

EIA REPORT:

SPECIALIST ECOLOGICAL STUDY

FOR THE

PROPOSED KLIP GAT SOLAR ENERGY FACILITY

NEAR NOUPOORT,

NORTHERN CAPE

Dr Helga van der Merwe

15 November 2012

EXECUTIVE SUMMARY

The proposed Klip Gat Solar Energy Facility is located in the Northern Cape province, north-west of Noupoot. The project is situated on Portion 2 of farm 80. The proposed project currently plans on connecting to the Linde/Carolus line which is located on the site.

According to Mucina and Rutherford (2006) one vegetation type can be found on the Klip Gat property namely the Eastern Upper Karoo vegetation type. Important taxa in this vegetation type are *Lycium* spp., *Eriocephalus* spp., *Pentzia* spp., *Helichrysum* spp., *Aristida* spp., *Eragrostis* spp. and *Tragus* spp. This vegetation type is the largest vegetation type mapped of all the vegetation types (49821 km²). The conservation status of the vegetation type is listed as Least Threatened. Large dams have been built in this vegetation type and about 2% of the land surface has been transformed.

Species lists generated for the 3124BA and 3124BB quarter degree grids for flora and fauna species were supplemented with data from other relevant sources. These lists were used to identify species of conservation significance.

The field survey resulted in the identification of two plant communities on the Klip Gat site i.e. the (1) *Pentzia incana* dominated mixed dwarf shrubland-grassland community and the (2) *Tragus koeleroides* dominated mixed dwarf shrubland-grassland community.

The first plant community is characterised by dwarf shrub species such as *Pentzia incana* (dominant), *Eriocephalus ericoides* (dominant), *Rosenia oppositifolia* (dominant), *P. globosa* and *Ruschia cradockensis*. Grass species found in this community include *Sporobolus fimbriatus* (dominant), *Tragus koeleroides* (dominant), *Eragrostis obtusa*, *Enneapogon desvauxii*, *Melica decumbens* and *S. iocladius*. Numerous bare areas and capped soils are found throughout this community. Species of conservation significance found in this community are all the *Euphorbia* species, the family Iridaceae and therefore all *Morea* species and the family Mesembryanthemaceae/Aizoaceae and therefore all *Ruschia* species.

Plant community 2 is characterised by the following dwarf shrubs: *Pteronia glomerata* (dominant), *Rosenia oppositifolia* (dominant), *Eriocephalus ericoides*, *Nenax microphylla*, *Selago* cf. *albida*. Grass species include *Tragus koeleroides* (dominant), *Eragrostis chloromelas* (dominant), *Aristida diffusa* and *Sporobolus iocladius*. Species of conservation significance include the family Iridaceae (therefore *Morea* species) and the family Mesembryanthemaceae/Aizoaceae (and therefore *Trichodeodema* species).

Various declared weeds and invader species were also found in the surrounding areas and care will have to be taken during the construction and operational phases in order to prevent their establishment and spread on site and into the natural vegetation. The

monitoring and control of declared weeds and invader plant species is of great importance since their establishment not only slows down the rehabilitation of denuded and disturbed areas but also prevents the rehabilitation of faunal habitat.

Fauna species found to be of conservation significance include mammals such as the black-footed cat (VU, CITES II), African wild cat (CITES II), white-tailed mouse (EN), leopard (NT, CITES I), aardwolf (CITES III) and birds, for example, the blue crane (VU, CITES II), Verreaux's eagle (CITES II), black stork (CITES II), blue bustard (NT), lesser kestrel (CITES II), greater kestrel (CITES II), rock kestrel (CITES II), Ludwig's bustard (EN, CITES II), black harrier (VU) and martial eagle (NT).

The Klip Gat site is situated in the Platberg-Karoo conservancy which is an Important Bird Area. Additional bird data collected from the Southern African Bird Atlas Project (SABAP 2) was used to identify bird species of conservation significance. This SABAP 2 list indicates the blue crane (VU), Lesser Kestrel (VU), Ludwig's Bustard (VU), blue korhaan (NT), greater flamingo (NT), secretary bird (NT), Lanner falcon (NT), kori bustard (NT) and Caspian Tern (NT) as species of conservation importance. Blue cranes were sighted during the field survey and the land owner mentioned the presence of martial eagles in the past.

Generally, the proposed solar facility site is not located in a highly sensitive area. The vegetation and habitat of the site occurs in the surrounding environment. Nevertheless, the impact on the environment should be kept to a minimum. This can be attained by limiting disturbance and loss the of vegetation and containing it in clearly demarcated areas. When the vegetation is removed or disturbed during construction due care will have to be taken to prevent erosion. It is suggested that a re-vegetation plan is compiled to ensure the return of vegetation as soon as possible. Run-off from the site will have to be controlled as not to cause soil erosion or increase or decrease runoff or silt transportation to the drainage system thereby affecting the hydrological processes in the greater environment.

These mitigating measures will reduce the impact of the development on the natural vegetation and faunal component, reduce the impact of declared weeds and alien invasive species establishing on disturbed or denuded sites and spreading into the natural vegetation and prevent negative effects on the drainage system present in the landscape.

It is recommended that a collection/destruction permit be obtained from Northern Cape Nature Conservation for the species found on site as for the species that could potentially occur on the site. The specially protected and protected families that should be applied for include: Aizoaceae/Mesembryanthemaceae, Amaryllidaceae, Apocynaceae, Asphodelaceae, Crassulaceae, Iridaceae and Orchidiaceae. Additionally, the genera *Androcymbium*, *Diascia*, *Euphorbia*, *Jamesbrittenia*, *Lachenalia*, *Lessertia*, *Manulea*,

Nemesia, *Ornithogalum*, *Oxalis*, *Pelargonium* and *Sutherlandia* should be applied for since the development will definitely disturb or destroy individuals belonging to these families and genera. Additionally, a permit for the disturbance or destruction of indigenous species must be applied for.

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GENERAL INFORMATION

Project:

Klip Gat Solar Energy Facility near Noupoort (Project name: Terra Solar – Section 2/80)

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The *Curriculum Vitae* and summary of expertise are attached as Appendix D.

Affiliation:

- South African Council for Natural Scientific Professions (SACNASP) (Pr.Sci.Nat.; Registration no. 400193/10).
- Golden Key International Honour Society – Membership upon invitation, granted to the 15% of academic achievers in their field of study. Membership number – 6790927.
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REGULATIONS GOVERNING THIS REPORT

The proposed development is governed by the EIA Regulations under the National Environmental Management Act, (Act No. 107 of 1998 (NEMA)).

Appointment of specialist

Dr Helga van der Merwe was appointed by Savannah Environmental (Pty) Ltd to conduct an Environmental impact assessment and report on findings for the proposed Klip Gat Solar Energy Facility, north-west of Noupoort, to be erected by Terra-Solar Energy (Pty) Ltd on portion 2 of farm 80. The services provided for this study comprise an assessment of the potential impacts of the proposed solar facility and associated infrastructure on the environment, vegetation and fauna as well as the identification of alternatives for the project.

Declaration of independence

A signed declaration of independence is attached as Appendix E.

Indemnity and conditions relating to this report

The opinions, findings, recommendations and conclusions provided in the current report are based on Helga van der Merwe's best scientific and professional knowledge and other available information. If new information should become available then Helga van der Merwe reserves the right to modify aspects of the report. This report (hard copy and/or electronic) must not be amended or extended without the prior written consent of the author. Furthermore, any recommendations, statements or conclusions drawn from or based on this report must make reference to the report. If these recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

Although Helga van der Merwe has exercised due care in preparing this report, she accepts no liability, and by receiving this document, the client indemnifies Helga van der Merwe against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

Scope and purpose of report

The scope and purpose of the report are summarised in the "Terms of Reference" section of this report.

TERMS OF REFERENCE

The specific terms of reference for the Environmental impact assessment (EIA) report include the following:

- Ground-truth and refine the ecological sensitivity map of the site that was developed during scoping. Particular attention will be paid to mapping the distribution of sensitive ecosystems at the site such as wetlands and drainage systems. The rocky areas will also be specifically investigated on account of the higher potential abundance of listed and protected species within these areas.
- Evaluate the likely presence of listed flora and fauna at the site and identify associated habitats that should be avoided to prevent impact on 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.

1. INTRODUCTION

Savannah Environmental (Pty) Ltd appointed Dr Helga van der Merwe to compile a desktop scoping report and later to conduct an ecological assessment for the proposed Klip Gat Solar Energy Facility (on portion 2 of farm 80), near Noupoot in the Northern Cape province.

The establishment of a photovoltaic (PV) solar energy facility and associated infrastructure is proposed within the broader area of approximately 848 hectares. The proposed facility is currently planning on connecting to the Linde/Carolus line in a loop west of the project approximately 200 m away. The basic estimated project size is 75MW using a PV solar system.

In July 2012 a desktop scoping report was compiled and submitted to Savannah Environmental (Pty) Ltd. A site visit was conducted on 16 October 2012 after contacting the land owner in order to assess the condition of the vegetation in October and if plant surveys could be conducted. He stated that the area had had the highest rainfall in 16 years and species should be identifiable. The area indicated by the developer as a 'buildable area' was surveyed in detail and is used as the basis for this Environmental impact assessment report. This report, prepared for Savannah Environmental (Pty) Ltd on behalf of Klip Gat Solar Energy, presents the findings of the desktop scoping study and field survey as well as an assessment of the significance of the impacts of the proposed activity on the environment.

2. ASSUMPTIONS

An area indicated as the 'buildable area' was surveyed in detail. Later (26 October 2012), the location of the access road, substation and power lines were provided. The following assumptions, limitations or uncertainties are listed regarding the ecological assessment of the proposed Klip Gat Solar Energy Facility:

- Information provided on 26 October 2012 indicates the project is planning on connecting to the Linde/Carolus line in a loop west of the project approximately 200 m away.
- On 26 October 2012 the location of the access road, substation and power lines were provided to the specialists.
- The precise location of the workshop area and construction laydown area is not yet known. It is presumed that it would be contained within the proposed site.
- Furthermore, it is assumed that the vegetation will be cleared and the soil levelled in order to construct the necessary foundations on which the photovoltaic panels will be mounted.
- A desktop study and one site visit cannot determine the presence of rare and threatened plant and animal species. To on the side of caution, it has been assumed

that suitable habitat for such species occurs in the area.

- The above-mentioned constraints and assumptions, did not have a significantly negative effect on the study.

3. METHODOLOGY

3.1 Field surveys

3.1.1 Vegetation

Available information on the vegetation and flora in the vicinity of the Klip Gat Solar Energy Facility as well as environmental parameters, such as topography, geology, land types and soils, climate and drainage were collected as part of the desktop scoping study. A plant species checklist for the 3124BA and 3124BB quarter degree grids were obtained from the SIBIS:SABIF Integrating Biodiversity Information database of the South African National Biodiversity Institute.

The stratification on the basis of colour, texture and topography of the Google Earth satellite images indicated relatively homogeneous physiographic units. This stratification was used as the basis for identifying broad habitat and/or vegetation types. In October 2012 vegetation surveys were conducted in the stratified homogenous units mapped. All identifiable plant species encountered on site were recorded. Additionally, environmental parameters such as aspect, topography, soil colour and texture as well as rock cover were noted. A preliminary checklist of species was compiled for each vegetation unit/habitat and the conservation significance of these species determined. Alien invader and exotic species were also noted. The potential impacts identified for the development were considered together with the floral and faunal component information on the site to formulate recommendations.

3.1.2 Fauna

Fauna checklists of species that could potentially occur on the study site were assembled from various databases such as SIBIS:SABIF Integrating Biodiversity Information (grids 3124BA and 3124BB), SABAP lists and Red Data species. Other relevant literature was also consulted.

Any fauna species seen on the site and in the immediate vicinity of the site were noted during the field survey. This information together with the desktop information previously gathered on the fauna as well as flora component information (desktop scoping and site survey) were used to guide the recommendations suggested in this EIA report.

3.2 Data analysis

Plant species data collected during the field surveys were analysed and various vegetation units/habitats were identified on the Klip Gat proposed development site. The conservation status of each species on the plant species checklists and fauna checklists were determined using various methods. Species of conservation importance or significance were identified using, amongst others, Red Data lists. These lists include the Red Data lists of southern African plants compiled by Hilton-Taylor (1996a, 1996b, 1997), the Southern African Plant Red Data list of Golding (2002), the Red List of South African Plants (Raimondo *et al.* 2009), the IUCN Red List of Threatened Species (Version 2011.2, downloaded 25 and 26 July 2012 and 22 October 2012).

Additionally, gazetted legislation was consulted and included the threatened and protected species list (TOPS list) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMA:BA), CITES appendices, Government Notice No. 1002 of 2011 (National list of ecosystems that are threatened and in need of protection, GNR 151 (Critically endangered, vulnerable and protected species list), GNR 1187 (Amendment of critically endangered, endangered, vulnerable and protected species list), protected trees according to the National Forests Act (Act no. 84 of 1998), and the Northern Cape Nature Conservation Act (Act No. 9 of 2009). The Conservation of Agricultural Resources Act (Act 43 of 1983) and its amendments indicate declared weeds and alien invasive plant species and was also consulted.

3.3 Methodology for impact assessment

The evaluation of the overall effect of a proposed activity on the environment is assisted by using Environmental impact assessment methodology. This methodology includes an assessment of the significant direct, indirect, cumulative and residual impacts. The significance of environmental impacts is assessed by means of the criteria including extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).

3.3.1 Nature

The nature of the impact refers to the causes of the effect, what will be affected and how it will be affected.

3.3.2 Extent (E) of impact

Two different states are recognized:

- Local (site or surroundings)
- Regional (provincial)

Rating = 1 (low) to 5 (high).

3.3.3 Duration (D)

The rating for duration (D) is awarded as follows:

Whether the life-time of the impact will be:

- Rating = 1: Very short term – up to 1 year
- Rating = 2: Short term – >1 – 5 years
- Rating = 3: Moderate term - >5 – 15 years
- Rating = 4: Long term – >15 years
The impact will occur during the operational life of the activity, and recovery may occur with mitigation (restoration and rehabilitation).
- Rating = 5: Permanent
The impact will destroy the ecosystem functioning and mitigation (restoration and rehabilitation) will not contribute in such a way or in such a time span that the impact can be considered transient.

3.3.4 Magnitude (M) (severity):

A rating for Magnitude (M) is awarded to each impact as follows:

- Rating = 0: Small impact – the ecosystem pattern, process and functioning are not affected.
- Rating = 2: Minor impact - a minor impact on the environment and processes will occur.
- Rating = 4: Low impact - slight impact on ecosystem pattern, process and functioning.
- Rating = 6: Moderate intensity – valued, important, sensitive or vulnerable systems or communities are negatively affected, but ecosystem pattern, process and functions can continue albeit in a slightly modified way.
- Rating = 8: High intensity – environment affected to the extent that the ecosystem pattern, process and functions are altered and may even temporarily cease. Valued, important, sensitive or vulnerable systems or communities are substantially affected.
- Rating = 10: Very high intensity – environment affected to the extent that the ecosystem pattern, process and functions are completely destroyed and may permanently cease.

3.3.5 Probability (P) (certainty):

The probability (P) describes the probability or likelihood of the impact actually occurring, and is rated as follows:

- Rating = 1: Very improbable – where the impact will not occur, either because of design or historic experience.
- Rating = 2: Improbable – where the impact is unlikely to occur (some possibility), either because of design or historic experience.
- Rating = 3: Probable - there is a distinct probability that the impact will occur (<50% chance of occurring).
- Rating = 4: Highly probable - most likely that the impact will occur (50 – 90% chance of occurring).
- Rating = 5: Definite – the impact will occur regardless of any prevention or mitigating measures (>90% chance of occurring).

3.3.6 Significance (S)

The rating can be low, medium or high. The significance is determined through a synthesis of the characteristics described above where:

$$S = (E+D+M)*P$$

The **significance weighting** should influence the development project as follows:

- Low significance (significance weighting: <30 points)
If the negative impacts have little real effects it should not have an influence on the decision to proceed with the project. In such circumstances there is a significant capacity of the environmental resources in the area to respond to change and withstand stress and they will be able to return to their pre-impacted state within the short-term.
- Medium significance (significance weighting: 30 – 60 points)
If the impact is negative it implies that the impact is real and sufficiently important to require mitigation and management measures before the proposed project can be approved. In such circumstances there is a reduction in the capacity of the environmental resources in the area to withstand stress and to return to their pre-impacted state within medium to long-term.
- High significance (significance weighting: >60 points)
The environmental resources will be destroyed in the area leading to the collapse of the ecosystem pattern, process and functioning. The impact strongly influences the decision whether or not to proceed with the project. If mitigation cannot be effectively implemented, the proposed activity should be terminated.

4. LEGISLATION

In the context of this Environmental impact assessment the following acts are relevant:

Environment Conservation Act (ECA) (No 73 of 1989 Amendment Notice No. R1183 of 1997)

The Environmental Conservation Act has been largely repealed by NEMA, but certain provisions remain, in particular provisions relating to environmental impact assessments. The ECA requires that Schedule 1 activities must undertake Environmental Impact Assessments (EIA). Such activities will only be permitted with written authorisation from a competent authority.

National Environmental Management Act (NEMA) (Act No. 107 of 1998)

The National Environmental Management Act requires measures be taken that 'prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development'. NEMA states that the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.

NEMA requires that: (1) that the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be altogether avoided, are minimised and remedied, (2) that a risk#averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions, and (3) sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004) and amendments

NEM:BA places the responsibility on the developer for:

- (1) the conservation of endangered ecosystems and restricts activities according to the categorisation of an area,
- (2) promotes the appropriate use of environmental management tools to ensure that development is sustainable and protects biodiversity, and
- (3) limits further loss of biodiversity and conserves endangered ecosystems.

Activities are restricted in terms of threatened and protected species while invasive species must be controlled and eradicated.

NEM:BA lists terrestrial ecosystems (Section 53) which are threatened and makes provision for the listing of species (Section 56) that are of such high conservation value, national importance or threatened that they need protection, e.g. critically endangered species, endangered species, vulnerable species and protected species.

National list of ecosystems that are threatened and in need of protection (Government Notice No. 1002 of 2011)

This list lists threatened or protected ecosystems based on national criteria and dictates environmental authorisation required.

Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) and amendments

By combating and preventing erosion and the weakening or destruction of water resources, and by protecting the vegetation and combating declared weeds and alien invader species, CARA legislation provides for the conservation of the natural agricultural resources.

This act classifies alien species into three categories:

(1) Category 1 plants may not occur on any land or inland water surface other than in biological control reserves; while

(2) Category 2 plants may not occur on any land or inland water surface other than a demarcated area or in a biological control reserve. A permit has to be obtained for keeping Category 2 plant species in a demarcated area;

(3) Category 3 includes ornamental plants that may no longer be planted but existing plants may remain (except within the flood line of water courses and wetlands) provided that all reasonable steps are taken to prevent the spreading thereof.

National Water Act (NWA) (Act No. 36 of 1998) and amendments

Any activities that are contemplated that could affect water resources require authorisation in terms of the NWA. This defines wetlands, riparian zones and water courses as water resources and protects them.

National Forests Act (NFA) (Act No. 84 of 1998) and amendments

The NFA states that no person may cut, disturb, damage or destroy (or remove) any tree listed as protected, except under a licence granted by the Minister. Additionally, the NFA makes provision for the declaration of specially protected areas, forest nature reserves, forest wilderness areas and protected woodlands.

National Veld and Forest Fire Act (Act No. 101 of 1998)

This act aims to prevent veld fires through firebreaks and requires fire-fighting measures to be implemented.

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

Activities involving specially protected and protected animals (fauna) are restricted in Section 3 and 4 of the NCNCA. This act states that no person may without a permit hunt, import, export, transport, keep, possess, breed, or trade in a specimen of specially protected or protected species. These sections are subject to certain provisions.

Restricted activities (Sections 49 and 50) involving specially protected and protected plant species are listed in the NCNCA which states that no person may, without a permit, pick, import, export, transport, cultivate or trade in a specimen of a protected plant.

Section 51 involves the picking, receipt, possession, acquisition or handling of indigenous plants and states that no person may, without a permit, pick an indigenous plant:

- (a) on a public road;
- (b) on land next to a public road within a distance of 100 m measured from the centre of the road; or
- (c) within an area bordering a natural water course, whether wet or dry, up to and within a distance of 100 m from the middle of a river on either side of the natural water course.

5. STUDY AREA

5.1 Locality

The proposed Klip Gat Solar Energy Facility is located on portion 2 of farm 80, close to Noupoot in the Northern Cape (Figure 1). This proposed solar (PV) facility site lies on the western side of the farm (Figure 1, 2 and 3). The project is currently planned to connect to the Linde/Carolus line which is located on the site.

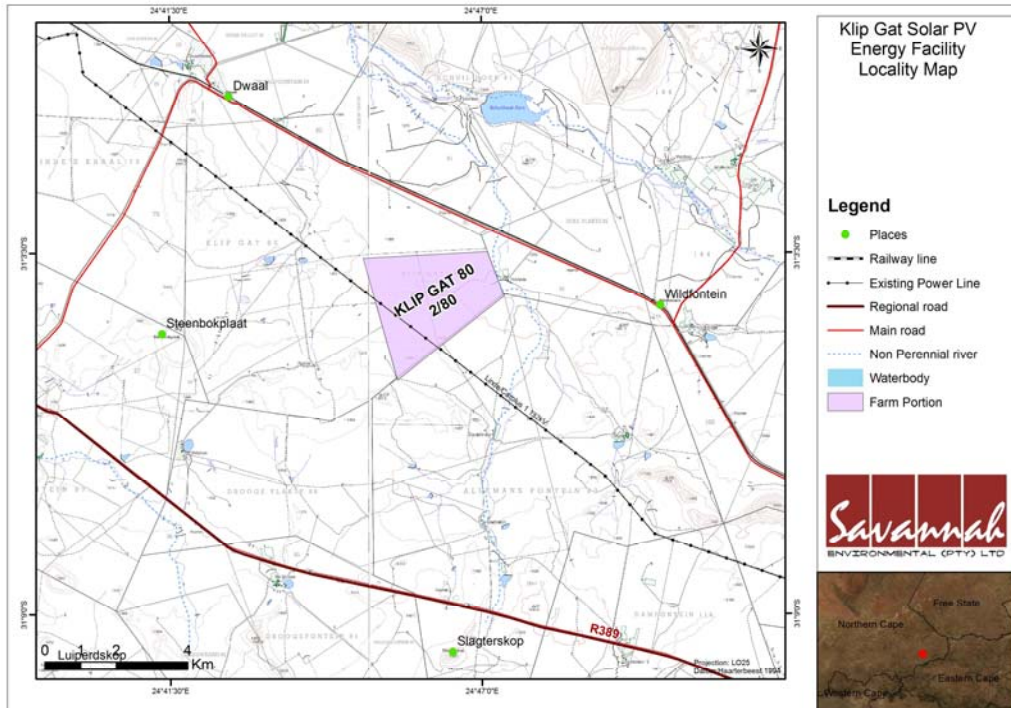


Figure 1. Location of the proposed Klip Gat Solar Energy Facility (map provided by Savannah Environmental (Pty) Ltd).



Figure 2. Location of the proposed Klip Gat Solar Energy Facility. Area outlined in white indicates the 'buildable areas' proposed for the solar facility (image provided by Savannah Environmental (Pty) Ltd).

5.2 Topography

Portion 2 of Farm 80 on which the proposed Klip Gat Solar Energy Facility is situated has a gently undulating topography (Figure 3 and 4). Further north and south of the property, hills and low mountains are evident. No drainage lines are indicated on the topocadastral map however, the satellite images indicate areas that could potentially be seasonal washes and this was confirmed by the site investigation. These areas are however situated outside of the boundaries of the proposed development.

