developments in the area, this is a potential cumulative impact of the development that will be assessed during the EIA.

4.3 POTENTIAL SIGNIFICANCE OF IMPACTS

A preliminary assessment of the likely extent and significance of each impact identified above is made 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 partially mitigate the impact, but most woody species cannot be translocated and would be lost from the development footprint.

Extent: The total extent of the development is relatively low and the solar energy facility will result in a concentrated local impact up to a few hundred hectares. Within this area, the impact is likely to be relatively high, but if appropriate areas within the site are used, then it is not likely that the development would have an impact on flora beyond the local on-site scale.

Potential Significance: The vegetation within the site is considered relatively low sensitivity with few species or habitats of concern present. With suitable avoidance and mitigation, the significance of this impact is likely to be of moderate to low significance.

Soil Erosion

Nature: Disturbance at the site during construction would leave the site vulnerable to soil erosion. Erosion would impact drainage systems as well as 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, but could impact drainage systems which receive a large amount of silt or eroded material.

Potential Significance: The site is nearly flat and so the risk of erosion is likely to be fairly low and manageable with mitigation. The significance of this impact is likely to be low.

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 vegetation clearing, 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.

Alien Plant Invasion

Nature: Disturbance at the site during construction would leave the site vulnerable to alien plant invasion. If such infestation is not controlled it may affect adjacent intact areas resulting in an impact on biodiversity or ecosystem function.

Extent: The extent of this impact would most likely be restricted to local area around the PV arrays, but could impact a wider area if severe infestations occur.

Potential Significance: Although this impact has potential significance, it can be reduced to a low level through clearing and alien plant management. Woody species would generate the most significant impacts, but these would be likely to be focussed on the drainage areas and invasion of these areas is unlikely to occur if they are suitably buffered from impact.

Impacts on Broad-Scale Ecological Processes

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: The significance of this impact is likely to be relatively low as the affected habitat is not likely to be of particular importance for avifauna. This is impact is likely to be of moderate to low significance.

5 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.

6 PROPOSED ACTIVITIES FOR THE EIA PHASE

The current study is the result of a desktop study as well as a preliminary site visit. This significantly reduces the uncertainty associated with the study site and the potential impacts of the development. However, the specific development area for the Charlie PV Power Plant has not been investigated in detail and as a result, the number of listed and protected species within the footprint would need to be clarified. In addition, the following activities

will be carried out in the EIA phase to characterise the site and assess the impact of the development on the receiving environment:

- Characterise the vegetation and plant communities present within the site in greater detail. 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.
- 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 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.

7 CONCLUSION & RECOMMENDATIONS

No features of very high sensitivity have been identified within the Straussheim Charlie Power Plant site. The majority of the site consists of low shrubland of medium-low sensitivity with few species or habitats of conservation present. Similarly, faunal diversity at the site is relatively low, largely as a result of the low diversity of habitats present and there are few listed species present and the development would not impact significantly on listed fauna. In addition, the site is not within a CBA or NPAES Focus area and impacts on broad-scale ecological processes are likely to be low, even though there are 3 facilities planned at the site.

The major impacts associated with the development of the Straussheim Charlie Power Plant, would be local habitat loss, and potentially the disruption of landscape connectivity. Although the number of renewable energy facilities in the area is relatively low, there may be additional facilities present in the area that are not yet registered on the DEA database and so the potential for cumulative impact may be greater than currently estimated. This will be investigated as part of the EIA phase. Overall, there do not appear to be any impacts that are likely to be associated with the development of the Straussheim Charlie Power Plant that cannot be mitigated to a low level and most impacts are likely to be of moderate to low significance and of local extent. As such, the site is considered a favourable site for the development of the PV plant.

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9 ANNEX 1. LIST OF MAMMALS

List of mammals which are likely to occur in the vicinity of the Staussheim site. Habitat notes and distribution records are based on Skinner & Chimimba (2005), while conservation status is from the IUCN Red Lists 2014.2 and South African Red Data Book for Mammals. Confirmed species are those observed in the area, not necessarily from the site itself.