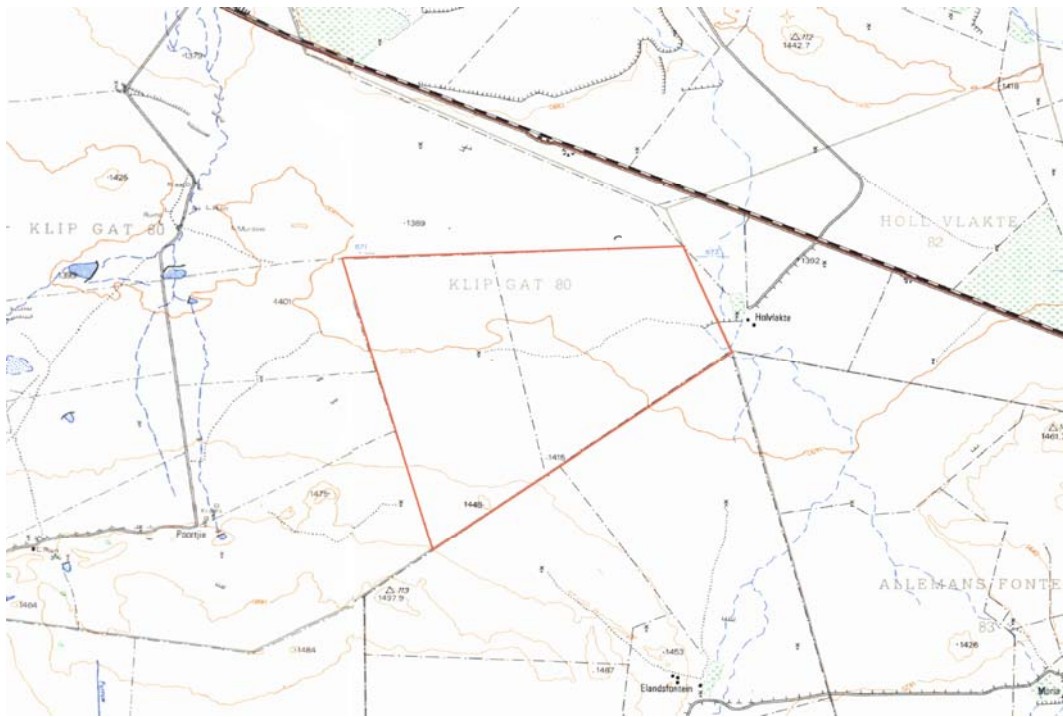


Figure 3. General topography of the proposed Klip Gat Solar Energy Facility site and surrounding environment.



Figure 4. Detail of the site proposed for development of the Klip Gat Solar Energy Facility (Section 2 of farm 80).

5.3 Geology, land types and soils

In general the region is underlain by sedimentary rocks. The proposed Klip Gat Solar Energy Facility site lies on a transition between Quaternary alluvial deposits and red, purple, grey and bluegreen mudstone and subordinate sandstone (Figure 5). Dolerite intrusions are found in the wider surrounding landscape but not on the actual proposed site (Figure 5).

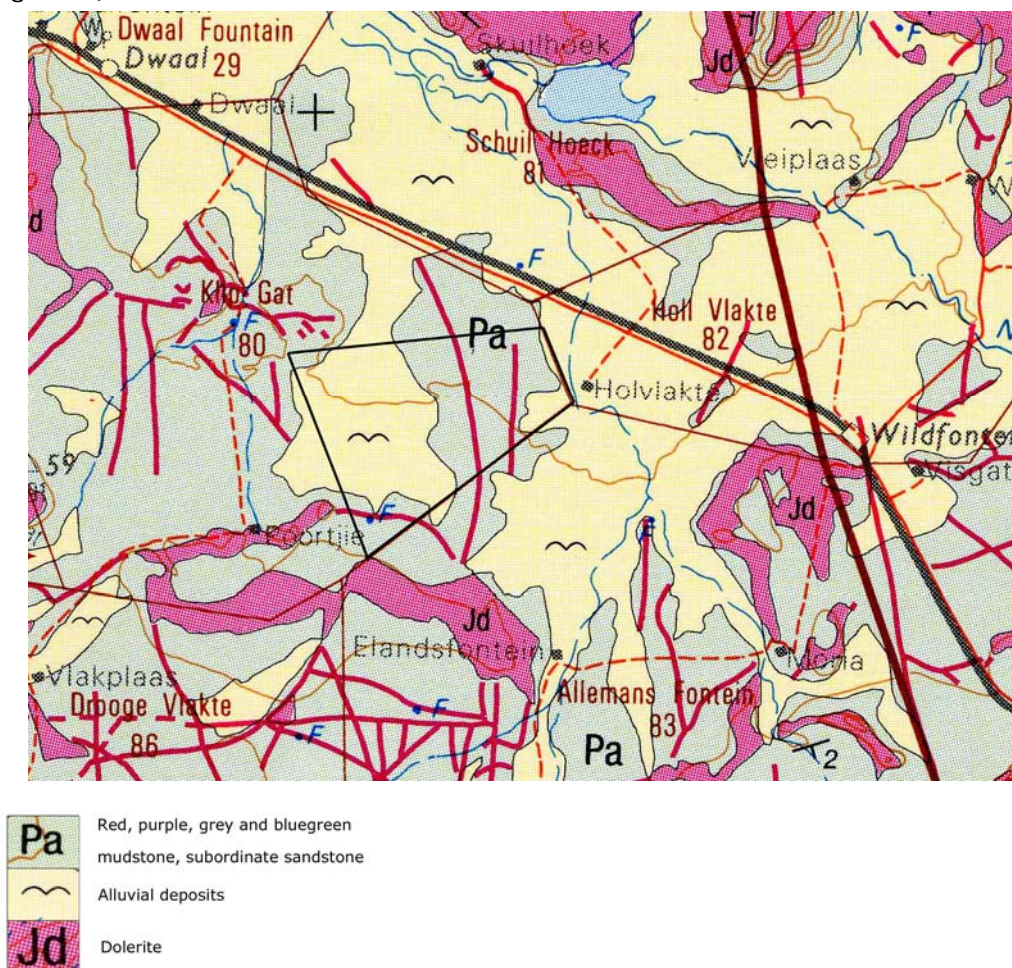


Figure 5. Geology of the proposed Klip Gat Energy Facility.

Land Type Da dominates Section 2 of the farm 80 (Klip Gat). The Da land type characterises areas where more than half of the area is comprised of duplex soils with red B horizons (Figure 6). The soils are not well drained due to their high clay content. These duplex soils are highly erodible. Due care will have to be taken to prevent soil erosion if vegetation is disturbed or destroyed and denuded areas left unstable and exposed.

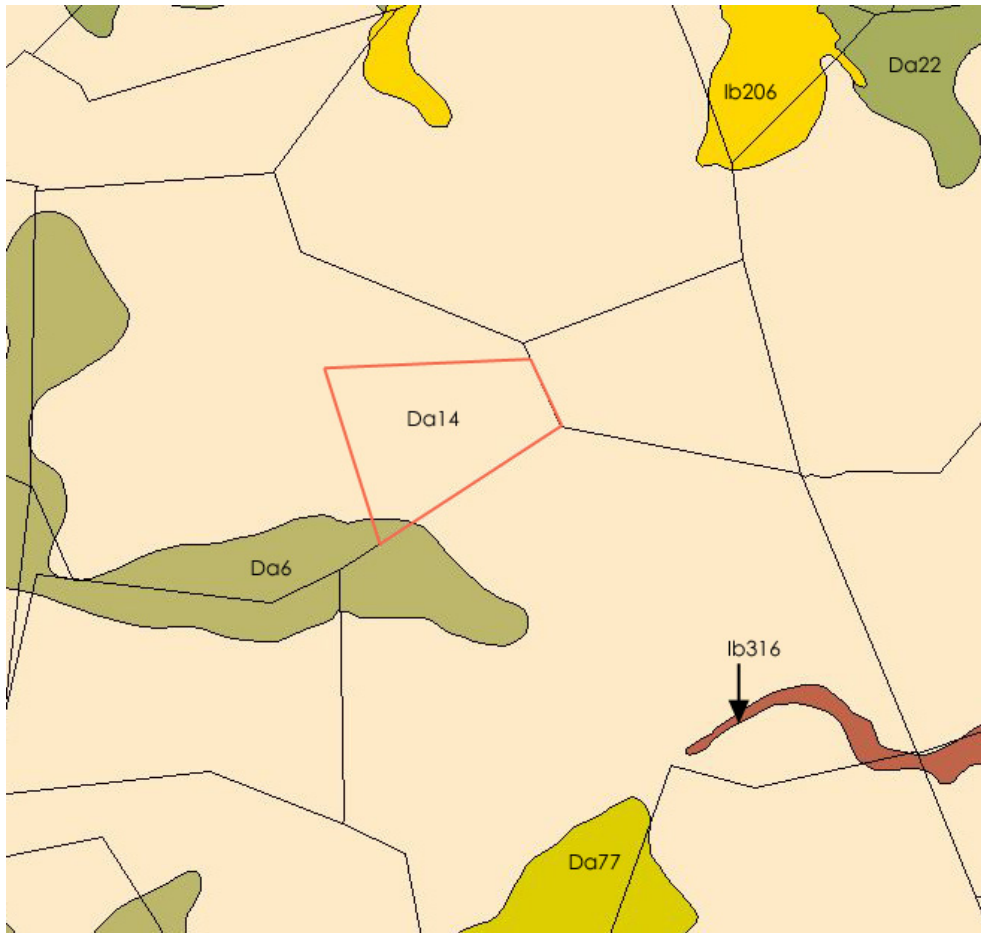


Figure 6. Land types found on the proposed Klip Gat Solar Energy Facility site.

5.4 Climate

The proposed Klip Gat Solar Energy Facility site falls within the summer rainfall region, i.e. rain falls mainly in summer and autumn with rainfall peaks in February and March (Figure 7, Table 1). The mean annual precipitation ranges from 297 mm at Andriesfontein to 438 mm at the Gariiep Dam (Table 1). Grootfontein Agricultural Station's maximum rainfall recorded in a 24 hour-period (Table 2) was for March (93 mm). The highest monthly maximum rainfall recorded for the station was 178 mm recorded in January (Table 2).

The mean maximum temperature for the Grootfontein Agricultural Station (Table 3) is for January (30.4°C), the warmest month, and a mean minimum temperature for July (0.1°C), the coldest month. An extreme maximum of 38.8°C (recorded in January) and an extreme minimum of -10.3°C (recorded in July) has been recorded for the station (Table 3).

Table 1. Rainfall (mm) at a number of rainfall stations in the vicinity of Noupoort

Months	1	2	3	4	5	Mean
Jan	47	35	55	47	36	44.0
Feb	76	46	95	76	60	66.0
Mar	74	63	77	74	52	66.6
Apr	47	29	52	47	41	40.4
May	20	18	27	20	16	19.0
Jun	12	6	14	12	13	11.6
Jul	8	7	8	8	13	9.8
Aug	20	7	14	20	15	14.6
Sep	10	13	7	10	11	10.4
Oct	32	21	29	32	26	27.0
Nov	27	29	25	27	30	29.8
Dec	33	23	35	33	23	30.6
Year	406	297	438	406	336	369.8

- 1 = Grootfontein (31° 29' S, 25° 02' E; 1270 m) (1961 - 1990)
2 = Andriesfontein (30° 57' S, 24° 36' E; 1372 m) (1914 – 1948)
3 = Gariep Dam (30° 37' S, 25° 30' E; 1212 m) (1964 – 1990)
4 = Oviston (30° 42' S, 25° 46' E; 1294 m) (1864 – 1981)
5 = De Aar (30° 39' S, 24° 1' E; 1240 m) (1961 – 1990)

Table 2. Maximum rainfall (mm) in 24 hours, highest maximum and lowest monthly minimum rainfall at Grootfontein (31° 29' S, 25° 02' E; 1270 m) (1961 - 1990)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
*Max	51	51	93	41	29	33	34	69	38	28	50	41	93
*High	178	157	143	108	63	57	56	89	85	93	95	129	569
*Low	1	0	5	2	0	0	0	0	0	0	2	1	235
*Mean	47	53	67	33	14	13	13	17	11	27	38	39	372

- *Maximum = maximum rainfall recorded in 24 hours (mm)
*High = highest monthly maximum rainfall (mm)
*Low = lowest monthly maximum rainfall (mm)
*Mean = mean monthly and annual rainfall (mm)

Table 3. Temperature data (°C) for Grootfontein (31° 29' S, 25° 02' E; 1270 m) (1961 - 1990)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Max	30.4	28.9	26.4	22.4	19.0	16.0	16.5	18.5	22.1	24.3	27.0	29.4	23.4
*Max	38.8	38.0	35.9	32.5	28.9	25.3	24.5	28.1	34.3	35.3	36.0	38.1	38.8
Min	13.1	12.9	11.1	7.1	3.4	0.6	0.1	1.7	4.4	6.9	9.4	11.5	6.9
*Min	4.2	1.2	-0.4	-4.0	-7.8	-10.0	-10.2	-10.3	-6.9	-5.5	-0.9	1.3	-10.3
Mean	21.7	20.9	18.8	14.8	11.2	8.3	8.3	10.1	13.3	15.6	18.2	20.4	15.1

- Max = mean daily maximum temperature for the month (°C)
*Max = extreme maximum temperature recorded per month (°C)
Min = mean daily minimum temperature for the month (°C)
*Min = extreme minimum temperature recorded per month (°C)

A Walter climate diagram compiled using weather data from the Grootfontein Agricultural Station indicates the wet period from January to April with a peak in March and the dry period from about May to December (Figure 7).

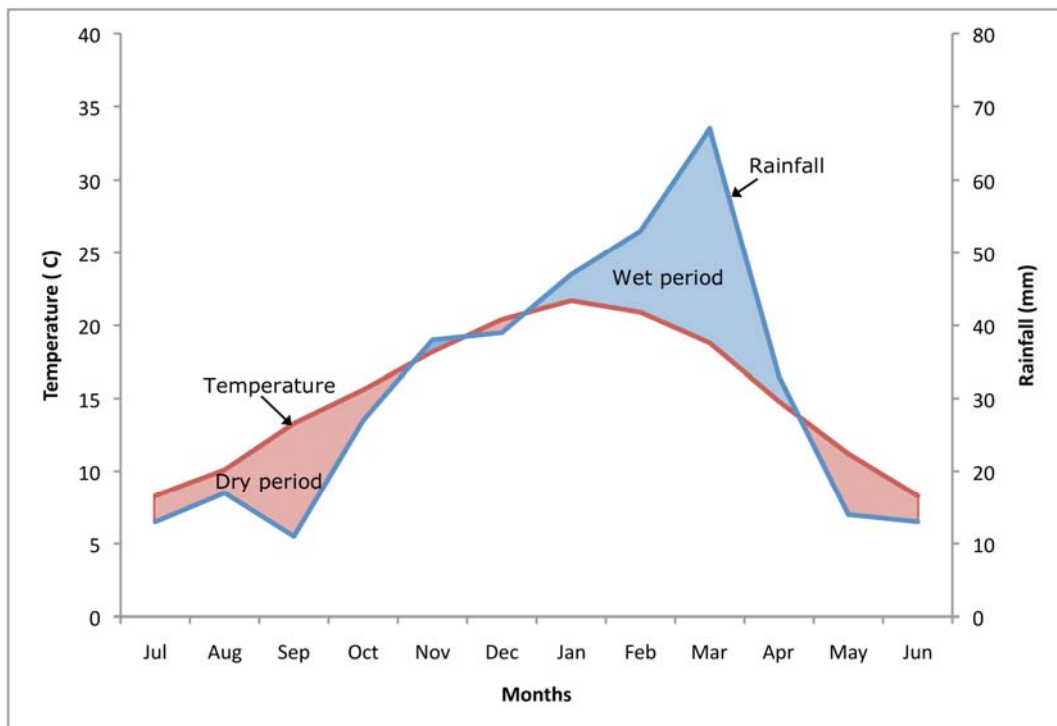


Figure 7. Walter climate diagram indicating weather data collected at the Grootfontein Agricultural Station.

5.5 Land use

Commercial livestock farming is the primary land use of the region. These commercial enterprises farm mainly with sheep and goats. Game is also present on some farms. The natural vegetation is reported to be in various stages of degradation due to overstocking with Acocks (1953) describing the conversion of the grasslands in this region to eroded Karoo as a national disaster.

5.6 Vegetation types

The site falls within the Eastern Upper Karoo (NKu4) of the Nama Karoo Biome (Mucina & Rutherford 2006) (Figure 8). This vegetation type is dominated by grasses and dwarf microphyllous (small-leaved) shrubs. Important taxa include *Lycium* spp. (tall shrubs), the dwarf shrubs *Eriocephalus* spp., *Pentzia* spp., *Helichrysum* spp. and the grasses *Aristida* spp., *Eragrostis* spp. and *Tragus* spp.

The Eastern Upper Karoo (NKu4), according to Mucina and Rutherford (2006), is the largest vegetation type mapped of all the vegetation types (49821 km²). The conservation status of this vegetation type is listed as Least Threatened with a 21% conservation target (Mucina and Rutherford 2006). Large dams have been built in this vegetation type and about 2% of the land surface has been transformed. Oviston, Commando Drift, Rolfontein and Gariep Dam Nature Reserves, formally conserve this vegetation type.

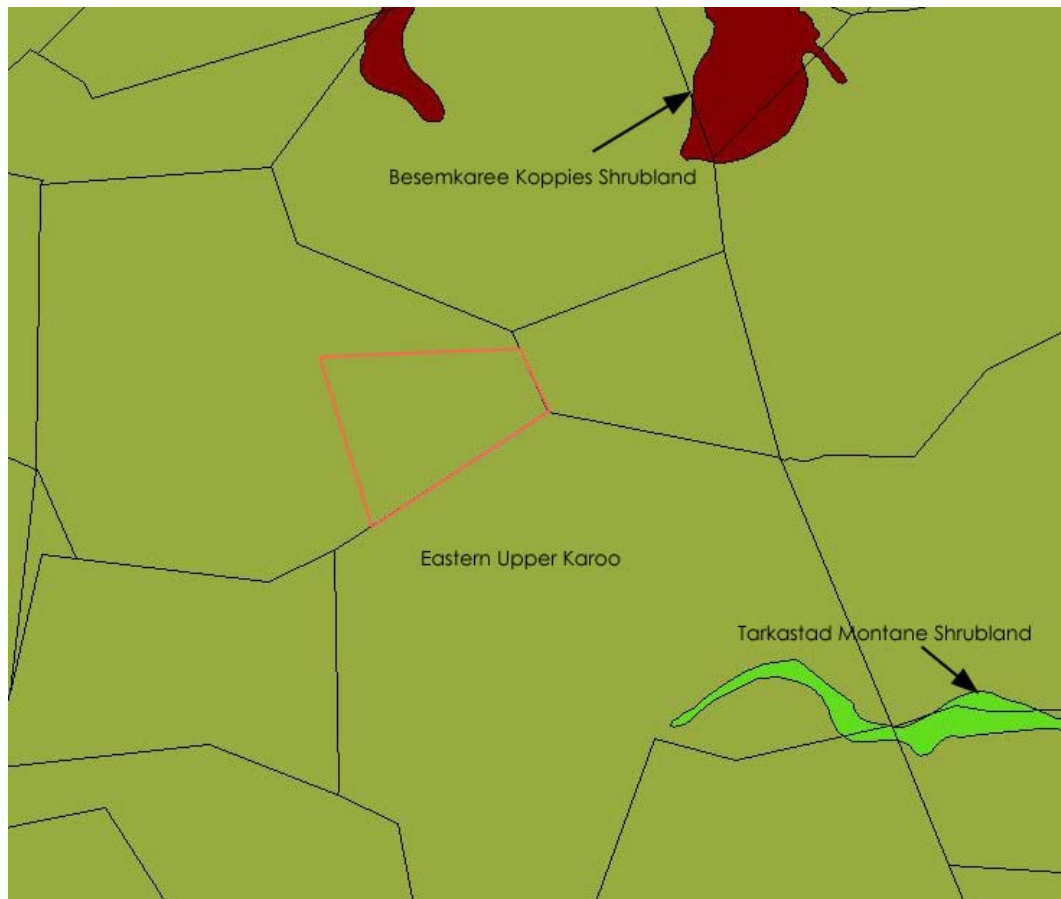


Figure 8. The proposed Klip Gat Solar Energy Facility site (indicated in red) located within the Eastern Upper Karoo vegetation type (Mucina & Rutherford (2006)).

To the north of the proposed site the Besemkaree Koppies Shrubland (Gh4) vegetation type is found (Mucina & Rutherford 2006). This vegetation type covers approximately 9678 km². The lower layer of the vegetation is dominated by dwarf microphyllous (small-leaved) shrubs and grasses, whereas the upper layer is dominated by tall shrubs such as *Searsia erosa*, *Searsia burchellii*, *Euclea crispa* and *Diospyros austro-africana*. To the south-east of the site the Tarkastad Montane Shrubland (Gs17) vegetation type occurs. Ridges, hills and isolated mountain slopes characterise this vegetation type. These areas are covered with low, semi-open, mixed shrubland and prominent species include:

Diospyros austro-africana, *Euryops annae*, *Aristida* spp., *Cynodon incompletus* and *Eragrostis* spp.

6. FINDINGS OF THE ASSESSMENT

6.1 Vegetation

Vegetation data of species collected in the quarter degree grids (3124BA and 3124BB) were downloaded from the SIBIS:SABIF Integrating Biodiversity Information website and is included as an appendix (Appendix A). Since two quarter degree grids cover a substantially larger area than the Klip Gat site, this list of species includes many species found in vegetation types and habitats not present on the Klip Gat site.

The flora species of conservation significance found included in the 3124BA quarter degree grid is *Asparagus stipulaceus* (Near Threatened). In the grid 3124BB are two Near Threatened species, *Asparagus stipulaceus* and *Gnaphalium declinatum*, and a Critically Endangered species *Marasmodes undulata*. None of these species were encountered during the site investigation.

A field survey was conducted on 26 October 2012 which is not the ideal time of the year to conduct field surveys in the Nama Karoo, however, the landowner suggested that the survey could be conducted since the area had abnormally good winter rains.

Section 2 of farm 80, Klip Gat, falls within the Eastern Upper Karoo (NKu4) vegetation type (Mucina & Rutherford 2006). The site on which the proposed development is to take place is characterised by a combination of dwarf shrubs and grass species. Two plant communities were identified on the site (Figure 9). These communities are the (1) *Pentzia incana* dominated mixed dwarf shrubland-grassland community and the (2) *Tragus koelerioides* dominated mixed dwarf shrubland-grassland community.

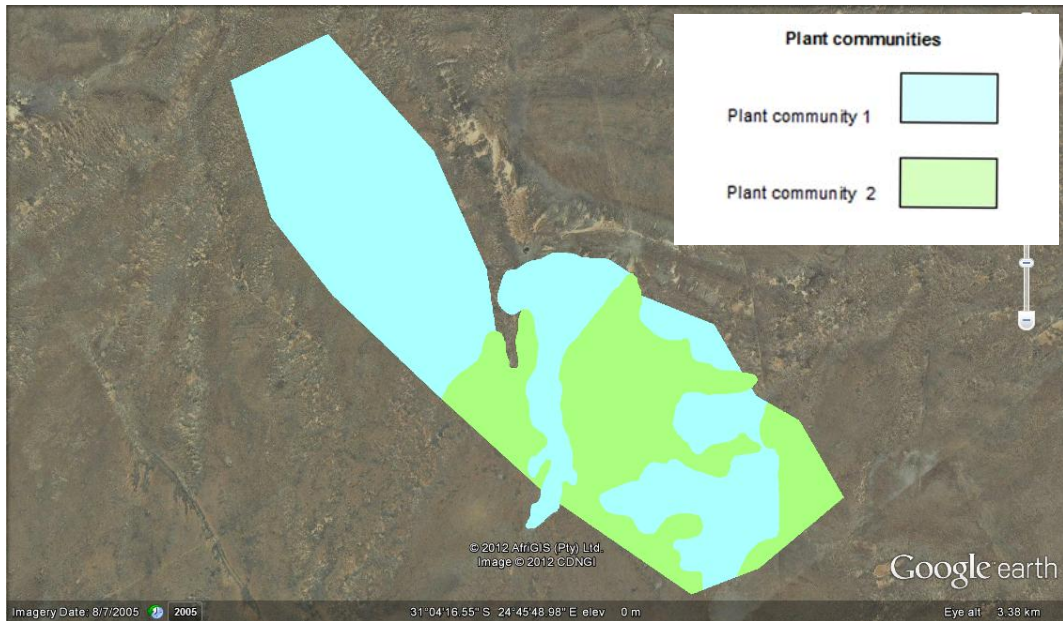


Figure 9. Map indicating the two plant communities found on the proposed Klip Gat development site.

***Pentzia incana* dominated mixed dwarf shrubland-grassland community**

This plant community is characterised by dwarf shrub species such as *Pentzia incana* (dominant), *Eriocephalus ericoides* (dominant), *Rosenia oppositifolia* (dominant), *P. globosa* and *Ruschia cradockensis*. Grass species found in this community include *Sporobolus fimbriatus* (dominant), *Tragus koeleroides* (dominant), *Eragrostis obtusa*, *Enneapogon desvauxii*, *Melica decumbens* and *S. iocladius*, (Table 4, Figure 10). The vegetation cover in this plant community is highly variable and numerous bare areas and capped soils are found throughout this community (Figure 11).



Figure 10. *Pentzia incana* dominated mixed dwarf shrubland-grassland community.



Figure 11. Bare capped soils scattered through community 1.

Species of conservation significance found in community 1 are the *Euphorbia* species, the family Iridaceae and therefore all *Morea* species and the family Mesembryanthemaceae/Aizoaceae and therefore all *Ruschia* species (according to the

NCNCA, Red Data status and CITES), (Table 4). All the species noted in this plant community are listed as Least Concern according to the IUCN Red Data list. However, the NCNCA regulates activities with respect to all flora indigenous to the Northern Cape.

Table 4. Species characteristic of the *Pentzia incana* dominated mixed dwarf shrubland-grassland

Species	Red Data status	NCNCA status	CITES status
<i>Albuca</i> sp.	-		
<i>Asparagus capensis</i>	LC		
<i>Asparagus mucronatus</i>	LC		
<i>Berkheya</i> cf. <i>annectens</i>	LC		
<i>Enneapogon desvauxii</i>	LC		
<i>Eragrostis obtusa</i>	LC		
<i>Eriocephalus ericoides</i>	LC		
<i>Euphorbia</i> cf. <i>aequoris</i>	LC	P	II
<i>Lycium cinerium</i>	LC		
<i>Melica decumbens</i>	LC		
<i>Moraea</i> cf. <i>pallida</i>	LC	P	
<i>Osteospermum spinescens</i>	LC		
<i>Pentzia globosa</i>	LC		
<i>Pentzia incana</i>	LC		
<i>Pteronia sordida</i>	LC		
<i>Rosenia oppositifolia</i>	LC		
<i>Ruschia cradockensis</i>	LC	P	
<i>Salsola tuberculata</i>	LC		
<i>Selago</i> cf. <i>saxatilis</i>	LC		
<i>Sporobolus fimbriatus</i>	LC		
<i>Sporobolus iocladius</i>	LC		
<i>Tragus koeleroides</i>	LC		
<i>Wahlenbergia</i> sp.	-		

***Tragus koeleroides* dominated mixed dwarf shrubland-grassland community**

The second plant community is characterised by the following dwarf shrubs: *Pteronia glomerata* (dominant), *Rosenia oppositifolia* (dominant), *Eriocephalus ericoides*, *Nenax microphylla* and *Selago* cf. *saxatilis*. Grass species include *Tragus koeleroides* (dominant), *Eragrostis chloromelas* (dominant), *Aristida diffusa* and *Sporobolus iocladius* (Figure 12).



Figure 12. *Tragus koeleroides* dominated mixed dwarf shrubland-grassland community.

Species of conservation significance, according to the NCNCA, IUCN Red Data lists and CITES found in community 2 are the family Iridaceae (therefore *Morea* species) and the family Mesembryanthemaceae/Aizoaceae (and therefore *Trichodeodema* species), (Table 5). All the species noted in this plant community are listed as Least Concern according to the IUCN Red Data lists. All indigenous flora, indigenous to the Northern Cape, are regulated by the NCNCA.

Table 5. Species characteristic of the *Tragus koeleroides* dominated mixed dwarf shrubland-grassland

Species	Red Data status	NCNCA status	CITES status
<i>Albua</i> sp.	-		
<i>Amphiglossa triflora</i>	LC		
<i>Aptosimum procumbens</i>	LC		
<i>Aristida diffusa</i>	LC		
<i>Asparagus capensis</i>	LC		
<i>Berkheya</i> cf. <i>annectens</i>	LC		
<i>Chrysocoma ciliata</i>	LC		
<i>Diospyros austro-africana</i>	LC		
<i>Enneapogon desvauxii</i>	LC		
<i>Eragrostis obtusa</i>	LC		
<i>Eriocephalus ericoides</i>	LC		
<i>Eriocephalus spinescens</i>	LC		
<i>Helichrysum luciloides</i>	LC		
<i>Moraea</i> cf. <i>pallida</i>	LC	P	
<i>Nenax microphylla</i>	LC		
<i>Pteronia glomerata</i>	LC		
<i>Pteronia sordida</i>	LC		

<i>Rosenia glandulosa</i>	LC		
<i>Rosenia humilus</i>	LC		
<i>Rosenia oppositifolia</i>	LC		
<i>Selago cf. saxatilis</i>	LC		
<i>Sporobolus iocladius</i>	LC		
<i>Thesium hystrix</i>	LC		
<i>Tragus koelerioides</i>	LC		
<i>Trichodeodema cf. pomeridianum</i>	LC	P	

It is recommended that a collection/destruction permit be obtained from Northern Cape Nature Conservation for the species found on site and for the species that could potentially occur on the site. Specially protected and protected families Aizoaceae/Mesembryanthemaceae, Amaryllidaceae, Apocynaceae, Asphodelaceae, Crassulaceae, Iridaceae and Orchidiaceae should be applied for. Additionally, the genera *Androcymbium*, *Euphorbia*, *Diascia*, *Jamesbrittenia*, *Lachenalia*, *Lessertia*, *Manulea*, *Nemesia*, *Ornithogalum*, *Oxalis*, *Pelargonium* and *Sutherlandia* should be applied. A permit for the disturbance or destruction of indigenous species should also be applied for.

6.2 Fauna (mammals, reptiles, amphibians, invertebrates and avifauna)

The SIBIS:SABIF Integrating Biodiversity Information website was used to generate lists of fauna that could potentially occur on the proposed Klip Gat site (Appendix B). These data are generated for the quarter degree grids 3124BA and 3124BB. Species on the generated lists would not necessarily be found on site, since the habitat on site would not necessarily be suitable for all these species.

The two quarter degree grid lists generated using SIBIS:SABIF Integrating Biodiversity Information were supplemented using other databases e.g. SABAP2 and relevant literature sources such as Skinner and Chimimba (2005), Branch (1998), Branch (2008), Carruthers (2001), Friedman and Daly (2004) and the latest Red Data Lists (IUCN 2011).

Various species of conservation significance were found within the 3124BA and 3124BB quarter degree grids (Appendix B). Mammals such as the black-footed cat (VU, CITES II), African wild cat (CITES II), white-tailed mouse (EN), leopard (NT, CITES I), aardwolf (CITES III) and birds, for example, the blue crane (VU, CITES II), Verreaux's eagle (CITES II), black stork (CITES II), blue bustard (NT), lesser kestrel (CITES II), greater kestrel (CITES II), rock kestrel (CITES II), Ludwig's bustard (EN, CITES II), black harrier (VU) and martial eagle (NT) are listed as of conservation significance.

The Klip Gat site is situated in the Platberg-Karoo conservancy (border farm) which is an Important Bird Area. Additional bird data collected from the Southern African Bird Atlas Project (SABAP 2) was used to flag additional bird species of conservation significance.

The bird species that could potentially be residents in the area, as well as migrants are listed in Appendix C. This SABAP 2 list indicates the blue crane (VU), Lesser Kestrel (VU), Ludwig's Bustard (VU), blue korhaan (NT), greater flamingo (NT), secretary bird (NT), Lanner falcon (NT), kori bustard (NT) and Caspian Tern (NT) as species of conservation importance. Blue cranes were sighted during the field survey and the land owner mentioned the presence of martial eagles in the past.

Signs of mole activity as well as porcupines were seen during the field survey. The landscape is littered with termitaria (Figure 12).



Figure 12. Termitaria present in the Klip Gat proposed development site.

6.3 Water courses, drainage lines and wetlands

No drainage lines are indicated on the topocadastral map of Section 2 of farm 80 (proposed Klip Gat site). However, a stratification of satellite images indicated areas that could potentially be seasonal washes and pans systems. This was confirmed by the field survey however, these areas are situated outside of the 'buildable areas' on which the proposed development could take place.

6.4 Sensitive areas

The stratification of satellite images of the proposed area to be developed indicates various vegetation/habitat types on the property. The site survey conducted during the EIA phase identified various vegetation and/or habitat units. In addition to information

gathered at the scoping phase, information gathered in the field was used to inform the impact assessment (potential impacts and their rating) and provide inputs into the management plan which forms an integral part of the EIA process.

7. IMPACT ASSESSMENT

7.1 Description of potential impacts of the proposed development

Potential impacts of the proposed development were identified for the Klip Gat site. Detail on the placement of the substation, access road and power line were provided on 26 October 2102 however, no detail has yet been provided on the construction laydown area or workshop area at the time when this report was compiled and it is assumed these areas will be contained within the 'buildable areas' indicated on the development site. For each site the potential impacts were evaluated separately for the construction and operational phases of project implementation.

7.1.1 Construction phase: Klip Gat site

- Impact on the natural vegetation

A direct loss of vegetation will arise from the construction of the panel foundations, substation and workshop area. Similarly, the establishment of a construction laydown area and upgrading of the existing access road to the necessary standards will lead to a direct loss of vegetation. The linking of the new power line to the existing Eskom line will also disturb the vegetation. Removal or disturbance of vegetation and the associated loss of habitat impacts on all plant species, i.e. the common, endemic and Red Data species. However, the footprint of the proposed development in relation to the surrounding environment is small, and because no protected trees, or threatened species were found at the proposed development site the development of the site will not have a major effect on the functioning and processes across the vegetation of the region.

- Impact on the spread of declared weedy and alien invasive plant species

The removal or disturbance of the natural vegetation on the site during the construction phase provides an ideal opportunity for declared weeds and invasive species to establish. Declared weedy and invasive plant species in the surrounding environment pose a threat to the remaining natural vegetation as well as the re-establishing vegetation. Species such as *Gomphocarpus fruticosus*, *Opuntia lindheimeri*, *Datura* spp., *Salsola kali*, *Amaranthus* spp. *Chenopodium* sp. and *Cirsium vulgare* could possibly establish and spread on the development site and into the natural vegetation around the site. Species listed in the Conservation of Agricultural Resources Act as Category 1 & 2 species will have to be controlled during the construction phase in order to limit their establishment and spread (on and off site) during the operational phase.

- Impact on fauna

The construction phase will lead to the disturbance and a loss of fauna habitat. Since the surrounding environment contains the same habitat, the mobile animal species are expected to disperse into these surrounding areas during the construction of the proposed development. The areas of natural vegetation left intact within the proposed development site are expected to be re-colonised by some of the faunal components that will return to the site once the construction phase has been completed. There are some threatened bird species, for example, blue crane, lesser kestrel, blue korhaan, secretary bird, Lanner falcon, Caspian tern, martial and tawny eagle, Cape vulture, Kori bustard and Ludwig's bustard, that utilise the habitats on site and in the surrounding environment. These species will avoid the area during the construction phase. Blue cranes were encountered on the development site and the land owner mentioned the presence of martial eagles. An avifauna specialist will have to ground-truth the final layout of the site in order to ensure that there are no blue crane nests and/or chicks on site before construction commences and no eagle nests are present in the immediate vicinity of the proposed development site.

- Impact on the drainage system

Care should be taken to prevent any impact on the drainage system of the greater Klip Gat area. This will imply that measures need to be implemented to prevent erosion from occurring where the vegetation has been disturbed or removed during construction. Runoff speed should be sufficiently slowed down and the amount of water reduced in order to limit erosion on site and in the immediate surrounds. Silt transportation should also be considered and the influence of the development on silt transportation. The land owner relies on underground water for irrigation purposes and thus the development should take into consideration the impact of any additional development on the ground water of the area and not place additional pressure to underground water resources.

7.1.2 Operational phase: Klip Gat site

- Impact on the natural vegetation

Natural vegetation should gradually begin to recolonise the disturbed and denuded areas following the construction phase. However, invasive weedy species will also colonise the area and may threaten the re-establishment of the natural vegetation. The rate at which the indigenous species re-establish will depend on the extent of the initial disturbance and the amount and types of seeds present in the seed bank. Different species may establish at different rates. An active re-vegetation plan should be implemented to assist the return of the natural indigenous species.

- Impact on the spread of declared weedy and alien invasive plant species

The construction phase will provide declared weedy and invader plant species an opportunity to establish on the disturbed and denuded areas. These declared weed and

alien invasive species will have to be actively controlled as not to negatively impact on the newly re-establishing natural vegetation. Species listed in the Conservation of Agricultural Resources Act as Category 1 & 2 species will have to be monitored and controlled during the operational phase of the proposed solar facility.

- Impact on fauna

Faunal components will re-colonise habitats that become available with the return of the re-establishing natural vegetation following the construction phase. Reflection from the solar panels will however, probably make the site unsuitable for most bird species. Vehicle movement and human activities may also make the site unsuitable for certain faunal components.

- Impact on the drainage system

Changes in runoff patterns off of the developed site during the operational phase could affect the hydrological processes in the landscape. The necessary mitigation measures will have to be in place in order to mitigate, for example, increased water runoff amounts and speeds as well as silt transportation.

7.1.3 Construction & operational phases: substation and power line

- Impact on the natural vegetation

Construction of the substation and power line will lead to a direct loss of vegetation at the footprint of the substation and pylon sites. Removal of vegetation and the associated loss of habitat impacts on the common, endemic and Red Data species. Some disturbance of the vegetation, beyond the footprints of the substation and power line will also result during the construction phase. Although the loss of the natural vegetation at the footprint of these infrastructural components will be permanent, the area covered will be small in relation to the surrounding environment.

- Impact on the spread of declared weedy and alien invasive plant species

Declared weedy and invasive plant species are found in the environment surrounding the proposed solar facility site. The removal of the natural vegetation on the substation site and pylon sites and the associated disturbance of natural habitats provide an ideal opportunity for declared weeds and invasive species to establish. Species listed in the Conservation of Agricultural Resources Act as Category 1 & 2 species will have to be controlled during the construction and operational phases.

- Impact on fauna

Impacts on the fauna populations on the substation and pylon sites relate to a loss of habitat and disturbance during the construction phase. Since the surrounding environment contains the same habitat, the fauna species are expected to move into these surrounding areas during construction. Because the loss of habitat at the substation and pylon footprint is permanent no return of animal species is likely during

the operational phase however, the rehabilitating disturbed areas could provide suitable habitat over time. According to the Northern Cape Nature Conservation Act, various faunal species are specially protected and protected fauna and may not be hunted or harmed. The drainage system provides habitat to a special suite of animal species and care should be taken not to disturb this system.

Bird collisions with overhead power lines are of great concern. Threatened bird species such as blue cranes, bustards, flamingo's and water birds are usually among the most affected species. This situation can be mitigated to a large degree by making the power lines more visible to the birds using various techniques. An avifauna specialist should provide site specific recommendations.

- Impact on the drainage system

The construction of the substation and overhead power lines could increase the erosion originating from the site and this could impact the drainage system. The necessary precautions to prevent erosion must be taken to limit the impact on hydrological processes in the landscape.

7.1.4 Construction & operational phases: access road

- Impact on the natural vegetation

The access road follows the same route as the current farm track. Nevertheless, the access road to the facility will be wider and surfaced by some means compared to the current track and some loss of the natural indigenous vegetation will inevitable occur. The loss and disturbance of natural vegetation should be limited as much as possible.

- Impact of the spread of declared weedy and alien invasive plant species

The broadening of the road will create an opportunity for declared weeds and invasive species to establish and spread into disturbed and denuded areas. Species listed in the Conservation of Agricultural Resources Act as Category 1 & 2 species will have to be monitored and controlled during both the construction and operational phases.

- Impact on fauna

The construction of the access road will cause a permanent loss of habitat to animal species. Disturbed areas should re-vegetate over time and re-create suitable habitats for fauna species that could gradually be recolonised.

- Impact on the drainage system

The construction of the access road could be done in such a way that there is no or a very limited impact on the drainage system. Water runoff (speed and amount) from the road will have to be controlled in order to avoid erosion and silt transportation mitigated in order to prevent damage to the drainage system further downstream.

7.2 RATING OF POTENTIAL IMPACTS

The potential impacts identified include the impact on the natural vegetation, the impact on the spread of declared weedy and alien invasive species, impact on the fauna and the impact on the drainage system in the greater landscape.

The rating of the potential impacts has been grouped into the construction phase and operational phase for the Klip Gat site.

7.2.1 Construction phase: Klip Gat site

Table 6. Summary of impacts of the proposed solar energy facility on the Klip Gat site during the construction phase

A) Nature: Impact of the construction phase on the natural vegetation		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Long-term (4)	Medium-term (3)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Definite (5)	Definite (5)
Significance (S = E+D+M) * P	Medium (55)	Medium (40)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	Partially irreplaceable	Partially irreplaceable
Can impacts be mitigated?	Low degree	
Mitigation: Development should be contained within the proposed development site and unnecessary disturbance adjacent to the site should be avoided. Construction areas should be clearly demarcated and all development contained within this area. The denuded and disturbed site should be re-vegetated as soon as possible. Declared weeds and invader species controlled throughout the construction phase.		
Cumulative impacts: Additional infrastructure development, for example, new power lines and upgrading the access road; the spread of alien invaders due to loss of natural vegetation; and increased water runoff (speed, amount, silt transportation) leading to erosion will exacerbate the negative impact of the development on the vegetation and will lead to a loss of habitat for indigenous fauna and flora.		
Residual impacts: Despite mitigation measures some loss of the vegetation is inevitable. However, because the vegetation type is large the overall impact on the vegetation type as a whole will be small.		

B) Nature: Impact of the construction phase on the spread of declared weeds and alien invasive plant species		
	Without mitigation	With mitigation
Extent (E)	Site & surrounds (2)	Site & surrounds (2)
Duration (D)	Long-term (4)	Medium-term (3)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) *P	Medium (48)	Low (27)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Low degree	Low degree
Can impacts be mitigated?	High degree	
<p>Mitigation: Development should be restricted to the proposed development site and the disturbance to the surrounding vegetation be restricted to a minimum. Disturbed areas should be rehabilitated as soon as possible following the construction of the development. A monitoring program should be established for the early detection and control of alien invasive plant species.</p>		
<p>Cumulative impacts: The establishment of declared weedy and alien invasive plant species could lead to their spread into the surrounding natural vegetation and onto neighbouring properties. Their presence may also slow down the recovery of the natural vegetation on disturbed/denuded areas.</p>		
<p>Residual impacts: Low residual impact if the declared weedy and alien invasive species are effectively controlled.</p>		

C) Nature: Impact of the construction phase on the fauna		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Long-term (4)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Definite (5)	Highly probable (4)
Significance (S = E+D+M) *P	Medium (60)	Medium (36)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	Partially irreplaceable	Partially irreplaceable
Can impacts be	Low degree	

mitigated?		
Mitigation:		
Limit disturbance to the clearly demarcated proposed development site and ensure that minimum disturbance takes place in the surrounding area. Disturbed areas should be rehabilitated as soon as possible following the construction of the facility in order to promote re-establishing faunal habitats.		
Cumulative impacts:		
Loss and/or disturbance of the natural vegetation and its associated habitat and an increase in declared weedy and alien invasive species could have a negative impact on the faunal component.		
Residual impacts:		
Residual impacts depend on the intensity and permanence of the disturbance and the rate at which the natural vegetation returns. The degree to which the faunal component returns to the site will largely depend on the success of the re-vegetation of the site.		

D) Nature: Impact of the construction phase on the drainage system		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Medium (3)
Magnitude (M)	High (8)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) *P	Medium (56)	Low (24)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Irreversible	High degree
Irreplaceable loss of resources?	Irreplaceable	Low degree
Can impacts be mitigated?	High degree	
Mitigation:		
Water runoff (amount and speed) from the proposed development site should be controlled to limit erosion damage to the developed site and surrounding areas. Silt transportation will also have to be mitigated in order to prevent a negative impact on the drainage system in the larger landscape. Ground water usage in the vicinity of the development should be limited as not to decrease water that should migrate along the drainage system.		
Cumulative impacts:		
A lack of natural vegetation to stabilise soils will lead to soil erosion which will exacerbate the pressure on the hydrological processes in the region.		
Residual impacts:		
Small, if mitigation takes place to limit/nullify the impact on the drainage system.		

7.2.2 Operational phase: Klip Gat site

Table 7. Summary of impacts of the proposed solar energy facility on the Klip Gat site during the operational phase

A) Nature: Impact of the operational phase on the natural vegetation		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Permanent (5)
Magnitude (M)	Low (4)	Minor (2)
Probability (P)	Definite (5)	Definite (5)
Significance (S = E+D+M) *P	Medium (50)	Medium (40)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	Partially irreplaceable	Partially irreplaceable
Can impacts be mitigated?	Low degree	
Mitigation: Disturbance should be contained within the proposed development and unnecessary disturbance adjacent to the site be avoided.		
Cumulative impacts: The spread of declared weeds and alien invaders and increased water runoff resulting in erosion will exacerbate the impact and lead to the further loss of natural vegetation and habitat for indigenous fauna and flora.		
Residual impacts: Although some of the natural vegetation will return to disturbed and denuded areas, it is highly unlikely that it will contain the full diversity of species present on the site before the development. If mitigation is successful in restricting disturbance to the site the residual impacts should be low.		