Scientific Name	Common Name	Status	Habitat	Likelihood
Macroscledidea (Elephant Shrews):				
Macroscelides proboscideus	Round-eared Elephant Shrew	LC	Species of open country, with preference for shrub bush and sparse grass cover, also occur on hard gravel plains with sparse boulders for shelter, and on loose sandy soil provided there is some bush cover	High
Elephantulus rupestris	Western Rock Elephant Shrew	LC	Rocky koppies, rocky outcrops or piles of boulders where these offer sufficient holes and crannies for refuge.	High
Tubulentata:				
Orycteropus afer	Aardvark	LC	Wide habitat tolerance, being found in open woodland, scrub and grassland, especially associated with sandy soil	Confirmed
Hyracoidea (Hyraxes)				
Procavia capensis	Rock Hyrax	LC	Outcrops of rocks, especially granite formations and dolomite intrusions in the Karoo. Also erosion gullies	Confirmed
Lagomorpha (Hares and Rabbits):				
Lepus capensis	Cape Hare	LC	Dry, open regions, with palatable bush and grass	Confirmed
Lepus saxatilis	Scrub Hare	LC	Common in agriculturally developed areas, especially in crop-growing areas or in fallow lands where there is some bush development.	High
Rodentia (Rodents):				
Cryptomys hottentotus	African Mole Rat	LC	Wide diversity of substrates, from sandy soils to heavier compact substrates such as decomposed schists and stony soils	Confirmed
Hystrix africaeaustralis	Cape Porcupine	LC	Catholic in habitat requirements.	Confirmed
Pedetes capensis	Springhare	LC	Occur widely on open sandy ground or sandy scrub, on overgrazed grassland, on the fringes of vleis and dry river beds.	High
Xerus inauris	South African Ground Squirrel	LC	Open terrain with a sparse bush cover and a hard substrate	Confirmed
Graphiurus ocularis	Spectacled Dormouse	LC	Associated with sandstones of Cape Fold mountains, which have many vertical and horizontal crevices.	High
Rhabdomys pumilio	Four-striped Grass Mouse	LC	Essentially a grassland species, occurs in wide variety of habitats where there is good grass cover.	High
Mus minutoides	Pygmy Mouse	LC	Wide habitat tolerance	High
Mastomys coucha	Southern Multimammate Mouse	LC	Wide habitat tolerance.	High
Aethomys namaquensis	Namaqua Rock Mouse	LC	Catholic in their habitat requirements, but where there are rocky koppies, outcrops or boulder-strewn hillsides they use these	Confirmed

			preferentially	
Parotomys brantsii	Brants' Whistling Rat	LC	Associated with a dry sandy substrate in more arid parts of the Nama-karoo and Succulent Karoo. Species selects areas of low percentage of plant cover and areas with deep sands.	High
Parotomys littledalei	Littledale's Whistling Rat	LC	Riverine associations or associated with Lycium bushes or Psilocaulon absimile	High
Otomys unisulcatus	Bush Vlei Rat	LC	Shrub and fynbos associations in areas with rocky outcrops Tend to avoid damp situations but exploit the semi-arid Karoo through behavioural adaptation.	Low
Desmodillus auricularis	Cape Short-tailed Gerbil	LC	Tend to occur on hard ground, unlike other gerbil species, with some cover of grass or karroid bush	High
Gerbillurus paeba	Hairy-footed Gerbil	LC	Gerbils associated with Nama and Succulent Karoo preferring sandy soil or sandy alluvium with a grass, scrub or light woodland cover	High
Gerbilliscus leucogaster	Bushveld Gerbil	LC	Predominantly associated with light sandy soils or sandy alluvium	Low
Gerbilliscus brantsii	Higheld Gerbil	LC	Sandy soils or sandy alluvium with some cover of grass, scrub or open woodland	Low
Malacothrix typica	Gerbil Mouse	LC	Found predominantly in Nama and Succulent Karoo biomes, in areas with a mean annual rainfall of 150-500 mm.	High
Primates:				
Papio ursinus	Chacma Baboon	LC	Can exploit fynbos, montane grasslands, riverine courses in deserts, and simply need water and access to refuges.	High
Eulipotyphla (Shrews):				
Crocidura cyanea	Reddish-Grey Musk Shrew	LC	Occurs in relatively dry terrain, with a mean annual rainfall of less than 500 mm. Occur in karroid scrub and in fynbos often in association with rocks.	High
Erinaceomorpha (Hedgehog)				
Atelerix frontalis	South African Hedgehog	LC	Generally found in semi-arid and subtemperate environments with ample ground cover	Low
Carnivora:				
Proteles cristata	Aardwolf	LC	Common in the 100-600mm rainfall range of country, Nama-Karoo, Succulent Karoo Grassland and Savanna biomes	High
Caracal caracal	Caracal	LC	Caracals tolerate arid regions, occur in semi-desert and karroid conditions	High
Felis silvestris	African Wild Cat	LC	Wide habitat tolerance.	Confirmed
Felis nigripes	Black-footed cat	VU	Associated with arid country with MAR 100-500 mm, particularly areas with open habitat that provides some cover in the form of tall stands of grass or scrub.	High
Genetta genetta	Small-spotted genet	LC	Occur in open arid associations	High
Suricata suricatta	Meerkat	LC	Open arid country where substrate is hard and stony. Occur in Nama and Succulent Karoo but also fynbos	High

Cynictis penicillata	Yellow Mongoose	LC	Semi-arid country on a sandy substrate	Confirmed
Herpestes pulverulentus	Cape Grey Mongoose	LC	Wide habitat tolerance	High
Vulpes chama	Cape Fox	LC	Associated with open country, open grassland, grassland with scattered thickets and coastal or semi-desert scrub	High
Canis mesomelas	Black-backed Jackal	LC	Wide habitat tolerance, more common in drier areas.	Confirmed
Otocyon megalotis	Bat-eared Fox	LC	Open country with mean annual rainfall of 100-600 mm	Confirmed
Ictonyx striatus	Striped Polecat	LC	Widely distributed throughout the sub-region	Confirmed
Mellivora capensis	Ratel/Honey Badger	IUCN LC/SA RDB EN	Catholic habitat requirements	High
Rumanantia (Antelope):				
Oryx gazella	Gemsbok	LC	Open arid country	Confirmed
Sylvicapra grimmia	Common Duiker	LC	Presence of bushes is essential	High
Antidorcas marsupialis	Springbok	LC	Arid regions and open grassland.	Confirmed
Raphicerus campestris	Steenbok	LC	Inhabits open country,	Confirmed