B) Nature: Impact of the operational phase on the spread of declared weeds and alien invasive plant species		
	Without mitigation	With mitigation
Extent (E)	Site & surrounds (2)	Site & surrounds (2)
Duration (D)	Long-term (4)	Medium-term (3)
Magnitude (M)	Low (4)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) *P	Medium (40)	Low (27)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of	Low degree	Low degree

resources?		
Can impacts be mitigated?	High degree	
<p>Mitigation: Disturbance should be restricted to the proposed development site and disturbance to the surrounding vegetation should be kept to a minimum. Implement a monitoring program for the early detection of declared weedy and alien invasive plant species. Implement a control program to combat declared weedy and alien invasive plant species, quickly and effectively.</p>		
<p>Cumulative impacts: The establishment of declared weeds and alien invasive plant species could lead to their spread into the surrounding natural vegetation and onto neighbouring properties.</p>		
<p>Residual impacts: Low residual impact if the declared weedy and alien invasive species are monitored and controlled throughout the operational phase.</p>		

C) Nature: Impact of the operational phase on the fauna		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Long-term (4)	Long-term (4)
Magnitude (M)	Low (4)	Minor (2)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M)*P	Medium (36)	Low (21)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	Partially irreplaceable	Partially irreplaceable
Can impacts be mitigated?	Low degree	
<p>Mitigation: Limit disturbance to the proposed development site and ensure that the minimum disturbance takes place in the surrounding area.</p>		
<p>Cumulative impacts: Disturbance of the surrounding natural vegetation and an increase in declared weedy and alien invasive species could have a significantly negative impact on faunal habitat and thus the faunal component.</p>		
<p>Residual impacts: The degree to which the faunal component returns to the site will largely depend on the success of the re-vegetation of the site and the management of the site during the operational phase.</p>		

D) Nature: Impact of the operational phase on the drainage system		
	Without mitigation	With mitigation

Extent (E)	Local (1)	Local (1)
Duration (D)	Long-term (4)	Medium (3)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Probable (3)	Probable (3)
Significance (S = E+D+M) *P	Medium (33)	Low (24)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Irreversible	Medium degree
Irreplaceable loss of resources?	Irreplaceable	Low degree
Can impacts be mitigated?	High degree	
Mitigation: During the operational phase water runoff from the site should be controlled to limit erosion damage to the surrounding areas and drainage system. Ground water usage in the vicinity of the development should be limited as not to additionally decrease water that should migrate along the drainage system.		
Cumulative impacts: Soil erosion originating from the developed site and associated infrastructure will exacerbate the pressure on the hydrological processes in the region.		
Residual impacts: Small, if mitigation is successful.		

7.2.3 Construction & operational phases: substation and power line

Table 8. Summary of impacts of the proposed substation and power line

A) Nature: Impact of the construction and operational phases on the natural vegetation		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Permanent (5)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Definite (5)	Definite (5)
Significance (S = E+D+M) *P	Medium (60)	Medium (50)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Irreplaceable	Irreplaceable
Can impacts be mitigated?	Low degree	
Mitigation: Development should be contained in the proposed footprint of the substation and pylons		

and unnecessary disturbance adjacent to the site be avoided.
The power line should be placed with caution and minimum damage should occur along the route of the power line during the construction phase even although it covers a short distance.

Cumulative impacts:

Additional infrastructure development, for example, access road; the spread of alien invaders due to loss of natural vegetation; and increased water runoff leading to erosion will exacerbate the impact and lead to a further loss of habitat for indigenous fauna and flora.

Residual impacts:

Despite mitigation measures the loss of vegetation at the substation site will be permanent. However, because the vegetation type is so large overall loss will be small.

B) Nature: Impact of the construction and operational phases on the spread of declared weeds and alien invasive plant species

	Without mitigation	With mitigation
Extent (E)	Site & surrounds (2)	Site & surrounds (2)
Duration (D)	Long-term (4)	Medium-term (3)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) * P	Medium (48)	Low (27)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Low degree	Low degree
Can impacts be mitigated?	High degree	

Mitigation:

Development should be restricted to the substation site and pylon footprint and the disturbance to the surrounding vegetation be kept to a minimum.

Rehabilitate disturbed areas as soon as possible following construction of the infrastructure.

Establish a monitoring program for the early detection and control of alien invasive plant species.

Cumulative impacts:

The establishment of declared weedy and alien invasive plant species could lead to their spread into the surrounding natural vegetation and onto neighbouring properties.

Residual impacts:

Low residual impact if the declared weedy and alien invasive species are effectively monitored and controlled.

C) Nature: Impact of the construction and operational phases on the fauna

	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)

Duration (D)	Permanent (5)	Long-term (4)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) * P	Medium (48)	Low (27)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Irreplaceable	Irreplaceable
Can impacts be mitigated?	Low degree	
Mitigation:		
Limit disturbance to the proposed substation site and ensure that minimum disturbance takes place in the surrounding area.		
Power line construction should take fauna into account, especially birds, and important mitigation measures must include 'flappers' to make the power lines more visible to the birds.		
An avifauna specialist should ground-truth the construction areas before development commences in order to ensure no breeding pairs or chicks of conservation significant species are located in the areas and, if there are, how to mitigate the situation before construction begins.		
Cumulative impacts:		
Loss and/or disturbance of the natural vegetation and an increase in declared weedy and alien invasive species will have a significantly negative impact on the faunal component. Additional power lines and reflective mirrors will impact on fauna, especially birds.		
Residual impacts:		
Despite mitigation measures the loss of vegetation at the substation site will be permanent and the return of faunal elements negligible. Increasing the visibility of power lines should aid in the reduction of bird collisions but this will have to be monitored constantly and remedied if necessary.		

D) Nature: Impact of the construction and operational phases on the drainage system		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Medium (3)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Probable (3)	Improbable (2)
Significance (S = E+D+M) * P	Medium (36)	Low (16)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Partially reversible	High degree
Irreplaceable loss of resources?	Partially irreplaceable	Low degree
Can impacts be	High degree	

mitigated?		
Mitigation: Substation and power line construction should not affect the drainage system as long as erosion and silt transportation are controlled.		
Cumulative impacts: Soil erosion resulting from the changed/developed area will exacerbate the pressure on the hydrological processes in the region.		
Residual impacts: None, if mitigation takes place to limit/nullify the impact on the drainage system.		

7.2.4 Construction & operational phases: access road

Table 9. Summary of impacts of the proposed access road

A) Nature: Impact of the construction and operational phases on the natural vegetation		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Long-term (4)
Magnitude (M)	Low (4)	Low (4)
Probability (P)	Definite (5)	Highly probable (4)
Significance (S = E+D+M) *P	Medium (50)	Medium (36)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Irreplaceable	Irreplaceable
Can impacts be mitigated?	Low degree	
Mitigation: Disturbance should be contained in the footprint of the proposed access road (current farm track) and unnecessary disturbance adjacent to the route be restricted.		
Cumulative impacts: The spread of declared weeds and alien invaders and increased water runoff leading to erosion will exacerbate the impact and lead to a further loss of natural vegetation and habitat for indigenous fauna and flora.		
Residual impacts: Despite mitigation measures the loss of vegetation on the access road will be permanent. However, because the vegetation unit is so large overall loss will be small. Loss of vegetation adjacent to the road could be successfully mitigated.		
B) Nature: Impact of the construction and operational phases on the spread of declared weeds and alien invasive plant species		
	Without mitigation	With mitigation

Extent (E)	Site & surrounds (2)	Site & surrounds (2)
Duration (D)	Long-term (4)	Medium-term (3)
Magnitude (M)	Low (4)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) *P	Medium (40)	Low (27)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Low degree	Low degree
Can impacts be mitigated?	High degree	
Mitigation: Disturbance should be restricted to the footprint of the proposed access road and the disturbance to the surrounding vegetation be kept to a minimum. Implement the monitoring program for the early detection of declared weeds and alien invasive plant species. Implement a program to control declared weeds and alien invasive plant species.		
Cumulative impacts: The establishment of declared weeds and alien invasive plant species could lead to their spread into the surrounding natural vegetation and onto neighbouring properties.		
Residual impacts: Low residual impact if the declared weed and alien invasive species are effectively monitored and controlled.		

C) Nature: Impact of the construction and operational phases on the fauna		
	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Long-term (4)
Magnitude (M)	Low (4)	Low (4)
Probability (P)	Highly probable (4)	Probable (3)
Significance (S = E+D+M) *P	Medium (40)	Low (27)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Irreplaceable	Irreplaceable
Can impacts be mitigated?	Low degree	
Mitigation: Limit disturbance to the footprint of the proposed access road and ensure that minimum disturbance takes place in the surrounding area.		
Cumulative impacts: Disturbance of the surrounding natural vegetation and an increase in declared weeds and		

alien invasive species along the access road could have a significantly negative impact on the faunal component.

Residual impacts:

Despite mitigation measures the loss of habitat on the access road will be permanent. Residual impacts will furthermore depend on the intensity and permanence of disturbance adjacent to the access road as to whether the faunal component returns to these adjacent sites. Compaction of road surface may hamper the crossing of burrowing animals.

D) Nature: Impact of the construction and operational phases on the drainage system

	Without mitigation	With mitigation
Extent (E)	Local (1)	Local (1)
Duration (D)	Permanent (5)	Medium (3)
Magnitude (M)	Moderate (6)	Low (4)
Probability (P)	Highly probable (4)	Improbable (2)
Significance (S = E+D+M) * P	Medium (48)	Low (16)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Irreversible	Medium degree
Irreplaceable loss of resources?	Irreplaceable	Low degree
Can impacts be mitigated?	High degree	
Mitigation: The access road should not interfere with the hydrological processes of the drainage system if correctly placed and issues such as erosion effectively controlled.		
Cumulative impacts: Soil erosion originating from the access road will exacerbate the pressure on the hydrological processes in the region.		
Residual impacts: None if the location of the access road is carefully chosen and mitigation is successful.		

8. MANAGEMENT PLAN

The measures proposed for the inclusion in the draft Environmental Management Plan are as follows:

Table 10 Measures for inclusion in draft Environmental Management Plan for the Klip Gat site

A) OBJECTIVE: Mitigating disturbance or loss of the natural vegetation	
Project component/s	Any activity that could result in a disturbance or loss of the natural vegetation e.g. construction of panel infrastructure,

	access roads, substation and power lines.	
Potential impact	Disturbance or loss of indigenous vegetation during the construction and operational phases results in a loss of biodiversity and habitat, increases declared weedy and alien invasive plant species and soil erosion; and disrupts natural faunal populations.	
Activity/risk source	Construction and operational phases.	
Mitigation: target/objective	Target: Minimise loss and disturbance of natural vegetation. Re-vegetate denuded and disturbed areas as soon as possible. Monitor and control declared weeds and invader species. Time period: Construction and operational phases.	
Mitigation: Action/control	Responsibility	Timeframe
1. Minimise large-scale clearance of natural vegetation and disturbance to the proposed site. 2. Use existing and dedicated access roads to limit disturbance of the natural vegetation. 3. Minimise damage to natural vegetation beyond the site during the construction of the power line and access road. 4. Re-vegetate disturbed areas as soon as possible after construction. 5. Prevent soil erosion originating from the site. 6. Monitor and control declared weeds and invader species.	Construction team Project management Environmental Control Officer.	Duration of construction and operational phase.
Performance indicator	Minimal loss or disturbance of natural vegetation in and around the Klip Gat site. Vehicles drive on dedicated roads with no disturbance of the surrounding natural vegetation. Damage to the natural vegetation is minimised during the construction of associated infrastructure such as the power line and access roads.	
Monitoring	Construction site should be clearly demarcated and construction should be restricted to this area. Existing and dedicated roads should be clearly marked and only those roads utilised by vehicles. Power line placement and construction should limit disturbance to the natural vegetation. The Environmental Control Officer should monitor and report to the Environmental Assessment Practitioner as to whether the construction is contained within these boundaries and that the surrounding natural vegetation has not been negatively affected.	

	During the operational phase, activities should be restricted to the developed site and associated infrastructure.
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B) OBJECTIVE: Control declared weed and alien invasive plant species		
Project component/s	Any activity that could result in a disturbance or loss of the natural vegetation e.g. construction of panel infrastructure, access roads, substation and power lines.	
Potential impact	Disturbance or loss of indigenous vegetation during the construction and operational phase results in a loss of biodiversity and habitat, increases declared weedy and alien invasive plant species and soil erosion; and disrupts natural faunal populations.	
Activity/risk source	Construction and operational phases.	
Mitigation: target/objective	Target: Minimise loss or disturbance of natural vegetation. Re-vegetate denuded and disturbed areas as soon as possible. Early detection of declared weedy and alien invasive species. Control of declared weedy and alien invasive species. Time period: Construction and operational phases.	
Mitigation: Action/control	Responsibility	Timeframe
<ol style="list-style-type: none"> 1. Minimise large-scale clearance of natural vegetation and disturbance to the proposed site. 2. Use existing and dedicated access roads to limit disturbance of the natural vegetation. 3. Minimise damage to natural vegetation during the construction of associated infrastructure such as substation and power lines. 4. Re-vegetate the disturbed areas as soon as possible with indigenous vegetation. 5. Monitor and control declared weedy and alien invasive species. 6. Prevent soil erosion originating from the site. 	Construction team Project management Environmental Control Officer.	Duration of construction and operational phases.
Performance indicator	No (or a small number of) declared weedy and alien invasive species present on the developed site or along roads and power lines or in the surrounding area.	
Monitoring	Regular surveys of the extent of declared weedy and alien invasive plant species and the implementation of control measures according to legislation. Monitoring should continue	

	from the construction phase throughout the lifespan of the facility. The surrounding natural vegetation should also be monitored for the spread of invasive species.
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C) OBJECTIVE: Mitigating loss of faunal component		
Project component/s	Any activity that could result in a disturbance or loss of the natural vegetation and loss of habitat e.g. construction of panel infrastructure, access roads, power lines.	
Potential impact	Disturbance or loss of indigenous vegetation during the construction and operational phase results in a loss of habitat and biodiversity, increases declared weedy and alien invasive plant species and soil erosion; and disrupts natural faunal populations.	
Activity/risk source	Construction and operational phases.	
Mitigation: target/objective	Target: Minimise loss or disturbance of natural vegetation/habitat. Re-vegetate denuded and disturbed areas as soon as possible. Monitor and control declared weeds and invader species. Time period: Construction and operational phases.	
Mitigation: Action/control	Responsibility	Timeframe
<ol style="list-style-type: none"> 1. Minimise large-scale clearance of natural vegetation and disturbance to the proposed site. 2. Use existing and dedicated access roads to limit disturbance of the natural vegetation. 3. Minimise damage to natural vegetation during the construction of associated infrastructure such as the substation, power lines and access road. 4. Re-vegetate the disturbed areas as soon as possible with indigenous vegetation. 5. Monitor and control declared weeds and invader species. 6. Prevent soil erosion originating from the site. 7. Power lines should be provided with markers/flappers when constructed. 8. The site should be ground-truthed by an Avifauna 	Construction team Project management Environmental Control Officer.	Duration of construction and operational phases.

specialist before construction begins to ensure no eggs or chicks of breeding blue cranes or other conservation significant species are disturbed.		
Performance indicator	Minimum loss of the faunal component in and around the development, substation along roads and power lines.	
Monitoring	<p>Record bird, reptile and mammal species on site before and after construction in order to determine the scale of changes that have occurred. Power lines should be clearly marked to prevent bird collisions.</p> <p>Bird collisions with power lines should be monitored and mitigated where necessary.</p> <p>No losses in blue crane or other species of conservation significance are recorded.</p>	

D) OBJECTIVE: Prevent damage to the drainage system		
Project component/s	Any activity that could result in a disturbance or loss of the natural vegetation and change in soil properties e.g. construction of panel infrastructure, access roads, substation and power lines.	
Potential impact	Disturbance or loss of indigenous vegetation during the construction and operational phase results in a loss of biodiversity and habitat, increases declared weedy and alien invasive plant species and soil erosion; and disrupts natural faunal populations.	
Activity/risk source	Construction and operational phases.	
Mitigation: target/objective	<p>Target: Minimise loss or disturbance of natural vegetation/habitat in order to limit influence on soil properties.</p> <p>Re-vegetate denuded and disturbed areas as soon as possible.</p> <p>Monitor and control declared weeds and invader species.</p> <p>Time period: Construction and operational phases.</p>	
Mitigation: Action/control	Responsibility	Timeframe
<p>1. Minimise large-scale clearance of natural vegetation and disturbance to the proposed site.</p> <p>2. Use existing and dedicated access roads to limit disturbance of the natural vegetation.</p> <p>3. Minimise damage to natural vegetation during the construction of associated infrastructure such as the substation, power lines and</p>	<p>Construction team</p> <p>Project management</p> <p>Environmental Control Officer.</p>	<p>Duration of construction and operational phases.</p>

access road. 4. Re-vegetate the disturbed areas as soon as possible with indigenous vegetation. 5. Monitor and control declared weeds and invader plant species. 6. Prevent soil erosion originating from the site. 7. Limit the use of underground water in order to prevent overutilisation of water resources.		
Performance indicator	Minimal/no impact on drainage system.	
Monitoring	Yearly monitoring of the drainage system to ensure that the hydrological system is functioning correctly.	

9. DISCUSSION AND CONCLUSIONS

The proposed Klip Gat Solar Energy Facility is located on Section 2 of farm 80, close to Noupport in the Northern Cape. Currently the project plans to connect to the Linde/Carolus line in a loop to the west of the project approximately 200 m away.

According to Mucina and Rutherford (2006) one vegetation type can be found on the Klip Gat property namely the Eastern Upper Karoo vegetation type. Important taxa in this vegetation type are *Lycium* spp., *Eriocephalus* spp., *Pentzia* spp., *Helichrysum* spp., *Aristida* spp., *Eragrostis* spp. and *Tragus* spp. This vegetation type is the largest vegetation type mapped of all the vegetation types (49821 km²). The conservation status of the vegetation type is listed as Least Threatened (Mucina and Rutherford, 2006). Large dams have been built in this vegetation type and about 2% of the land surface has been transformed.

Species lists generated for the 3124BA and 3124BB quarter degree grids for plant and animal species were supplemented with data from other relevant sources including Red Data lists. These lists were used to identify species of conservation significance. Flora species of conservation significance included *Asparagus stipulaceus* (NT) and *Gnaphalium declinatum* (NT) and *Marasomdes undulata* (CR). The site investigation determined that these species were unlikely to occur in the proposed development site.

Two plant communities were identified on the Klip Gat site. These communities are the (1) *Pentzia incana* dominated mixed dwarf shrubland-grassland community and the (2) *Tragus koelerioides* dominated mixed dwarf shrubland-grassland community.

The first plant community is dominated by dwarf shrub species such as *Pentzia incana*, *Eriocephalus ericoides* and *Rosenia oppositifolia*. Grass species found to dominate in this community include *Sporobolus fimbriatus* and *Tragus koeleroides*. Numerous bare areas and capped soils are found throughout this community. Species of conservation significance found in this community are *Euphorbia* species, the family Iridaceae (*Morea* species) and the family Mesembryanthemaceae/Aizoaceae (*Ruschia* species). All the species noted in this plant community are listed as Least Concern according to the IUCN Red Data lists.

Plant community 2 is dominated by the dwarf shrubs *Pteronia glomerata* and *Rosenia oppositifolia*. Dominant grass species include *Tragus koeleroides* and *Eragrostis chloromelas*. Species of conservation significance include the family Iridaceae (therefore *Morea* species) and the family Mesembryanthemaceae/Aizoaceae (therefore *Trichodeodema* species). All the species noted in this plant community are listed as Least Concern according to the IUCN Red Data lists.

It is recommended that a collection/destruction permit be obtained from Northern Cape Nature Conservation for the species found on site and for the species that could potentially occur on the site. Thus, the specially protected and protected families Aizoaceae/Mesembryanthemaceae, Amaryllidaceae, Apocynaceae, Asphodelaceae, Crassulaceae, Iridaceae and Orchidiaceae and genera *Androcymbium*, *Euphorbia*, *Diascia*, *Jamesbrittenia*, *Ornithogalum*, *Oxalis*, *Lachenalia*, *Lessertia*, *Manulea*, *Nemesia*, *Ornithogalum*, *Sutherlandia* and *Pelargonium* should be applied for since the development will in all probability disturb or destroy individuals belonging to these families and genera. Additionally, a permit for the disturbance or destruction of indigenous species should be applied for.

Various declared weeds and invader species were also found in the surrounding areas and care will have to be taken during the construction and operational phases in order to prevent their establishment and spread on site and into the natural vegetation. The monitoring and control of declared weeds and invader plant species is of great importance since their establishment not only slows down the rehabilitation of denuded and disturbed areas but also prevents the rehabilitation of faunal habitat.

Fauna species found to be of conservation significance included mammals such as the black-footed cat (VU, CITES II), African wild cat (CITES II), white-tailed mouse (EN), leopard (NT, CITES I), aardwolf (CITES III) and birds, for example, the blue crane (VU, CITES II), Verreaux's eagle (CITES II), black stork (CITES II), blue bustard (NT), lesser kestrel (CITES II), greater kestrel (CITES II), rock kestrel (CITES II), Ludwig's bustard (EN, CITES II), black harrier (VU) and martial eagle (NT).

The Klip Gat site is situated in the Platberg-Karoo conservancy which is an Important Bird Area. Additional bird data was collected from the Southern African Bird Atlas Project

(SABAP 2) and used to identify bird species of conservation significance. This SABAP 2 list indicates the blue crane (VU), Lesser Kestrel (VU), Ludwig's Bustard (VU), blue korhaan (NT), greater flamingo (NT), secretary bird (NT), Lanner falcon (NT), kori bustard (NT) and Caspian Tern (NT) as species of conservation importance. Blue cranes were sighted during the field survey and the land owner mentioned the presence of martial eagles in the past.

In general, **the proposed Klip Gat solar facility site is not located in a highly sensitive area and the vegetation and habitat of the site occurs in the surrounding environment.** Nevertheless, the impact on the environment should be kept to a minimum by limiting disturbance and loss the of vegetation and containing it to clearly demarcated areas. Revegetation efforts should begin as soon as possible and declared weeds and invader species monitored and controlled throughout the construction and operational phases. Soil erosion should be prevented in order to limit impacts on the site and in the surrounding landscape. **The faunal component, especially avifauna, should be monitored throughout and mitigation measures implemented where necessary, for example, improving the visibility of the power lines.** These mitigating measures will reduce the impact of the development on the natural vegetation and faunal component as well as reduce the impact of declared weeds and alien invasive species establishing on disturbed or denuded sites and spreading.

The duplex soils found in the area are highly erodible, thus if the vegetation is removed or disturbed during construction due care will have to be taken to prevent erosion. It is suggested that a re-vegetation plan is compiled to ensure the return of a vegetation cover as soon as possible. Care will have to be taken not to negatively impact on the drainage system of the landscape. Run-off from the site will have to be controlled as not to cause soil erosion or increase or decrease runoff or silt transportation to the drainage system thereby affecting the hydrological processes in the environment.

No alternatives are currently suggested as long as the site, substation, power line and access road are developed at the locations provided to the specialists. Additionally , the construction laydown area and workshop should be contained within the 'buildable areas' provided to the specialists.

10. RECOMMENDATIONS

Generally, the proposed solar facility development site is not located in a highly sensitive area. The vegetation and habitat of the site occurs in the surrounding environment. Nevertheless, the impact on the environment should be kept to a minimum. This can be largely attained by limiting disturbance and loss of vegetation and containing it in clearly demarcated areas. When the vegetation is removed or disturbed during construction due care will have to be taken to prevent erosion. It is suggested that a re-vegetation plan is compiled to ensure the return of vegetation and associated habitat as soon as

possible. Care will have to be taken not to negatively impact on the hydrological processes in the landscape. Run-off from, for example, the site and access road will have to be controlled as well as silt transportation in order to limit impacts on the hydrological processes in the larger landscape.

These mitigating measures will reduce the impact of the development on the natural vegetation and faunal component, reduce the impact of declared weeds and alien invasive species establishing on disturbed or denuded sites and spreading into the natural vegetation and prevent negatively affecting the drainage system present in the landscape.

It is recommended that a collection/destruction permit be obtained from Northern Cape Nature Conservation for the species found on site as for the species that could potentially occur on the site. The specially protected and protected families that should be applied for include: Aizoaceae/Mesembryanthemaceae, Amaryllidaceae, Apocynaceae, Asphodelaceae, Crassulaceae, Iridaceae and Orchidiaceae. Additionally, the genera *Androcymbium*, *Euphorbia*, *Diascia*, *Jamesbrittenia*, *Lachenalia*, *Lessertia*, *Manulea*, *Nemesia*, *Ornithogalum*, *Oxalis*, *Pelargonium* and *Sutherlandia* should be applied for since the development will most likely disturb or destroy individuals belonging to these families and genera. Additionally, a permit for the disturbance or destruction of indigenous species must be applied for.

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12. APPENDICES

Appendix A. Plant species found in the quarter degree grids (3124BA and 3124BB) downloaded from the SIBIS:SABIF Integrating Biodiversity Information website

Quarter degree grid 3124BA

Family	Species	NCNCA	Red Data Status
CRASSULACEAE	<i>Adromischus sphenophyllus</i>	P	LC
HYACINTHACEAE	<i>Albuca setosa</i>		LC
ASPHODELACEAE	<i>Aloe broomii</i> var. <i>broomii</i>	P	LC
AMARANTHACEAE	<i>Amaranthus thunbergii</i>		LC
ASTERACEAE	<i>Amellus strigosus</i> subsp. <i>pseudoscabridus</i>		LC
ASTERACEAE	<i>Amphiglossa triflora</i>		LC
RUBIACEAE	<i>Anthospermum rigidum</i> subsp. <i>pumilum</i>		LC
SCROPHULARIACEAE	<i>Aptosimum elongatum</i>		LC
PAPAVERACEAE	<i>Argemone mexicana</i> forma <i>mexicana</i>		NE
POACEAE	<i>Aristida adscensionis</i>		LC
POACEAE	<i>Aristida congesta</i> subsp. <i>barbicollis</i>		LC
POACEAE	<i>Aristida diffusa</i> subsp. <i>burkei</i>		LC
ASPARAGACEAE	<i>Asparagus retrofractus</i>		LC
ASPARAGACEAE	<i>Asparagus stipulaceus</i>		NT
ASPLENIACEAE	<i>Asplenium cordatum</i>		LC
ASTERACEAE	<i>Berkheya annectens</i>		LC
ASTERACEAE	<i>Berkheya rigida</i>		LC
CYPERACEAE	<i>Bulbostylis humilis</i>		LC
SCROPHULARIACEAE	<i>Chaenostoma halimifolium</i>		LC
PTERIDACEAE	<i>Cheilanthes bergiana</i>		LC
PTERIDACEAE	<i>Cheilanthes hirta</i>		LC
CHENOPODIACEAE	<i>Chenopodium glaucum</i>		NE
CHENOPODIACEAE	<i>Chenopodium schraderianum</i>		NE
POACEAE	<i>Chloris virgata</i>		LC
ASTERACEAE	<i>Chrysocoma ciliata</i>		LC
ASTERACEAE	<i>Cineraria aspera</i>		LC
CUCURBITACEAE	<i>Citrullus lanatus</i>		LC
CUCURBITACEAE	<i>Cucumis myriocarpus</i> subsp. <i>leptodermis</i>		LC
POACEAE	<i>Cymbopogon pospischilii</i>		NE
POACEAE	<i>Cynodon incompletus</i>		LC
CYPERACEAE	<i>Cyperus usitatus</i>		LC
CARYOPHYLLACEAE	<i>Dianthus caespitosus</i> subsp. <i>caespitosus</i>		LC
POACEAE	<i>Digitaria eriantha</i>		LC
ASTERACEAE	<i>Dimorphotheca cuneata</i>		LC

EBENACEAE	<i>Diospyros austro-africana</i> var. <i>austro-africana</i>		LC
EBENACEAE	<i>Diospyros austro-africana</i> var. <i>microphylla</i>		LC
EBENACEAE	<i>Diospyros lycioides</i> subsp. <i>lycioides</i>		LC
EBENACEAE	<i>Diospyros pallens</i>		LC
HYACINTHACEAE	<i>Dipcadi viride</i>		LC
HYACINTHACEAE	<i>Drimia intricata</i>		LC
POACEAE	<i>Enneapogon desvauxii</i>		LC
POACEAE	<i>Enneapogon scoparius</i>		LC
POACEAE	<i>Eragrostis bergiana</i>		LC
POACEAE	<i>Eragrostis bicolor</i>		LC
POACEAE	<i>Eragrostis curvula</i>		LC
POACEAE	<i>Eragrostis homomalla</i>		LC
POACEAE	<i>Eragrostis lehmanniana</i> var. <i>chaunantha</i>		LC
POACEAE	<i>Eragrostis obtusa</i>		LC
POACEAE	<i>Eragrostis truncata</i>		LC
ASTERACEAE	<i>Eriocephalus ericoides</i> subsp. <i>ericoides</i>		LC
ASTERACEAE	<i>Eriocephalus spinescens</i>		LC
ERIOSPERMACEAE	<i>Eriospermum corymbosum</i>		LC
EUPHORBIACEAE	<i>Euphorbia arida</i>		LC
POACEAE	<i>Eustachys paspaloides</i>		LC
ASTERACEAE	<i>Felicia muricata</i> subsp. <i>cinerascens</i>		LC
ASTERACEAE	<i>Felicia ovata</i>		LC
AIZOACEAE	<i>Galenia secunda</i>	P	LC
ASTERACEAE	<i>Gazania jurineifolia</i> subsp. <i>jurineifolia</i>		LC
ASTERACEAE	<i>Gazania krebsiana</i> subsp. <i>arctotoides</i>		LC
AMARYLLIDACEAE	<i>Gethyllis transkarooica</i>	P	LC
GISEKIACEAE	<i>Gisekia pharnacioides</i> var. <i>pharnacioides</i>		LC
THYMELAEACEAE	<i>Gnidia microphylla</i>		LC
THYMELAEACEAE	<i>Gnidia polycephala</i>		LC
ASTERACEAE	<i>Helichrysum asperum</i> var. <i>albidulum</i>		LC
ASTERACEAE	<i>Helichrysum lucilioides</i>		LC
ASTERACEAE	<i>Helichrysum tysonii</i>		LC
ASTERACEAE	<i>Helichrysum zeyheri</i>		LC
MALVACEAE	<i>Hermannia coccocarpa</i>		LC
MALVACEAE	<i>Hermannia cuneifolia</i> var. <i>cuneifolia</i>		LC
MALVACEAE	<i>Hermannia linearifolia</i>		LC
MALVACEAE	<i>Hermannia pulchella</i>		LC
ASTERACEAE	<i>Hertia pallens</i>		LC
POACEAE	<i>Heteropogon contortus</i>		LC
MALVACEAE	<i>Hibiscus trionum</i>		NE
POACEAE	<i>Hyparrhenia hirta</i>		LC
FABACEAE	<i>Indigofera alternans</i> var. <i>alternans</i>		LC
JUNCACEAE	<i>Juncus rigidus</i>		LC
RUBIACEAE	<i>Kohautia cynanchica</i>		LC

HYACINTHACEAE	<i>Ledebouria undulata</i>		LC
BRASSICACEAE	<i>Lepidium africanum</i> subsp. <i>africanum</i>		LC
FABACEAE	<i>Lessertia pauciflora</i> var. <i>pauciflora</i>	SP	LC
MOLLUGINACEAE	<i>Limeum aethiopicum</i> subsp. <i>aethiopicum</i> var. <i>aethiopicum</i>		..
FABACEAE	<i>Lotononis platycarpa</i>		LC
SOLANACEAE	<i>Lycium cinereum</i>		LC
SOLANACEAE	<i>Lycium hirsutum</i>		LC
MALVACEAE	<i>Malva parviflora</i> var. <i>parviflora</i>		NE
FABACEAE	<i>Medicago laciniata</i> var. <i>laciniata</i>		NE
MELIANTHACEAE	<i>Melianthus comosus</i>		LC
POACEAE	<i>Melica racemosa</i>		LC
FABACEAE	<i>Melolobium microphyllum</i>		LC
APOCYNACEAE	<i>Microloma armatum</i> var. <i>armatum</i>		LC
GERANIACEAE	<i>Monsonia burkeana</i>		LC
IRIDACEAE	<i>Moraea falcifolia</i>	P	LC
IRIDACEAE	<i>Moraea polystachya</i>	P	LC
SCROPHULARIACEAE	<i>Nemesia fruticans</i>	P	LC
RUBIACEAE	<i>Nenax microphylla</i>		LC
HYACINTHACEAE	<i>Ornithogalum prasinum</i>	P	..
HYACINTHACEAE	<i>Ornithogalum tenuifolium</i> subsp. <i>tenuifolium</i>	P	LC
COLCHICACEAE	<i>Ornithoglossum viride</i>		LC
COLCHICACEAE	<i>Ornithoglossum vulgare</i>		LC
ASTERACEAE	<i>Osteospermum leptolobum</i>		LC
OXALIDACEAE	<i>Oxalis depressa</i>	P	LC
POACEAE	<i>Panicum stapfianum</i>		LC
ASTERACEAE	<i>Pegolettia retrofracta</i>		LC
GERANIACEAE	<i>Pelargonium minimum</i>	SP	LC
ASTERACEAE	<i>Pentzia globosa</i>		LC
ASTERACEAE	<i>Pentzia incana</i>		LC
ASTERACEAE	<i>Pentzia punctata</i>		LC
ASTERACEAE	<i>Pentzia sphaerocephala</i>		LC
ASTERACEAE	<i>Pentzia spinescens</i>		LC
ASTERACEAE	<i>Phymaspermum parvifolium</i>		LC
AIZOACEAE	<i>Plinthus karooicus</i>	P	LC
POLYGALACEAE	<i>Polygala virgata</i> var. <i>virgata</i>		LC
PORTULACACEAE	<i>Portulaca oleracea</i>		LC
ASTERACEAE	<i>Pteronia glauca</i>		LC
ASTERACEAE	<i>Pteronia tricephala</i>		LC
RICCIACEAE	<i>Riccia albornata</i>		..
IRIDACEAE	<i>Romulea macowanii</i> var. <i>macowanii</i>	P	LC
ASTERACEAE	<i>Rosenia glandulosa</i>		LC
ASTERACEAE	<i>Rosenia humilis</i>		LC
MESEMBRYANTHEMACEAE	<i>Ruschia vulvaria</i>	P	..
CHENOPODIACEAE	<i>Salsola aphylla</i>		LC

CHENOPODIACEAE	<i>Salsola calluna</i>		LC
GERANIACEAE	<i>Sarcocaulon patersonii</i>		LC
ANACARDIACEAE	<i>Searsia burchellii</i>		LC
ANACARDIACEAE	<i>Searsia erosa</i>		LC
SCROPHULARIACEAE	<i>Selago albida</i>		LC
SCROPHULARIACEAE	<i>Selago geniculata</i>		LC
SCROPHULARIACEAE	<i>Selago saxatilis</i>		LC
PEDALIACEAE	<i>Sesamum capense</i>		LC
POACEAE	<i>Setaria verticillata</i>		LC
SOLANACEAE	<i>Solanum nigrum</i>		NE
SOLANACEAE	<i>Solanum tomentosum</i> var. <i>tomentosum</i>		LC
POACEAE	<i>Sporobolus fimbriatus</i>		LC
POACEAE	<i>Sporobolus ludwigii</i>		LC
LAMIACEAE	<i>Stachys spathulata</i>		LC
IRIDACEAE	<i>Syringodea concolor</i>	P	LC
ASTERACEAE	<i>Tarchonanthus camphoratus</i>		LC
POACEAE	<i>Tetrachne dregei</i>		LC
POACEAE	<i>Themeda triandra</i>		LC
POACEAE	<i>Tragus berteronianus</i>		LC
POACEAE	<i>Tragus koelerioides</i>		LC
POACEAE	<i>Tragus racemosus</i>		LC
ZYGOPHYLLACEAE	<i>Tribulus terrestris</i>		LC
MESEMBRYANTHEMACEAE	<i>Trichodiadema pomeridianum</i>	P	LC
ASTERACEAE	<i>Trichogyne paronychioides</i>		LC
ASTERACEAE	<i>Troglophyton capillaceum</i> subsp. <i>capillaceum</i>		LC
ASTERACEAE	<i>Ursinia nana</i> subsp. <i>nana</i>		LC
CAMPANULACEAE	<i>Wahlenbergia albens</i>		LC
CAMPANULACEAE	<i>Wahlenbergia androsacea</i>		LC
CAMPANULACEAE	<i>Wahlenbergia tenella</i> var. <i>tenella</i>		LC

Clarification of symbols:

Northern Cape Nature Conservation Act lists some of these plant species as Specially Protected (SP) and Protected (P).

IUCN Red data list categories are as follows: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX). Species Not Evaluated are listed as NE. These categories indicate the conservation importance of a species based on an expert evaluation of the species.

Quarter degree grid 3124BB

Family	Species	NCNCA	Red Data Status
HYACINTHACEAE	<i>Albuca exuviata</i>		LC
HYACINTHACEAE	<i>Albuca setosa</i>		LC
ASPHODELACEAE	<i>Aloe broomii</i> var. <i>broomii</i>	P	LC
AMARANTHACEAE	<i>Amaranthus deflexus</i>		NE
AMARANTHACEAE	<i>Amaranthus thunbergii</i>		LC
ASTERACEAE	<i>Amellus strigosus</i> subsp. <i>pseudoscabridus</i>		LC
ASTERACEAE	<i>Amphiglossa triflora</i>		LC
RUBIACEAE	<i>Anthospermum rigidum</i> subsp. <i>pumilum</i>		LC
SCROPHULARIACEAE	<i>Aptosimum elongatum</i>		LC
ASTERACEAE	<i>Arctotheca calendula</i>		LC
ASTERACEAE	<i>Arctotis arctotoides</i>		LC
PAPAVERACEAE	<i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i>		NE
POACEAE	<i>Aristida adscensionis</i>		LC
POACEAE	<i>Aristida congesta</i> subsp. <i>barbicollis</i>		LC
POACEAE	<i>Aristida congesta</i> subsp. <i>congesta</i>		LC
POACEAE	<i>Aristida diffusa</i> subsp. <i>burkei</i>		LC
ASPARAGACEAE	<i>Asparagus concinnus</i>		LC
ASPARAGACEAE	<i>Asparagus retrofractus</i>		LC
ASPARAGACEAE	<i>Asparagus stipulaceus</i>		NT
ASTERACEAE	<i>Athanasia minuta</i> subsp. <i>minuta</i>		LC
CHENOPODIACEAE	<i>Atriplex lindleyi</i> subsp. <i>inflata</i>		NE
CHENOPODIACEAE	<i>Atriplex semibaccata</i> var. <i>appendiculata</i>		LC
CHENOPODIACEAE	<i>Atriplex suberecta</i>		LC
CHENOPODIACEAE	<i>Bassia salsoloides</i>		LC
ASTERACEAE	<i>Berkheya annectens</i>		LC
POACEAE	<i>Bromus catharticus</i>		NE
POACEAE	<i>Bromus pectinatus</i>		LC
AMARYLLIDACEAE	<i>Brunsvigia radulosa</i>	P	LC
BRYACEAE	<i>Bryum dichotomum</i>		..
CYPERACEAE	<i>Bulbostylis humilis</i>		LC
SCROPHULARIACEAE	<i>Chaenostoma halimifolium</i>		LC
SCROPHULARIACEAE	<i>Chaenostoma macrosiphon</i>		LC
AIZOACEAE	<i>Chasmatophyllum musculinum</i>	P	LC
PTERIDACEAE	<i>Cheilanthes bergiana</i>		LC
CHENOPODIACEAE	<i>Chenopodium glaucum</i>		NE
CHENOPODIACEAE	<i>Chenopodium schraderianum</i>		NE
POACEAE	<i>Chloris virgata</i>		LC
ASTERACEAE	<i>Chrysocoma ciliata</i>		LC
ASTERACEAE	<i>Cineraria aspera</i>		LC
ASTERACEAE	<i>Cineraria mollis</i>		LC

BRUCHIACEAE	<i>Cladophascum gymnomitrioides</i>		..
COMMELINACEAE	<i>Commelina africana</i> var. <i>africana</i>		LC
CONVOLVULACEAE	<i>Convolvulus sagittatus</i>		LC
APOCYNACEAE	<i>Cordylogyne globosa</i>		LC
ASTERACEAE	<i>Cotula anthemoides</i>		LC
ASTERACEAE	<i>Cotula microglossa</i>		LC
ASTERACEAE	<i>Cotula turbinata</i>		LC
CRASSULACEAE	<i>Cotyledon orbiculata</i> var. <i>oblonga</i>	P	LC
CRASSULACEAE	<i>Crassula muscosa</i> var. <i>muscosa</i>	P	LC
CUCURBITACEAE	<i>Cucumis myriocarpus</i> subsp. <i>leptodermis</i>		LC
POACEAE	<i>Cymbopogon pospischilii</i>		NE
POACEAE	<i>Cynodon incompletus</i>		LC
BORAGINACEAE	<i>Cynoglossum lanceolatum</i>		LC
CYPERACEAE	<i>Cyperus laevigatus</i>		LC
CYPERACEAE	<i>Cyperus</i> sp.		..
CYPERACEAE	<i>Cyperus usitatus</i>		LC
AIZOACEAE	<i>Delosperma aberdeenense</i>	p	LC
CARYOPHYLLACEAE	<i>Dianthus caespitosus</i> subsp. <i>caespitosus</i>		LC
ASTERACEAE	<i>Dicerotheramnus rhinocerotis</i>		LC
POACEAE	<i>Digitaria argyrograpta</i>		LC
POACEAE	<i>Digitaria eriantha</i>		LC
ASTERACEAE	<i>Dimorphotheca zeyheri</i>		LC
EBENACEAE	<i>Diospyros austro-africana</i> var. <i>austro-africana</i>		LC
EBENACEAE	<i>Diospyros austro-africana</i> var. <i>microphylla</i>		LC
EBENACEAE	<i>Diospyros pallens</i>		LC
HYACINTHACEAE	<i>Dipcadi viride</i>		LC
HYACINTHACEAE	<i>Drimia intricata</i>		LC
HYACINTHACEAE	<i>Drimia macrantha</i>		LC
POACEAE	<i>Ehrharta pusilla</i>		LC
POACEAE	<i>Enneapogon desvauxii</i>		LC
POACEAE	<i>Eragrostis bergiana</i>		LC
POACEAE	<i>Eragrostis bicolor</i>		LC
POACEAE	<i>Eragrostis chloromelas</i>		LC
POACEAE	<i>Eragrostis curvula</i>		LC
POACEAE	<i>Eragrostis lehmanniana</i> var. <i>chaunantha</i>		LC
POACEAE	<i>Eragrostis lehmanniana</i> var. <i>lehmanniana</i>		LC
POACEAE	<i>Eragrostis obtusa</i>		LC
POACEAE	<i>Eragrostis procumbens</i>		LC
POACEAE	<i>Eragrostis truncata</i>		LC
ASTERACEAE	<i>Eriocephalus ericoides</i> subsp. <i>ericoides</i>		LC
ASTERACEAE	<i>Eriocephalus spinescens</i>		LC
GERANIACEAE	<i>Erodium cicutarium</i>		NE
EUPHORBIACEAE	<i>Euphorbia aequoris</i>	P	LC
EUPHORBIACEAE	<i>Euphorbia clavarioides</i> var. <i>clavarioides</i>	P	LC
EUPHORBIACEAE	<i>Euphorbia inaequilatera</i> var. <i>inaequilatera</i>	P	LC

EUPHORBIACEAE	<i>Euphorbia mauritanica</i> var. <i>corallothamnus</i>	P	LC
EUPHORBIACEAE	<i>Euphorbia mauritanica</i> var. <i>mauritanica</i>	P	LC
ASTERACEAE	<i>Euryops oligoglossus</i> subsp. <i>oligoglossus</i>		LC
POACEAE	<i>Eustachys paspaloides</i>		LC
CHENOPODIACEAE	<i>Exomis microphylla</i> var. <i>axyrioides</i>		LC
ASTERACEAE	<i>Felicia muricata</i> subsp. <i>cinerascens</i>		LC
ASTERACEAE	<i>Felicia ovata</i>		LC
AIZOACEAE	<i>Galenia secunda</i>	P	LC
ASTERACEAE	<i>Garuleum latifolium</i>		LC
ASTERACEAE	<i>Gazania jurineifolia</i> subsp. <i>jurineifolia</i>		LC
ASTERACEAE	<i>Gazania krebsiana</i> subsp. <i>krebsiana</i>		LC
GISEKIACEAE	<i>Gisekia pharnacioides</i> var. <i>pharnacioides</i>		LC
IRIDACEAE	<i>Gladiolus permeabilis</i> subsp. <i>edulis</i>	P	LC
ASTERACEAE	<i>Gnaphalium declinatum</i>		NT
THYMELAEACEAE	<i>Gnidia polycephala</i>		LC
THYMELAEACEAE	<i>Gnidia wikstroemiana</i>		LC
APOCYNACEAE	<i>Gomphocarpus fruticosus</i> subsp. <i>fruticosus</i>		LC
ASPHODELACEAE	<i>Haworthia venosa</i> subsp. <i>tessellata</i>	P	LC
ASTERACEAE	<i>Helichrysum asperum</i> var. <i>albidulum</i>		LC
ASTERACEAE	<i>Helichrysum lucilioides</i>		LC
ASTERACEAE	<i>Helichrysum pentzioides</i>		LC
ASTERACEAE	<i>Helichrysum pumilio</i> subsp. <i>pumilio</i>		LC
ASTERACEAE	<i>Helichrysum zeyheri</i>		LC
BRASSICACEAE	<i>Heliophila lactea</i>		LC
MALVACEAE	<i>Hermannia erodioides</i>		LC
MALVACEAE	<i>Hermannia jacobefolia</i>		LC
MALVACEAE	<i>Hermannia linearifolia</i>		LC
MALVACEAE	<i>Hermannia multiflora</i>		LC
MALVACEAE	<i>Hermannia pulverata</i>		LC
MALVACEAE	<i>Hermannia vestita</i>		LC
APIACEAE	<i>Heteromorpha arborescens</i> var. <i>arborescens</i>		LC
POACEAE	<i>Heteropogon contortus</i>		LC
POACEAE	<i>Hordeum murinum</i> subsp. <i>glaucum</i>		NE
POACEAE	<i>Hordeum stenostachys</i>		NE
POACEAE	<i>Hyparrhenia hirta</i>		LC
FABACEAE	<i>Indigofera alternans</i> var. <i>alternans</i>		LC
SCROPHULARIACEAE	<i>Jamesbrittenia atropurpurea</i> subsp. <i>atropurpurea</i>	P	LC
SCROPHULARIACEAE	<i>Jamesbrittenia aurantiaca</i>	P	LC
SCROPHULARIACEAE	<i>Jamesbrittenia filicaulis</i>	P	LC
POACEAE	<i>Karooochloa purpurea</i>		LC
CUCURBITACEAE	<i>Kedrostis africana</i>		LC
ASPHODELACEAE	<i>Kniphofia linearifolia</i>	P	LC
RUBIACEAE	<i>Kohautia cynanchica</i>		LC
ASTERACEAE	<i>Lactuca dregeana</i>		LC