10 ANNEX 2. LIST OF REPTILES

List of reptiles which are likely to occur at the proposed Straussheim Charlie site, based on the SARCA database. Conservation status is from the SARCA 2014 Assessment.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records
Agamidae	*Agama*	*aculeata*	*aculeata*	Common Ground Agama	Least Concern	4
Agamidae	*Agama*	*anchietae*		Anchieta's Agama	Least Concern	5
Colubridae	*Boaedon*	*capensis*		Brown House Snake	Least Concern	3
Colubridae	*Dasypeltis*	*scabra*		Rhombic Egg-eater	Least Concern	1
Colubridae	*Psammophis*	*namibensis*		Namib Sand Snake	Least Concern	1
Colubridae	*Psammophis*	*notostictus*		Karoo Sand Snake	Least Concern	3
Colubridae	*Telescopus*	*beetzii*		Beetz's Tiger Snake	Least Concern	2
Cordylidae	*Karusasaurus*	*polyzonus*		Karoo Girdled Lizard	Least Concern	3
Gekkonidae	*Chondrodactylus*	*angulifer*	*angulifer*	Common Giant Ground Gecko	Least Concern	5
Gekkonidae	*Chondrodactylus*	*bibronii*		Bibron's Gecko	Least Concern	14
Gekkonidae	*Pachydactylus*	*capensis*		Cape Gecko	Least Concern	4
Gekkonidae	*Pachydactylus*	*latirostris*		Quartz Gecko	Least Concern	6
Gekkonidae	*Pachydactylus*	*rugosus*		Common Rough Gecko	Least Concern	5
Gekkonidae	*Ptenopus*	*garrulus*	*maculatus*	Spotted Barking Gecko	Least Concern	6
Lacertidae	*Heliobolus*	*lugubris*		Bushveld Lizard	Least Concern	1
Lacertidae	*Nucras*	*tessellata*		Western Sandveld Lizard	Least Concern	1
Lacertidae	*Pedioplanis*	*inornata*		Plain Sand Lizard	Least Concern	3
Lacertidae	*Pedioplanis*	*lineoocellata*	*lineoocellata*	Spotted Sand Lizard	Least Concern	39
Lacertidae	*Pedioplanis*	*namaquensis*		Namaqua Sand Lizard	Least Concern	9
Scincidae	*Acontias*	*lineatus*		Striped Dwarf Legless Skink	Least Concern	1
Scincidae	*Trachylepis*	*capensis*		Cape Skink	Least Concern	2
Scincidae	*Trachylepis*	*occidentalis*		Western Three-striped Skink	Least Concern	6
Scincidae	*Trachylepis*	*sparsa*		Karasburg Tree Skink	Least Concern	1
Scincidae	*Trachylepis*	*spilogaster*		Kalahari Tree Skink	Least Concern	2
Scincidae	*Trachylepis*	*sulcata*	*sulcata*	Western Rock Skink	Least Concern	6
Scincidae	*Trachylepis*	*variegata*		Variegated Skink	Least Concern	17
Testudinidae	*Psammobates*	*tentorius*	*verroxii*	Verrox's Tent Tortoise	Not listed	12
Testudinidae	*Stigmochelys*	*pardalis*		Leopard Tortoise	Least Concern	1
Typhlopidae	*Rhinotyphlops*	*lalandei*		Delalande's Beaked	Least Concern	1

				Blind Snake		
Viperidae	*Bitis*	*arietans*	*arietans*	Puff Adder	Least Concern	1

11 ANNEX 3. LIST OF AMPHIBIANS

List of amphibians which are likely to occur in the vicinity of the Straussheim Charlie site, according to the Southern African Atlas of Frogs.

Family	Genus	Species	Common name	Red list category
Brevicepitidae	*Breviceps*	*adspersus*	Bushveld Rain Frog	Least Concern
Bufonidae	*Amietophrynus*	*gutturalis*	Guttural Toad	Least Concern
Bufonidae	*Amietophrynus*	*poweri*	Power's Toad	Least Concern
Bufonidae	*Amietophrynus*	*rangeri*	Raucous Toad	Least Concern
Bufonidae	*Poyntonophrynus*	*vertebralis*	Southern Pygmy Toad	Least Concern
Bufonidae	*Vandijkophrynus*	*gariepensis*	Karoo Toad	Least Concern
Pipidae	*Xenopus*	*laevis*	Common Platanna	Least Concern
Pyxicephalidae	*Amietia*	*angolensis*	Common or Angola River Frog	Least Concern
Pyxicephalidae	*Cacosternum*	*boettgeri*	Common Caco	Least Concern
Pyxicephalidae	*Tomopterna*	*cryptotis*	Tremelo Sand Frog	Least Concern