ASTERACEAE	<i>Lactuca serriola</i>		NE
BORAGINACEAE	<i>Lappula capensis</i>		LC
BORAGINACEAE	<i>Lappula heteracantha</i>		NE
BRASSICACEAE	<i>Lepidium africanum</i> subsp. <i>africanum</i>		LC
BRASSICACEAE	<i>Lepidium desertorum</i>		LC
FABACEAE	<i>Lessertia pauciflora</i> var. <i>pauciflora</i>	SP	LC
ASTERACEAE	<i>Leysera tenella</i>		LC
MOLLUGINACEAE	<i>Limeum aethiopicum</i> subsp. <i>aethiopicum</i> var. <i>aethiopicum</i>		..
MOLLUGINACEAE	<i>Limeum sulcatum</i> var. <i>gracile</i>		LC
BORAGINACEAE	<i>Lithospermum cinereum</i>		LC
SOLANACEAE	<i>Lycium cinereum</i>		LC
MALVACEAE	<i>Malva parviflora</i> var. <i>parviflora</i>		NE
ASTERACEAE	<i>Marasmodes undulata</i>		CR
MARSILEACEAE	<i>Marsilea macrocarpa</i>		LC
BRASSICACEAE	<i>Matthiola torulosa</i>		LC
FABACEAE	<i>Medicago laciniata</i> var. <i>laciniata</i>		NE
MELIANTHACEAE	<i>Melianthus comosus</i>		LC
POACEAE	<i>Melica decumbens</i>		LC
FABACEAE	<i>Melolobium candicans</i>		LC
FABACEAE	<i>Melolobium microphyllum</i>		LC
POACEAE	<i>Merxmullera disticha</i>		LC
APOCYNACEAE	<i>Microloma armatum</i> var. <i>armatum</i>		LC
IRIDACEAE	<i>Moraea bipartita</i>	P	LC
IRIDACEAE	<i>Moraea crispa</i>	P	LC
IRIDACEAE	<i>Moraea falcifolia</i>	P	LC
IRIDACEAE	<i>Moraea pallida</i>	P	LC
IRIDACEAE	<i>Moraea polystachya</i>	P	LC
IRIDACEAE	<i>Moraea simulans</i>	P	LC
SCROPHULARIACEAE	<i>Nemesia fruticans</i>	P	LC
SCROPHULARIACEAE	<i>Nemesia versicolor</i> var. <i>versicolor</i>	P	LC
RUBIACEAE	<i>Nenax microphylla</i>		LC
ASTERACEAE	<i>Nolletia ciliaris</i>		LC
ASTERACEAE	<i>Osteospermum leptolobum</i>		LC
ASTERACEAE	<i>Osteospermum spinescens</i>		LC
ASTERACEAE	<i>Othonna pavonia</i>		LC
OXALIDACEAE	<i>Oxalis depressa</i>	P	LC
POACEAE	<i>Panicum stapfianum</i>		LC
PAPAVERACEAE	<i>Papaver aculeatum</i>		LC
ASTERACEAE	<i>Pegolettia retrofracta</i>		LC
GERANIACEAE	<i>Pelargonium minimum</i>	SP	LC
POACEAE	<i>Pentaschistis airoides</i> subsp. <i>airoides</i>		LC
ASTERACEAE	<i>Pentzia globosa</i>		LC
ASTERACEAE	<i>Pentzia lanata</i>		LC
ASTERACEAE	<i>Pentzia punctata</i>		LC

ASTERACEAE	<i>Pentzia sphaerocephala</i>		LC
ASTERACEAE	<i>Pentzia spinescens</i>		LC
ASTERACEAE	<i>Phymaspermum aciculare</i>		LC
ASTERACEAE	<i>Phymaspermum parvifolium</i>		LC
ASTERACEAE	<i>Phymaspermum pubescens</i>		LC
ASTERACEAE	<i>Phymaspermum scoparium</i>		LC
PLANTAGINACEAE	<i>Plantago lanceolata</i>		LC
AIZOACEAE	<i>Plinthus karoocicus</i>	P	LC
POACEAE	<i>Poa annua</i>		NE
CARYOPHYLLACEAE	<i>Pollichia campestris</i>		LC
POLYGALACEAE	<i>Polygala ephedroides</i>		LC
POLYGALACEAE	<i>Polygala virgata</i> var. <i>decora</i>		LC
POLYGONACEAE	<i>Polygonum aviculare</i>		LC
PORTULACACEAE	<i>Portulaca oleracea</i>		LC
ASTERACEAE	<i>Pseudognaphalium undulatum</i>		LC
MESEMBRYANTHEMACEAE	<i>Psilocaulon articulatum</i>	P	LC
MESEMBRYANTHEMACEAE	<i>Psilocaulon coriarium</i>	P	LC
ASTERACEAE	<i>Pteronia erythrochaeta</i>		LC
ASTERACEAE	<i>Pteronia glauca</i>		LC
ASTERACEAE	<i>Pteronia glomerata</i>		LC
ASTERACEAE	<i>Pteronia tricephala</i>		LC
RANUNCULACEAE	<i>Ranunculus multifidus</i>		NE
RICCIACEAE	<i>Riccia pottsiana</i>		..
RICCIACEAE	<i>Riccia pulveracea</i>		..
RICCIACEAE	<i>Riccia volkii</i>		..
IRIDACEAE	<i>Romulea macowanii</i> var. <i>macowanii</i>	P	LC
ASTERACEAE	<i>Rosenia glandulosa</i>		LC
ASTERACEAE	<i>Rosenia humilis</i>		LC
ASTERACEAE	<i>Rosenia oppositifolia</i>		LC
POLYGONACEAE	<i>Rumex lanceolatus</i>		LC
MESEMBRYANTHEMACEAE	<i>Ruschia cradockensis</i> subsp. <i>cradockensis</i>	P	LC
MESEMBRYANTHEMACEAE	<i>Ruschia vulvaria</i>	P	..
CHENOPODIACEAE	<i>Salsola calluna</i>		LC
CHENOPODIACEAE	<i>Salsola glabrescens</i>		LC
CHENOPODIACEAE	<i>Salsola kali</i>		LC
LAMIACEAE	<i>Salvia stenophylla</i>		..
LAMIACEAE	<i>Salvia verbenaca</i>		LC
POACEAE	<i>Schismus barbatus</i>		LC
APOCYNACEAE	<i>Schizoglossum eustegioides</i>	P	LC
ANACARDIACEAE	<i>Searsia erosa</i>		LC
SCROPHULARIACEAE	<i>Selago albida</i>		LC
SCROPHULARIACEAE	<i>Selago galpinii</i>		LC
SCROPHULARIACEAE	<i>Selago geniculata</i>		LC
SCROPHULARIACEAE	<i>Selago glabrata</i>		..
SCROPHULARIACEAE	<i>Selago paniculata</i>		LC

SCROPHULARIACEAE	<i>Selago saxatilis</i>		LC
SCROPHULARIACEAE	<i>Selago speciosa</i>		LC
ASTERACEAE	<i>Senecio burchellii</i>		LC
ASTERACEAE	<i>Senecio incomptus</i>		LC
ASTERACEAE	<i>Senecio leptophyllus</i>		LC
ASTERACEAE	<i>Senecio reptans</i>		LC
PEDALIACEAE	<i>Sesamum capense</i>		LC
CARYOPHYLLACEAE	<i>Silene burchellii</i> var. <i>angustifolia</i>		LC
BRASSICACEAE	<i>Sisymbrium burchellii</i> var. <i>burchellii</i>		LC
BRASSICACEAE	<i>Sisymbrium capense</i>		LC
SOLANACEAE	<i>Solanum nigrum</i>		NE
SOLANACEAE	<i>Solanum tomentosum</i> var. <i>tomentosum</i>		LC
POACEAE	<i>Sporobolus fimbriatus</i>		LC
POACEAE	<i>Sporobolus ioclados</i>		LC
POACEAE	<i>Sporobolus ludwigii</i>		LC
POACEAE	<i>Sporobolus</i> sp.		..
POACEAE	<i>Stipagrostis namaquensis</i>		LC
POACEAE	<i>Stipagrostis obtusa</i>		LC
AIZOACEAE	<i>Stomatium paucidens</i>	P	LC
POACEAE	<i>Tetrachne dregei</i>		LC
SANTALACEAE	<i>Thesium durum</i>		LC
SANTALACEAE	<i>Thesium lineatum</i>		LC
SANTALACEAE	<i>Thesium namaquense</i>		LC
ASPHODELACEAE	<i>Trachyandra asperata</i> var. <i>asperata</i>	P	LC
ASTERACEAE	<i>Tragopogon porrifolius</i>		NE
POACEAE	<i>Tragus berteronianus</i>		LC
POACEAE	<i>Tragus koelerioides</i>		LC
POACEAE	<i>Tragus racemosus</i>		LC
ZYGOPHYLLACEAE	<i>Tribulus terrestris</i>		LC
MESEMBRYANTHEMACEAE	<i>Trichodiadema pomeridianum</i>	P	LC
ASTERACEAE	<i>Tripteris aghillana</i> var. <i>integrifolia</i>		LC
ASTERACEAE	<i>Ursinia nana</i> subsp. <i>nana</i>		LC
CAMPANULACEAE	<i>Wahlenbergia albens</i>		LC
CAMPANULACEAE	<i>Wahlenbergia androsacea</i>		LC

Clarification of symbols:

Northern Cape Nature Conservation Act lists some of these plant species as Specially Protected (SP) and Protected (P).

IUCN Red data list categories are as follows: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX). Species Not Evaluated are listed as NE. These categories indicate the conservation importance of a species based on an expert evaluation of the species.

**Appendix B. Complete list of fauna that could possibly occur on the proposed
Klip Gat Solar Facility site locality (compiled from various sources)
and their conservation significance**

Quarter degree grid 3124BA

MAMMALS

Scientific name	Common name	NCNCA	Red Data Status	CITES
<i>Pipistrellus capensis</i>	Cape serotine bat	P	LC	
<i>Aethomys granti</i>	Grant's rock mouse	P	LC	
<i>Aethomys namaquensis</i>	Namaqua rock mouse	P	LC	
<i>Antidorcas marsupialis</i>	Springbok	P	LC	
<i>Aonyx capensis</i>	African clawless otter	P	LC	
<i>Atelerix frontalis</i>	Southern African hedgehog	SP	LC	
<i>Canis mesomelas</i>	Black-backed jackal	DCA	LC	
<i>Caracal caracal</i>	Caracal	DCA	LC	
<i>Cercopithecus pygerythrus</i>	Vervet monkey	DCA	LC	
<i>Connochaetes gnou</i>	Black wildebeest	P	LC	
<i>Crocidura cyanea</i>	Reddish-grey musk shrew	P	LC	
<i>Cryptomys hottentotus</i>	African mole rat	P	LC	
<i>Cynictis penicillata</i>	Yellow mongoose	P	LC	
<i>Desmodillus auricularis</i>	Cape short-tailed gerbil	P	LC	
<i>Elephantulus rupestris</i>	Western rock elephant-shrew	P	LC	
<i>Felis nigripes</i>	Black-footed cat	SP	VU	II
<i>Felis sylvestris</i>	African wild cat	SP	NA	II
<i>Galerella pulverulenta</i>	Cape grey mongoose	P	LC	
<i>Genetta genetta</i>	Small-spotted genet	P	LC	
<i>Gerbillus paeaba</i>	Hairy-footed gerbil	P	NA	
<i>Graphiurus murinus</i>	Woodland dormouse	P	LC	
<i>Graphiurus ocellatus</i>	Spectacled dormouse	P	LC	
<i>Hystrix africaeaustralis</i>	Cape porcupine	P	LC	
<i>Ichneumia albicauda</i>	White-tailed mongoose	P	LC	
<i>Lepus saxatilis</i>	Scrub hare	P	LC	
<i>Macroscelides proboscideus</i>	Round-eared elephant-shrew	P	LC	
<i>Malacothrix typica</i>	Gerbil mouse	P	LC	
<i>Mastomys coucha</i>	Southern multimammate mouse	P	LC	
<i>Mus minutoides</i>	Pygmy mouse	P	LC	
<i>Mystromys albicaudatus</i>	White-tailed mouse	P	EN	
<i>Nycteris thebaica</i>	Egyptian slit-faced bat	P	LC	
<i>Oreotragus oreotragus</i>	Klipspringer	P	LC	
<i>Orycteropus afer</i>	Aardvark	SP	LC	
<i>Oryx gazella</i>	Gemsbok	P	LC	
<i>Otocyon megalotis</i>	Bat-eared fox	SP	LC	
<i>Otomys unisulcatus</i>	Bush vlei rat	P	LC	

<i>Panthera pardus</i>	Leopard	SP	NT	I
<i>Papio hamadryas</i>	Chacma baboon	DCA	LC	
<i>Parotomys brantsii</i>	Brant's whistling rat	P	LC	
<i>Pedetis capensis</i>	Springhare	P	NA	
<i>Pelea capreolus</i>	Grey rhebuck	P	LC	
<i>Poecilogale albinucha</i>	African striped weasel	SP	LC	
<i>Procavia capensis</i>	Rock hyrax	P	LC	
<i>Pronolagus rupestris</i>	Smith's red rock rabbit	P	LC	
<i>Proteles cristata</i>	Aardwolf	SP	LC	III
<i>Raphicerus campestris</i>	Steenbok	P	LC	
<i>Redunca fulvorufula</i>	Mountain reedbuck	P	LC	
<i>Rhabdomys pumilio</i>	Four-striped grass mouse	P	LC	
<i>Saccostomus campestris</i>	Pouched mouse	P	LC	
<i>Suricata suricatta</i>	Suricate	P	LC	
<i>Sylvicapra grimmia</i>	Common duiker	P	LC	
<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat	P	LC	
<i>Tragelaphus oryx</i>	Eland	P	LC	
<i>Vulpes chama</i>	Cape fox	SP	LC	
<i>Xerus inauris</i>	South African ground squirrel	P	LC	

BIRDS

Species	Family	Common name	NCNCA	Red Data Status	CITES
<i>Acrocephalus gracilirostris</i>	SYLVIIDAE	Lesser swamp-warbler	P	LC	
<i>Alcedo cristata</i>	HALCYONIDAE	Malachite kingfisher	P	LC	
<i>Alopochen aegyptiaca</i>	ANATIDAE	Egyptian goose	P	LC	
<i>Anas erythrorhyncha</i>	ANATIDAE	Red-headed finch	P	LC	
<i>Anas undulata</i>	ANATIDAE	Yellow-billed duck	P	LC	
<i>Anhinga rufa</i>	ANHINGIDAE	African darter	P	LC	
<i>Anthus cinnamomeus</i>	MOTACILLIDAE	African rock pipit	P	NA	
<i>Anthus crenatus</i>	MOTACILLIDAE	Yellow-tufted pipit	P	LC	
<i>Anthus vaalensis</i>	MOTACILLIDAE	Buffy pipit	P	LC	
<i>Apus affinis</i>	APODIDAE	Little swift	P	LC	
<i>Apus caffer</i>	APODIDAE	White-rumped swift	P	LC	
<i>Ardea cinerea</i>	ARDEIDAE	Grey heron	P	LC	
<i>Ardea melanocephala</i>	ARDEIDAE	Black-headed heron	P	LC	
<i>Bostrychia hagedash</i>	PLATALEIDAE	Hadedda ibis	P	LC	
<i>Bradornis infuscatus</i>	MUSCICAPIDAE	Chat flycatcher	P	LC	
<i>Bubo africanus</i>	STRIGIDAE	Spotted eagle-owl	SP	LC	
<i>Burhinus capensis</i>	BURHINIDAE	Water thick-knee	P	LC	

<i>Buteo rufofuscus</i>	ACCIPITRIDAE	Jackal buzzard	SP	LC
<i>Buteo vulpinus</i>	ACCIPITRIDAE	Steppe buzzard	SP	NA
<i>Calandrella cinerea</i>	ALAUDIDAE	Red-capped lark	P	LC
<i>Cercomela familiaris</i>	TURDIDAE	Familiar chat	p	LC
<i>Cercomela schlegelii</i>	TURDIDAE	Karoo chat	P	LC
<i>Cercomela sinuata</i>	TURDIDAE	Sickle-winged chat	P	LC
<i>Cercomela tractrac</i>	TURDIDAE	Tractrac chat	P	LC
<i>Cercotrichas coryphoeus</i>	TURDIDAE	Karoo scrub-robin	P	NA
<i>Charadrius tricollaris</i>	CHARADRIIDAE	Three-banded plover	P	LC
<i>Chersomanes albofasciata</i>	ALAUDIDAE	Spike-heeled lark	P	LC
<i>Chrysococcyx caprius</i>	CUCULIDAE	Didric cuckoo	P	LC
<i>Circus maurus</i>	ACCIPITRIDAE	Black harrier	SP	VU
<i>Cisticola subruficapilla</i>	SYLVIIDAE	Grey-black cisticola	P	LC
<i>Cisticola tinniens</i>	SYLVIIDAE	Levaillant's cisticola	P	LC
<i>Colius colius</i>	COLIIDAE	White-backed mousebird	CIS	LC
<i>Columba guinea</i>	COLUMBIDAE	Speckled pigeon	P	LC
<i>Corvus albus</i>	CORVIDAE	White-necked raven	P	LC
<i>Creatophora cinerea</i>	STURNIDAE	Wattled starling	P	LC
<i>Crithagra albogularis</i>	FRINGILLIDAE	White-throated canary	P	NA
<i>Crithagra flaviventris</i>	FRINGILLIDAE	Yellow canary	P	NA
<i>Elanus caeruleus</i>	ACCIPITRIDAE	Black shouldered kite	SP	LC
<i>Emberiza capensis</i>	FRINGILLIDAE	Cape bunting	P	LC
<i>Emberiza impetuanii</i>	FRINGILLIDAE	Lark-like bunting	P	LC
<i>Emberiza tahapisi</i>	FRINGILLIDAE	Cinnamon breasted bunting	P	LC
<i>Eremomela icteropygialis</i>	SYLVIIDAE	Yellow-billed eremomela	P	LC
<i>Eremopterix verticalis</i>	ALAUDIDAE	Grey-backed sparrow lark	P	LC
<i>Estrilda astrild</i>	ESTRILDIDAE	Common waxbill	P	LC
<i>Euplectes orix</i>	PLOCEIDAE	Red bishop	CIS	LC
<i>Eupodotis afra</i>	OTIDIDAE	Black bustard	..	LC
<i>Eupodotis caerulescens</i>	OTIDIDAE	Blue bustard	..	NT
<i>Eupodotis vigorsii</i>	OTIDIDAE	Karoo korhaan	P	LC
<i>Falco naumanni</i>	FALCONIDAE	Lesser kestrel	SP	LC

II

<i>Falco rupicolis</i>	FALCONIDAE	Rock kestrel	SP	LC	II
<i>Falco rupicoloides</i>	FALCONIDAE	Greater kestrel	SP	LC	II
<i>Fulica cristata</i>	RALLIDAE	Red-knobbed coot	P	LC	
<i>Galerida magnirostris</i>	ALAUDIDAE	Large-billed lark	P	LC	
<i>Gallinula chloropus</i>	RALLIDAE	African snipe	P	LC	
<i>Grus paradisea</i>	GRUIDAE	Blue crane	P	VU	II
<i>Himantopus</i> <i>himantopus</i>	RECURVIROSTRIDAE	Black-winged stilt	P	LC	
<i>Hirundo albigularis</i>	HIRUNDINIDAE	White-throated swallow	P	LC	
<i>Hirundo cucullata</i>	HIRUNDINIDAE	Greater striped swallow	P	LC	
<i>Hirundo fuligula</i>	HIRUNDINIDAE	Rock martin	P	LC	
<i>Hirundo rustica</i>	HIRUNDINIDAE	Barn swallow	P	LC	
<i>Hirundo spilodera</i>	HIRUNDINIDAE	South African cliff-swallow	P	LC	
<i>Lanius collaris</i>	LANIIDAE	Common fiscal	P	LC	
<i>Malcorus pectoralis</i>	SYLVIIDAE	Rufous-eared warbler	P	LC	
<i>Melierax canorus</i>	ACCIPITRIDAE	Southern pale chanting goshawk	SP	LC	
<i>Merops apiaster</i>	MEROPIDAE	European bee-eater	P	LC	
<i>Mirafra apiata</i>	ALAUDIDAE	Cape clapper lark	P	LC	
<i>Motacilla capensis</i>	MOTACILLIDAE	Cape wagtail	P	LC	
<i>Myrmecocichla formicivora</i>	TURDIDAE	Anteating chat	P	LC	
<i>Nectarinia famosa</i>	NECTARINIIDAE	Malachite sunbird	P	LC	
<i>Neotis ludwigii</i>	OTIDIDAE	Ludwig's bustard	SP	EN	II
<i>Numida meleagris</i>	NUMIDIDAE	Helmeted guineafowl	P	LC	
<i>Oena capensis</i>	COLUMBIDAE	Namaqua dove	P	LC	
<i>Oenanthe monticola</i>	TURDIDAE	Mountain wheatear	P	LC	
<i>Oenanthe pileata</i>	TURDIDAE	Capped wheatear	P	LC	
<i>Parus afer</i>	PARIDAE	Grey tit	P	LC	
<i>Passer domesticus</i>	PLOCEIDAE	House sparrow	CIS	LC	
<i>Passer melanurus</i>	PLOCEIDAE	Cape sparrow	CIS	LC	
<i>Phalacrocorax africanus</i>	PHALACROCORACIDAE	Reed cormorant	P	LC	
<i>Phalacrocorax lucidus</i>	PHALACROCORACIDAE	White-breasted cormorant	P	NA	
<i>Phoenicopterus minor</i>	PHOENICOPTERIDAE	Lesser flamingo	SP	..	
<i>Phoenicopterus ruber</i>	PHOENICOPTERIDAE	American flamingo	SP	LC	

<i>Phragmacia substriata</i>	SYLVIIDAE	Namaqua warbler	P	LC
<i>Platalea alba</i>	PLATALEIDAE	African spoonbill	P	LC
<i>Plectropterus gambensis</i>	ANATIDAE	Spur-winged goose	P	LC
<i>Ploceus velatus</i>	PLOCEIDAE	Southern masked weaver	CIS	LC
<i>Podiceps cristatus</i>	PODICIPEDIDAE	Great crested Grebe	P	LC
<i>Polemaetus bellicosus</i>	ACCIPITRIDAE	Martial eagle	SP	NT
<i>Prinia hypoxantha</i>	SYLVIIDAE	Drakensberg prinia	P	LC
<i>Pterocles namaqua</i>	PTEROCLIDIDAE	Namaqua sandgrouse	P	LC
<i>Pycnonotus nigricans</i>	PYCNONOTIDAE	African red-eyed bulbul	CIS	NA
<i>Recurvirostra avosetta</i>	RECURVIROSTRIDAE	Pied Avocet	P	LC
<i>Scleroptila africanus</i>	PHASIANIDAE	Grey-wing francolin	P	NA
<i>Scopus umbretta</i>	SCOPIIDAE	Hamerkop	P	LC
<i>Spreo bicolor</i>	STURNIDAE	Pied starling	P	LC
<i>Streptopelia capicola</i>	COLUMBIDAE	Cape turtle-dove	P	LC
<i>Streptopelia semitorquata</i>	COLUMBIDAE	Red-eyed turtle-dove	P	LC
<i>Streptopelia senegalensis</i>	COLUMBIDAE	Laughing dove	P	NA
<i>Sturnus vulgaris</i>	STURNIDAE	Common starling	..	LC
<i>Tachybaptus ruficollis</i>	PODICIPEDIDAE	Little Grebe	P	LC
<i>Tadorna cana</i>	ANATIDAE	Southern African shelduck	P	LC
<i>Telophorus zeylonus</i>	MALACONOTIDAE	Bokmakierie	P	LC
<i>Tricholaema leucomelas</i>	CAPITONIDAE	Acacia barbet	P	LC
<i>Turdus olivaceus</i>	TURDIDAE	Olvie thrush	P	LC
<i>Upupa africana</i>	UPUPIDAE	African hoopoe	P	LC
<i>Vanellus armatus</i>	CHARADRIIDAE	Blacksmith lapwing	P	LC
<i>Vanellus coronatus</i>	CHARADRIIDAE	Crowned lapwing	P	LC

INSECTS

Species	Family	Common name	NCNCA	Red Data status	CITES
<i>Berosus</i> sp.	HYDROPHILIDAE			NA	
<i>Branchipodopsis</i> sp.	BRANCHIPODIDAE			NA	
<i>Colias electo</i> subsp. <i>electo</i>	PIERIDAE	African clouded butterfly		NA	
<i>Leptestheria</i> sp.	LEPTESTHERIIDAE			NA	
<i>Tropocorixa wahlbergi</i>	CORIXIDAE			NA	
<i>Tyndallhydrus caraboides</i>	DYTISCIDAE			NA	
Unidentified Ancyliidae	ANCYLIDAE			NA	
Unidentified Notostraca	UNIDENTIFIED NOTOSTRACA			NA	
<i>Unio caffer</i>	UNIONIDAE			LC	

Clarification of symbols:

Northern Cape Nature Conservation Act lists some of these animal species as Protected (P), Specially Protected (SP) or Damage Causing Animals (DCA).

IUCN Red data list categories are as follows: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX). Species Not Assessed are listed as NA. These categories indicate the conservation importance of a species based on an expert evaluation of the species.

CITES Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade. CITES does not regulate the EIA process but species listed in the Appendices of CITES are considered to be of conservation importance internationally and thus should be considered of conservation importance locally.

Quarter degree grid 3124BB

MAMMALS

Scientific name	Common name	NCNCA	Red Data Status	CITES
<i>Pipistrellus capensis</i>	Cape serotine bat	P	LC	
<i>Aethomys granti</i>	Grant's rock mouse	P	LC	
<i>Aethomys namaquensis</i>	Namaqua rock mouse	P	LC	
<i>Antidorcas marsupialis</i>	Springbok	P	LC	
<i>Aonyx capensis</i>	African clawless otter	P	LC	
<i>Atelerix frontalis</i>	Southern African hedgehog	SP	LC	
<i>Canis mesomelas</i>	Black-backed jackal	DCA	LC	
<i>Caracal caracal</i>	Caracal	DCA	LC	
<i>Cercopithecus pygerythrus</i>	Vervet monkey	DCA	LC	
<i>Connochaetes gnou</i>	Black wildebeest	P	LC	
<i>Crocidura cyanea</i>	Reddish-grey musk shrew	P	LC	
<i>Cryptomys hottentotus</i>	African mole rat	P	LC	
<i>Cynictis penicillata</i>	Yellow mongoose	P	LC	
<i>Desmodillus auricularis</i>	Cape short-tailed gerbil	P	LC	
<i>Elephantulus rupestris</i>	Western rock elephant-shrew	P	LC	
<i>Felis nigripes</i>	Black-footed cat	SP	VU	II
<i>Felis sylvestris</i>	African wild cat	SP	NA	II
<i>Galerella pulverulenta</i>	Cape grey mongoose	P	LC	
<i>Genetta genetta</i>	Small-spotted genet	P	LC	
<i>Gerbillus paebea</i>	Hairy-footed gerbil	P	NA	
<i>Graphiurus murinus</i>	Woodland dormouse	P	LC	
<i>Graphiurus ocellatus</i>	Spectacled dormouse	P	LC	
<i>Hystrix africaeaustralis</i>	Cape porcupine	P	LC	
<i>Ichneumia albicauda</i>	White-tailed mongoose	P	LC	
<i>Lepus saxatilis</i>	Scrub hare	P	LC	
<i>Macroscelides proboscideus</i>	Round-eared elephant-shrew	P	LC	
<i>Malacothrix typica</i>	Gerbil mouse	P	LC	
<i>Mastomys coucha</i>	Southern multimammate mouse	P	LC	
<i>Mus minutoides</i>	Pygmy mouse	P	LC	
<i>Mystromys albicaudatus</i>	White-tailed mouse	P	EN	
<i>Nycteris thebaica</i>	Egyptian slit-faced bat	P	LC	
<i>Oreotragus oreotragus</i>	Klipspringer	P	LC	
<i>Orycteropus afer</i>	Aardvark	SP	LC	
<i>Oryx gazella</i>	Gemsbok	P	LC	
<i>Otocyon megalotis</i>	Bat-eared fox	SP	LC	
<i>Otomys unisulcatus</i>	Bush vlei rat	P	LC	
<i>Panthera pardus</i>	Leopard	SP	NT	I
<i>Papio hamadryas</i>	Chacma baboon	DCA	LC	
<i>Parotomys brantsii</i>	Brant's whistling rat	P	LC	

<i>Pedetes capensis</i>	Springhare	P	NA	
<i>Pelea capreolus</i>	Grey rhebuck	P	LC	
<i>Poecilogale albinucha</i>	African striped weasel	SP	LC	
<i>Procavia capensis</i>	Rock hyrax	P	LC	
<i>Pronolagus rupestris</i>	Smith's red rock rabbit	P	LC	
<i>Proteles cristata</i>	Aardwolf	SP	LC	III
<i>Raphicerus campestris</i>	Steenbok	P	LC	
<i>Redunca fulvorufula</i>	Mountain reedbuck	P	LC	
<i>Rhabdomys pumilio</i>	Four-striped grass mouse	P	LC	
<i>Saccostomus campestris</i>	Pouched mouse	P	LC	
<i>Suricata suricatta</i>	Suricate	P	LC	
<i>Sylvicapra grimmia</i>	Common duiker	P	LC	
<i>Tadarida aegyptiaca</i>	Egyptian free-tailed bat	P	LC	
<i>Tragelaphus oryx</i>	Eland	P	LC	
<i>Vulpes chama</i>	Cape fox	SP	LC	
<i>Xerus inauris</i>	South African ground squirrel	P	LC	

BIRDS

Species	Family	Common name	NCNCA	Red Data Status	CITES
<i>Alopochen aegyptiaca</i>	ANATIDAE	Egyptian goose	P	LC	
<i>Anas undulata</i>	ANATIDAE	Yellow-billed duck	P	LC	
<i>Anthus cinnamomeus</i>	MOTACILLIDAE	African rock pipit	P	NA	
<i>Anthus crenatus</i>	MOTACILLIDAE	Yellow-tufted pipit		LC	
<i>Anthus leucophrys</i>	MOTACILLIDAE	Plain-backed pipit		LC	
<i>Apus affinis</i>	APODIDAE	Little swift	P	LC	
<i>Apus caffer</i>	APODIDAE	White-rumped swift	P	LC	
<i>Aquila verreauxii</i>	ACCIPITRIDAE	Verreaux's eagle	SP	LC	II
<i>Ardea cinerea</i>	ARDEIDAE	Grey heron	P	LC	
<i>Ardea melanocephala</i>	ARDEIDAE	Black-headed heron	P	LC	
<i>Bostrychia hagedash</i>	PLATALEIDAE	Hadedda ibis	P	LC	
<i>Bradornis infuscatus</i>	MUSCICAPIDAE	Chat flycatcher	P	LC	
<i>Bubo africanus</i>	STRIGIDAE	Spotted eagle-owl	SP	LC	
<i>Bubo capensis</i>	STRIGIDAE	Cape eagle-owl	SP	LC	
<i>Buteo rufofuscus</i>	ACCIPITRIDAE	Jackal buzzard	SP	LC	
<i>Buteo vulpinus</i>	ACCIPITRIDAE	Steppe buzzard	SP	NA	
<i>Calidris minuta</i>	SCOLOPACIDAE	Little stint	P	LC	
<i>Cercomela familiaris</i>	TURDIDAE	Familiar chat	P	LC	
<i>Cercomela schlegelii</i>	TURDIDAE	Karoo chat	P	LC	
<i>Cercomela sinuata</i>	TURDIDAE	Sickle-winged	P	LC	

		chat		
<i>Cercotrichas coryphoeus</i>	Muscicapidae	Karoo scrub-robin	P	LC
<i>Certhilauda curvirostris</i>	ALAUDIDAE	Cape long-billed lark	P	LC
<i>Ceryle rudis</i>	HALCYONIDAE	Pied kingfisher	P	LC
<i>Charadrius tricollaris</i>	CHARADRIIDAE	Three-banded plover	P	LC
<i>Chersomanes albofasciata</i>	ALAUDIDAE	Spike-heeled lark	P	LC
<i>Chrysococcyx caprius</i>	CUCULIDAE	Didric cuckoo	P	LC
<i>Ciconia nigra</i>	CICONIIDAE	Black stork	SP	LC
<i>Cisticola fulvicapilla</i>	SYLVIIDAE	Neddicky	P	LC
<i>Cisticola subruficapilla</i>	SYLVIIDAE	Grey-black cisticola	P	LC
<i>Cisticola tinniens</i>	SYLVIIDAE	Lavaillant's cisticola	p	LC
<i>Colius colius</i>	COLIIDAE	White-backed mousebird	CIS	LC
<i>Colius striatus</i>	COLIIDAE	Speckled mousebird	CIS	LC
<i>Columba guinea</i>	COLUMBIDAE	Speckled pigeon	P	LC
<i>Columba livia</i>	COLUMBIDAE	Rock dove	P	LC
<i>Corvus albicollis</i>	CORVIDAE	White-necked raven	P	LC
<i>Corvus albus</i>	CORVIDAE	Pied crow	CIS	LC
<i>Corvus capensis</i>	CORVIDAE	Cape crow	CIS	LC
<i>Cossypha caffra</i>	TURDIDAE	Cape robin-chat	P	LC
<i>Creatophora cinerea</i>	STURNIDAE	Wattled starling	P	LC
<i>Crithagra albogularis</i>	FRINGILLIDAE	White-throated canary	P	NA
<i>Crithagra flaviventris</i>	FRINGILLIDAE	Yellow canary	P	LC
<i>Elanus caeruleus</i>	ACCIPITRIDAE	Black shouldered kite	SP	LC
<i>Emberiza capensis</i>	FRINGILLIDAE	Cape bunting	P	LC
<i>Emberiza impetuani</i>	FRINGILLIDAE	Lark-like bunting	P	LC
<i>Emberiza tahapisi</i>	FRINGILLIDAE	Cinnamon-breasted bunting	P	LC
<i>Eremomela icteropygialis</i>	SYLVIIDAE	Yellow-billed eremomela	P	LC
<i>Estrilda astrild</i>	ESTRILDIDAE	Common waxbill	P	LC
<i>Euplectes orix</i>	PLOCEIDAE	Red bishop	CIS	LC
<i>Eupodotis afra</i>	OTIDIDAE	Black bustard	..	LC
<i>Eupodotis caerulescens</i>	OTIDIDAE	Blue bustard	..	NT
<i>Eupodotis vigorsii</i>	OTIDIDAE	Karoo korhaan	P	LC

II

<i>Falco naumanni</i>	FALCONIDAE	Lesser kestrel	SP	LC	II
<i>Falco rupicolis</i>	FALCONIDAE	Rock kestrel	SP	LC	II
<i>Falco rupicoloides</i>	FALCONIDAE	Greater kestrel	SP	LC	II
<i>Fulica cristata</i>	RALLIDAE	Red-knobbed coot	P	LC	
<i>Galerida magnirostris</i>	ALAUDIDAE	Large-billed lark	P	LC	
<i>Geocolaptes olivaceus</i>	PICIDAE	Ground woodpecker	P	LC	
<i>Grus paradisea</i>	GRUIDAE	Blue crane	P	VU	II
<i>Himantopus himantopus</i>	RECURVIROSTRIDAE	Black winged stilt	P	LC	
<i>Hirundo albigularis</i>	HIRUNDINIDAE	White-throated swallow	P	LC	
<i>Hirundo cucullata</i>	HIRUNDINIDAE	Greater striped swallow	P	LC	
<i>Hirundo rustica</i>	HIRUNDINIDAE	Barn swallow	P	LC	
<i>Hirundo spilodera</i>	HIRUNDINIDAE	South African cliff-swallow	P	LC	
<i>Lanius collaris</i>	LANIIDAE	Common fiscal	P	LC	
<i>Malcorus pectoralis</i>	SYLVIIDAE	Rufous-eared warbler	P	LC	
<i>Melierax canorus</i>	ACCIPITRIDAE	Southern pale chanting goshawk	SP	LC	
<i>Mirafra apiata</i>	ALAUDIDAE	Cape clapper lark	P	LC	
<i>Motacilla capensis</i>	MOTACILLIDAE	Cape wagtail	P	LC	
<i>Myrmecocichla formicivora</i>	TURDIDAE	Anteating chat	P	LC	
<i>Nectarinia famosa</i>	NECTARINIIDAE	Malachite sunbird	P	LC	
<i>Neotis ludwigii</i>	OTIDIDAE	Ludwig's bustard	SP	EN	II
<i>Numida meleagris</i>	NUMIDIDAE	Helmeted guineafowl	P	LC	
<i>Oena capensis</i>	COLUMBIDAE	Namaqua dove	P	LC	
<i>Oenanthe monticola</i>	TURDIDAE	Mountain wheatear	P	LC	
<i>Onychognathus morio</i>	STURNIDAE	Red winged starling	CIS	LC	
<i>Onychognathus nabouroup</i>	STURNIDAE	Pale-winged starling	P	LC	
<i>Parisoma subcaeruleum</i>	SYLVIIDAE	Chestnut-vented tit-babbler	P	NA	
<i>Passer diffusus</i>	PLOCEIDAE	Southern grey-headed sparrow	P	LC	
<i>Passer domesticus</i>	PLOCEIDAE	House sparrow	CIS	LC	
<i>Passer melanurus</i>	PLOCEIDAE	Cape sparrow	CIS	LC	
<i>Phalacrocorax africanus</i>	PHALACROCORACIDA E	White-breasted cormorant	P	NA	

<i>Phragmacia substriata</i>	SYLVIIDAE	Namaqua warbler	P	LC
<i>Platalea alba</i>	PLATALEIDAE	African spoonbill	P	LC
<i>Plectropterus gambensis</i>	ANATIDAE	Spur-winged goose	P	LC
<i>Ploceus capensis</i>	PLOCEIDAE	Cape weaver	CIS	LC
<i>Ploceus velatus</i>	PLOCEIDAE	Southern masked weaver	CIS	LC
<i>Prinia hypoxantha</i>	SYLVIIDAE	Drakensberg prinia	P	LC
<i>Pycnonotus nigricans</i>	PYCNONOTIDAE	African red-eyed bulbul	CIS	NA
<i>Recurvirostra avosetta</i>	RECURVIROSTRIDAE	Pied Avocet	P	LC
<i>Riparia paludicola</i>	HIRUNDINIDAE	Brown throated martin	P	LC
<i>Saxicola torquatus</i>	TURDIDAE	African stonechat	P	LC
<i>Scleroptila levaillantoides</i>	PHASIANIDAE	Orange River francolin	P	LC
<i>Scopus umbretta</i>	SCOPIIDAE	Hamerkop	P	LC
<i>Serinus alario</i>	FRINGILLIDAE	Black-headed canary	P	LC
<i>Serinus canicollis</i>	FRINGILLIDAE	Cape canary	P	LC
<i>Sigelus silens</i>	MUSCICAPIDAE	Fiscal flycatcher	P	LC
<i>Spreo bicolor</i>	STURNIDAE	Pied starling	P	LC
<i>Streptopelia capicola</i>	COLUMBIDAE	Cape turtle-dove	P	LC
<i>Streptopelia semitorquata</i>	COLUMBIDAE	Red-eyed turtle- dove	P	LC
<i>Streptopelia senegalensis</i>	COLUMBIDAE	Laughing dove	P	NA
<i>Struthio camelus</i>	STRUTHIONIDAE	Ostrich	P	LC
<i>Sturnus vulgaris</i>	STURNIDAE	Common starling
<i>Sylvietta rufescens</i>	SYLVIIDAE	Cape crombec		LC
<i>Tachybaptus ruficollis</i>	PODICIPEDIDAE	Little Grebe	P	LC
<i>Tadorna cana</i>	ANATIDAE	Southern African shelduck	P	LC
<i>Telophorus zeylonus</i>	MALACONOTIDAE	Bokmakierie	P	LC
<i>Threskiornis aethiopicus</i>	PLATALEIDAE	African sacred ibis	P	LC
<i>Tricholaema leucomelas</i>	CAPITONIDAE	Acacia pied barbet	P	LC
<i>Tringa nebularia</i>	SCOLOPACIDAE	Green sandpiper	P	LC
<i>Tringa stagnatilis</i>	SCOLOPACIDAE	Marsh sandpiper	P	LC
<i>Turdus olivaceus</i>	TURDIDAE	Olive thrush	P	LC
<i>Upupa africana</i>	UPUPIDAE	African hoopoe	P	NA
<i>Urocolius indicus</i>	COLIIDAE	Red-faced mouse	CIS	LC

		bird		
<i>Vanellus armatus</i>	CHARADRIIDAE	Blacksmith lapwing	P	LC
<i>Vanellus coronatus</i>	CHARADRIIDAE	Crowned lapwing	P	LC
<i>Vidua macroura</i>	VIDUIDAE	Pin-tailed whydah	P	LC
<i>Zosterops pallidus</i>	ZOSTEROPIIDAE	Orange river white eye	P	LC

INSECTS

Species	Family	Common name	NCNCA	Red data Status	CITES
<i>Aloeides gowani</i>	LYCAENIDAE	Gowan's Copper butterfly		NA	
<i>Larifuga montana</i>	TRIAENONYCHIDAE	Cave sheet-web spider		NA	
<i>Parazuphium debile</i>	CARABIDAE	Beetle		NA	

Clarification of symbols:

Northern Cape Nature Conservation Act lists some of these animal species as Protected (P), Specially Protected (SP) or Damage Causing Animals (DCA).

IUCN Red data list categories are as follows: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX). Species Not Assessed are listed as NA. These categories indicate the conservation importance of a species based on an expert evaluation of the species.

CITES Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival. Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade. CITES does not regulate the EIA process but species listed in the Appendices of CITES are considered to be of conservation importance internationally and thus should be considered of conservation importance locally.

Appendix C. SABAP 2 list for the Platberg-Karoo conservancy

Rank	Common name	Afrikaans name	Scientific name	Status
1	Cape Sparrow	Gewone Mossie	<i>Passer melanurus</i>	
2	Southern Masked-Weaver	Swartkeelgeelvink	<i>Ploceus velatus</i>	
3	Cape Turtle-Dove	Gewone Tortelduif	<i>Streptopelia capicola</i>	
4	Laughing Dove	Rooiborsduifie	<i>Streptopelia senegalensis</i>	
5	African Red-eyed Bulbul	Rooioogtiptol	<i>Pycnonotus nigricans</i>	
6	Anteating Chat	Swartpiek	<i>Myrmecocichla formicivora</i>	
7	Common Fiscal	Fiskaallaksmen	<i>Lanius collaris</i>	
8	Cape Wagtail	Gewone Kwikkie	<i>Motacilla capensis</i>	
9	Hadeda Ibis	Hadeda	<i>Bostrychia hagedash</i>	
10	Acacia Pied Barbet	Bonthoutkapper	<i>Tricholaema leucomelas</i>	
11	Barn Swallow	Europese Swael	<i>Hirundo rustica</i>	
12	Karoo Scrub-Robin	Slangverklikker	<i>Cercotrichas coryphoeus</i>	
13	Pied Crow	Witborskraai	<i>Corvus albus</i>	
14	Yellow Canary	Geelkanarie	<i>Crithagra flaviventris</i>	
15	Greater Striped Swallow	Grootstreepswael	<i>Hirundo cucullata</i>	
16	Egyptian Goose	Kolgans	<i>Alopochen aegyptiacus</i>	
17	Southern Red Bishop	Rooivink	<i>Euplectes orix</i>	
18	Bokmakierie Bokmakierie	Bokmakierie	<i>Telophorus zeylonus</i>	
19	Cape Robin-Chat	Gewone Janfrederik	<i>Cossypha caffra</i>	
20	Speckled Pigeon	Kransduif	<i>Columba guinea</i>	
21	Fiscal Flycatcher	Fiskaalvlievanger	<i>Sigelus silens</i>	
22	Little Swift	Kleinwindswael	<i>Apus affinis</i>	
23	Familiar Chat	Gewone Spekvreter	<i>Cercomela familiaris</i>	
24	Rufous-eared Warbler	Rooioorlangstertjie	<i>Malcorus pectoralis</i>	
25	White-rumped Swift	Witkruiswindswael	<i>Apus caffer</i>	
26	Black-chested Prinia	Swartbandlangstertjie	<i>Prinia flavicans</i>	
27	White-backed Mousebird	Witkruismuisvoel	<i>Colius colius</i>	
28	Northern Black Korhaan	Witvlerkkorhaan	<i>Afrotis afraoides</i>	
29	Red-eyed Dove	Grootringduif	<i>Streptopelia semitorquata</i>	
30	Blacksmith Lapwing	Bontkiewiet	<i>Vanellus armatus</i>	
31	House Sparrow	Huismossie	<i>Passer domesticus</i>	
32	Southern Pale Chanting Goshawk	Bleeksingvalk	<i>Melierax canorus</i>	
33	Pied Starling	Witgatspreeu	<i>Spreo bicolor</i>	
34	Eastern Clapper Lark	Hoefeldklappertjie	<i>Mirafra fasciolata</i>	
35	Rock Martin	Kransswael	<i>Hirundo fuligula</i>	
36	Helmeted Guineafowl	Gewone Tarentaal	<i>Numida meleagris</i>	
37	Red-faced Mousebird	Rooiwangmuisvoel	<i>Urocolius indicus</i>	
38	Karoo Thrush	Geelbeklyster	<i>Turdus smithi</i>	
39	Namaqua Dove	Namakwaduifie	<i>Oena capensis</i>	

40	Spike-heeled Lark	Vlaktelewerik	<i>Chersomanes albofasciata</i>	
41	Three-banded Plover	Driebandstrandkiewiet	<i>Charadrius tricollaris</i>	
42	African Hoopoe	Hoephoep	<i>Upupa africana</i>	
43	Spur-winged Goose	Wildemakou	<i>Plectropterus gambensis</i>	
44	Cape Glossy Starling	Kleinglansspreeu	<i>Lamprotornis nitens</i>	
45	European Bee-eater	Europese Byvreter	<i>Merops apiaster</i>	
46	White-throated Swallow	Witkeelswael	<i>Hirundo albigularis</i>	
47	Red-billed Quelea	Rooibekkewelea	<i>Quelea quelea</i>	
48	Black-throated Canary	Bergkanarie	<i>Crithagra atrogularis</i>	
49	South African Cliff-Swallow	Familieswael	<i>Hirundo spilodera</i>	
50	Chestnut-vented Tit-Babbler	Bosveldtjeriktik	<i>Parisoma subcaeruleum</i>	
51	Wattled Starling	Lelspreeu	<i>Creatophora cinerea</i>	
52	Diderick Cuckoo	Diederikkie	<i>Chrysococcyx caprius</i>	
53	Orange River White-eye	Gariepglasogie	<i>Zosterops pallidus</i>	
54	African Pipit	Gewone Koester	<i>Anthus cinnamomeus</i>	
55	Blue Crane	Bloukraanvoel	<i>Anthropoides paradiseus</i>	VU
56	White-throated Canary	Witkeelkanarie	<i>Crithagra albogularis</i>	
57	Brown-throated Martin	Afrikaanse Oewerswael	<i>Riparia paludicola</i>	
58	Scaly-feathered Finch	Baardmannetjie	<i>Sporopipes squamifrons</i>	
59	Lesser Kestrel	Kleinrooivalk	<i>Falco naumanni</i>	VU
60	White-browed Sparrow-Weaver	Koringvoel	<i>Plocepasser mahali</i>	
61	South African Shelduck	Kopereend	<i>Tadorna cana</i>	
62	Southern Grey-headed Sparrow	Gryskopmossie	<i>Passer diffusus</i>	
63	Capped Wheatear	Hoefeldskaapwagter	<i>Oenanthe pileata</i>	
64	Crested Barbet	Kuifkophoutkapper	<i>Trachyphonus vaillantii</i>	
65	Reed Cormorant	Rietduiker	<i>Phalacrocorax africanus</i>	
66	Yellow-billed Duck	Geelbekeend	<i>Anas undulata</i>	
67	Mountain Wheatear	Bergwagter	<i>Oenanthe monticola</i>	
68	Crowned Lapwing	Kroonkiewiet	<i>Vanellus coronatus</i>	
69	Black-shouldered Kite	Blouvalk	<i>Elanus caeruleus</i>	
70	Grey Heron	Bloureier	<i>Ardea cinerea</i>	
71	Desert Cisticola	Woestynklopkloppie	<i>Cisticola aridulus</i>	
72	Sabota Lark	Sabotalewerik	<i>Calendulauda sabota</i>	
73	Black-headed Heron	Swartkopreier	<i>Ardea melanocephala</i>	
74	Large-billed Lark	Dikbeklewerik	<i>Galerida magnirostris</i>	
75	Brown-hooded Kingfisher	Bruinkopvisvanger	<i>Halcyon albiventris</i>	
76	Grey-backed Cisticola	Grysrugtinktinkie	<i>Cisticola subruficapilla</i>	
77	Kalahari Scrub-Robin	Kalahariwipstert	<i>Cercotrichas paena</i>	
78	Ludwig's Bustard	Ludwigse Pou	<i>Neotis ludwigii</i>	VU
79	Steppe Buzzard	Bruinjakkalsvoel	<i>Buteo vulpinus</i>	
80	Namaqua Warbler	Namakwalangstertjie	<i>Phragmacia substriata</i>	

81	Lesser Swamp-Warbler	Kaapse Rietsanger	<i>Acrocephalus gracilirostris</i>	
82	Red-knobbed Coot	Bleshoender	<i>Fulica cristata</i>	
83	Neddicky Neddicky	Neddikkie	<i>Cisticola fulvicapilla</i>	
84	Chat Flycatcher	Grootvlieevanger	<i>Bradornis infuscatus</i>	
85	Black-winged Stilt	Rooipootelsie	<i>Himantopus himantopus</i>	
86	White-breasted Cormorant	Witborsduiker	<i>Phalacrocorax carbo</i>	
87	Long-billed Crombec	Bosveldstompstert	<i>Sylvietta rufescens</i>	
88	African Sacred Ibis	Skoorsteenveer	<i>Threskiornis aethiopicus</i>	
89	Common Scimitarbill	Swartbekkakelaar	<i>Rhinopomastus cyanomelas</i>	
90	Little Grebe	Kleindobbertjie	<i>Tachybaptus ruficollis</i>	
91	White-fronted Bee-eater	Rooikeelbyvreter	<i>Merops bullockoides</i>	
92	Cape Bunting	Rooivlerkstreepkoppie	<i>Emberiza capensis</i>	
93	Cardinal Woodpecker	Kardinaalspeg	<i>Dendropicos fuscescens</i>	
94	Jackal Buzzard	Rooiborsjakkalsvoel	<i>Buteo rufofuscus</i>	
95	Yellow-bellied Eremomela	Geelpensbossanger	<i>Eremomela icteropygialis</i>	
96	Pale-winged Starling	Bleekvlerkspreeu	<i>Onychognathus nabouroup</i>	
97	Spotted Thick-knee	Gewone Dikkop	<i>Burhinus capensis</i>	
98	Pirit Batis	Piritbosbontrokkie	<i>Batis pririt</i>	
99	Spotted Flycatcher	Europese Vlieievanger	<i>Muscicapa striata</i>	
100	Red-headed Finch	Rooskopvink	<i>Amadina erythrocephala</i>	
101	African Reed-Warbler	Kleinrietsanger	<i>Acrocephalus baeticatus</i>	
102	Fairy Flycatcher	Feevlieievanger	<i>Stenostira scita</i>	
103	Red-billed Teal	Rooibekeend	<i>Anas erythrorhyncha</i>	
104	Fawn-coloured Lark	Vaalbruinlewerik	<i>Calendulauda africanoides</i>	
105	Lark-like Bunting	Vaalstreepkoppie	<i>Emberiza impetuani</i>	
106	Cattle Egret	Veereier	<i>Bubulcus ibis</i>	
107	Common Ostrich	Volstruis	<i>Struthio camelus</i>	
108	Red-capped Lark	Rooikoplewerik	<i>Calandrella cinerea</i>	
109	Zitting Cisticola	Landeryklopkloppie	<i>Cisticola juncidis</i>	
110	Common Waxbill	Rooibeksysie	<i>Estrilda astrild</i>	
111	Blue Korhaan	Bloukorhaan	<i>Eupodotis caerulescens</i>	NT
112	Common Greenshank	Groenpootruiter	<i>Tringa nebularia</i>	
113	Karoo Prinia	Karoolangstertjie	<i>Prinia maculosa</i>	
114	Cinnamon-breasted Bunting	Klipstreepkoppie	<i>Emberiza tahapisi</i>	
115	African Fish-Eagle	Visarend	<i>Haliaeetus vocifer</i>	
116	Levaillant's Cisticola	Vleitinkinkie	<i>Cisticola tinniens</i>	
117	Pied Kingfisher	Bontvisvanger	<i>Ceryle rudis</i>	
118	Common Moorhen	Grootwaterhoender	<i>Gallinula chloropus</i>	
119	Verreaux's Eagle	Witkruisarend	<i>Aquila verreauxii</i>	
120	White Stork	Witooievaar	<i>Ciconia ciconia</i>	

121	Brubru Brubru	Bontroklaksman	<i>Nilaus afer</i>	
122	Pin-tailed Whydah	Koningrooibekkie	<i>Vidua macroura</i>	
123	African Stonechat	Gewone Bontrokkie	<i>Saxicola torquatus</i>	
124	Greater Kestrel	Grootrooivalk	<i>Falco rupicoloides</i>	
125	Sickle-winged Chat	Vlaktespekvreter	<i>Cercomela sinuata</i>	
126	White-faced Duck	Nonnetjie-eend	<i>Dendrocygna viduata</i>	
127	African Pied Wagtail	Bontkwikkie	<i>Motacilla aguimp</i>	
128	African Black Duck	Swarteend	<i>Anas sparsa</i>	
129	Rock Kestrel	Kransvalk	<i>Falco rupicolus</i>	
130	Karoo Korhaan	Vaalkorhaan	<i>Eupodotis vigorsii</i>	
131	Layard's Tit-Babbler	Grystjeriktik	<i>Parisoma layardi</i>	
132	Red-backed Shrike	Rooruglaksman	<i>Lanius collurio</i>	
133	Greater Flamingo	Grootflamink	<i>Phoenicopterus ruber</i>	NT
134	Red-winged Starling	Roovlerkspreeu	<i>Onychognathus morio</i>	
135	Namaqua Sandgrouse	Kelkiewyn	<i>Pterocles namaqua</i>	
136	Secretarybird Secretarybird	Sekretarisvoel	<i>Sagittarius serpentarius</i>	NT
137	Malachite Kingfisher	Kuifkopvisvanger	<i>Alcedo cristata</i>	
138	Karoo Chat	Karoospekvreter	<i>Cercomela schlegelii</i>	
139	Cape Teal	Teeleend	<i>Anas capensis</i>	
140	Grey-backed Sparrowlark	Gysruglewerik	<i>Eremopterix verticalis</i>	
141	Barn Owl	Nonnetjie-uil	<i>Tyto alba</i>	
142	Cape White-eye	Kaapse Glasogie	<i>Zosterops virens</i>	
143	Common Starling	Europese Spreeu	<i>Sturnus vulgaris</i>	
144	African Palm-Swift	Palmwindswael	<i>Cypsiurus parvus</i>	
145	Dusky Sunbird	Namakwasuikerbekkie	<i>Cinnyris fuscus</i>	
146	African Black Swift	Swartwindswael	<i>Apus barbatus</i>	
147	African Spoonbill	Lepelaar	<i>Platalea alba</i>	
148	African Rock Pipit	Klipkoester	<i>Anthus crenatus</i>	
149	Spotted Eagle-Owl	Gevlekte Ooruil	<i>Bubo africanus</i>	
150	African Darter	Slanghalsvoel	<i>Anhinga rufa</i>	
151	African Quailfinch	Gewone Kwartelvinkie	<i>Ortygospiza atricollis</i>	
152	Rock Dove	Tuinduif	<i>Columba livia</i>	
153	Ruff Ruff	Kemphaan	<i>Philomachus pugnax</i>	
154	Golden-tailed Woodpecker	Goudstertspieg	<i>Campethera abingoni</i>	
155	Little Stint	Kleinstrandloper	<i>Calidris minuta</i>	
156	Ashy Tit	Akasiagrismees	<i>Parus cinerascens</i>	
157	Greater Honeyguide	Grootheuningwyser	<i>Indicator indicator</i>	
158	Glossy Ibis	Glansibis	<i>Plegadis falcinellus</i>	
159	Black-headed Canary	Swartkopkanarie	<i>Serinus alario</i>	
160	Short-toed Rock-Thrush	Korttoonkliplyster	<i>Monticola brevipes</i>	
161	Kittlitz's Plover	Geelborsstrandkiewiet	<i>Charadrius pecuarius</i>	
162	Pied Avocet	Bontelsie	<i>Recurvirostra avosetta</i>	
163	Hamerkop Hamerkop	Hamerkop	<i>Scopus umbretta</i>	
164	Brown-crowned Tchagra	Roovlerktjagra	<i>Tchagra australis</i>	
165	Red-breasted Swallow	Rooborsswael	<i>Hirundo semirufa</i>	

166	White-necked Raven	Withalskraai	<i>Corvus albicollis</i>	
167	Pearl-breasted Swallow	PiÅ½relborsswael	<i>Hirundo dimidiata</i>	
168	Lesser Grey Shrike	Gryslaksman	<i>Lanius minor</i>	
169	Karoo Long-billed Lark	Karoolangbeklewerik	<i>Certhilauda subcoronata</i>	
170	Double-banded Courser	Dubbelbanddrawwertjie	<i>Rhinoptilus africanus</i>	
171	Goliath Heron	Reusereier	<i>Ardea goliath</i>	
172	Willow Warbler	Hofsanger	<i>Phylloscopus trochilus</i>	
173	Karoo Lark	Karoolewerik	<i>Calendulauda albescens</i>	
174	Cape Shoveler	Kaapse Slopeend	<i>Anas smithii</i>	
175	Swallow-tailed Bee-eater	Swaelstertbyvreter	<i>Merops hirundineus</i>	
176	Malachite Sunbird	Jangroentjie	<i>Nectarinia famosa</i>	
177	Yellow-billed Egret	Geelbekwitreier	<i>Egretta intermedia</i>	
178	Lanner Falcon	Edelvalk	<i>Falco biarmicus</i>	NT
179	Little Egret	Kleinwitreier	<i>Egretta garzetta</i>	
180	Great Reed-Warbler	Grootrietsanger	<i>Acrocephalus arundinaceus</i>	
181	Booted Eagle	Dwergarend	<i>Aquila pennatus</i>	
182	Common House-Martin	Huiswael	<i>Delichon urbicum</i>	
183	Long-billed Pipit	Nicholsonse Koester	<i>Anthus similis</i>	
184	Abdim's Stork	Kleinswartooievaar	<i>Ciconia abdimii</i>	
185	Common Quail	Afrikaanse Kwartel	<i>Coturnix coturnix</i>	
186	Cape Penduline-Tit	Kaapse Kapokvoel	<i>Anthoscopus minutus</i>	
187	Grey-winged Francolin	Bergpatrys	<i>Scleroptila africanus</i>	
188	Wood Sandpiper	Bosruiter	<i>Tringa glareola</i>	
189	Alpine Swift	Witpenswindswael	<i>Tachymarptis melba</i>	
190	Black-crowned Night-Heron	Gewone Nagreier	<i>Nycticorax nycticorax</i>	
191	Gabar Goshawk	Kleinsingvalk	<i>Melierax gabar</i>	
192	Marsh Sandpiper	Moerasruiter	<i>Tringa stagnatilis</i>	
193	Kori Bustard	Gompou	<i>Ardeotis kori</i>	VU
194	Lesser Honeyguide	Kleinheuningwyser	<i>Indicator minor</i>	
195	Giant Kingfisher	Reusevisvanger	<i>Megaceryle maximus</i>	
196	Cloud Cisticola	Gevlekte Klopkloppie	<i>Cisticola textrix</i>	
197	Klaas's Cuckoo	Meitjie	<i>Chrysococcyx klaas</i>	
198	Yellow-billed Kite	Geelbekwou	<i>Milvus aegyptius</i>	
199	Olive Thrush	Olyflyster	<i>Turdus olivaceus</i>	
200	Speckled Mousebird	Gevlekte Muisvoel	<i>Colius striatus</i>	
201	Common Ringed Plover	Ringnekstrandkiewiet	<i>Charadrius hiaticula</i>	
202	Grey Tit	Piet-tjou-tjou-grysmees	<i>Parus afer</i>	
203	Red-billed Firefinch	Rooibekvuurvinkie	<i>Lagonosticta senegala</i>	
204	Rufous-naped Lark	Rooineklewerik	<i>Mirafraga africana</i>	
205	Amur Falcon	Oostelike Rooipootvalk	<i>Falco amurensis</i>	
206	Cape Crow	Swartkraai	<i>Corvus capensis</i>	
207	Black-necked Grebe	Swartnekdoobertjie	<i>Podiceps nigricollis</i>	
208	Little Rush-Warbler	Kaapse Vleisanger	<i>Bradypterus baboecala</i>	

209	Yellow-crowned Bishop	Goudgeelvink	<i>Euplectes afer</i>	
210	Fork-tailed Drongo	Mikstertbyvanger	<i>Dicrurus adsimilis</i>	
211	Cape Longclaw	Oranjekeelkalkoentjie	<i>Macronyx capensis</i>	
212	Pink-billed Lark	Pienkbeklewerik	<i>Spizocorys conirostris</i>	
213	Common Swift	Europese Windswael	<i>Apus apus</i>	
214	Eastern Long-billed Lark	Grasveldlangbeklewerik	<i>Certhilauda semitorquata</i>	
215	Caspian Tern	Reusesterretjie	<i>Sterna caspia</i>	NT
216	Great Egret	Grootwitreier	<i>Egretta alba</i>	
217	Curlew Sandpiper	Krombekstrandloper	<i>Calidris ferruginea</i>	
218	Plain-backed Pipit	Donkerkoester	<i>Anthus leucophrys</i>	
219	Burchell's Courser	Bloukopdrawwertjie	<i>Cursorius rufus</i>	
220	Black Crake	Swartriethaan	<i>Amaurornis flavirostris</i>	

Appendix D. *Curriculum vitae* and summary of expertise (Dr Helga van der Merwe)

PERSONAL INFORMATION

Surname	Van der Merwe
First names	Helga
Maiden name	Rösch
Identity Number	7303020177086
Date of Birth	2 March 1973
Sex	Female
Marital Status	Married
Nationality	South African
Home Language	English
Other Language(s)	Afrikaans
Fully Bilingual	Yes
Criminal Offences	None
Health	Good
Driver's Licence	Code 08 or EB
Church	NG Church
Home Address	Soekop Calvinia, 8190
Telephone Numbers	027 3412578
Postal Address	P.O. Box 1 Calvinia 8190

EDUCATIONAL QUALIFICATIONS

Last School Attended	Pretoria High School for Girls, Pretoria
Highest Standard Passed	Matric
Subjects Passed on	English (C), Afrikaans (B),
Higher grade	Science (C), Biology (B), Mathematics (C), Geography (C).
Extramural Activities	Tennis, Ecology club, First aid club, Photography club

HIGHER EDUCATION

University Attended	University of Pretoria
Degrees Obtained	BSc – Botany and Genetics BSc(Hons) - Botany (Ecology) (cum laude) MSc - Botany (Ecology) (cum laude) PhD – Plant Science
Other Subjects Passed	Chemistry 1 Physics and Mathematics 1 (first Semester) Zoology 2
Awards/Certificates	Margaretha Mes-commemorative award for Botany

	South African National Parks – Contribution made to conservation and the establishment of National Parks in Namaqualand
Bursaries	1991 - 1994 City Council of Pretoria Suid Afrikaanse Munisipale Vereniging 1994 - FRD Hons degree bursary 1995 - FRD MSc degree bursary 1996 - FRD MSc degree bursary 2008 – NRF PhD degree bursary 2009 – NRF PhD degree bursary

TITLE BSc (HONS) PROJECT

Predicting competitive ability of Namaqualand species by using plant traits.

TITLE OF MSc THESIS

Life history strategies of Namaqualand pioneer plant species.

TITLE OF PhD THESIS

Patterns of plant diversity in the Hantam-Tanqua-Roggeveld subregion of the Succulent Karoo, South Africa.

EMPLOYMENT HISTORY

- Student (1991 - 1996) – University of Pretoria
- Temporary Part-time Research Assistant (1990-1993) – University of Pretoria
- Tutor for Biology (First Semester 1995) – University of Pretoria
- Tutor for Botany (Second Semester 1995) – University of Pretoria
- Tutor for Biology (First Semester 1996) – University of Pretoria
- Preparation of Biology and Botany practicals (when technical assistants were on excursion or on leave) – University of Pretoria
- Senior Nature Conservation Scientist – Northern Cape Nature Conservation (April 1997 – June 2004)
- Temporary Full-time Research Officer - University of Pretoria (July 2004 – June 2008). I secured funding for a project in the Hantam-Tanqua-Roggeveld. These external funds received from the Critical Ecosystem Partnership Fund through the SKEP initiative were used to fund this position.
- Part-time PhD student at the Department of Plant Science, University of Pretoria (2006 – 2009)
- Student assistantship – University of Pretoria (August 2009 – December 2009)
- Botanical surveys, specialist reporting and compilation of a field guide (May 2008 – until present)

MEMBERSHIPS

Golden Key International Honour Society – Membership upon invitation, granted to the 15% of academic achievers in their field of study. Membership number – 6790927.

South African Council for Natural Scientific Professions – Registered in the field of Botanical Science. Membership number 400193/10.

South African Association of Botanists

Botanical Society of South Africa

CHARACTER REFERENCES

Prof. M.W. van Rooyen (Gretel)

Department of Botany

University of Pretoria

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PUBLICATIONS

RÖSCH, H., VAN ROOYEN, M.W. & THERON G.K. 1997. Predicting competitive interactions between pioneer plant species by using plant traits (*Journal of Vegetation Science* (8): 489-494).

RÖSCH, H., VAN ROOYEN, M.W. & THERON G.K. 1997. Community level competition between five Namaqualand pioneer plant species (*South African Journal of Botany* 63(1): 1-3).

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VAN DER MERWE, H. & VAN ROOYEN, M.W. Life form and species diversity on abandoned croplands, Roggeveld, South Africa African. (*Journal of Range and Forage Science* 28: 99-110).

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FIELD GUIDE PUBLISHED

Wild flowers of the Roggeveld and Tanqua. 2010. Helga van der Merwe in collaboration with Gretel van Rooyen.

CONGRESS PAPERS AND POSTERS

RÖSCH, H., VAN ROOYEN, M.W. & THERON G.K. 1995. Predicting competitive ability of Namaqualand species by using plant traits. (Poster - SAAB)

RÖSCH, H., VAN ROOYEN, M.W. & THERON G.K. 1995. Predicting competitive ability of

Namaqualand species by using plant traits. (Poster and Presentation - Arid Zone Ecology Forum)

RÖSCH, H., VAN ROOYEN, M.W. & THERON G.K. 1996. Multivariate analysis of thirty Namaqualand pioneer plant species. (Poster - SAAB)

RÖSCH, H. 1997. Multivariate analysis of thirty Namaqualand pioneer plant species using plant traits. (Paper presented -Namaqualand workshop)

RÖSCH, H. 2000. Management units identified on Goegap Nature Reserve. (Poster – AZEF)

CONSERVATION INTERNATIONAL, 2002. SKEP (Succulent Karoo Ecosystem Plan). (Poster – AZEF)

BROODRYK, N.L., VAN ROOYEN, M.W., VAN DER MERWE, H. & LE ROUX, A. 2006. Long-term monitoring of the vegetation in the Goegap Nature Reserve in Namaqualand, South Africa. (Poster – South African Environmental Observation Network – SAEON – Summit & workshop)

VAN DER MERWE, H., VAN ROOYEN, M.W. & VAN ROOYEN, N. 2006. Vegetation of the Hantam-Tanqua-Roggeveld. (Poster presentation – AZEF)

BROODRYK, N.L., VAN ROOYEN, M.W., VAN DER MERWE, H. & LE ROUX, A. 2006. Long-term monitoring of the vegetation in the Goegap Nature Reserve in Namaqualand, South Africa. (Poster presentation – AZEF)

VAN DER MERWE, H. & VAN ROOYEN, M.W. 2007. Patterns of plant diversity in the Hantam-Tanqua-Roggeveld. (Poster presentation– AZEF)

VAN DER MERWE, H. & VAN ROOYEN, M.W. 2009. Plant diversity parameters in the Hantam-Tanqua Roggeveld. (Poster presentation – SAAB)

CONGRESSES ATTENDED

1995 – South African Association of Botanists, Bloemfontein.

1995 - Arid Zone Ecology Forum, Kimberley.

1996 - SAAB South African Association of Botanists, Stellenbosch.

1997 – Arid Zone Ecology Forum, Prince Albert

1997 – Namaqualand workshop

1999 – Arid Zone Ecology Forum, Van Rhynsdorp

2000 – Arid Zone Ecology Forum, Kakamas

2001 – Arid Zone Ecology Forum, Calitzdorp

2001 – Indigenous Plant Use Forum, Kimberley

2002 – Indigenous Plant Use Forum, George

2002 – Arid Zone Ecology Forum, Middelburg Eastern Cape (Vice-chairperson)

2003 – Arid Zone Ecology Forum, Kathu (Vice-chairperson)
2004 – Royal Society / BIOTA Colloquium, Victoria West
2006 – Arid Zone Ecology Forum, Kamieskroon
2007 – Arid Zone Ecology Forum, Sutherland
2009 – SAAB South African Association of Botanists, Stellenbosch
2011 – Arid Zone Ecology Forum, Nieuwoudtville

PRESS RELEASES

Boere wees op die uitkyk vir skelms – May 2000

Landowners beware – May 2000

Navorsingsprojek in die Hantam, Tankwa en Roggeveld area – July 2004

Die Universiteit van Pretoria loods 'n navorsingsprojek in die Hantam, Tankwa en Roggeveld area – July 2004

DEPARTMENTAL REPORTS PRODUCED AT NORTHERN CAPE NATURE CONSERVATION

Revision of floral monitoring techniques on Goegap Nature Reserve – 1998.

Project operational plan: Quantification of the herbaceous component on Goegap Nature Reserve – 1998.

Project operational plan: The use of large herbivore exclosures to determine grazing capacity on Goegap Nature Reserve – 1998.

The use of mammal exclosures to determine grazing pressure on Goegap Nature Reserve – 1998 report – 1999.

Goegap Nature Reserve management units – 2000.

Quantification of the herbaceous component on Goegap Nature Reserve – Year 2000 (Internal report series no. 2).

Veld Condition Assessment on Goegap Nature Reserve – Year 2002 (Internal report series no. 3.).

Description of the vegetation on Oorlogskloof Nature Reserve. (Internal report series no. 7).

NUMEROUS BOTANICAL SPECIALIST REPORTS HAVE BEEN COMPILED AS PART OF ENVIRONMENTAL IMPACT ASSESSMENTS AND VEGETATION SURVEYS IN THE ARID AREAS OF SOUTH AFRICA.

Appendix E. Declaration of independence (Dr Helga van der Merwe)



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

SPECIALIST ECOLOGICAL STUDY FOR THE PROPOSED KLIP GAT SOLAR ENERGY FACILITY NEAR NOUPOORT, NORTHERN CAPE

Specialist:	Dr. Helga van der Merwe		
Contact person:	Dr. Helga van der Merwe		
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Project Consultant:	Savannah Environmental (Pty) Ltd		
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Telephone:	011 2346621	Fax:	086 6840547
E-mail:	ravisha@savannahsa.com		

4.2 The specialist appointed in terms of the Regulations

I, Helga van der Merwe, declare that --

General declaration:

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Helga van der Merwe

Signature of the specialist:

Name of company (if applicable):

30 July 2012

Date: