TERRESTRIAL BIODIVERSITY ASSESSMENT

for the Solar Photovoltaic Facility, Rhino on Remainder of Farm Rhenosterkop 155 and Sunnyside on Farm 400, Beaufort West

M²ENCO

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Title:

Terrestrial Biodiversity Assessment for the Solar Photovoltaic Facility, Rhino, on Remainder of Farm Rhenosterkop 155 and Sunnyside on Farm 400 in Beufort West, Western Cape Province under DFFE reference number 14/12/16/3/3/1/2921.

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Reviewer:

Reuhl Lombard (Environmental consultant, *Pr.Sci.Nat* 128735)

Report no:

SiVEST/TERR/PF/2023/85a/Draft/V2

Date:

February 2024

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EXECUTIVE SUMMARY

A fauna and flora study (i.e. Terrestrial Biodiversity Assessment) was conducted by MENCO to assess the possible impacts on the local biodiversity related to the development of a solar PV facility within the Beaufort West Local Municipality. This is in support of a BA process as required in terms of the EIA Regulations enacted under the NEMA undertaken by SiVEST on behalf of the client (K2022578692 South Africa (Pty) Ltd) for the proposed development of the 500 MW solar PV facility and associated infrastructure, to be located approximately 20 km to the east of and north-east of Beaufort West in the Western Cape Province.

The proposed solar PV facility will fall on two parcels of land referred to individually as the Rhino (on Rhenosterkop RE/155) and Sunnyside SEF (on Farm 400).

The desktop study revealed that very few species of conservational importance are found within the quarter degree grid cells encompassing the project area. However, of these species, none were recorded during site investigations nor are they expected to occur in areas directly related to the proposed project sites (with the exception perhaps of *Chersobius boulengeri*).

CBAs are located north and west of the Rhino SEF site along the seasonal watercourse, Platdoring river. The small area of the CBA, which infringes the site to the west, was confirmed not to be of sensitive nature with the main drainage line in the center of the CBA being the driving feature from which the CBA has been delineated. This CBA will not be affected by the development as it infringes a mere 20 m into the site. The northern CBAs will also remain unaffected. It is also noteworthy that due to the low levels of transformation in the area, the irreplaceability of these CBAs is likely low.

All major and minor drainage lines within the Rhino and Sunnyside solar PV areas are mapped as functional natural or near-natural ESAs. The ESAs are generally small and represent buffered areas around drainage features. This includes minor washes, the drainage areas largely devoid of riparian vegetation. It is unlikely that development would be able to avoid all ESAs and some habitat loss is inevitable. The minor drainage features in particular do not represent broad-scale ecological corridors and are unlikely to impact ecological functionality should development occur. Development will likely impinge on ESAs, however, these minor drainage lines are not particularly sensitive and the impacts would

likely be low.

The sites in question have been impacted by past and present anthropogenic activities, predominantly sheep farming, and can no longer be classified as pristine environments. This is evidenced from the grazing pressure and the presence of invasive species within the site.

The impacts of the activities related to development of the sites should be minimal considering the overall low sensitivity of the habitat. Of the 12 broad scale impacts, three were rated as Medium with the rest rated as Low impacts prior to mitigation. Following mitigation, all impacts can be reduced to Low level impacts. From a terrestrial biodiversity point of view, inclusive of fauna and flora elements, the project in question should be allowed to continue. Authorisation (14/12/16/3/3/1/2921) should take cognisance of the recommendations mentioned below.

Recommendations to be taken into consideration:

- Should development infringe on the 500 m regulated area surrounding any NFEPA identified wetland areas, or any specialist delineated wetlands, the applicant will need to approach the DWS and consider the relevant application processes for either a GA or a WUL.
- It is recommended that highly sensitive areas (highlighted in **Section 4.1.1**) be avoided for development as far as possible. Existing road infrastructure should be prioritised for use to minimise new road development.
- Road infrastructure crossing drainage lines must be free-draining, non-erosive in nature and bank stability must be maintained. The appropriate application process for Water Use must be followed.
- Maintenance and monitoring plans should be compiled and be approved by the relevant regulatory authorities. These should relate to requirements of water use licencing, alien invasive control, and NEMA, specifically presences of SCCs and all mortalities of faunal species that occur on site.
- While the presence of Black-footed Cats has been confirmed through previous assessments or direct sightings in the area under consideration, it was not found on site during the project assessment. This species is transient in nature and will avoid the area during construction. No direct impacts are expected. Nevertheless, should this species or any other SCC (faunal and floral) be identified on site during

construction, this should be brought to the attention of the authors of this report to assisit with the management thereof.

- It is recommended that the mitigatory measures as mentioned in **Section 7** (also refer to ***Table 7-5***) of this report be implemented and included in the EMPr and Authorisation application.
- It is recommended that a rehabilitation plan be developed 5 years prior to closure, as the current environment at time of closure will need to be assessed.

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LIST OF ADDENDUMS

Addendum 1: Screening Report for Rhino and Sunnyside Solar PV Facility
Addendum 2: Site Sensitivity Verification Report for Rhino and Sunnyside Solar PV Facility

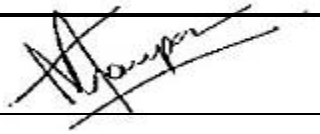
LIST OF ABBREVIATIONS

(Pty) Ltd	Proprietary company
°C	Degrees celcius
AOO	Area of Occupancy
CBAs	Critical Biodiversity Areas
CR	Critically Endangered
ECO	Environmental Control Officer
EMPr	Environmental Management Programme
EOO	Extent of Occurrence
ESAs	Ecological Support Areas
Et al.	et alia
Etc.	Et cetera
GA	General Authorisation
GIS	Geographic Information System
GN	Government Notice
Ha	Hectare
i.e.	Id est
IUCN	International Union for Conservation of Nature
Km	Kilometer
LC	Least Concern
M	Meter
MSc.	Master in Science
MENCO	M2 Environmental Connections
n/a	Not applicable
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998) as amended
NEMBA	National Environmental Managerment Biodiversity Act, 2004 (Act 10 of 2004) as amended
NFEPA	National Freshwater Ecosystem Priority Areas
No.	Number
NT	Near Threatened
PAs	Protected Areas
POSA	Plants of South Africa
Pr.Sci.Nat	Professional Natural Scientist
PV	Photovoltaic
QDG	Quarter Degree Grid

SA	South Africa
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SPP	Species (multiple)
VU	Vulnerable
WEF	Wind Energy Facility
WUL	Water Use Licence

Declaration of Independence (author)

I, **Michelle Thompson**, declare that I act as the independent specialist for the fauna and flora assessment of this application. I conduct assessments in an objective manner, even when the views and findings might not be favourable to the Applicant. I have the expertise to conduct the assessment and will comply with the NEMA, EIA Regulations and other applicable legislation. I do not have conflicting interests in the undertaking of the activity. I undertake to disclose all material information in my possession that has or may have the potential of influencing any decision to be taken in respect to the application.

Signature of Specialist	
SACNASP Registration No	117994
Name of Company	M² Environmental Connections (Pty) Ltd
Date	February 2024

Declaration of Independence (Reviewer)

I, **Reuhl Lombard**, declare that I act as the independent specialist for the fauna and flora assessment of this application. I conduct assessments in an objective manner, even when the views and findings might not be favourable to the Applicant. I have the expertise to conduct the assessment and will comply with the NEMA, EIA Regulations and other applicable legislation. I do not have conflicting interests in the undertaking of the activity. I undertake to disclose all material information in my possession that has or may have the potential of influencing any decision to be taken in respect to the application.

Signature of Specialist	
SACNASP Registration No	128735
Name of Company	M² Environmental Connections (Pty) Ltd
Date	February 2024

GN 320 and 1150 OF 2020: PROTOCOLS FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY, ANIMAL AND PLANT SPECIES

Terrestrial Biodiversity Specialist Assessment:	
The assessment must be prepared by a specialist registered with the SACNASP with expertise in the field of terrestrial biodiversity.	The author, Michelle Thompson, is registered with SACNASP (Pr. Sci. Nat. 11794) Reviewed by Reuhl Lombard, registered with SACNASP (Pr. Sci. Nat. 128735)
The assessment must be undertaken on the preferred site and within the proposed development footprint.	Footprints investigated
The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
a description of the ecological drivers or processes of the system and how the proposed development will impact these;	Section 4
ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;	Section 4
the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Section 4
the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments;	Section 4 and 5
a description of terrestrial biodiversity and ecosystems on the preferred site, including: main vegetation types; threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;	Section 4 and 5
the assessment must identify any alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the Screening Tool and verified through the SSV; and	Section 6
the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify: terrestrial CBAs, including: the reasons why an area has been identified as a CBA; an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or	Section 4 and 5

in achieving the goal of rehabilitation; the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s); the impact on ecosystem threat status; the impact on explicit subtypes in the vegetation; the impact on overall species and ecosystem diversity of the site; and the impact on any changes to threat status of populations of species of conservation concern in the CBA;	
terrestrial ESAs, including: the impact on the ecological processes that operate within or across the site; the extent the proposed development will impact on the functionality of the ESA; and loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;	Section 4
PAs as defined by the National Environmental Management Protected Areas [Amendment] Act, 2004 (Act 31 of 2004) including- an opinion on whether the proposed development aligns with the objectives or purpose of the PA and the zoning as per the protected area management plan;	Section 4
priority areas for protected area expansion, including- the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;	Section 4
SWSAs including: the impact(s) on the terrestrial habitat of a SWSA; and the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);	n/a
FEPA sub catchments, including- the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;	Section 4
indigenous forests, including: impact on the ecological integrity of the forest; and percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	n/a
The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae (CV);	Section 10
a signed statement of independence by the specialist;	Page XII and XIII
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome	Section 3 and 9

of the assessment;	
a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 3
a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 9
a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	n/a
additional environmental impacts expected from the proposed development;	Section 7
any direct, indirect and cumulative impacts of the proposed development;	Section 7
the degree to which impacts and risks can be mitigated;	Section 7
the degree to which the impacts and risks can be reversed;	Section 7
the degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 7
proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;	Table 7-5
a motivation must be provided if there were development footprints identified as bove that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	n/a
a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Section 8
any conditions to which this statement is subjected.	Section 8
Terrestrial Animal Species Specialist Assessment:	
The assessment must be undertaken by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic group ("taxa") for which the assessment is being undertaken.	Section 10
The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline; and must; identify the SCC which were found, observed or are likely to occur within the study area; provide evidence (photographs or sound recordings) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3); identify the distribution, location, viability and provide a detailed description of population size of the SCC, identified within the study area; identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area; determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened	Section 4

Species, South African Red List of Species, and/or other relevant databases; determine the potential impact of the proposed development on the habitat of the SCC located within the study area; include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation; identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems; identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long term viability; determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC; discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or NT Species, as well as any undescribed species; or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and identify any alternative development footprints within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the SSV.	
This report must include as a minimum the following information—	
contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a CV;	Intro page and Section 10
a signed statement of independence by the specialist;	Page XII and XIII
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 3 and 9
a description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant;	Section 3
a description of the mean density of observations/ number of sample sites per unit area and the site inspection observations;	Section 4
a description of the assumptions made and any uncertainties or gaps in knowledge or data;	Section 9
details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 4
the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;	Section 3
the location of areas not suitable for development and to be avoided during construction where relevant;	n/a

a discussion on the cumulative impacts;	Section 7.2
impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;	Table 7-5
a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant;	Section 8
a motivation must be provided if there were any development footprints identified as above that were identified as having "low" or "medium" terrestrial animal species sensitivity and were not considered appropriate.	n/a
Terrestrial Plant Species Specialist Assessment:	
The assessment must be undertaken by a specialist registered with the SACNASP, within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	Section 10
The assessment must be undertaken within the study area.	Footrprint investigated
The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline and must: Identify the SCC which were found, observed or are likely to occur within the study area; provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3); identify the distribution, location, viability and detailed description of population size of the SCC identified within the study area; identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area; determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases; determine the potential impact of the proposed development on the habitat of the SCC located within the study area; include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation; identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems; identify any potential impact on ecological connectivity	Section 4

within the broader landscape, and resulting impacts on the identified SCC and its long term viability; determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC; and discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or NT Species, as well as any undescribed species11; and identify any alternative development footprints within the preferred development site which would be of "low" sensitivity" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	
This report must include as a minimum the following information:	
contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a CV;	Intro page and Section 10
a signed statement of independence by the specialist;	Page XII and XIII
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 3 and 9
a description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;	Section 3
a description of the assumptions made and any uncertainties or gaps in knowledge or data;	Section 4
a description of the mean density of observations/number of samples sites per unit area of site inspection observations;	Section 9
details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	Section 4
the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;	Section 3
the location of areas not suitable for development and to be avoided during construction where relevant;	n/a
a discussion on the cumulative impacts;	Section 7.2
impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;	Table 7-5
a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	Section 8
motivation must be provided if there were any development footprints identified as above that were identified as having "low" or "medium" terrestrial plant species sensitivity and were not considered appropriate.	n/a

1 Introduction

A fauna and flora study was conducted by M² Environmental Connections (Pty) Ltd (MENCO) to assess possible impacts on local biodiversity related to the development of a solar photovoltaic (PV) facility within the Beaufort West Local Municipality of the Central Karoo District Municipality. This study was conducted in support of an Environmental Authorisation (EA) process as required in terms of the Environmental Impact Assessment Regulations, 2014 as amended (EIA Regulations), promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA).

The proposed solar PV facility will fall on two parcels of land, the Rhino solar energy facility (SEF) on Rhenosterkop RE/155 and the Sunnyside SEF on Farm 400.

The project will entail the construction of the following development sites:

Table 1-1: Developments to be constructed

Structure No	Structure Type	QDG[1]	Pentad[2]
Rhino PV Facility	Solar Photovoltaic Energy Facility	3222BB	3210_2250 3210_2245
Sunnyside PV Facility	Solar Photovoltaic Energy Facility	3222BD	3220_2250 3220_2245

1.1 Location

The project area falls under the jurisdiction of the Central Karoo District Municipality approximately 25 kilometres (km) north east and east of Beaufort West within the Beaufort West Local Municipality (***Figure 1-1*** below).

The local settings of the development sites are indicated in ***Figure 1-2*** and ***Figure 1-5*** below. The Rhino solar PV facility area is a single area of 563 hectares (ha) while the Sunnyside solar PV facility area comprises of a cluster of two portions, a western portion and an eastern portion, with a combined 525.2 ha available for development. Both areas have a maximum export capacity of 250MW, for a total consideration of 500MW output.

[1] Quarter Degree Grid cell wherein the structure is located

[2] Southern African Bird Atlas Project 2

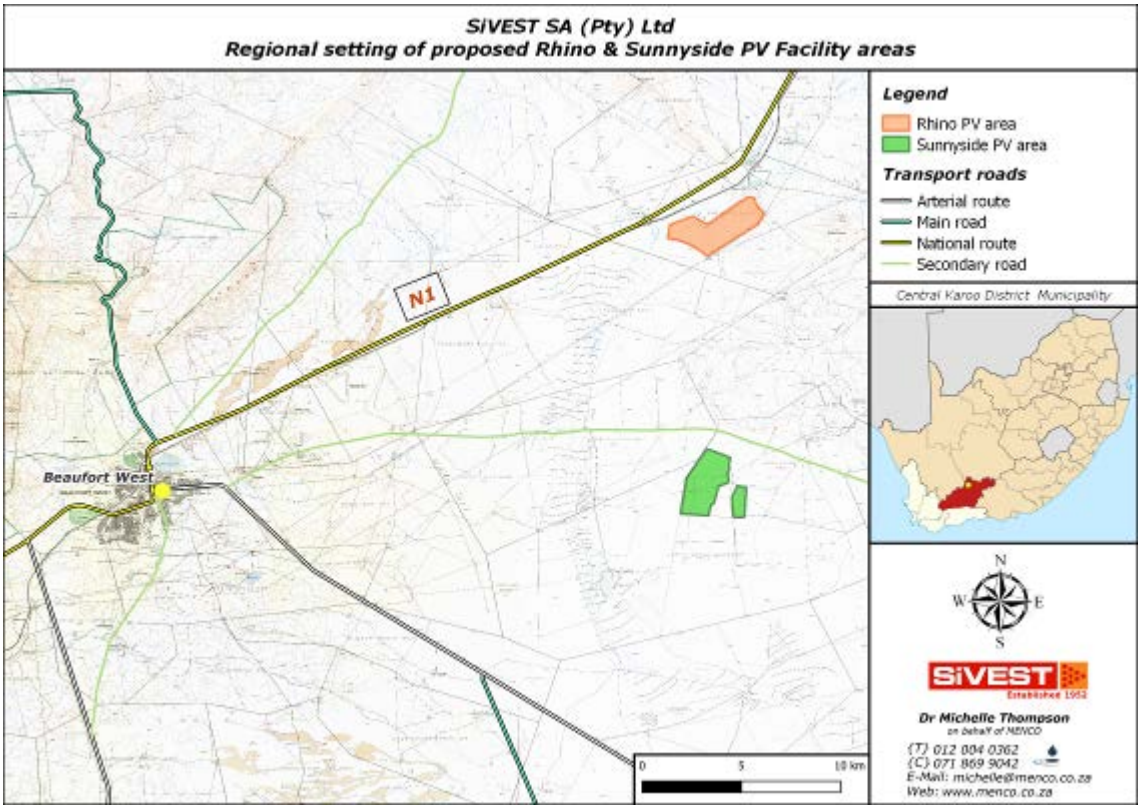


Figure 1-1: Regional setting of development sites

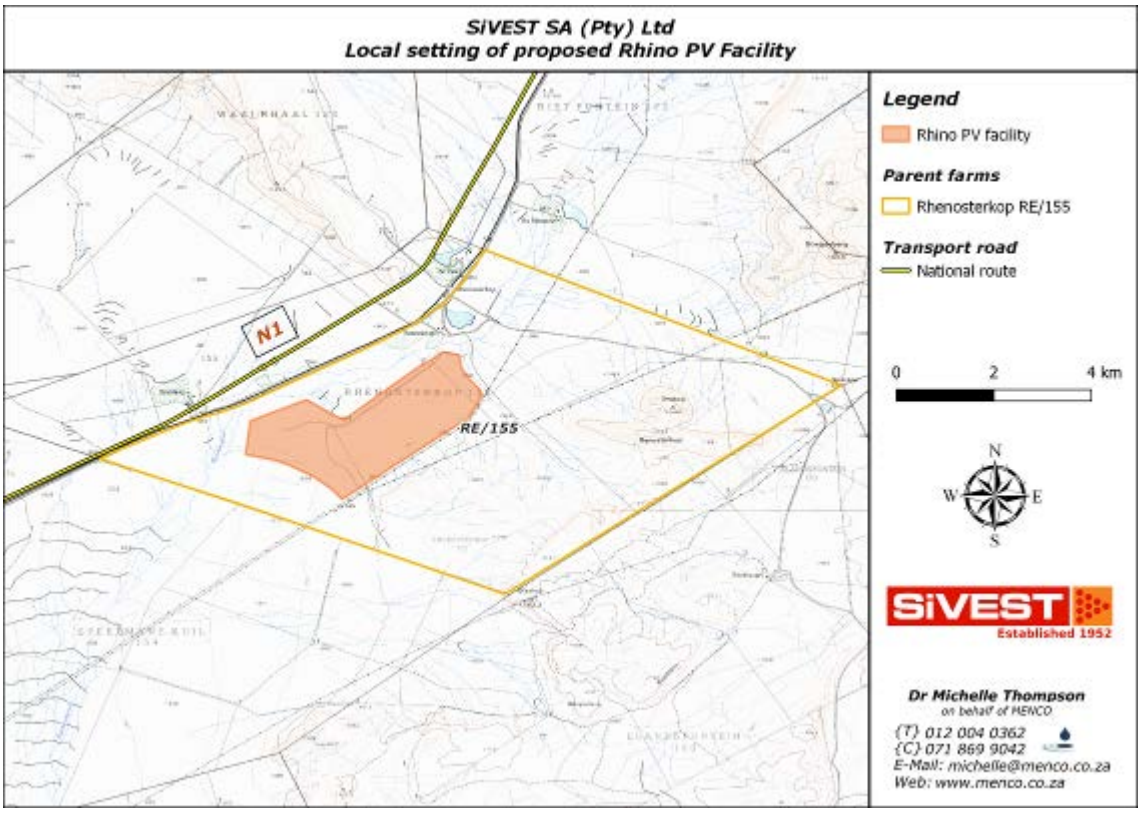


Figure 1-2: Local setting of proposed Rhino PV area

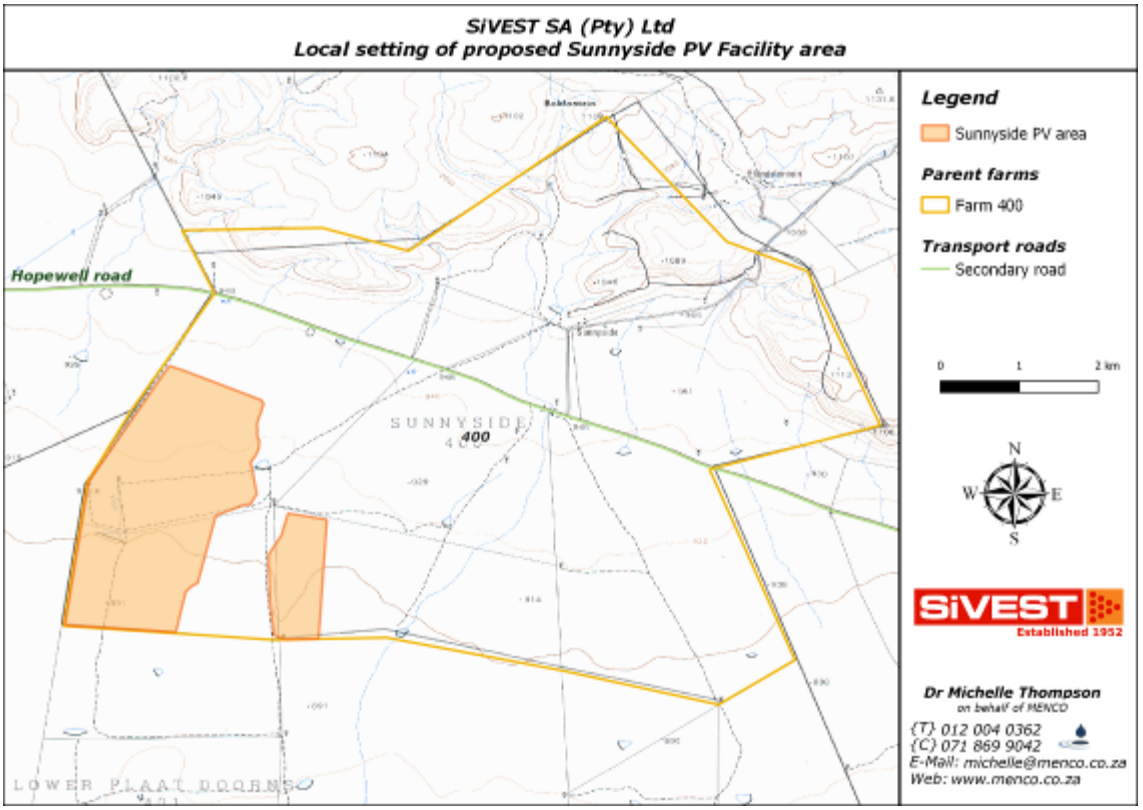


Figure 1-3: Local setting of proposed Sunnyside PV area

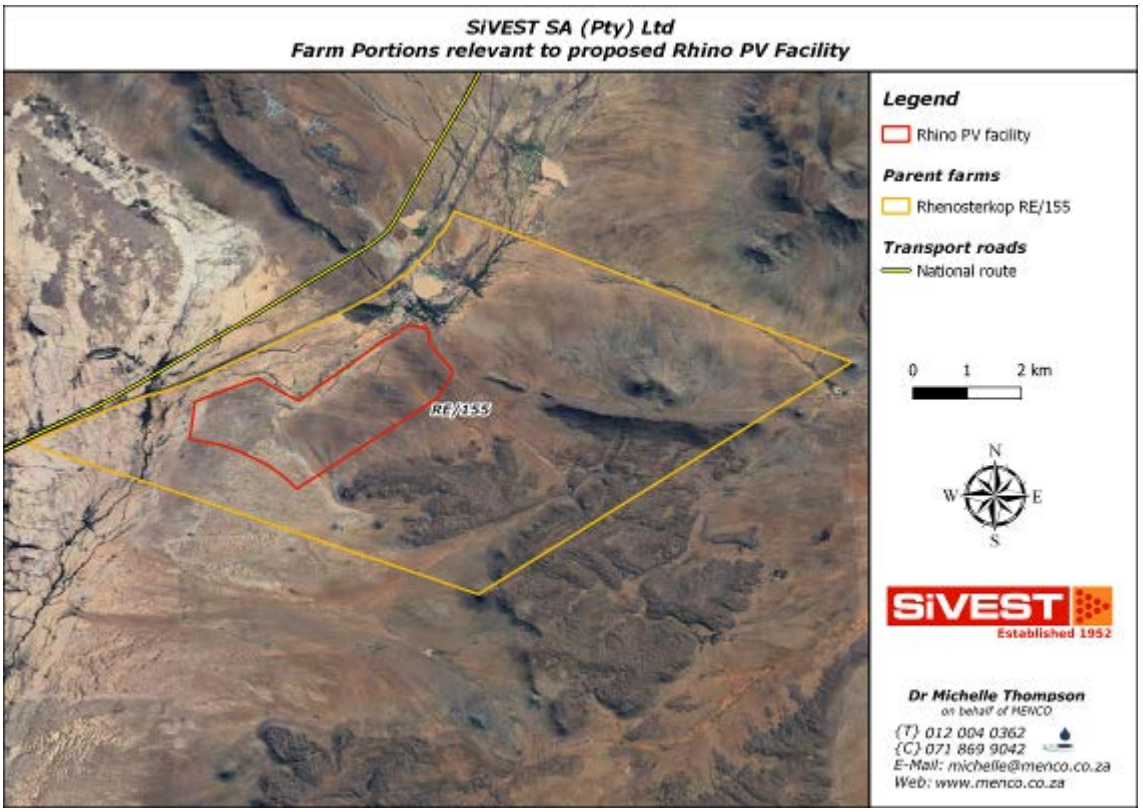


Figure 1-4: Farm portions relevant to the Rhino PV area

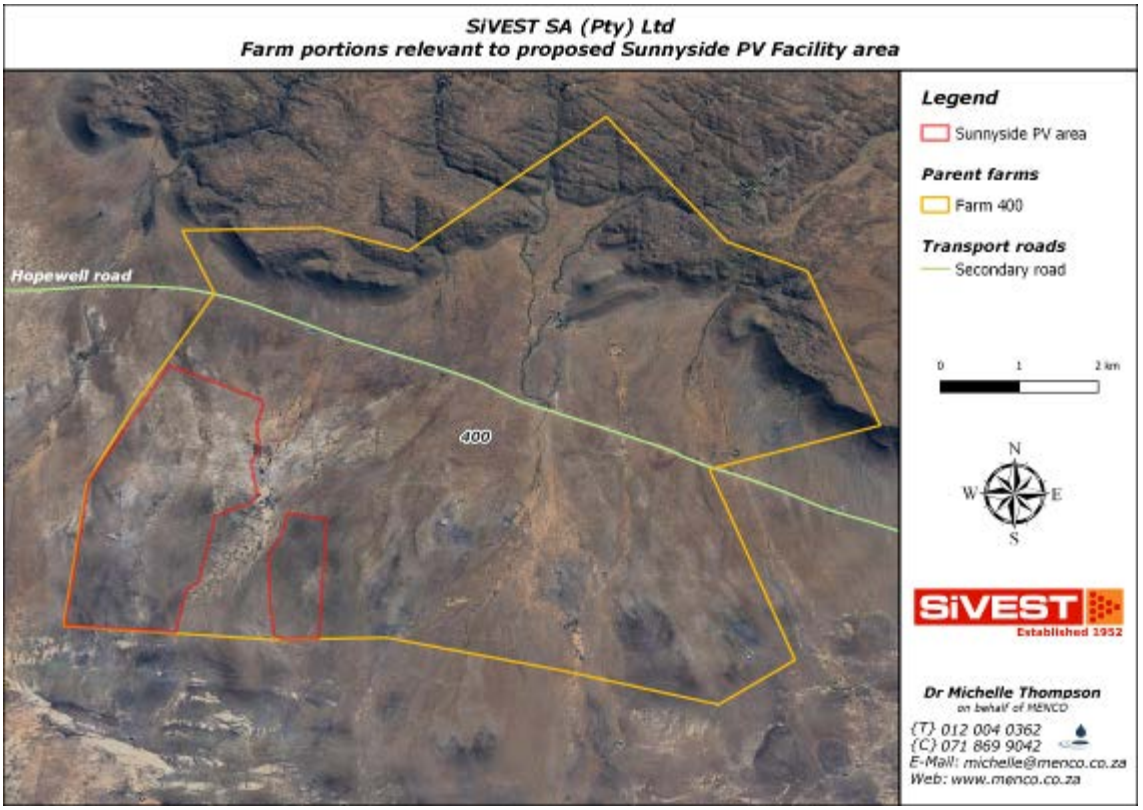


Figure 1-5: Farm portions relevant to the Sunnyside PV area

1.2 Key Activities

The key activities that require EA relate to the development of the solar PV facility infrastructure and road networks required to effectively access infrastructure. The structures in question and the project as a whole triggered themes and sensitivities (***Table 1-2***). In terms of Government Notice (GN) No. 320 and 1150 of 2020 these themes and sensitivies must undergo Site Sensitivity Verification (SSV) to determine the level of assessment, i.e., Compliance Statement or Specialist Impact Assessment. A Screening Report was generated from the National Web-Based Environmental Screening Tool (Screening Tool) in terms of Regulation 16 of the EIA Regulations, refer to the table below.

Table 1-2: Screening Tool outcomes

Theme	Sensitivity	Rationale
Rhino PV area		
Animal Species	High	Birds, Reptiles
Aquatic Biodiversity	Very high	ESA1, Rivers
Avifauna	Low	Low sensitivity
Plant Species	Medium	Sensitive species

Theme	Sensitivity	Rationale
Terrestrial Biodiversity	Very High	CBA1, ESA2
Sunnyside PV area		
Animal Species	High	Both portions: Birds, Reptiles
Aquatic Biodiversity	Very high	West portion: ESA1
	Low	East portion: Low sensitivity
Avifauna	Low	Both portions: Low sensitivity
Plant Species	Medium	Both portions: Sensitive species
Terrestrial Biodiversity	Very High	West portion: CBA1, ESA2
	Low	East portion: Low sensitivity

2 Scope of Work

GN 1150 of October 2020 provides protocols and criteria for the assessment and reporting of impacts on terrestrial biodiversity for any activity requiring EA. The assessment and minimum reporting requirements of this protocol are associated with detected levels of environmental sensitivity identified by the Screening Tool) coupled with the findings of a SSV. The requirements for terrestrial biodiversity are dictated by landscapes or sites which support various levels of biodiversity, inclusive of the presence of potential species of concern.

A prefeasibility assessment was conducted on the Rhino solar PV site a year prior (1 to 3 October 2022). In addition, prior to commencing with the current specialist assessment, the sites under consideration were subjected to SSV to understand the current use of the land and confirm the potential environmental sensitivity as identified by the Screening Tool. This took place on the 10 to 12 October 2023, during which both solar PV areas were assessed. As part of the SSV, a desktop analysis was done on the sites and followed up by a preliminary on-site inspection. The Screening Report for the proposed developments can be viewed under ***Addendum 1.***

In line with GN 320, an applicant intending to undertake an identified activity on a site identified on the Screening Tool as being of “very high sensitivity” for terrestrial biodiversity, must first undertake a SSV to confirm or dispute the Screening Tool findings and thereafter submit a Compliance Statement or Terrestrial Biodiversity Specialist Assessment dependent on the findings of the SSV. The protocols also state that if any part of the proposed development footprint falls within an area of “very high” sensitivity, the assessment and reporting requirements prescribed for the “very high” sensitivity apply to the entire footprint. In the event that the site is classified by the Screening Tool as being of “low” or “very low sensitivity”, the applicant must submit Compliance

Statement in accordance to the GN 320. In this particular case, the below has relevance.

The Western Cape Biodiversity Spatial Plan for Beaufort West (WCBSP, 2017), presents the most updated Critical Biodiversity Areas Map for the region and delineates biodiversity priority areas as Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA) and Protected Areas (PA). CBAs are key natural areas that are required to meet national biodiversity pattern and process targets. Areas housing critically endangered (CR) ecosystems as well as areas required for the continued existence and functioning of ecosystems and ecosystem services are also classified as CBAs. ESs include natural, near-natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or PAs, and are usually vital for supporting landscape connectivity and the delivery of ecosystem services (Pool-Stanvliet et al. 2017).

Two classifications exist within CBAs namely:

- Irreplaceable (CBA1): sites where no other options exist for meeting targets for biodiversity features.
- Optimal/ Important (CBA2): best-design sites which represent an efficient configuration of sites to meet targets in an ecologically sustainable way that is least conflicting with other land uses and activities.

Table 2-1: Critical conservation areas for terrestrial biodiversity extracted from the screening tool report

Development site	Screening Tool Criteria	Description
Rhino solar PV area	ESAs	ESA1 – all drainage lines ESA2 – modified drainage lines
	CBAs	Bordered by a small CBA1 area
Sunnyside solar PV area	ESAs	ESA1 – all drainage lines ESA2 – modified drainage lines

Within most of the PV sites the general vegetation matrix is of low sensitivity. However, the majority of the sites in question were identified as having medium plant sensitivity, high animal sensitivity and very high terrestrial biodiversity sensitivity based on the criteria of the Screening Tool. This is largely due to the fact that the sites are located near to, or encompass, ESAs where ecological processes must be maintained, and these

areas are expected to have a very high sensitivity. The only solar PV area diverging from this is the east portion of the Sunnyside cluster which has low sensitivity for terrestrial biodiversity. The plant theme was confirmed as Low sensitivity and the Animal theme was characterised as medium sensitivity with the proposed site intersecting ESAs which play a supporting role to protect terrestrial biodiversity. Please refer to **Section 4.1.1** for further information.

Based on the information gathered from online databases, as well as a ground truthing site visit conducted on the 10 - 12 October 2023, it was the opinion of the specialists that the habitat found on the sites could potentially house SCCs. Further, the proposed sites have sensitive areas identified by the WCBSP (2017), which required further investigation. As such the sites were determined to be of medium sensitivity for Terrestrial Biodiversity and the protocols stated in GN 1150 of March 2020 should be followed and a **Terrestrial Biodiversity Specialist Assessment** should be conducted.

Based on the above and the site inspection, the focus of work involved for the assessment of terrestrial biodiversity therefore included the following tasks:

- A desktop review of the conservation context of the site, in relation to areas of biodiversity importance, based on available conservation planning for the Province/Municipal area;
- SSV in terms of GN No 320 and 1150;
- A review of habitat requirements for key species flagged as potentially occurring on the sites based on available systematic conservation planning information for the area;
- Mapping and classification of all habitat types within and around the study area;
- Field visit to survey habitats (concentrating on untransformed areas) in order to obtain an indication of the current status of mapped vegetation units (vegetation composition, condition of habitats, etc.);
- An assessment of the potential of habitats to support key species of flora/ fauna of conservation concern identified as potentially occurring on the site;
- Terrestrial Biodiversity (including Animal and Plant Species) Impact Assessment in line with GN No. 320 and 1150;
- Recommendation of site-specific mitigation measures;
- Recommending the need for further specialist studies, if required.

3 Methods of investigation

During the desktop survey, available data from the site was obtained for the fauna and flora communities that have been recorded from this area as well as the conservation

importance of the site. Specific attention was given to species on the IUCN Red List. Data were obtained from the following resources:

Plants: SANBI[3], POSA[4] (http://posa.sanbi.org), IUCN[5] (2023)

Reptiles and Amphibians:

- The Virtual Museum (managed by the FitzPatrick Institute of African Ornithology and The Biodiversity and Development Institute) - ReptileMAP and FrogMap (http://vmus.adu.org.za/).
- Reptile SCC[6] information from Bates *et al*. (2014) and IUCN (2023)
- Amphibian SCC information from Du Preez and Carruthers (2017), IUCN (2023)

Mammals: The Virtual Museum - MammalMAP (http://vmus.adu.org.za/), Skinner and Chimimba (2005), SCC information from Child *et al.*2016, IUCN (2023).

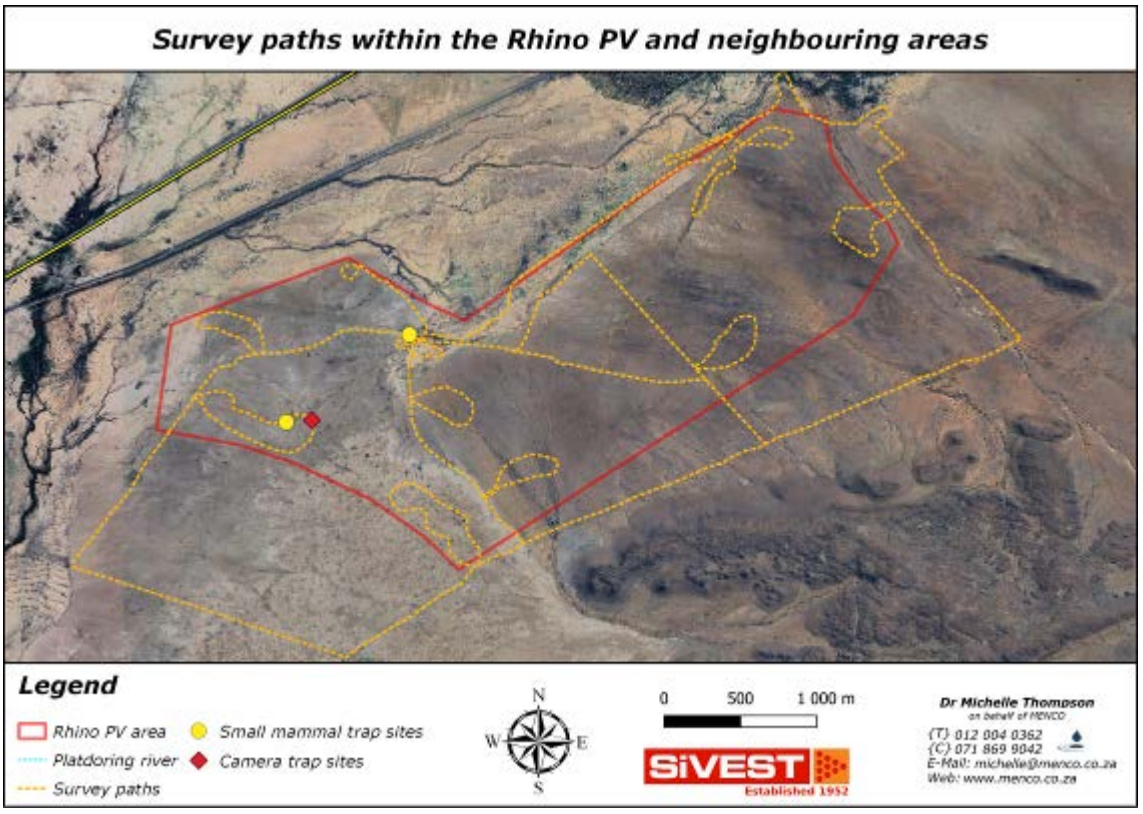


Figure 3-1: Survey paths relevant to the Rhino PV area

[3] South African National Biodiversity Institute

[4] Plants of Southern Africa

[5] International Union for Conservation of Nature

[6] Species of Conservation Concern

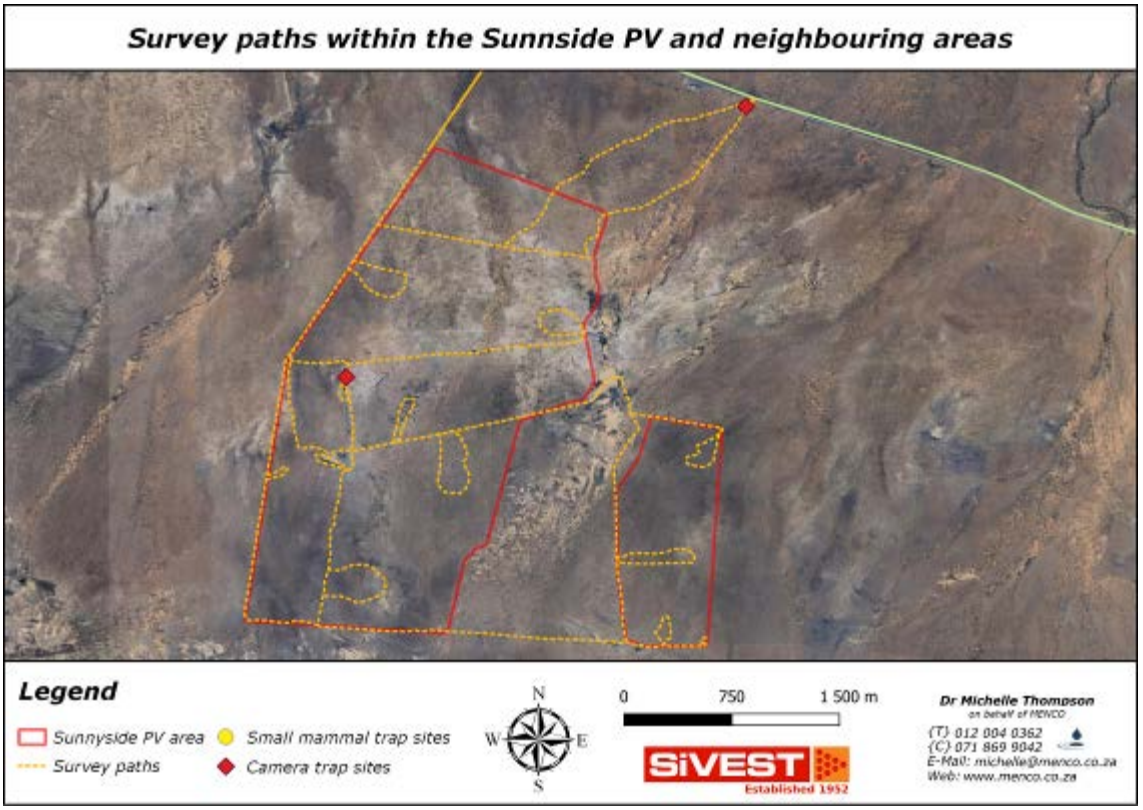


Figure 3-2: Survey paths relevant to the Sunnyside PV area

In addition to the desktop survey and the prefeasibility study conducted in 2022, the sites in question were investigated by means of a site walk-over by two field specialists from 10 to 12 October 2023. The level of this study does not warrant intensive long term field sampling. Rather, the conditions on site were evaluated during a rapid field assessment and placed into context with the regional vegetation type (Mucina and Rutherford, 2006), from which a series of conclusions and subsequent recommendations were derived to inform the mitigation measures. During the field survey, the sites were evaluated on foot (***Figure 3-1*** and ***Figure 3-2***) and a series of georeferenced photographs were taken of the habitat attributes. The field surveys focused on the classification of the observed fauna, flora, habitats and the actual and potential presence of SCC in South Africa (either classified as Vulnerable (VU), or higher, by the IUCN (2021), ***Figure 4-6***, protected by National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004) as amended (NEMBA), or indeed other legislations applicable provincially or nationally). Species classified as Rare were also considered, where identified by the Screening Tool.

Small mammal trapping took place at two locations on the Rhino solar PV area on the evening of 10 October 2023 with a total of ten traps placed at locations where small mammals were expected. The traps were checked early in the morning on

11 October 2023. Further, camera traps were placed at locations on both the Rhino (evening of 10 October 2023) and Sunnyside (evening of 11 October 2023) solar PV areas, to bolster mammal records.

4 Environmental profile

4.1 Description of the area and conservational importance

The Central Karoo, in which the project falls, is characterised by low and erratic summer rainfall and dry winters. The annual rainfall in the region is low (Beaufort West: 392 mm[7] per annum) and the temperature in summer is hot (maximum 31.7°C) with cold winter nights (minimum 4.4°C). A National List of Threatened Ecosystems for South Africa was gazetted on 9 December 2011, considering the data, it was found that the sites are situated as follows:

Table 4-1: Relevant ecosystems and vegetation types

Bioregion	Vegetation Type	Threat Status
Lower Karoo Bioregion	Gamka Karoo	Least Threatened
Intrazonal	Southern Karoo Riviere	Least Threatened

The vegetation of the sites are described in further detail in **Section 4.2**.

4.1.1 Sensitive features

4.1.1.1 Critical Biodiversity Areas

In terms of the Western Cape Land Use Guideline Handbook which provides land use guidelines for CBAs, these areas should be kept in a natural state as far as possible and transformation within these areas is considered undesirable (Pool-Stanvliet *et al*. 2017).

The CBA mapping makes use of hexagonal planning units which tend to be more extensive than the features they protect. As such, the underlying biodiversity objectives and ecological functioning of the CBAs would not necessarily be compromised by developments within close proximity. This is particularly relevant to the CBAs which fall north and west of the Rhino PV site along the seasonal watercourse, the Platdoring River. The small area of the CBA which infringes the site to the west was confirmed not to be of sensitive nature with the main drainage line in the center of the CBA being the driving feature from which the CBA has been delineated. This CBA will not be affected by the

[7] millimetres

development as it infringes a mere 20 metres (m) into the site. The northern CBAs will also remain unaffected. It is also noteworthy that due to the low levels of transformation in the area, the irreplaceability of these CBAs is likely low (***Figure 4-1***). There were no CBs relevant to the Sunnyside PV area (***Figure 4-2***).

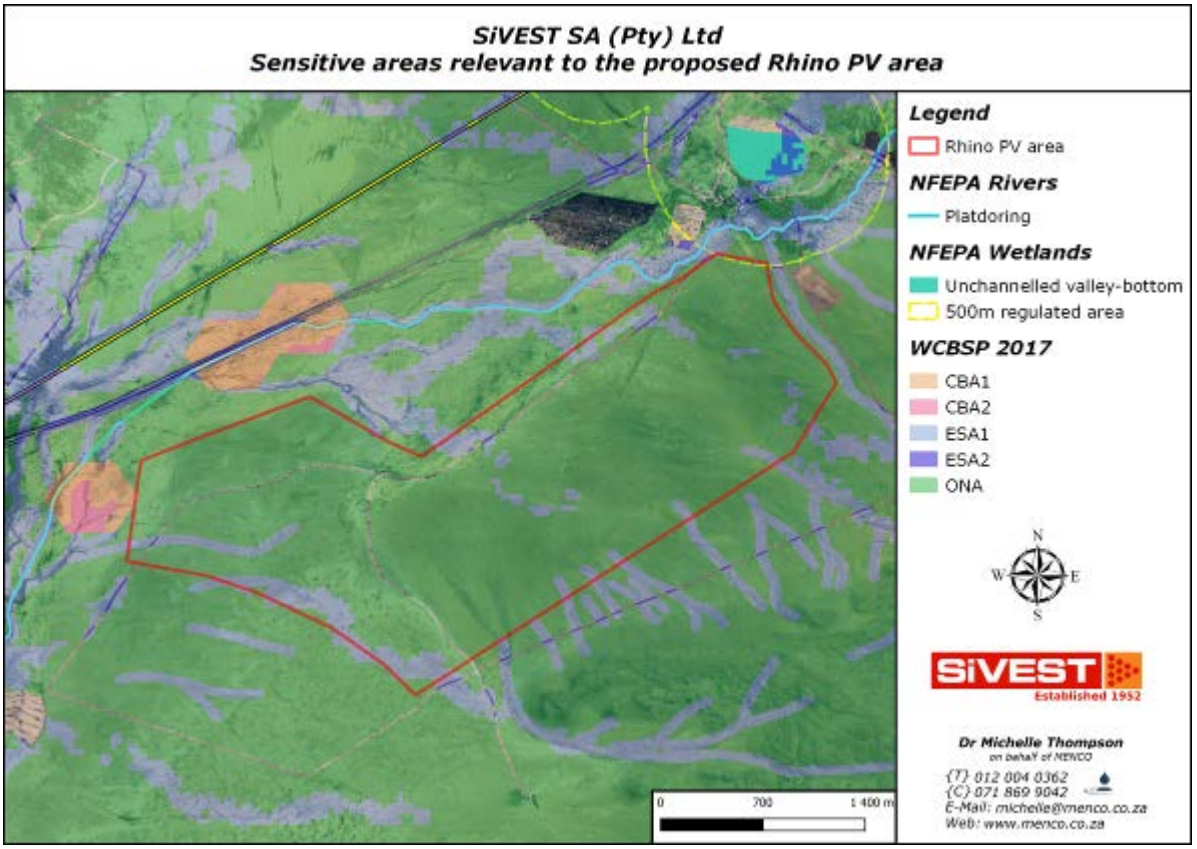


Figure 4-1: Critical Biodiversity Areas for Rhino solar PV site

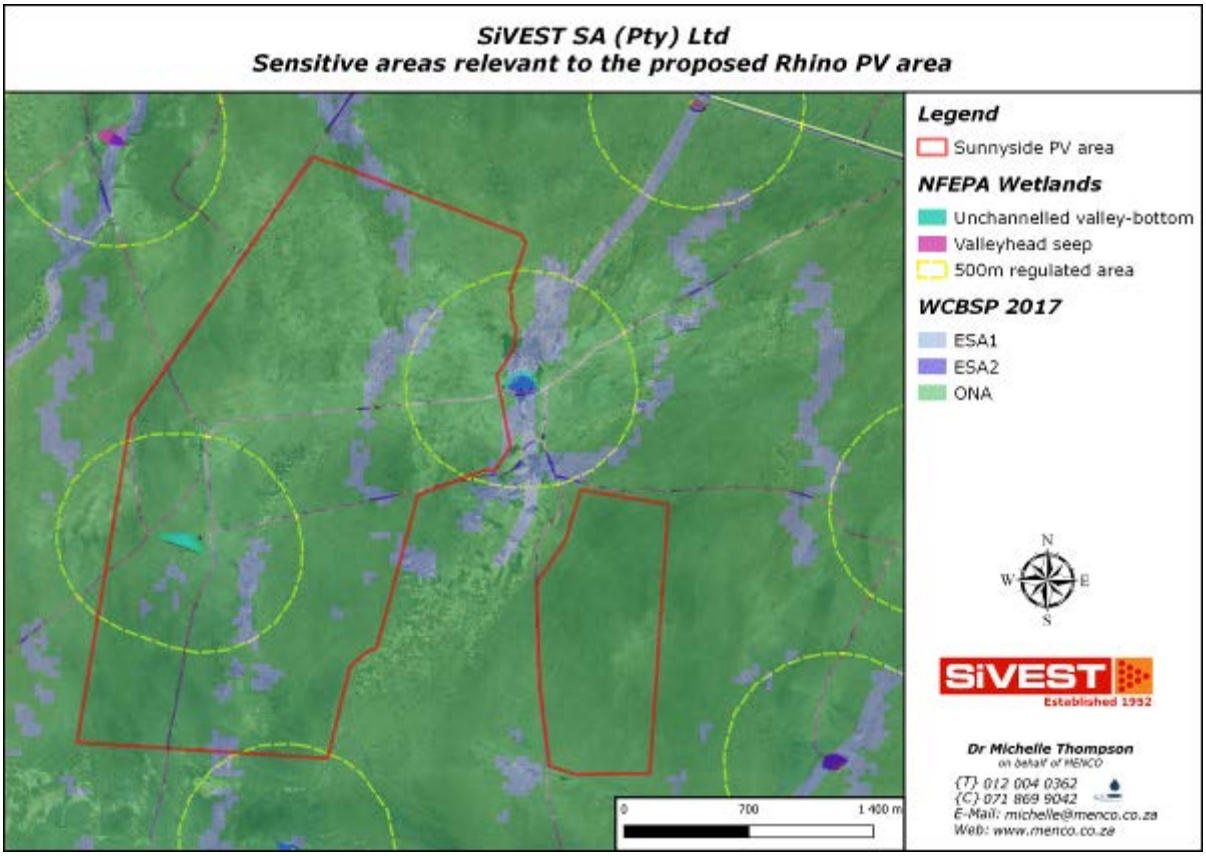


Figure 4-2: Critical Biodiversity Areas for Sunnyside solar PV site

4.1.1.2 Ecological Support Areas

All major and minor drainage lines within the Rhino and Sunnyside solar PV areas are mapped as functional natural or near-natural ESAs. The ESAs are generally small and represent buffered areas around drainage features. This includes minor washes, the drainage areas largely devoid of riparian vegetation. It is unlikely that the development would be able to avoid all ESAs and some habitat loss is inevitable. The minor drainage features in particular do not represent broad-scale ecological corridors and are unlikely to impact ecological functionality should the development occur. The development will likely impinge on ESAs, however, these minor drainage lines are not particularly sensitive and the impacts would likely be low. Additionally, some of the wetlands (mostly artificial dams) in the area are also delineated as ESA2, however, none of these areas fall within the sites (more in **Section 4.1.1.4**). Should the development make use of the long existing road infrastructure which currently impinges on ESAs (where this occurs these areas have been delineated as ESA2), the additive habitat loss from the development could be reduced (***Figure 4-1***).

While the 100 m regulated area around the Platdoring River, north of the Rhino solar PV area triggers Water Uses in terms of Section 21 (c) and (i) of the National Water Act, 1998 (Act 36 of 1998) as amended (NWA), there are only minor terrestrial biodiversity

impact concerns for the river and its associated CBAs and ESAs that can be mitigated (see **Section 5**).

4.1.1.3 Protected Areas

No formal PAs are found within 5 km of the development sites, with the nearest PA (Steenbokkie Private Nature Reserve) located > 10 km to the southwest of the Rhino solar PV area and approximately 5.7 km west of the Sunnyside solar PV area. Similarly, there are no Important Bird Areas (IBA) (BirdLife SA, 2015) near to the sites with the closest IBA, Karoo National Park, located > 25 km from the development sites.

4.1.1.4 Wetlands

When considering SANBI's National Freshwater Ecosystem Priority Areas (NFEPA), it is found that the Rhino solar PV area is located within the 500 m regulated area surrounding a single unchannelled valleybottom (UCVB) wetland located to the north-eastern corner of the site. It should be noted that the NFEPA database is conservative in its approach and thus frequently delineated wetlands erroneously (for example dam reservoirs, swimming pools, WWTW[8]). This wetland is an artificial dam with the development unlikely to impact the functionality of the dam as the Platdoring River intercepts the regulated area separating the site from the wetland area (***Figure 4-1***).

Similarly, there is an artificial dam (classified as an UCVB wetland) within the Sunnyside solar PV area with the 500 m regulated areas of several other UCVB wetlands infringing on the site (***Figure 4-2***). These are not natural features and habitat surrounding these areas consists predominantly of invasive *Prosopis* trees.

While the 500 m regulated area around the wetlands triggers Water Uses in terms of Section 21 (c) and (i) of the NWA, there are are no terrestrial biodiversity impact concerns for the wetlands (see **Section 5**).

[8] Wastewater Treatment Works

4.2 Vegetation

The sites are all situated within the Nama Karoo Biome, within the Lower Karoo Bioregion (Mucina and Rutherford, 2006). The Lower Karoo Bioregion is the lowest-altitude bioregion within the Nama Karoo biome, receiving less rainfall (mean annual precipitation of 203 mm per annum) and less frost than other bioregions. The Rhino solar PV site also fringes on Southern Karoo Riviere vegetation, classified as Inland Azonal Vegetation.

A national process has been undertaken to identify and list threatened ecosystems that are currently under threat of being transformed by other land uses, as per Section 52 of NEMBA (GN 1002 of December 2011). The overarching aim of listing threatened ecosystems is to minimise the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function, and composition of threatened ecosystems (SANBI, 2011).

The vegetation unit for the solar PV sites is characteristic of the Gamka Karoo, a least threatened (LC) vegetation type of the Lower Karoo Bioregion. The Rhino solar PV site is also located within close proximity to Southern Karoo Riviere vegetation (also LC) located on the northern boundary of the sites along tributaries of the Platdoring River. Both vegetation units are largely still intact with neither having been significantly transformed.

4.2.1 Gamka Karoo (NKI 1)

The Gamka Karoo vegetation unit is predominantly contained within a large basin between the Great Escarpment (Nuweveld Mountains) in the north and northwest, and the Cape Fold Belt Mountains (mostly Swartberg Mountains) in the south and from the edge of the Gamka basin catchment area (i.e. Dwyka River tributary) in the west to about the Kariega River in the east. The vegetation unit landscape is characterised by highly irregular to slightly undulating plains with dwarf spiny shrubland dominated by Karoo dwarf shrubs (e.g. *Chrysocoma ciliata*, *Eriocephalus ericoides*) with rare low trees (e.g. *Euclea undulata*). Drought-resistant grasses (*Stipagrostis*, *Aristida*) form dense stands (especially after abundant rains) on broad sandy bottomlands (Mucina and Rutherford, 2006).

The geology comprises mainly of Mudstones and sandstones of the Beaufort Group (Adelaide Subgroup) with some Ecca (Fort Brown) shales supporting very shallow and stony soils of the Glenrosa and/or Mispah forms (Mucina and Rutherford, 2006).

This was the dominant vegetation type for both the solar PV site, with the area represented largely by tracts of fairly homogenous land.

4.2.2 Southern Karoo Riviere (AZi 6)

This LC vegetation unit is found within the Koedoesberge-Moordenaars Karoo, Prince Albert Succulent Karoo, Gamka Karoo, Eastern Lower Karoo, southern parts of the Eastern Upper Karoo as well as some parts of the Albany Thicket Biome south of Cradock within an altitude range of 250 to 1 550 m. The vegetation and landscape are characterised by narrow riverine flats supporting a complex of *Vachellia karroo* or *Tamarix usneoides* thickets fringed by tall *Salsola*-dominated shrubland (up to 1.5 m high), particularly on heavier, salt-laden, soils on broad alluvia. In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. Mesic thicket forms in the far eastern part of this region which may contain *Leucosidea serice*a, *Rhamnusprinoides* and *Ehrharta erecta* (Mucina and Rutherford 2006).

The geology is defined by salt-rich sandy and clay alluvial deposits on mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup). Torrential rains in summer cause sudden flood surges which reshape the riverbeds and neighbouring alluvium.

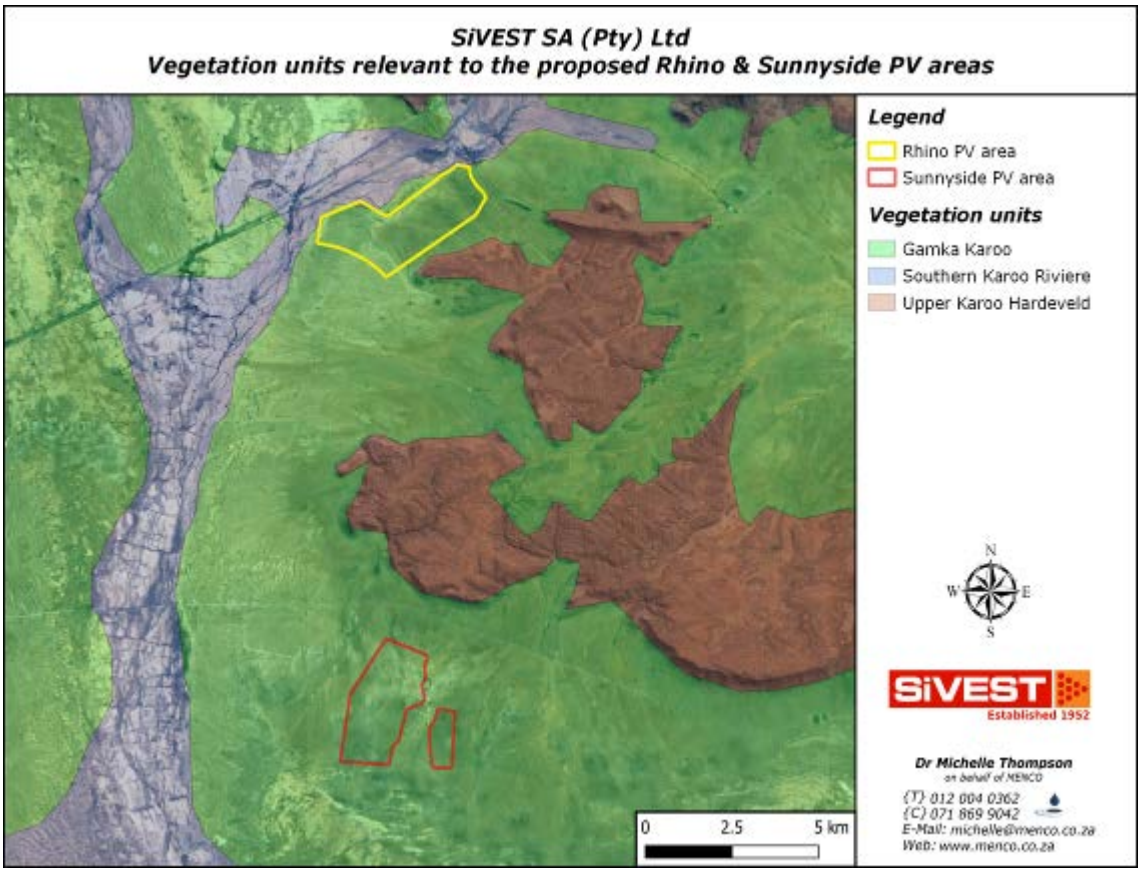


Figure 4-3: Vegetation units present in the development sites

This vegetation type overlaps with identified CBAs north of the Rhino PV site and is fed by drainage line ESAs mainly north of this site. The habitat within this vegetation type is dominated by exotic invasive *Prosopis*, historically brought in to arid regions of the country to provide shade and fodder for livestock.

Refer to ***Figure 4-4*** and ***Figure 4-5*** for site photographs of the typical vegetation found in relation to the sites.



Figure 4-4: Typical vegetation types found at the Rhino solar PV development site



Figure 4-5: Typical vegetation types found at the Sunnyside solar PV development site

4.3 Plants

The proposed sites are comprised of low and medium sensitivity areas. A list of only 36 plant species have been previously recorded in the quarter degree squares 3222BB, which encompasses the project area as a whole (POSA, http://newposa.sanbi.org/). This low number of records was therefore bolstered by the inclusion of neighbouring QDGs 3222BC and 3222BD. The complete plant list from QDGs considered is presented in ***Appendix 1***. Of the inclusive list of 525 species previously recorded, there are no SCC or red-list species occurring with several medium sensitivity species reported from the Screening Tool. None of the medium sensitivity species were recorded during the site assessment. In addition, no red-listed species were recorded during the site assessment. Refer to ***Figure 4-6*** below for a summary of the relevant IUCN Red List status criteria related to SCC.

Table 4-2: Sensitive species identified by the Screening Tool

Sensitivity	Sensitive plant species
Medium	*Anisodontea malvastroides*
Medium	*Hereroa concava*
Medium	*Peersia frithii*
Medium	Sensitive species 1212
Medium	Sensitive species 383
Medium	Sensitive species 945

4.3.1 Sensitive species 383 – Vulnerable B1ab(iii)

This species has a restricted range, known only from five locations within the Great Karoo, where it occurs in a small area between Merweville and Klaarstroom. The species has an extent of occurrence (EOO) of 3 495 square kilometres (km²). The species is found on gentle, stony slopes often growing inside other bushes of the Nama and Succulent Karoo. Due to a lack of scientific botanical studies in the region, the species is likely more common with a larger range. Habitat loss and degradation as a result of livestock grazing and increased duration and intensity of droughts has resulted in the decline of the population. The known range of this species falls entirely within areas flagged for shale gas fracking, which could have an extreme impact on this species (Raimondo 2019; Raimondo *et al.* 2009). The range for this species falls further south of the project sites, however, due to the lack of scientific botanical surveys for this species, it is undersampled. The potential of locating the species on the sites is low but should it be detected on site the author of this report should be informed so that mitigation measures can be actioned.

4.3.2 *Peersia frithii* – Vulnerable B1ab(iii,iv,v)

Peersia is a poorly known genus with species difficult to identify in the field. Currently, only six locations of occurrence are known with a massive range reduction having occurred in comparison to historic records. The current EOO for the species is 690 km². The extensive decline of the species is likely due to livestock overgrazing but the species is also at risk should shale gas fracking take place in the greater area (not part of the current project). This species occurs on slopes or flats of finely weathered Ecca shales of the Nama Karoo in the Eastern Cape, Northern Cape and Western Cape. However, the species is very rare with no samples recorded in any surveys of the Karoo BioGaps project which sampled widely across the Karoo Basin between 2015 to 2018 (Raimondo 2019; Raimondo *et al.* 2009). No specimens from the genus were recorded during the site visit and it unlikely that the species will be found at any of the habitat suitable solar PV site due to overgrazing.

4.3.3 *Hereroa concava* – Vulnerable B1ab(iii)

Hereroa concava appears to be endemic to a small area in the Great Karoo between Beaufort West, Richmond and De Aar where plants grow sheltered among shrubs on flats and plateaus of shale outcrops, within the Eastern Upper Karoo and Upper Karoo Hardeveld. It is a rare and poorly known species (only three to five known locations) but the species is possibly overlooked. Its EOO, calculated from herbarium specimen records, is 12 151 km², but is highly uncertain. It is suspected to be declining due to ongoing habitat loss and degradation outside of PAs, and will also be impacted should shale gas fracking go ahead (not part of the current project). Further, in the species' preferred habitat around Beaufort West, habitat is being lost to uranium mining. Large tracts of karoo vegetation are also experiencing ongoing degradation due to the combined impact of extreme overgrazing and prolonged droughts. Due to the absence of key habitat requirements for the species, there is a small possibility the species may occur within the project sites. Should any specimens be located in the future, these should be reported to the author so that a mitigation strategy can be developed.

4.3.4 Sensitive species 945 – Rare

This relatively widespread but rare species, which typically occurs in small subpopulations (<20 plants), is not currently threatened. It is, however, easily overlooked, as it is cryptic when not flowering, and when flowering, flowers last only a few days. The species grows on summits of rocky dolerite ridges of the Sneeuberg, Agter-Sneeuberg and Nuweveld Mountains of the Nama Karoo. There are currently no severe threats to this species. However, its distribution range falls within an area earmarked for shale gas extraction (not part of the current project). This species was not

observed during site visits and is unlikely to occur in the proposed solar PV development sites.

4.3.5 *Anisodontea malvastroides* – Rare

This species is endemic to the mountains of the Great Karoo, where it is a widespread localised habitat specialist of the Nuweveld and Sneeuberg mountains between Beaufort West and Middelburg. It occurs in arid grassland on summit plateaus and escarpments with an EOO of 76 58 km². Scattered subpopulations are also localized to cliffs, where it is locally abundant. There are currently no threats to this species and the population is suspected to be stable. This species is unlikely to be found on both sites due to a lack of suitable habitat.

4.4 Habitat description

Typically the solar PV sites had low plant biodiversity, as expected with the comparative low species diversity and endemism of the Nama-Karoo. No sensitive species identified by the Screening Tool as potentially being at the site were found and therefore the site as a whole was determined to be of low plant sensitivity overall.

4.4.1 Rhino solar PV area

The site is characterised by karoo dwarf scrubland which was largely stunted, likely from grazing pressure. These sites are pasture for sheep and some antelope species (springbok and blesbok) and were dominated by *Eriocephalus ericoides* and *Pentzia* and *Zygophyllum* species.

The south eastern portion of the landscape was more diverse and defined by a calcrete terrace where *Pteronia* species dominated. In the lower lying run-off areas to the north east the sandy soils facilitated large tracts of *Stipagrostis ciliata* and *S. obtusa* to grow.

The far eastern section of the site housed karoo scrub vegetation similar in species composition with a higher proportion of bare earth patches and a gravelly soil structure.

Areas surrounding artificial water troughs are dominated by alien invasive species (IAP) such as *Prosopis* and *Eucalyptus* with *Euphorbia mauritanica* dominant in the wash-out areas adjacent to these areas.

4.4.2 Sunnyside solar PV area

Similar to the Rhino solar PV, the majority of the site consisted of short karoo scrubland (*Eriocephalus ericoides*, *Pentzia* and *Zygophyllum* species). Comparatively, Mesemb

species were more common in the Sunnyside solar PV area and the veld appears to be in better condition, with less grazing pressure and some areas strongly grass dominant (*Stipagrostis* spp.).

A very minor drainage line runs through the western portion of the site resulting in a slightly different vegetation composition (*Asparagus* and taller *Rhigozum obovatum* with occasional *Vachellia karroo* interspersed). While this habitat is not sensitive, it is divergent and less common in the landscape.

Areas to the south of the western portion as well as the majority of the eastern portion consisted of *Pentzia* dominant karoo scrub on gravel plains with a higher proportion of bare earth present.

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.
A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.
A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.
A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:
(a) direct observation *[except A3]*
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality
(d) actual or potential levels of exploitation
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	D1. < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	D2. typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Figure 4-6: IUCN Red List status criteria[9]

[9] IUCN Standards and Petitions Committee. 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee

The following species listed in ***Table 4-3*** were found within the PV sites.

Table 4-3: Plant species recorded at PV sites (S = Sunnyside, R =Rhino) *[10]

Family	*Taxon*	IUCN	PV area
Asphodelaceae	*Aloe claviflora*	LC	R, S
Amaryllidaceae	*Ammocharis coranica*	LC	S
Scrophulariaceae	*Aptosimum spinescens*	LC	R, S
Asteraceae	*Arctotis leiocarpa*	LC	R, S
Papaveraceae	*Argemone ochroleuca*	Exotic	R, S
Asparagaceae	*Asparagus spp.*	LC	R, S
Asparagaceae	*Asparagus suaveolens*	LC	R, S
Acanthaceae	*Blepharis spp.*	*	R, S
Amaranthaceae	*Caroxylon spp.*	*	R, S
Asteraceae	*Cuspidia cernua*	LC	R, S
Ebenaceae	*Diospyros lycioides*	LC	R, S
Aizoaceae	*Drosanthemum hispidum*	LC	S
Poaceae	*Eragrostis bergiana*	LC	R, S
Asteraceae	*Eriocephalus ericoides*	LC	R, S
Euphorbiaceae	*Euphorbia mauritanica*	LC	R
Asteraceae	*Felicia muricata*	LC	R, S
Poaceae	*Fingerhuthia africana*	LC	R, S
Iridaceae	*Gladiolus permeabilis*	LC	R, S
Apocynaceae	*Gomphocarpus filiformis*	LC	R, S
Malvaceae	*Hermannia cuneifolia*	LC	R, S
Asteraceae	*Kleinia longiflora*	LC	R, S
Asteraceae	*Lasiopogon glomerulatus*	LC	S
Asparagaceae	*Ledebouria apertiflora*	LC	S
Solanaceae	*Lycium pumilum*	LC	R, S
Aizoaceae	*Mesembryanthemum coriarium*	LC	R, S
Aizoaceae	*Mesembryanthemum nodiflorum*	LC	S
Aizoaceae	*Mesembryanthemum spp.*	*	R, S
Geraniaceae	*Monsonia*	LC	R, S
Geraniaceae	*Monsonia salmoniflora*	LC	R, S
Iridaceae	*Moraea polystachya*	LC	S
Asteraceae	*Oedera spp.*	*	R, S
Asteraceae	*Oncosiphon piluliferum*	LC	R, S
Cactaceae	*Opuntia ficus indica*	LC	R, S
Asteraceae	*Pentzia incana*	LC	S
Asteraceae	*Pentzia spp.*	*	R, S
Fabaceae	*Prosopis velutina*	Exotic	R, S
Asteraceae	*Pteronia glomerata*	LC	R, S

[10] *Mutiple unidentified species, no status can be allocated

Family	*Taxon*	IUCN	PV area
Asteraceae	*Pteronia spp.*	LC	R, S
Bignoniaceae	*Rhigozum obovatum*	LC	R, S
Aizoaceae	*Ruschia intricata*	LC	R, S
Poaceae	*Stipagrostis ciliata*	LC	R, S
Poaceae	*Stipagrostis obtusa*	LC	R, S
Santalaceae	*Thesium spp.*	*	R, S
Zygophyllaceae	*Tribulus terrestris*	LC	R, S
Fabaceae	*Vachellia karroo*	LC	R, S
Zygophyllaceae	*Zygophyllum chrysopteron Retief*	LC	R, S
Zygophyllaceae	*Zygophyllum microcarpa*	LC	R, S
Zygophyllaceae	*Zygophyllum retrofracta*	LC	R, S

4.5 Mammals

Only eight mammal species have been previously recorded in the QDG which encompasses the site as a whole (3222BB). To bolster the list of mammal species with the potential to occur, neighbouring QDGs 3222BC and 3222BD were included, yielding a total 74 species which could possibly occur (***Appendix 2***). Of the species, several are listed as SCC (***Table 4-4***). Two of these species (*Hippotragus equinus* and *Loxodonta africana*) mainly only occur in PAs, and will not be found on site. The remaining two species are discussed below.

Table 4-4: Mammals of conservation concern previously recorded

Family	Scientific name	Common name	IUCN	
			Global	Regional
Bovidae	*Hippotragus equinus*	Roan Antelope	LC	EN[11]
Elephantidae	*Loxodonta africana*	African Bush Elephant	EN A2bd[12]	VU
Felidae	*Felis nigripes*	Black-footed Cat	VU C2a(i)	VU C2a(i)
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	CR C2a(i)	CR C2a(i)

4.5.1 Rhino PV area

Grazing pressure from sheep was high in the majority of the Rhino solar PV site with springbok and blesbok also contributing to the grazing levels but to a lower extent. A single Grey Rhebuck (NT[13]) was sighted in the Platdoring drainage approximately 1.5 km outside the site footprint to the west. This species is unlikely to make use of the habitat within the footprints due to grazing competition. The presence of mammals within the

[11] Endangered

[12] IUCN Standards and Petitions Committee. 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee

[13] Near Threatned

solar PV sites was evidenced mostly from scat (particularly lagomorphs) with older evidence from larger mammals such as aardvark also present.

Small mammal trapping took place where small mammals were expected. Only a single *Rhabdomys pumilio* was captured on site. Only Springbok were captured on the camera trap images.

4.5.2 Sunnyside PV area

This site was not assessed during the pre-feasibility study conducted in 2022 and thus less time was spent on it in comparison to the Rhino solar PV site. Despite this, a similar mammalian cohort to the Rhino solar PV area was recorded on site, with similar species composition expected. The only species recorded on Sunnyside solar PV area, and not on the Rhino solar PV area, was Vervet Monkey.

Table 4-5: Mammals observed in or near the development sites (S = Sunnyside, R = Rhino)

Scientific name	Common name	ID type	IUCN	PV area
Antidorcas marsupialis	Springbok	Sighting	LC	R, S
Chlorocebus pygerythrus	Vervet Monkey	Scat, camera trap	LC	S
Cynictus penicillata	Yellow mongoose	Sighting	LC	R, S
Damaliscus pygargus phillipsi	Blesbuck	Sighting	LC	R
Hystrix africaeaustralis	Cape Porcupine	Scat, quills	LC	R, S
Lepus capensis	Cape Hare	Scat	LC	R, S
Lepus saxatilis	Scrub hare	Scat	LC	R, S
Lupulella mesomelas	Black-backed Jackal	Spoor, scat	LC	R, S
Orycteropus afer	Aardvark	Scat, burrows	LC	R, S
Otocyon megalotis	Bat-eared Fox	Sighting	LC	R
Otomys unisulcatus	Karoo Bush Rat	Sighting	LC	R
Pelae capreolus	Grey Rhebok	Sighting	NT	R
Raphicerus campestris	Steenbok	Sighting, scat	LC	R, S
Rhabdomys pumilio	Xeric Four-striped Grass Rat	Sighting	LC	R
Suricatta suricatta	Meerkat	Sighting	LC	R, S
Xerus inauris	South African Ground Squirrel	Sighting	LC	R, S

4.5.2.1 Black-footed Cat Felis nigripes (VU C2a(i))

The Black-footed Cat, is a VU species that could potentially inhabit the area, even though no direct observations have been made. This diminutive feline species has an established habitat range that includes parts of Southern Africa. It primarily dwells in arid and semi-arid regions, such as South Africa, Botswana, Namibia, and Zimbabwe where it is known to predate on small mammals, birds, reptiles and invertebrates (Swart, 2013).

The Black-footed Cat in South Africa faces a range of significant threats to its survival. These include habitat loss due to agriculture and urban development, human-wildlife conflicts resulting from predation on small livestock, overexploitation for the illegal pet trade and traditional medicine markets, electrocution from electric fences and power lines, road mortality, the potential impact of climate change on prey availability and habitat, and vulnerability to diseases.

While the presence of Black-footed Cats has been confirmed through previous assessments or direct sightings in the area under consideration, it was not found on site during the project assessment. It is, however, worth noting that their elusive nature and solitary behaviour can make them challenging to detect. Considering the Central Karoo is the stronghold for the species, where the highest density of the species occurs, as well as the fact that the species is listed as VU, it is important to exercise caution and consider the potential presence of the Black-footed Cat during the planning and construction phases of the project to ensure its protection and conservation. The species has the potential to occur on both Rhino and Sunnyside solar PV areas.

4.5.2.2 Riverine Rabbit Bunolagus monticularis (CR C2a(i))

The Riverine Rabbit is endemic to the semi-arid central Karoo region of South Africa (EOO) is 54 227 km² and area of occupancy (AOO) is 2 943 km²). The population is alarmingly small (157 to 207 mature individuals) with no subpopulation having > 50 mature individuals. The species is inferred to be declining due to continuing habitat loss and degradation, and ongoing loss of mature individuals. There are an estimated 12 subpopulations (nine in the northern range and three recently discovered south of the historic known range). Large numbers of surveys throughout the distribution range have confirmed current subpopulations but failed to detect subpopulations in some areas of the historic range. The species is cryptic to detect and intense monitoring is required to detect the species. Subpopulations are presumably further fragmented and isolated by anthropogenic barriers to dispersal, such as impoundments in river channels and

fencing, and are threatened by illegal hunting and predation by domestic animals. Additionally, both climate change and fracking are emerging threats to Riverine Rabbits.

The sites fall outside the known distributions for Riverine Rabbit populations. However, the habitat on site was assessed for the potential presence of Riverine Rabbits *Bunolagus monticularis* (CR) which, although not identified as present by the Screening Tool may possibly have been present due to patchy habitat selection. However, the sites were determined to not contain significant suitable vegetation for the species. If the species is found on site, this must be reported to the author of this report and a species-specific study conducted to determine whether the project may proceed, given that this species is CR.

4.6 Reptiles

A list of 56 reptile species found in the quarter degree squares 3222BB, 3222BC and 3222BD is presented in ***Appendix 3***. An unexpectedly low number of reptiles were identified on site, with more reptiles recorded on the Sunnyside solar PV area compared to the Rhino solar PV area. While the reptile diversity is likely higher no reptiles of conservation concern are expected to occur on site (however, note the below). Reptiles recorded on site are reported in ***Table 4-6***.

Table 4-6: Reptiles recorded in the development footprint (S = Sunnyside, R = Rhino)

Scientific name	Common name	ID type	IUCN	PV Area
Agama aculeata	Ground agama	Sighting	LC	R, S
Naja nivea	Cape Cobra	Sighting	LC	R
Pedioplanis lineoocellata	Common/Spotted sand lizard	Sighting	LC	R, S
Pedioplanis namaquensis	Namaqua sand lizard	Sighting	LC	R, S
Psammophis leightoni	Cape Sand Snake	Skin ID	LC	S
Ptenopus garrulus maculatus	Spotted Barking Gecko	Sighting	LC	R, S
Stigmochelys pardalis	Leopard tortoise	Sighting	LC	S
Trachylepis variegata	Variegated Skink	Sighting	LC	S

As per the requirements for the environmental application process, species identified as SCC by the screening tool must also be investigated. A single SCC species with medium sensitivity was identified and is discussed below.

4.6.1 *Chersobius boulengeri* (Endangered – A4ace)

This small tortoise species inhabits dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes. This well camouflaged species is seldom seen as it is only active for short periods during the day and may aestivate for extended periods during unfavourable environmental conditions. The species is found in isolated populations inhabiting dwarf shrubland, usually with succulent and grassy elements where rocks or rock crevices and/or vegetation can provide refuge (Hofmeyr and Baard 2014).

The generally overgrazed nature of the Rhino solar PV site and lack of sufficient regugia on both PV areas make the habitat less than ideal for this species to occur. However, the proximity to suitable habitat in the nearby Upper Karroo Hardeveld make it possible that this species could occur. Should this species be located on site during site inspection or during the construction phase the author of this report should be notified so that a specific mitigation strategy can be developed.

4.7 Amphibians

Few amphibians have previously been found in the QDGs, and neighbouring grids, encompassing the sites. The restricted nature of amphibian habitats (seasonal pans, drainage lines) and the generally arid nature of the sites translates to an overall low abundance of amphibians, with only *Xenopus laevis* identified at one of the artificial water holes on the Sunnyside solar PV area. Thus, the long-term impact on amphibians is likely minimal. None of the previously recorded species are listed as SCC (***Appendix 4***).

5 Habitat Classification and Sensitivity summary

To understand the sensitivity of the development site the habitat was characterised (***Figure 5-1*** and ***Figure 5-2***) in terms of the extent of the disturbance, and faunal and floral biodiversity and given a sensitivity ranking (ranked from 1 to 5, with 1 being the least sensitive, refer to ***Table 5-1***.

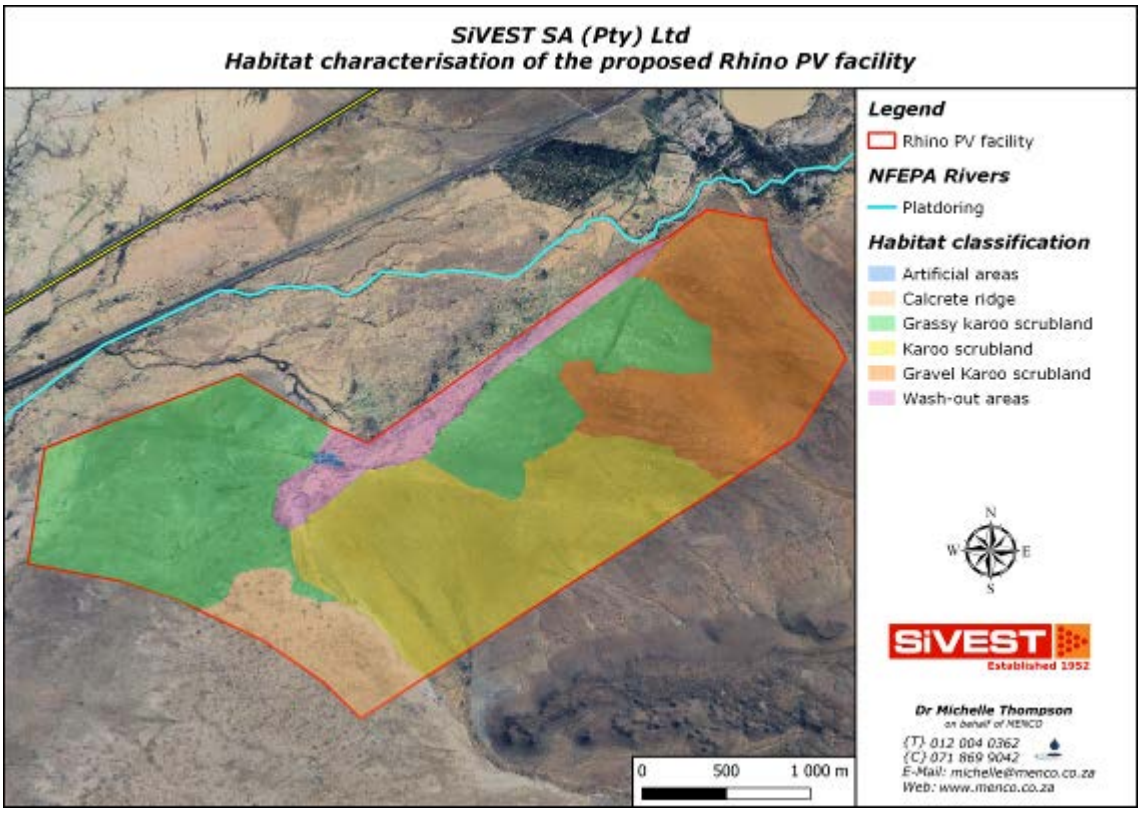


Figure 5-1: Habitat types delineated in the Rhino solar PV site

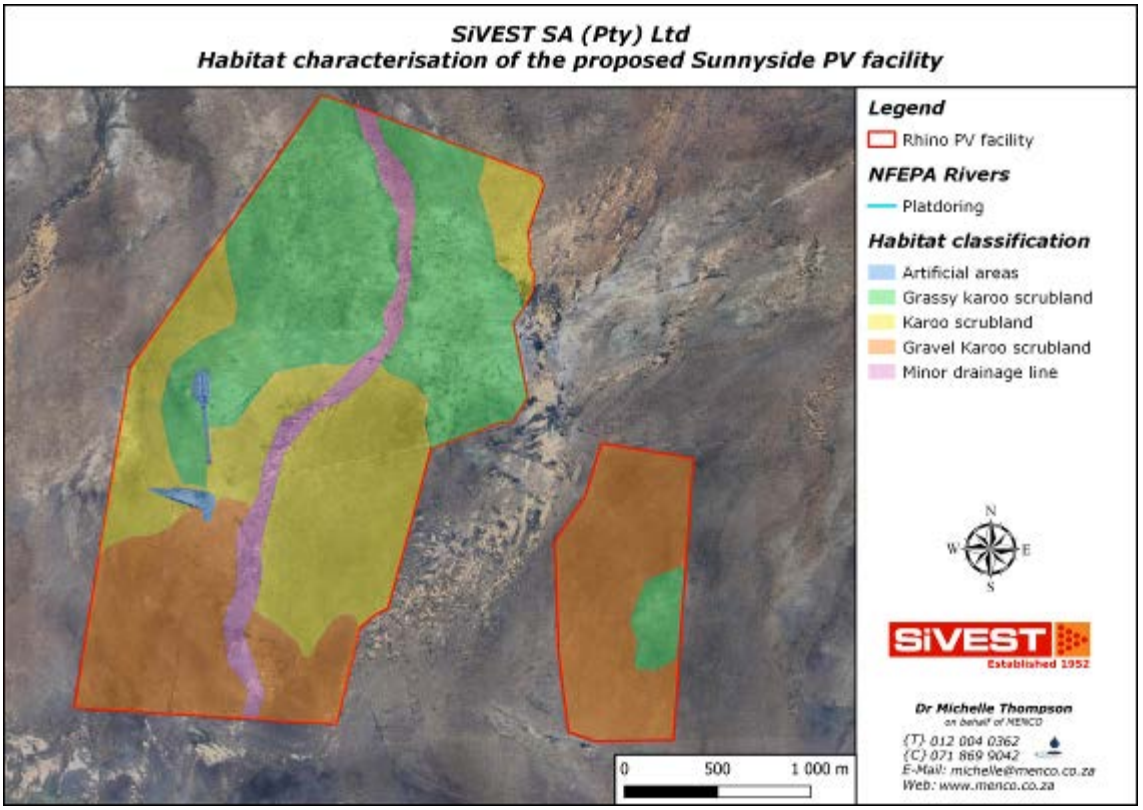


Figure 5-2: Habitat types delineated in the Sunnyside solar PV site

Table 5-1: Habitat type delineations to assess habitat sensitivity (Rank: 1- 5, 1 = least sensitive).

Site	Habitat types / features	Extent of disturbance	Fauna and Flora	Overall sensitivity (Rank 1-5)
RHINO PV FACILITY				
PV	**Arid Karoo scrubland**	Mild – heavy grazing pressure from sheep and low pressure of game grazing. Generally low level of erosion. Habitat is common in the region. Bare earth percentage is high in places	Relatively high biodiversity in comparison to other solar PV facility habitats. Dwarf shrubland interspersed with drought-resistant grass (*Stipagrostis* dominant). No SCC present. Higher mammalian and reptile diversity than other solar PV facility habitats.	2.5
	Arid Gravel Karoo scrubland	Habitat is common in the region. Similar to the common Arid Karoo shrubland discussed above in floral composition and overall biodiversity with the difference of rockier substate, erosion likely higher than in the	Relatively high biodiversity in comparison to other solar PV facility habitats. Dwarf shrubland interspersed with drought-resistant grass (*Stipagrostis* dominant). No SCC present. Higher mammalian and reptile	2.5

Site	Habitat types / features	Extent of disturbance	Fauna and Flora	Overall sensitivity (Rank 1-5)
		above habitat type. Bare earth percentage is high in places	diversity than other solar PV facility habitats.	
	Wash-out areas	Areas degraded by medium to high levels of erosion with a perceived high run-off rate.	Biodiversity degraded. Taller trees particularly *Vachellia karroo* and *Prosopis velutina*. Succulent shrubs (Mesembs and Melktou are dominant. No SCC likely to be present.	1.5
	Grassy scrubland	Disturbance largely related to sediment build up. Appears to be lower pressure from livestock grazing currently.	Sandy soil and sediment deposits facilitate large tracts of grass (*Stipagrostis* dominant) with a lower percentage of karoo scrub. Bare earth percentage is high in places. High animal biodiversity. Low plant biodiversity but likely higher seasonal biomass in good rainfall years.	2
	Calcrete ridge	High erosion rate on account of the erosion of shallow sandy soils. Medium grazing pressure from sheep and game on site.	Relatively high biodiversity but no special species present or likely to be present. Species richness similar to karoo shrubland with percentage composition varying. Habitat less common in the landscape.	3
	Artificial areas	Waterholes and water infrastructure. Highly disturbed. Habitat consists of very little natural vegetation.	Low biodiversity and many IAPs. Dominated by exotic tree species such as *Eucalyptus* and *Prosopis*	1
SUNNYSIDE PV FACILITY				
PV	**Arid Karoo scrubland**	Mild – heavy grazing pressure from sheep and low pressure of game grazing. Generally low level of erosion. Habitat is common in the region.	Relatively high biodiversity in comparison to other solar PV facility habitats. Dwarf shrubland interspersed with drought-resistant grass (Stipagrostis dominant). No SCC present. Higher mammalian and reptile diversity than other solar PV facility habitats.	2.5
	Arid Gravel Karoo scrubland	Habitat is common in the region. Similar to the common Arid Karoo shrubland discussed above in floral composition and overall biodiversity with the	Relatively high biodiversity in comparison to other solar PV facility habitats. Dwarf shrubland interspersed with drought-resistant grass (Stipagrostis	2.5

Site	Habitat types / features	Extent of disturbance	Fauna and Flora	Overall sensitivity (Rank 1-5)
		difference of rockier substate, erosion likely higher than above habitat type.	dominant). No SCC present. Higher mammalian and reptile diversity than other solar PV facility habitats.	
	Minor drainage line	Low disturbance in the form of erosion from drainage of neighbouring areas	Slightly different floral species composition with a higher average vegetation height. No SCC found. Habitat less common in the landscape.	3
	Grassy scrubland	Disturbance largely related to sediment build up. Appears to be lower pressure from livestock grazing currently.	Sandy soil and sediment deposits facilitate large tracts of grass (*Stipagrostis* dominant) with a lower percentage of karoo scrub. Bare earth percentage is lower than in Arid karoo shrubland and gravel karoo shrubland. Higher animal biodiversity. Low plant biodiversity but likely higher seasonal biomass in good rainfall years.	2
	Artificial areas	Waterholes and water infrastructure. Highly disturbed. Habitat consists of very little natural vegetation.	Low biodiversity and many IAPs. Dominated by exotic tree species such as *Prosopis* and other tree species (*V. karroo*)	1

6 Alternatives considered and Preferred layout

The proposed solar PV facility forms part of a larger proposed renewable energy development which includes both solar and wind energy facility (WEF). Currently, there are two clusters proposed, Rhino and Sunnyside. This report considers the application for the solar PV facility, Rhino and Sunnyside, only.

A prefeasibility assessment, or Environmental Site Establishment (ESE) process, was undertaken from September 2022 to January 2023 to screen the greater project site from an environmental and social perspective. The ESE process included both desktop studies as well as on-site surveys by avifauna, bat, ecology and heritage specialists. The aim of the ESE was to define the scope of the Basic Assessment (BA) phase of the project.

For the solar PV facility, the Remainder of Farm Rhenosterkop 155 was originally identified as most suitable from a topographic, local, and environmental perspective. However, due to avifauna (Martial Eagle) no-development buffers, the development area was reduced significantly.

Furthermore, there was a lack of landowner support for development on some sections of the property due to agriculture preferences and visual impacts. The area was therefore adjusted, and alternatives identified to compensate for the areas which needed to be omitted. Landowners were re-engaged and agreements to the solar PV facility development under certain conditions were undertaken. In addition, specialist constraints were incorporated into the proposed design and layout. These developmental footprints are indicated below (***Figure 6-1*** and ***Figure 6-2***) and form the basis of this assessment report.

Due to the suitability of the climate, conditions, topography (including close proximity to the national grid) and the location within a Renewable Energy Development Zone (REDZ), Zone 11/ Beaufort West, no further property/ location alternatives have been considered.

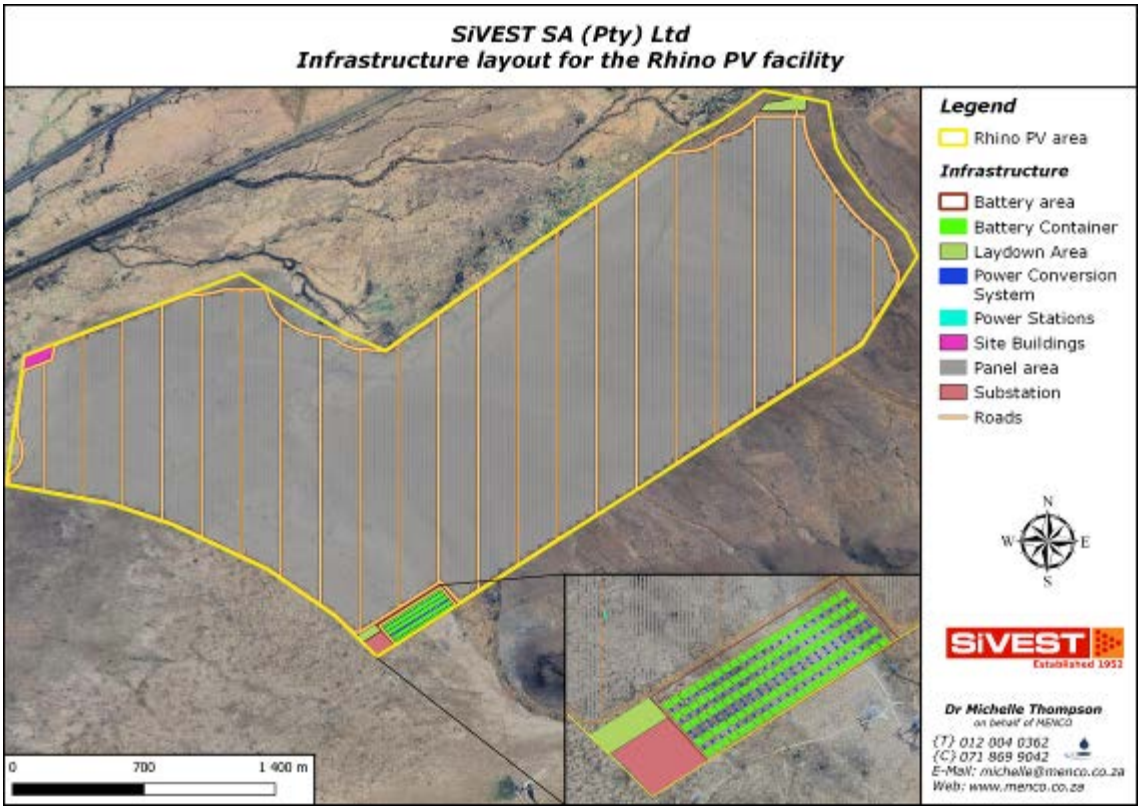


Figure 6-1: Infrastructure of the Rhino solar PV area

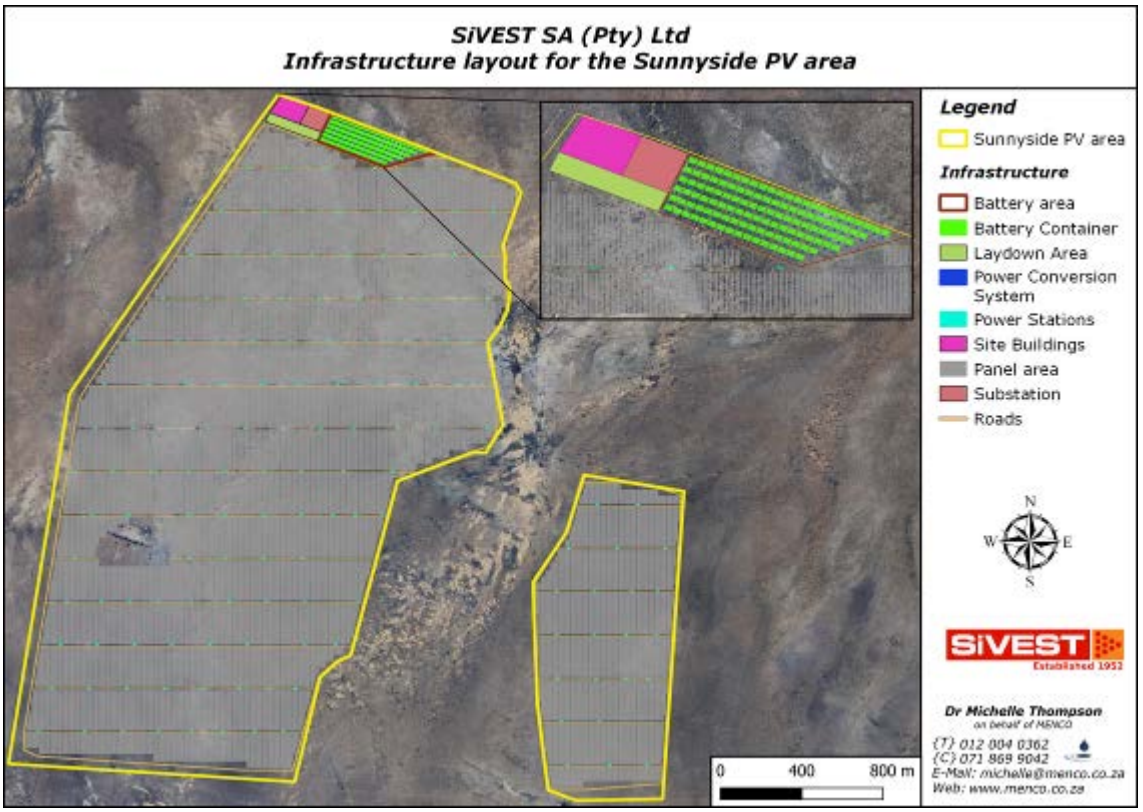


Figure 6-2: Infrastructure of the Sunnyside solar PV area

7 Impact Assessment

7.1 Local Potential Impacts

The major potential impacts of the proposed PV facility broadly relate to the following:

- **Habitat Loss and Fragmentation:** The construction and operation of solar PV facilities often involve clearing land and removing vegetation, resulting in the direct loss of habitat for local plant and animal species. This can lead to fragmentation of habitats, isolating populations and reducing biodiversity.
- **Displacement and Disruption of Wildlife**: The disturbance caused by construction activities, increased human presence, and noise can displace wildlife from their habitats. Local species may be forced to relocate, impacting their survival, reproduction, and ability to find suitable resources such as food and shelter.
- **Changes in Microclimates**: Solar PV facilities can modify the microclimate of the local area. The installation of large panels can create shading, alter wind patterns, and affect temperature and humidity levels. These changes can impact local vegetation and associated wildlife that rely on specific climatic conditions.
- **Potential Impact on Plant Communities:** The installation of solar panels can prevent sunlight from reaching the ground, potentially affecting the growth and distribution of understory vegetation. This can have cascading effects on plant-dependent species, such as insects, birds, and small mammals, which rely on specific plant communities for food, shelter, and nesting sites.
- **Chemical Usage and Pollution**: Maintenance activities at solar PV facilities, such as managing vegetation, may involve the use of chemicals. If not handled properly, these chemicals can have negative potential impacts on local biodiversity, contaminating soil, water bodies, and affecting non-target organisms.
- **Introduction and further establishment of Invasive Species:** The construction and development of solar PV facilities may inadvertently introduce or facilitate the spread of IAPs. Invasive species can outcompete native plants and disrupt local ecosystems, reducing biodiversity and altering habitat composition.

7.2 Cumulative Potential Impacts

The proposed Rhino and Sunnyside solar PV areas fall within the Beafort West REDZ/ Zone 11. As such there has been a considerable drive for renewable energy establishment in the region. There are at least 16 approved renewable energy proects in the broader Beaufort West region, 35 km radius of the site, (Renewable Energy Environmental Authorisation Database (REEA Q3, 2023)) refer to ***Figure 7-1***. However, in terms of constructed and operational PV plants, the combined area in the wider region that has already been impacted is currently low.

Several of the authorised developments fall in close proximity to the proposed solar PV sites, which raises the potential for future cumulative impacts in the area, as the overall development pressure in the wider area increases. Given that these areas are in a relatively natural state the overall extent of future cumulative impacts stemming from the solar energy developments in the area are regarded as a medium impact. The additional contribution of the small current development (in comparison to existing approved developments) to this cumulative impact is considered to be low and of local significance only. Therefore the cumulative impacts are expected to remain as medium with the addition of the Rhino and Sunnyside solar PV facility.

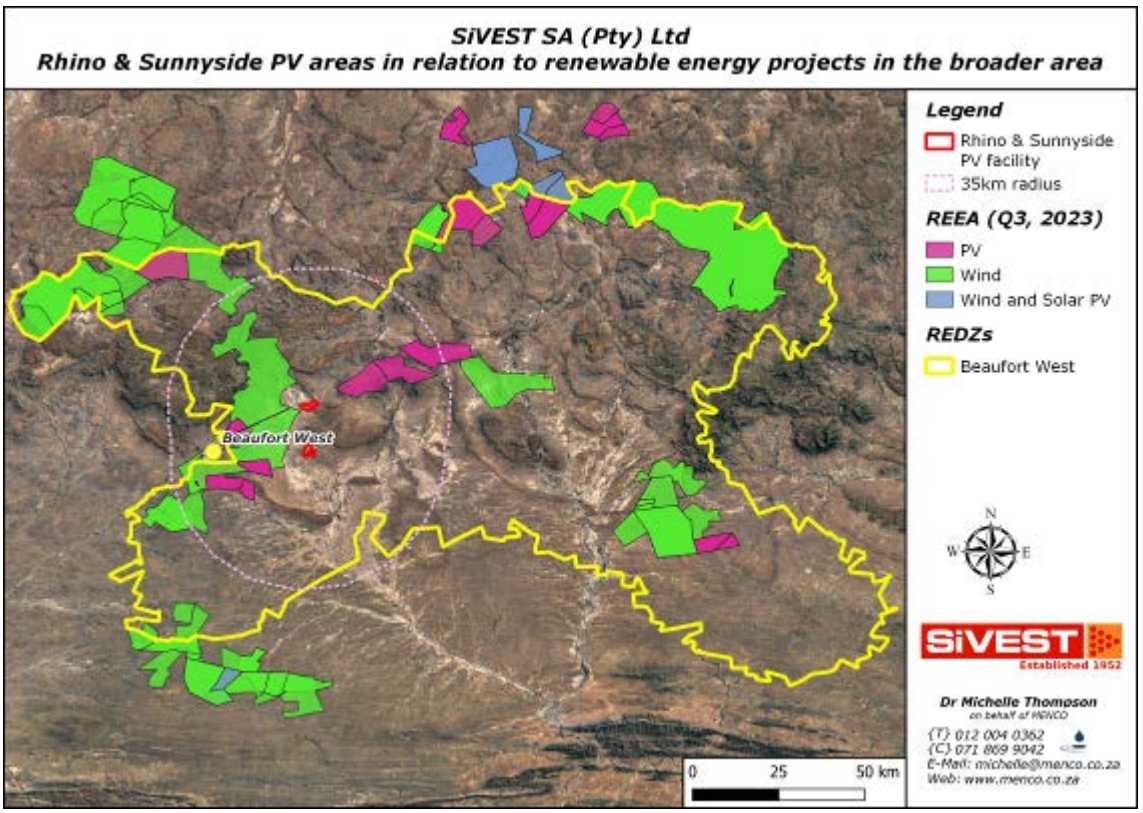


Figure 7-1: Renerable energy projects authorised within 35 km of the proposed Rhino and Sunnyside solar PV areas

The cumulative impacts of the solar PV facility development can be broadly categorised as follows:

- **Land Fragmentation and Habitat Loss**: The cumulative development of the solafr PV facility amongst a backdrop of intense renewable energy development leads to extensive land fragmentation and habitat loss. As more land is lost the cumulative effects are felt in terms of the loss of larger adjacent habitats, which can disrupt wildlife movement and decrease overall biodiversity.
- **Ecological Connectivity**: The cumulative presence of solar PV facilities, in congruence with other renewable energy developments, can impact ecological connectivity and the ability of species to move between habitats. Fragmented landscapes can isolate populations and limit gene flow, which can have long-term consequences for genetic diversity and species survival.
- **Ecosystem Disturbance:** The combined disturbance from the solar PV facility constructions and operations and neighbouring renewable energy development in a region can have compounding effects on ecosystems. The cumulative noise, land disturbance, and human activity can disrupt ecological processes, alter wildlife behaviour, and lead to population declines or local extinctions.
- **Altered Hydrology and Water Resources:** As the proposed solar PV facility and neighbouring renewable energy developments are situated near rivers, wetlands and within watersheds, the cumulative impacts can affect hydrological patterns. Changes in water flow, runoff, and drainage due to multiple facilities can impact local water resources, wetlands, and aquatic ecosystems.
- **Visual and Landscape Impact:** The cumulative presence of a solar PV facility amongst a backdrop of renewable energy development in a particular region can alter the visual aesthetics and landscape characteristics. Large-scale deployment of solar panels may transform the visual identity of an area, impacting scenic views and potentially affecting human perceptions and recreational experiences.
- **Cumulative Infrastructure Development:** Alongside solar PV facilities, additional infrastructure, such as access roads, transmission lines, and substations, will be required. The cumulative development of infrastructure can further fragment landscapes, disturb habitats, and lead to additional ecological impacts beyond those directly associated with the solar PV facilities themselves.

7.3 Impact Assessment Methodology

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 7-1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will beentirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.

4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will beentirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.

4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

7.3.1 Quantitative Description of Potential Impacts

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity

Table 7-2: Impact Risk Classes

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

7.4 Assessment

This section describes the possible impacts related to the construction and operation phases of the proposed project and includes potential mitigatory measures to reduce the potential threat to the environment

Table 7-3: Potential risks and mitigatory measures

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		Extent [E]	Probability [P]	Reversibility [R]	Irreplaceable loss of resources [I]	Duration [D]	Magnitude	TOTAL	STATUS (+ OR -)	Significance Rating [S]		E	P	R	L	D	M	TOTAL	STATUS (+ OR -)	Significance Rating [S]
Construction Phase																				
Habitat loss: the loss of natural habitat and SCC due to vegetation clearing	Habitat destruction, ecosystem fragmentation, habitat degradation	1	4	2	1	3	3	33	-	Medium	[All vegetation will be cleared for the development of the solar PV facility. No sensitive areas containing SCC floral species were identified on site] Vegetation removal to be limited to the smallest possible footprint Where possible use existing road infrastructure, additional road infrastructure to minimised (e.g. single road access) An independent suitably qualified scientist is to be appointed as Environmental Control Officer (ECO) to oversee works. Should any SCC be found on site these must be relocated to suitable habitat in the nearby environment	1	2	1	1	2	2	14	-	Low
Changes in soil characteristics: Vegetation clearing through the use of heavy machinery and increased vehicle movement	Exposure of soil to wind and rain could result in erosion and sedimentation into neighbouring habitat, leading to changes in habitat characteristics and modified habitats. Soil compaction.	2	3	2	1	3	2	22	-	Low	No stormwater management is being implemented on site. Due to the general nature of habitat within the site (low growing karoo scrub), this should be allowed to re-establish following the construction of the solar PV facility. This will allow for the stabilisation of soils. Bulk of vegetation clearing and earthworks to be completed at the end of the dry season to reduce erosion from water runoff. In PV areas, compacted soil to be ripped and tilled following construction to allow the	1	2	2	1	2	1	8	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		Extent [E]	Probability [P]	Reversibility [R]	Irreplaceable loss of resources [I]	Duration [D]	Magnitude	TOTAL	STATUS (+ OR -)	Significance Rating [S]		E	P	R	L	D	M	TOTAL	STATUS (+ OR -)	Significance Rating [S]
											regeneration of habitat.									
Faunal and floral mortality: increased vehicle access and increased construction personnel	Increase in construction personnel to the project site and heavy vehicle movement leading to increased poaching of animals or medicinal plants or destruction of protected species	1	2	4	1	1	2	18	-	Low	An independent suitably qualified scientist to be appointed as ECO to oversee works especially when working in and around the site. Implementation and enforcement of strict speed limits. Working at night should be avoided. Following construction, the site must be cleared of all possible polluting materials and all temporary structures must be removed and responsibly disposed of. This must include environmental education on the "No Access" and sensitive areas as well as protected species. No harvesting of plants, plant material, animal or surface water may be allowed.	1	1	4	1	1	2	16	-	Low
Increased noise: Construction of the solar PV facility	Increased noise during construction may affect behaviour and distribution of fauna	2	3	1	1	1	1	8	-	Low	[Noise generating activities will only take place during the construction phase] Mitigatory measures include: Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised; The use of vehicle horns should be minimized where possible.	1	2	1	1	1	1	6	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		Extent [E]	Probability [P]	Reversibility [R]	Irreplaceable loss of resources [I]	Duration [D]	Magnitude	TOTAL	STATUS (+ OR -)	Significance Rating [S]		E	P	R	L	D	M	TOTAL	STATUS (+ OR -)	Significance Rating [S]
											Restrict construction and operational activity to daylight working hours.									
Establishment, spread and propagation of alien invasive species: Construction of the PV facility	Activities related to the construction of the solar PV facility can cause the spread and establishment of alien invasive species	2	4	2	1	3	2	24	-	Low	An effective Alien Invasive Awareness and Management Programme should be established, focusing on the identification and removal of pervasive invasive species. Further: 1. AIP material should be removed from the site to reduce the potential for re-establishment. 2. Ongoing management as part of the alien invasive management programme. 3. The Alien Invasive Management Plan will need to be applied broadly to the entire footprint to effectively reduce alien invasive species and prevent their recolonisation of cleared areas.	1	2	2	1	3	1	9	-	Low
Soil contamination: Spillages and Leakage of harmful substances from heavy machinery and vehicle movement	Heavy machinery can result in spillages of harmful substances and potential contamination of soil with hydrocarbons	1	3	1	1	1	1	7	-	Low	Vehicles to be adequately maintained and fitted with drip trays when left standing. It is advisable that spill kits are available on site.	1	1	1	1	1	1	5	-	Low
Impeding faunal movement corridors	Loss of ecological connectivity and faunal movement corridor due to habitat fragmentation from fencing	2	3	1	1	3	2	20	-	Low	It is foreseen that the entire site will be fenced off. This will isolate the site completly and will prohibit faunal movement through the site. This can be mitigated by allowing for semi-permeable fencing options along the site borders. This will maintain the connectivity between the site and adjacent external habitats.	2	2	1	1	3	1	9	-	Low
Operational Phase																				

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		Extent [E]	Probability [P]	Reversibility [R]	Irreplaceable loss of resources [I]	Duration [D]	Magnitude	TOTAL	STATUS (+ OR -)	Significance Rating [S]		E	P	R	L	D	M	TOTAL	STATUS (+ OR -)	Significance Rating [S]
Changes to soil characteristics: PV maintenance and erosion from panel washing	Washing of panels could contribute to the erosion and sedimentation of neighbouring habitats	1	1	2	1	1	1	6	-	Low	Unlikely to have significant impact as the volume of water required, that will runoff, will likely quickly seep into soil and/evaporate Frequency of panel washing to be minimised	1	1	2	1	1	1	6	-	Low
Visual impact: solar PV facility operations	Operation of solar PV facility, the reflective surfaces and operational light pollution may cause disorientation affecting the behaviour and distribution of fauna	2	3	1	1	3	2	20	-	Low	Light pollution from safety and security lighting infrastructure creates glare off panels and increased light pollution, disrupting nocturnal species' behavior and natural rhythms, such as migration patterns or hunting behavior. The need for artificial lighting should be minimised. Should it be necessary, lighting at the solar PV facility should have appropriate shielding or make use of downward directional fixures with low intensity lighting. Illumination of adjacent habitats should be avoided.	2	2	1	1	3	2	18	-	Low
Establishment, spread and propagation of alien invasive species: Maintenance of the solar PV facility	Activities related to the maintenance of the solar PV facility can cause the spread and establishment of alien invasive species	2	4	2	1	3	2	24	-	Medium	An effective Alien Invasive Awareness and Management Programme should be established, focusing on the identification and removal of pervasive invasive species. Further: 1. AIP material should be removed from the site to reduce the potential for re-establishment. 2. Ongoing management as part of the alien invasive management programme. 3. The Alien Invasive Management Plan will need to be applied broadly to the entire footprint to effectively reduce alien invasive species and prevent their recolonisation of	1	2	2	1	3	1	9	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		Extent [E]	Probability [P]	Reversibility [R]	Irreplaceable loss of resources [I]	Duration [D]	Magnitude	TOTAL	STATUS (+ OR -)	Significance Rating [S]		E	P	R	L	D	M	TOTAL	STATUS (+ OR -)	Significance Rating [S]
											cleared areas.									
Soil contamination: Spillages and Leakage of harmful substances from heavy machinery and vehicle movement	Heavy machinery can result in spillages of harmful substances and potential contamination of soil with hydrocarbons	1	3	1	1	1	1	7	-	Low	Vehicles to be adequately maintained and fitted with drip trays when left standing. It is advisable that spill kits are available on site.	1	1	1	1	1	1	5	-	Low
Cumulative																				
Broad-scale ecological processes	Transformation and presence of the facility will contribute to cumulative habitat loss and impacts on broad-scale ecological processes such as fragmentation.	2	4	2	1	3	2	24	-	Medium	Refer to specific mitigation measures of specific impacts discussed earlier	2	3	2	1	3	2	22	-	Low

Table 7-4: Summary of site sensitivity, impacts and recommendations for the potential development of PV sites

Sensitivities	Potential Impacts (Construction & Operational phases)	Recommendations
PV sites	• *Habitat fragmentation will occur with overall habitat loss during operation should vegetation need to be completely removed.* • *Unrestricted movement of personnel can impact the environment.* • *Increased noise and visual activity may affect behaviour and distribution of fauna.* • *Distrurbed areas are more prone to invasive species establishment (inclusive of accidental vehicle related spread and propagation).* • *Possible soil erosion due to vegetation loss and PV maintenance (washing).* • *Sedimentation of drainage lines, tributaries and rivers as a result of increased erosion potential.* • *Broad-scale ecological processes will be impacted.* • *Changes in land-use capability.* • *Impact on faunal movement patterns and potential (i.e. fencing).* • *General degradation of construction sites.* • *Hazardous material spillage potential.*	*<u>Screening of sites</u>* • *Site sensitivity is generally low but site selection should favour areas with the lowest sensitivity.* • *Vegetation removal should be limited to where absolutely necessary.* • *CBAs should be avoided for the placement of panels as far as possible.* • *Where possible existing access infrastructure should be used.* • *Minimise the development footprint as far as possible, which includes locating temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas (areas ranked 1-2 above).* *<u>Development of site</u>* • *Restrict all movement to designated areas particularly during construction.* • *Adopt a pre-emptive invasive species awareness raising and management plan.* • *No harvesting of plants, or plant material, animals or surface water (unless authorised) may be allowed.* • *Consideration and construction of relevant stormwater management infrastructures (i.e. berms, trenches, bunding and sediment retention ponds).* • *Adopt a semi-permeable fencing structure allowing for species movement.* • *Appoint and Independent ECO to oversee construction activities.* • *All hazardous materials should be stored in access controlled areas on concrete/ impermeable surfaces and monitored on a daily basis.*

Table 7-5: Input to the Environmental Management Programme

Impact / Aspect	Mitigation / Management Actions	Responsibility	Methodology	Mitigation / Management objectives and outcomes	Frequency
Construction Phase					
Habitat destruction, ecosystem fragmentation, habitat degradation	Vegetation removal to be limited to the smallest possible footprint Where possible use existing road infrastructure, additional road infrastructure to minimised (e.g. single road access) An independent suitably qualified scientist is to be appointed as Environmental Control Officer (ECO) to oversee works. Should any SCC be found on site these must be relocated to suitable habitat in the nearby environment	Applicant, ECO	Area delineation, monitoring, record keeping.	Minimal vegetation loss. Natural regeneration.	Continuous throughout phase.
Exposure of soil to wind and rain could result in erosion and sedimentation into neighbouring habitat, leading to changes in habitat characteristics and modified habitats. Soil compaction.	No stormwater management is being implemented on site. Due to the general nature of habitat within the site (low growing karoo scrub), this should be allowed to re-establish following the construction of the solar PV facility. This will allow for the stabilisation of soils. Bulk of vegetation clearing and earthworks to be completed at the end of the dry season to reduce erosion from water runoff. In PV areas, compacted soil to be ripped and tilled following construction to allow the regeneration of habitat.	Applicant, ECO	Project scheduling and area maintenance.	Runoff and erosion control. Natural regeneration.	Continuous throughout phase.
Increase in construction personnel to the project site and heavy vehicle movement leading to increased poaching of animals or medicinal plants or destruction of protected species	An independent suitably qualified scientist to be appointed as ECO to oversee works especially when working in and around the site. Implementation and enforcement of strict speed limits. Working at night should be avoided. Following construction, the site must be cleared of all possible polluting materials and all temporary structures must be removed and responsibly disposed of. This must include environmental education on the "No Access" and sensitive areas as well as protected species. No harvesting of plants, plant material, animal or surface water may be allowed.	Applicant, ECO, Contractors	Awareness raising, toolbox talks, “training and induction” related to site specific conditions.	No intentional loss of fauna and flora apart from planned vegetation clearance.	Continuous throughout phase.
Increased noise during construction may affect behaviour and distribution of fauna	[Noise generating activities will only take place during the construction phase] Mitigatory measures include: Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised; The use of vehicle horns should be minimized where possible. Restrict construction and operational activity to daylight	Applicant, ECO, Contractors	Awareness raising, toolbox talks, “training and induction” related to site specific conditions.	Minimise noise generation. Record keeping and monitoring.	Continuous throughout phase.

	working hours.				
Activities related to the construction of the solar PV facility can cause the spread and establishment of alien invasive species	An effective Alien Invasive Awareness and Management Programme should be established, focusing on the identification and removal of pervasive invasive species. Further: 1. AIP material should be removed from the site to reduce the potential for re-establishment. 2. Ongoing management as part of the alien invasive management programme. 3. The Alien Invasive Management Plan will need to be applied broadly to the entire footprint to effectively reduce alien invasive species and prevent their recolonisation of cleared areas.	ECO	Invasive Awareness and Management Programme	Monitoring, control, record keeping. Limit spread of AIP.	Continuous throughout phase.
Heavy machinery can result in spillages of harmful substances and potential contamination of soil with hydrocarbons	Vehicles to be adequately maintained and fitted with drip trays when left standing. It is advisable that spill kits are available on site.	Applicant, ECO, Contractors	Awareness raising, toolbox talks, "training and induction" related to site specific conditions.	Spill management and area clean-up.	Continuous throughout phase.
Loss of ecological connectivity and faunal movement corridor due to habitat fragmentation from fencing	It is foreseen that the entire site will be fenced off. This will isolate the site completely and will prohibit faunal movement through the site. This can be mitigated by allowing for semi-permeable fencing options along the site borders. This will maintain the connectivity between the site and adjacent external habitats.	Applicant	Semi-permeable fencing	Connectivity maintenance and monitoring. Record keeping of faunal species on site.	Continuous throughout Construction and Operation phases
Operational Phase					
Washing of panels could contribute to the erosion and sedimentation of neighbouring habitats	Unlikely to have significant impact as the volume of water required, that will runoff, will likely quickly seep into soil and/evaporate. Frequency of panel washing to be minimised.	ECO, Operator	Site management and monitoring.	Monitoring, control, record keeping.	Planning and implementation phases.
Operation of solar PV facility, the reflective surfaces and operational light pollution may cause disorientation affecting the behaviour and distribution of fauna	Light pollution from safety and security lighting infrastructure creates glare off panels and increased light pollution, disrupting nocturnal species' behaviour and natural rhythms, such as migration patterns or hunting behaviour. The need for artificial lighting should be minimised. Should it be necessary, lighting at the solar PV facility should have appropriate shielding or make use of downward directional fixtures with low intensity lighting. Illumination of adjacent habitats should be avoided.	ECO, Operator	Site management and monitoring.	Monitoring, control, record keeping.	Planning and implementation phases.
Activities related to the maintenance of the solar PV facility can cause the spread and establishment of alien invasive species	An effective Alien Invasive Awareness and Management Programme should be established, focusing on the identification and removal of pervasive invasive species. Further: 1. AIP material should be removed from the site to reduce the potential for re-establishment. 2. Ongoing management as part of the alien invasive management programme. 3. The Alien Invasive Management Plan will need to be	ECO	Invasive Awareness and Management Programme.	Monitoring, control, record keeping. Limit spread of AIP.	Continuous throughout phase.

	applied broadly to the entire footprint to effectively reduce alien invasive species and prevent their recolonisation of cleared areas.				
Heavy machinery can result in spillages of harmful substances and potential contamination of soil with hydrocarbons	Vehicles to be adequately maintained and fitted with drip trays when left standing. It is advisable that spill kits are available on site.	Applicant, ECO, Contractors	Awareness raising, toolbox talks, "training and induction" related to site specific conditions.	Spill management and area clean-up.	Continuous throughout phase.

8 Conclusion, Recommendations and Impact Statement

The potential impacts of the activities related to the development of solar PV energy farm sites were assessed in this report. It was found that while the developments would contribute to habitat loss and fragmentation for some species, given the low levels of transformation in the area and in general the low to medium sensitivity of the majority of the area, the development is unlikely to have a high impact on ecological processes.

We therefore deem it acceptable to proceed with the necessary EA process, provided the applicant is willing to adhere to the recommendations below.

The potential impacts of the activities related to development of the sites should be minimal considering the overall low sensitivity of the habitat. Of the twelve (12) broad scale potential impacts, three (3) were rated as Medium with the rest rated as Low prior to mitigation. Following mitigation, all potential impacts can be reduced to Low level. From a terrestrial biodiversity point of view, inclusive of fauna and flora elements, the project in question should be allowed to continue. An EA should take cognisance of the recommendations mentioned below.

Recommendations to be taken into consideration:

- Should development infringe on the 500 m regulated area surrounding any NFEPA identified wetland areas, or any specialist delineated wetlands, the applicant will need to approach the DWS and consider the relevant application processes for either a GA or a WUL.
- It is recommended that highly sensitive areas (highlighted in **Section 4.1.1**) be avoided for development as far as possible. Existing road infrastructure should be prioritised for use to minimise new road development.
- Road infrastructure crossing drainage lines must be free-draining, non-erosive in nature and bank stability must be maintained. The appropriate application process for Water Use must be followed.
- Maintenance and monitoring plans should be compiled and be approved by the relevant regulatory authorities. These should relate to requirements of water use licencing, alien invasive control, and NEMA, specifically presences of SCCs and all mortalities of faunal species that occur on site.
- While the presence of Black-footed Cats has been confirmed through previous assessments or direct sightings in the area under consideration, it was not found on

site during the project assessment. This species is transient in nature and will avoid the area during construction. No direct impacts are expected. Nevertheless, should this species or any other SCC (faunal and floral) be identified on site during construction, this should be brought to the attention of the authors of this report to assisit with the management thereof.

- It is recommended that the mitigatory measures as mentioned in **Section 7** (also refer to ***Table 7-5***) of this report be implemented and included in the EMPr and Authorisation application.
- It is recommended that a rehabilitation plan be developed 5 years prior to closure, as the current environment at time of closure will need to be assessed.

9 Limitations and Assumptions

The desktop section of this study was conducted with up to date resources. However, it should be noted that these data sources could be biased towards charismatic and larger species, with rare, less active species possibly avoiding detection. Should any species, particularly SCC, not included in this report be identified during the construction, operational and rehabilitation phases, it is expected of the site manager to bring this information to the attention of the author of this report. Such species will be included and assessed in terms of potential threats posed by the activities, and possible mitigation measures will be proposed. As this type of study deals with dynamic natural ecosystems, it might, however, also be possible that additional information becomes available in time. The WCBSP, 2017 on which the bioregional plan is based, was developed using appropriate methods and uses the best available data at the time of its development. However, key aspects such as the distribution of threatened species remain poorly known and incomplete.

In addition, as this study was a once off assessment, seasonal or temporal variation in the presence or absence of species has been accounted for through the use of long-term online databases. During the site visit, due to the size and time availability not all sections of the site could be assessed and directly sampled in the field. This being said, specific effort was made to investigate all the different habitats present to obtain a representative sample of all the habitats present. Another limitation of the study lies with the potential under sampling of short lived plant species, which had just begun to sprout, and could not be identified to species level.

It is therefore important that the report be viewed and acted upon with these limitations in mind. MENCO cannot be held responsible for conclusions and pro-active mitigation measures that are made in good faith based on the available resources and information provided at the time of the study.

10 Expertise of the Specialist

This study was conducted by Dr Michelle Thompson and reviewed by Mr Reuhl Lombard of MENCO. Dr Thompson holds a PhD in Zoology from the University of Pretoria with many years (>10) experience of field research in terrestrial biodiversity. She is SACNASP registered as a Professional Natural Scientist (*Pr.Sci.Nat, reference number* 117994) in the field of Zoological Sciences. Mr Lombard holds a MSc. Degree in Zoology from the University of Pretoria and has more than seven years' experience in the field of Terrestrial Biodiversity. He is a registered *Pr.Sc.Nat* (*reference number* 128735) in the field of Environmental Science.

A list of relevant work experience of the reviewer and author is summarised in the table below:

Name of Company Position	Project	Responsibilities	Date of completion
M2 Environmental Connections (Pty) Ltd (hereafter referred to as MENCO) Environmental Consultant	Jones and Wagener (Pty) Ltd Terrestrial Biodiversity Compliance Statement for Rhovan Vanadium Mine	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the rehabilitation of pit areas as well as the construction of a above ground pipeline. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Nov-2023
	GIBB (Pty) Ltd. Terrestrial Biodiversity Assessment of Flow Gauging Weirs for the Mokolo Crocodile Water Augmentation Project - Phase 2	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the construction and operation of three gauging weirs in the Crocodile River. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Nov-2023
	Jones and Wagener (Pty) Ltd. Majuba PV facilities and Grid Connection	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the construction of PV facility. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Oct-2023
	Jones and Wagener (Pty) Ltd. Thutuka PV facilities and Grid Connection	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the construction of PV facility. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the	Oct-2023

Name of Company Position	Project	Responsibilities	Date of completion
		project.	
	Jones and Wagener (Pty) Ltd. Steelpoort PV Facility	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the construction of PV facility. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Sept-2023
	Geo Pollution Technologies (Pty) Ltd. Coega, Cotswold, Lafarge, and Ridgeview	Fauna and Flora Studies inclusive of a risk assessment identifying potential impacts related to the decommissioning of diesel storage tanks. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Apr-2023
	Jones and Wagener (Pty) Ltd. Rhovan Vanadium TSF Rehabilitation	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the rehabilitation of TSF. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Jan-2023
	Geo Pollution Technologies (Pty) Ltd. Mkuze	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the decommissioning of diesel storage tanks. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Dec-2022
	Jones and Wagener (Pty) Ltd. Hotazel PV and WEF facility	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the construction of PV and WEF facility. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Nov-2022
	Jones and Wagener (Pty) Ltd. Rhenosterkop PV and WEF facility	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the construction of PV and WEF facility. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Nov-2022

Name of Company Position	Project	Responsibilities	Date of completion
	Geo Pollution Technologies (Pty) Ltd. Kleinzee – De Beers Namaqualand Mines	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the removal of a river crossing. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Oct-2022
	Jones and Wagener (Pty) Ltd. Gauteng Department of Roads and Transport Bridges and Culvert upgrade project	Fauna and Flora Study inclusive of a risk assessment identifying potential impacts related to the upgrading/restoration of structures within close proximity to riverine habitats. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Feb-2022
	Nedan – Philafrica Foods	Fauna and Flora Study inclusive of a risk assessment following a food grade oil spill into the natural environment. Report writing, GIS, data mining, scientific interpretation and a risk assessment formed part of the project.	Feb-2021
	Sedibeng Brewery: Heineken	Update of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Jan-2021
	KEGO Mining	Desktop Fauna and Flora Study in support of an Environmental Authorisation. Report writing, GIS, data mining and scientific interpretation formed part of the project.	Nov-2020
	Greyling Vark Boerdery	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Feb-2020
	William Patrick Bower Colliery	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Oct-2019
	Sedibeng Brewery: Heineken	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Oct-2019

Name of Company Position	Project	Responsibilities	Date of completion
	Xanadu Eco Park	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Sep-2019
	Chevron Millys	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Sep-2019
	LEFA Coal and Energy (Pty): Kaalplaats Mine	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Jul-2019
	Brakfontein Colliery	Compilation of an Alien Invasive Plant Management Plan. Extensive field work, GIS, data collection, - management, - mining and interpretation.	May-2019
	Submerged Industrial (Pty) Ltd: Hartebeeslaagte	Desktop Fauna and Flora Study in support of a Prospecting Right. Report writing, GIS, data mining and scientific interpretation formed part of the project.	Apr-2019
	LEFA Coal and Energy (Pty) Ltd: Dannhauser Coal Prospecting Right	Compilation of a Basic Assessment Report and EMPr in support of a Coal Prospecting Right in KwaZulu-Natal. In addition to this, a Desktop Fauna and Flora Study was compiled with comprehensive project management and Public Participation.	Feb-2019
	Kingdom VMS Resorts	Compilation of an Alien Invasive Plant Management Plan for the resort and surrounding grounds. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Feb-2019
	Samancor Western Chrome Mines:	Compilation of a consolidated Alien Invasive Plant Management Plan for the respective mining operations. Extensive field work, GIS, data collection, - management, - mining and interpretation.	Dec-2018
	Mooinooi		
	Millsell		
	Waterkloof		
	Buffelsfontein		

Name of Company Position	Project	Responsibilities	Date of completion
	BBS Service Station 100 (Pty) Ltd: Knopjeslaagte Fuel Station	Compilation of a Basic Assessment Report as well as supporting Specialist Studies in the field of Fauna and Flora and Public Participation. For the entire project a project management role was fulfilled, while also being responsible for fieldwork, GIS, report writing and liaising and consulting with regulatory authorities and Interested and Affected Parties regarding environmental issues as raised during a public participation process.	Apr-2018
	Submerged Industrial (Pty) Ltd: Weltevreden	Fauna and Flora Study in support of a Mining Right. Fieldwork, report writing, GIS, data mining and scientific interpretation formed part of the project.	Apr-2018

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12 Appendices

Appendix 1: Plant species known to occur within 3222BB, 3222BC & 3222BD.

Family	Taxon	QDG	Status
Acanthaceae	*Barleria stimulans*	3222BC	LC
Acanthaceae	*Blepharis mitrata*	3222BC	LC
Acanthaceae	*Blepharis villosa*	3222BC	LC
Acanthaceae	*Justicia guerkeana*	3222BC	LC
Acanthaceae	*Monechma incanum*	3222BC	LC
Achariaceae	*Kiggelaria africana*	3222BC	LC
Aizoaceae	*Aizoon glinoides*	3222BB	LC
Aizoaceae	*Aizoon rigidum*	3222BC	LC
Aizoaceae	*Aloinopsis rosulata*	3222BC	LC
Aizoaceae	*Aptenia geniculiflora*	3222BC	LC
Aizoaceae	*Arenifera spinescens*	3222BC	LC
Aizoaceae	*Aridaria noctiflora ssp. noctiflora*	3222BC	LC
Aizoaceae	*Aridaria noctiflora ssp. straminea*	3222BC	LC
Aizoaceae	*Delosperma lootsbergense*	3222BC	LC
Aizoaceae	*Drosanthemum calycinum*	3222BC	LC
Aizoaceae	*Drosanthemum hispidum*	3222BC	LC
Aizoaceae	*Drosanthemum lique*	3222BC	LC
Aizoaceae	*Drosanthemum vespertinum*	3222BC	LC
Aizoaceae	*Galenia glandulifera*	3222BB	LC
Aizoaceae	*Galenia papulosa*	3222BD	LC
Aizoaceae	*Galenia procumbens*	3222BC	LC
Aizoaceae	*Galenia sarcophylla*	3222BD	LC
Aizoaceae	*Malephora thunbergii*	3222BC	LC
Aizoaceae	*Mesembryanthemum articulatum*	3222BC	LC
Aizoaceae	*Mesembryanthemum coriarium*	3222BC	LC
Aizoaceae	*Mesembryanthemum crystallinum*	3222BC	LC
Aizoaceae	*Mesembryanthemum excavatum*	3222BC	LC
Aizoaceae	*Mesembryanthemum granulicaule*	3222BC	LC
Aizoaceae	*Mesembryanthemum guerichianum*	3222BC	LC
Aizoaceae	*Mesembryanthemum inachabense*	3222BC	LC
Aizoaceae	*Mesembryanthemum noctiflorum ssp. stramineum*	3222BC	LC
Aizoaceae	*Mesembryanthemum stenandrum*	3222BC	LC
Aizoaceae	*Mestoklema tuberosum*	3222BB	LC
Aizoaceae	*Prenia tetragona*	3222BC	LC
Aizoaceae	*Psilocaulon coriarium*	3222BC	LC
Aizoaceae	*Ruschia altigena*	3222BC	LC
Aizoaceae	*Ruschia hamata*	3222BC	LC
Aizoaceae	*Ruschia spinosa*	3222BC	LC
Aizoaceae	*Sceletium anatomicum*	3222BC	LC
Aizoaceae	*Sceletium emarcidum*	3222BC	LC
Aizoaceae	*Tetragonia arbuscula*	3222BC	LC
Aizoaceae	*Tetragonia robusta*	3222BC	LC
Aizoaceae	*Trichodiadema intonsum*	3222BC, 3222BD	LC
Aizoaceae	*Trichodiadema setuliferum*	3222BB	LC
Alliaceae	*Tulbaghia leucantha*	3222BC	LC
Amaranthaceae	*Atriplex lindleyi ssp. inflata*	3222BC	LC

Family	Taxon	QDG	Status
Amaranthaceae	*Atriplex nummularia ssp. nummularia*	3222BC	LC
Amaranthaceae	*Salsola atrata*	3222BC	LC
Amaranthaceae	*Salsola dealata*	3222BC	LC
Amaranthaceae	*Salsola kali*	3222BC	LC
Amaranthaceae	*Salsola minutifolia*	3222BC	LC
Amaranthaceae	*Salsola seminuda*	3222BC	LC
Amaranthaceae	*Sericocoma avolans*	3222BC	LC
Amaryllidaceae	*Gethyllis transkarooica*	3222BC	LC
Amaryllidaceae	*Gethyllis villosa*	3222BD	LC
Amaryllidaceae	*Haemanthus humilis ssp. humilis*	3222BC	LC
Anacampserotaceae	*Anacampseros albidiflora*	3222BC	LC
Anacampserotaceae	*Anacampseros arachnoides*	3222BC	LC
Anacampserotaceae	*Anacampseros filamentosa ssp. filamentosa*	3222BC	LC
Anacardiaceae	*Searsia pallens*	3222BC	LC
Anacardiaceae	*Searsia pyroides var. pyroides*	3222BD	LC
Anacardiaceae	*Searsia undulata*	3222BC	LC
Apiaceae	*Chamarea longipedicellata*	3222BC	LC
Apiaceae	*Heteromorpha arborescens var. arborescens*	3222BC	LC
Apocynaceae	*Asclepias fruticosa*	3222BB	LC
Apocynaceae	*Brachystelma circinatum*	3222BC	LC
Apocynaceae	*Ceropegia stapeliiformis ssp. stapeliiformis*	3222BC	LC
Apocynaceae	*Gomphocarpus filiformis*	3222BC	LC
Apocynaceae	*Gomphocarpus tomentosus ssp. tomentosus*	3222BC	LC
Apocynaceae	*Hoodia gordonii*	3222BC	LC
Apocynaceae	*Huernia barbata ssp. barbata*	3222BC	LC
Apocynaceae	*Huernia thuretii*	3222BB	LC
Apocynaceae	*Microloma armatum var. armatum*	3222BC	LC
Apocynaceae	*Piaranthus comptus*	3222BC	LC
Apocynaceae	*Piaranthus geminatus ssp. geminatus*	3222BC	LC
Apocynaceae	*Piaranthus geminatus var. geminatus*	3222BC	LC
Apocynaceae	*Piaranthus pillansii*	3222BC	LC
Apocynaceae	*Schizoglossum aschersonianum var. longipes*	3222BC	LC
Apocynaceae	*Schizoglossum bidens ssp. bidens*	3222BC	LC
Apocynaceae	*Tridentea jucunda*	3222BC	LC
Apocynaceae	*Xysmalobium gomphocarpoides var. parvilobum*	3222BC	DD
Araliaceae	*Cussonia paniculata ssp. paniculata*	3222BC	LC
Asparagaceae	*Asparagus aethiopicus*	3222BC, 3222BD	LC
Asparagaceae	*Asparagus burchellii*	3222BC	LC
Asparagaceae	*Asparagus capensis var. capensis*	3222BD	LC
Asparagaceae	*Asparagus lignosus*	3222BD	LC
Asparagaceae	*Asparagus mucronatus*	3222BC	LC
Asparagaceae	*Asparagus retrofractus*	3222BC, 3222BD	LC
Asparagaceae	*Asparagus striatus*	3222BC	LC
Asparagaceae	*Asparagus suaveolens*	3222BC	LC
Asphodelaceae	*Aloe claviflora*	3222BC	LC
Asphodelaceae	*Aloe humilis*	3222BD	LC

Family	Taxon	QDG	Status
Asphodelaceae	*Aloe longistyla*	3222BC	LC
Asphodelaceae	*Bulbine abyssinica*	3222BC, 3222BD	LC
Asphodelaceae	*Bulbine frutescens*	3222BB, 3222BC, 3222BD	LC
Asphodelaceae	*Bulbine lagopus*	3222BB	LC
Asphodelaceae	*Bulbine narcissifolia*	3222BC, 3222BD	LC
Asphodelaceae	*Bulbine triebneri*	3222BC	LC
Asphodelaceae	*Gasteria disticha var. disticha*	3222BC	LC
Asphodelaceae	*Gasteria disticha var. robusta*	3222BC	LC
Asphodelaceae	*Haworthia fasciata*	3222BB	LC
Asphodelaceae	*Haworthia marumiana var. marumiana*	3222BB, 3222BC	NE
Asphodelaceae	*Haworthia nigra var. diversifolia*	3222BC	NE
Asphodelaceae	*Haworthia nigra var. nigra*	3222BC	NE
Asphodelaceae	*Haworthia semiviva*	3222BC	NE
Asphodelaceae	*Haworthia venosa ssp. tessellata*	3222BC	NE
Asphodelaceae	*Haworthiopsis tessellata var. tessellata*	3222BC	NT
Asphodelaceae	*Trachyandra acocksii*	3222BC	LC
Asphodelaceae	*Trachyandra jacquiniana*	3222BC	LC
Aspleniaceae	*Asplenium adiantum-nigrum var. adiantum-nigrum*	3222BD	LC
Aspleniaceae	*Asplenium cordatum*	3222BC	LC
Aspleniaceae	*Asplenium trichomanes ssp. quadrivalens*	3222BC, 3222BD	LC
Asteraceae	*Arctotis arctotoides*	3222BC	LC
Asteraceae	*Arctotis erosa*	3222BC, 3222BD	LC
Asteraceae	*Arctotis leiocarpa*	3222BC	LC
Asteraceae	*Arctotis microcephala*	3222BC	LC
Asteraceae	*Athanasia microcephala*	3222BC, 3222BD	LC
Asteraceae	*Berkheya glabrata*	3222BC	LC
Asteraceae	*Cenia microglossa*	3222BC	NE
Asteraceae	*Chrysocoma ciliata*	3222BC	LC
Asteraceae	*Conyza scabrida*	3222BD	LC
Asteraceae	*Cotula microglossa*	3222BC	LC
Asteraceae	*Dicoma picta*	3222BC	LC
Asteraceae	*Dimorphotheca cuneata*	3222BC	LC
Asteraceae	*Eriocephalus africanus var. paniculatus*	3222BC	LC
Asteraceae	*Eriocephalus ericoides ssp. ericoides*	3222BC, 3222BD	LC
Asteraceae	*Eriocephalus spinescens*	3222BC	LC
Asteraceae	*Eriocephalus tenuifolius*	3222BC	LC
Asteraceae	*Eumorphia corymbosa*	3222BD	LC
Asteraceae	*Euryops cuneatus*	3222BC	LC
Asteraceae	*Euryops imbricatus*	3222BC	LC
Asteraceae	*Euryops lateriflorus*	3222BC, 3222BD	LC
Asteraceae	*Euryops oligoglossus ssp. oligoglossus*	3222BC, 3222BD	LC
Asteraceae	*Euryops subcarnosus ssp. vulgaris*	3222BC	LC

Family	Taxon	QDG	Status
Asteraceae	*Felicia fascicularis*	3222BC	LC
Asteraceae	*Felicia filifolia ssp. bodkinii*	3222BC	LC
Asteraceae	*Felicia filifolia ssp. filifolia*	3222BC	LC
Asteraceae	*Felicia hirsuta*	3222BC, 3222BD	LC
Asteraceae	*Felicia hyssopifolia ssp. polyphylla*	3222BD	LC
Asteraceae	*Felicia muricata ssp. muricata*	3222BC	LC
Asteraceae	*Felicia namaquana*	3222BC	LC
Asteraceae	*Felicia ovata*	3222BC	LC
Asteraceae	*Garuleum bipinnatum*	3222BC	LC
Asteraceae	*Gazania heterochaeta*	3222BC	LC
Asteraceae	*Gazania krebsiana*	3222BB	LC
Asteraceae	*Gazania lichtensteinii*	3222BC	LC
Asteraceae	*Gazania rigida*	3222BC	LC
Asteraceae	*Geigeria filifolia*	3222BB	LC
Asteraceae	*Geigeria ornativa ssp. ornativa*	3222BC	LC
Asteraceae	*Gerbera piloselloides*	3222BC	LC
Asteraceae	*Gnaphalium capense*	3222BC	LC
Asteraceae	*Helichrysum asperum var. appressifolium*	3222BC	NT
Asteraceae	*Helichrysum caespititium*	3222BC	NT
Asteraceae	*Helichrysum hamulosum*	3222BC, 3222BD	LC
Asteraceae	*Helichrysum lineare*	3222BD	LC
Asteraceae	*Helichrysum pumilio ssp. pumilio*	3222BC	LC
Asteraceae	*Helichrysum rugulosum*	3222BC	LC
Asteraceae	*Helichrysum scitulum*	3222BC	LC
Asteraceae	*Helichrysum trilineatum*	3222BC, 3222BD	LC
Asteraceae	*Helichrysum zeyheri*	3222BC, 3222BD	LC
Asteraceae	*Hertia ciliata*	3222BC	LC
Asteraceae	*Lactuca inermis*	3222BC	LC
Asteraceae	*Leysera gnaphalodes*	3222BC	LC
Asteraceae	*Leysera tenella*	3222BC	LC
Asteraceae	*Oligocarpus calendulaceus*	3222BC	LC
Asteraceae	*Osteospermum microphyllum*	3222BC	LC
Asteraceae	*Pegolettia retrofracta*	3222BC	LC
Asteraceae	*Pentzia calcarea*	3222BC	LC
Asteraceae	*Pentzia incana*	3222BC	LC
Asteraceae	*Pentzia lanata*	3222BC	LC
Asteraceae	*Pentzia quinquefida*	3222BB, 3222BC	LC
Asteraceae	*Phymaspermum parvifolium*	3222BC	LC
Asteraceae	*Pseudognaphalium luteoalbum*	3222BC	LC
Asteraceae	*Pteronia bolusii*	3222BC	LC
Asteraceae	*Pteronia hutchinsoniana*	3222BC	LC
Asteraceae	*Pteronia membranacea*	3222BC	LC
Asteraceae	*Pteronia stoehelinoides*	3222BC	LC
Asteraceae	*Rosenia humilis*	3222BC	LC
Asteraceae	*Rosenia oppositifolia*	3222BC	LC
Asteraceae	*Senecio achilleifolius*	3222BD	LC
Asteraceae	*Senecio angustifolius*	3222BD	LC
Asteraceae	*Senecio asperulus*	3222BD	LC

Family	Taxon	QDG	Status
Asteraceae	*Senecio burchellii*	3222BC	LC
Asteraceae	*Senecio cotyledonis*	3222BC	LC
Asteraceae	*Senecio inaequidens*	3222BC	LC
Asteraceae	*Senecio pinnulatus*	3222BD	LC
Asteraceae	*Sonchus dregeanus*	3222BC	LC
Asteraceae	*Tarchonanthus minor*	3222BC	LC
Asteraceae	*Tripteris aghillana var. aghillana*	3222BC	LC
Asteraceae	*Tripteris sinuata var. sinuata*	3222BC	LC
Asteraceae	*Troglophyton capillaceum ssp. capillaceum*	3222BC	LC
Asteraceae	*Ursinia nana ssp. nana*	3222BC, 3222BD	LC
Aytoniaceae	*Plagiochasma rupestre var. rupestre*	3222BC	LC
Bignoniaceae	*Rhigozum obovatum*	3222BC	LC
Bignoniaceae	*Rhigozum trichotomum*	3222BC	LC
Boraginaceae	*Anchusa riparia*	3222BC	LC
Boraginaceae	*Ehretia rigida ssp. rigida*	3222BC	LC
Boraginaceae	*Lithospermum hirsutum*	3222BC	LC
Boraginaceae	*Lithospermum scabrum*	3222BC	LC
Boraginaceae	*Lobostemon stachydeus*	3222BC	LC
Boraginaceae	*Trichodesma africanum*	3222BC	LC
Brassicaceae	*Heliophila carnosa*	3222BC	LC
Brassicaceae	*Heliophila crithmifolia*	3222BB	LC
Brassicaceae	*Heliophila minima*	3222BC	LC
Bruniaceae	*Audouinia esterhuyseniae*	3222BC	LC
Cactaceae	*Cylindropuntia fulgida*	3222BC	LC
Cactaceae	*Cylindropuntia imbricata*	3222BC	LC
Cactaceae	*Opuntia cespitosa*	3222BC	LC
Cactaceae	*Opuntia elata*	3222BC	LC
Cactaceae	*Opuntia microdasys*	3222BC	LC
Cactaceae	*Opuntia stricta var. stricta*	3222BC	LC
Cactaceae	*Tephrocactus articulatus*	3222BC	LC
Campanulaceae	*Wahlenbergia cernua*	3222BD	LC
Campanulaceae	*Wahlenbergia nodosa*	3222BC, 3222BD	LC
Campanulaceae	*Wahlenbergia tenella var. tenella*	3222BC	LC
Campanulaceae	*Wahlenbergia undulata*	3222BC	LC
Capparaceae	*Cadaba aphylla*	3222BC	LC
Caryophyllaceae	*Cerastium capense*	3222BC, 3222BD	LC
Caryophyllaceae	*Dianthus micropetalus*	3222BC	LC
Caryophyllaceae	*Silene burchellii var. angustifolia*	3222BC	LC
Colchicaceae	*Colchicum melanthioides ssp. transvaalense*	3222BD	LC
Colchicaceae	*Ornithoglossum vulgare*	3222BC	LC
Convolvulaceae	*Convolvulus sagittatus*	3222BC	LC
Crassulaceae	*Cotyledon cuneata*	3222BC	LC
Crassulaceae	*Cotyledon orbiculata var. oblonga*	3222BC	LC
Crassulaceae	*Cotyledon orbiculata var. orbiculata*	3222BC	LC
Crassulaceae	*Cotyledon papillaris*	3222BC	LC
Crassulaceae	*Crassula barbata ssp. barbata*	3222BC	LC
Crassulaceae	*Crassula capitella ssp. thyrsiflora*	3222BC	LC
Crassulaceae	*Crassula corallina ssp. corallina*	3222BC	LC
Crassulaceae	*Crassula cotyledonis*	3222BC	LC

Family	Taxon	QDG	Status
Crassulaceae	*Crassula expansa ssp. expansa*	3222BC	LC
Crassulaceae	*Crassula montana ssp. quadrangularis*	3222BC	LC
Crassulaceae	*Crassula pubescens ssp. pubescens*	3222BC	LC
Crassulaceae	*Crassula rogersii*	3222BC	LC
Crassulaceae	*Crassula socialis*	3222BC	LC
Crassulaceae	*Crassula tomentosa var. tomentosa*	3222BC	LC
Crassulaceae	*Tylecodon reticulatus ssp. reticulatus*	3222BC	LC
Crassulaceae	*Tylecodon wallichii ssp. wallichii*	3222BC	LC
Cucurbitaceae	*Cucumis africanus*	3222BC, 3222BD	LC
Cucurbitaceae	*Cucumis myriocarpus ssp. leptodermis*	3222BC	LC
Cucurbitaceae	*Cucumis zeyheri*	3222BB	LC
Cyperaceae	*Bulbostylis humilis*	3222BD	LC
Cyperaceae	*Carex burkei*	3222BC	LC
Cyperaceae	*Cyperus longus var. tenuiflorus*	3222BD	NE
Cyperaceae	*Cyperus marginatus*	3222BC, 3222BD	LC
Cyperaceae	*Cyperus textilis*	3222BD	LC
Cyperaceae	*Cyperus usitatus*	3222BD	LC
Cyperaceae	*Ficinia ramosissima*	3222BC	LC
Cyperaceae	*Fuirena coerulescens*	3222BD	LC
Cyperaceae	*Isolepis angelica*	3222BD	LC
Cyperaceae	*Isolepis cernua var. cernua*	3222BD	LC
Cyperaceae	*Isolepis setacea*	3222BB, 3222BD	LC
Cyperaceae	*Kyllinga pulchella*	3222BC	LC
Cyperaceae	*Pseudoschoenus inanis*	3222BD	LC
Dipsacaceae	*Scabiosa columbaria*	3222BC, 3222BD	LC
Ebenaceae	*Diospyros austroafricana var. austroafricana*	3222BC	LC
Ebenaceae	*Diospyros austroafricana var. microphylla*	3222BC	LC
Ebenaceae	*Diospyros lycioides ssp. lycioides*	3222BC	LC
Euphorbiaceae	*Euphorbia braunsii*	3222BD	LC
Euphorbiaceae	*Euphorbia decepta*	3222BC	LC
Euphorbiaceae	*Euphorbia hypogaea*	3222BC	LC
Euphorbiaceae	*Euphorbia mauritanica*	3222BC	LC
Euphorbiaceae	*Euphorbia pseudoglobosa*	3222BC	LC
Euphorbiaceae	*Euphorbia racemosa*	3222BC	LC
Euphorbiaceae	*Euphorbia rhombifolia*	3222BC	LC
Euphorbiaceae	*Euphorbia spartaria*	3222BC	LC
Euphorbiaceae	*Euphorbia stellispina*	3222BC	LC
Euphorbiaceae	*Euphorbia stolonifera*	3222BC	LC
Euphorbiaceae	*Euphorbia tridentata*	3222BC	LC
Fabaceae	*Argyrolobium argenteum*	3222BC	LC
Fabaceae	*Aspalathus acicularis ssp. acicularis*	3222BC	NE
Fabaceae	*Aspalathus divaricata ssp. divaricata*	3222BC	NE
Fabaceae	*Indigastrum niveum*	3222BC	LC
Fabaceae	*Indigofera alternans*	3222BB	LC
Fabaceae	*Indigofera alternans var. alternans*	3222BC, 3222BD	LC
Fabaceae	*Indigofera heterophylla*	3222BB, 3222BC	LC

Family	Taxon	QDG	Status
Fabaceae	*Indigofera meyeriana*	3222BC	LC
Fabaceae	*Indigofera sessilifolia*	3222BC	LC
Fabaceae	*Lessertia frutescens ssp. frutescens*	3222BC	LC
Fabaceae	*Lessertia frutescens ssp. microphylla*	3222BC	LC
Fabaceae	*Lessertia inflata*	3222BC	LC
Fabaceae	*Lessertia pauciflora*	3222BB	LC
Fabaceae	*Lessertia sneeuwbergensis*	3222BC	LC
Fabaceae	*Lotononis azureoides*	3222BC	LC
Fabaceae	*Lotononis caerulescens*	3222BC	LC
Fabaceae	*Lotononis laxa*	3222BC	LC
Fabaceae	*Lotononis tenella*	3222BC	LC
Fabaceae	*Medicago laciniata var. laciniata*	3222BC	LC
Fabaceae	*Melolobium candicans*	3222BC, 3222BD	LC
Fabaceae	*Melolobium microphyllum*	3222BC	LC
Fabaceae	*Prosopis chilensis*	3222BC	NE
Fabaceae	*Prosopis glandulosa var. glandulosa*	3222BC	NE
Fabaceae	*Prosopis velutina*	3222BC	NE
Fabaceae	*Trifolium africanum var. africanum*	3222BC	LC
Fabaceae	*Vachellia karroo*	3222BB, 3222BC	LC
Frankeniaceae	*Frankenia pulverulenta*	3222BC	LC
Fumariaceae	*Cysticapnos pruinosa*	3222BC	LC
Funariaceae	*Funaria spathulata*	3222BC	LC
Gentianaceae	*Sebaea pentandra var. pentandra*	3222BC	LC
Geraniaceae	*Erodium cicutarium*	3222BC	LC
Geraniaceae	*Geranium harveyi*	3222BC	LC
Geraniaceae	*Monsonia salmoniflora*	3222BC	LC
Geraniaceae	*Pelargonium abrotanifolium*	3222BB, 3222BC	LC
Geraniaceae	*Pelargonium althaeoides*	3222BC	LC
Geraniaceae	*Pelargonium aridum*	3222BC	LC
Geraniaceae	*Pelargonium brevirostre*	3222BC	LC
Geraniaceae	*Pelargonium capituliforme*	3222BC	LC
Geraniaceae	*Pelargonium denticulatum*	3222BC	LC
Geraniaceae	*Pelargonium glutinosum*	3222BB	LC
Geraniaceae	*Pelargonium griseum*	3222BC	LC
Geraniaceae	*Pelargonium grossularioides*	3222BC	LC
Geraniaceae	*Pelargonium laxum ssp. laxum*	3222BC	LC
Geraniaceae	*Pelargonium malacoides*	3222BB	LC
Geraniaceae	*Pelargonium multicaule ssp. multicaule*	3222BC	LC
Geraniaceae	*Pelargonium myrrhifolium var. myrrhifolium*	3222BC	LC
Geraniaceae	*Pelargonium ramosissimum*	3222BC, 3222BD	LC
Geraniaceae	*Pelargonium ribifolium*	3222BC	LC
Geraniaceae	*Pelargonium senecioides*	3222BB	LC
Geraniaceae	*Pelargonium sessiliflorum*	3222BC	LC
Geraniaceae	*Pelargonium sidoides*	3222BD	LC
Geraniaceae	*Pelargonium tetragonum*	3222BC	LC
Geraniaceae	*Pelargonium tragacanthoides*	3222BC	LC
Geraniaceae	*Sarcocaulon crassicaule*	3222BC	LC
Gisekiaceae	*Gisekia pharnaceoides var. pharnaceoides*	3222BC	LC

Family	Taxon	QDG	Status
Grimmiaceae	*Grimmia laevigata*	3222BC	LC
Hyacinthaceae	*Albuca exuviata*	3222BC	LC
Hyacinthaceae	*Albuca namaquensis*	3222BC	LC
Hyacinthaceae	*Albuca setosa*	3222BC	LC
Hyacinthaceae	*Albuca unifolia*	3222BD	LC
Hyacinthaceae	*Albuca virens ssp. arida*	3222BC	LC
Hyacinthaceae	*Dipcadi viride*	3222BC	LC
Hyacinthaceae	*Drimia intricata*	3222BC, 3222BD	LC
Hyacinthaceae	*Lachenalia aurioliae*	3222BC	LC
Hyacinthaceae	*Lachenalia campanulata*	3222BC	LC
Hyacinthaceae	*Ledebouria ensifolia*	3222BC	LC
Hyacinthaceae	*Massonia depressa*	3222BC	LC
Hyacinthaceae	*Massonia echinata*	3222BD	LC
Hyacinthaceae	*Ornithogalum comptonii*	3222BC	LC
Hyacinthaceae	*Ornithogalum hispidum ssp. hispidum*	3222BD	LC
Hyacinthaceae	*Ornithogalum juncifolium var. juncifolium*	3222BC	LC
Hyacinthaceae	*Ornithogalum paludosum*	3222BC	LC
Hypoxidaceae	*Empodium flexile*	3222BC	LC
Iridaceae	*Gladiolus permeabilis ssp. permeabilis*	3222BC	LC
Iridaceae	*Hesperantha bachmannii*	3222BC	LC
Iridaceae	*Ixia marginifolia*	3222BC	LC
Iridaceae	*Moraea cookii*	3222BC	LC
Iridaceae	*Moraea crispa*	3222BC	LC
Iridaceae	*Moraea elliotii*	3222BC	LC
Iridaceae	*Moraea polystachya*	3222BC	LC
Iridaceae	*Moraea speciosa*	3222BC	LC
Iridaceae	*Moraea unguiculata*	3222BC, 3222BD	LC
Iridaceae	*Romulea macowanii var. macowanii*	3222BD	LC
Iridaceae	*Syringodea concolor*	3222BC	LC
Iridaceae	*Tritonia laxifolia*	3222BD	LC
Juncaceae	*Juncus exsertus*	3222BD	LC
Juncaceae	*Juncus inflexus*	3222BD	LC
Juncaceae	*Juncus scabriusculus*	3222BD	LC
Lamiaceae	*Mentha longifolia ssp. capensis*	3222BD	LC
Lamiaceae	*Salvia disermas*	3222BC	LC
Lamiaceae	*Salvia stenophylla*	3222BC	LC
Lamiaceae	*Stachys dregeana*	3222BC	LC
Lamiaceae	*Stachys linearis*	3222BB, 3222BC	LC
Lamiaceae	*Stachys rugosa*	3222BC, 3222BD	LC
Limeaceae	*Limeum aethiopicum var. aethiopicum*	3222BC	LC
Linaceae	*Linum adustum*	3222BC	LC
Lobeliaceae	*Lobelia dregeana*	3222BD	LC
Loranthaceae	*Moquiniella rubra*	3222BC	LC
Lythraceae	*Nesaea anagalloides*	3222BB	LC
Malvaceae	*Anisodontea anomala*	3222BD	LC
Malvaceae	*Anisodontea malvastroides*	3222BC	LC
Malvaceae	*Anisodontea triloba*	3222BC	LC
Malvaceae	*Grewia robusta*	3222BC	LC
Malvaceae	*Hermannia althaeifolia*	3222BC,	LC

Family	Taxon	QDG	Status
		3222BD	
Malvaceae	*Hermannia burkei*	3222BD	LC
Malvaceae	*Hermannia coccocarpa*	3222BC, 3222BD	LC
Malvaceae	*Hermannia cuneifolia var. cuneifolia*	3222BC	LC
Malvaceae	*Hermannia cuneifolia var. glabrescens*	3222BD	LC
Malvaceae	*Hermannia desertorum*	3222BC	LC
Malvaceae	*Hermannia filifolia var. grandicalyx*	3222BC	LC
Malvaceae	*Hermannia grandiflora*	3222BC	LC
Malvaceae	*Hermannia linearifolia*	3222BC	LC
Malvaceae	*Hermannia pulchella*	3222BC	LC
Malvaceae	*Hermannia spinosa*	3222BC	LC
Malvaceae	*Hermannia stricta*	3222BC	LC
Malvaceae	*Hermannia vestita*	3222BC	LC
Malvaceae	*Mahernia nana*	3222BC	LC
Malvaceae	*Malva pusilla*	3222BC	LC
Malvaceae	*Radyera urens*	3222BB, 3222BC	LC
Marsileaceae	*Marsilea burchellii*	3222BC	LC
Melianthaceae	*Melianthus comosus*	3222BC	LC
Orchidaceae	*Eulophia hians var. hians*	3222BC	LC
Orchidaceae	*Eulophia hians var. nutans*	3222BB	LC
Orchidaceae	*Holothrix villosa var. villosa*	3222BC	LC
Oxalidaceae	*Oxalis pes-caprae var. pes-caprae*	3222BB	LC
Peraceae	*Clutia marginata*	3222BC	LC
Peraceae	*Clutia thunbergii*	3222BC	LC
Plantaginaceae	*Veronica anagallis-aquatica*	3222BD	LC
Poaceae	*Aristida congesta ssp. congesta*	3222BC, 3222BD	LC
Poaceae	*Aristida diffusa ssp. burkei*	3222BC, 3222BD	LC
Poaceae	*Bromus catharticus*	3222BC, 3222BD	NE
Poaceae	*Cenchrus ciliaris*	3222BC	LC
Poaceae	*Chloris virgata*	3222BC	LC
Poaceae	*Cymbopogon prolixus*	3222BC	LC
Poaceae	*Cynodon dactylon*	3222BC	LC
Poaceae	*Cynodon incompletus*	3222BD	LC
Poaceae	*Digitaria eriantha*	3222BC, 3222BD	LC
Poaceae	*Ehrharta calycina*	3222BC	LC
Poaceae	*Enneapogon desvauxii*	3222BB, 3222BC, 3222BD	LC
Poaceae	*Enneapogon scaber*	3222BC	LC
Poaceae	*Enneapogon scoparius*	3222BD	LC
Poaceae	*Eragrostis bergiana*	3222BD	LC
Poaceae	*Eragrostis bicolor*	3222BC	LC
Poaceae	*Eragrostis chloromelas*	3222BC	LC
Poaceae	*Eragrostis curvula*	3222BB, 3222BC, 3222BD	LC
Poaceae	*Eragrostis homomalla*	3222BD	LC

Family	Taxon	QDG	Status
Poaceae	*Eragrostis lehmanniana var. lehmanniana*	3222BC, 3222BD	LC
Poaceae	*Eragrostis obtusa*	3222BC, 3222BD	LC
Poaceae	*Eragrostis procumbens*	3222BC	LC
Poaceae	*Festuca scabra*	3222BC	LC
Poaceae	*Fingerhuthia africana*	3222BB, 3222BC, 3222BD	LC
Poaceae	*Fingerhuthia sesleriiformis*	3222BC	LC
Poaceae	*Heteropogon contortus*	3222BC, 3222BD	LC
Poaceae	*Hordeum murinum ssp. leporinum*	3222BC	LC
Poaceae	*Hyparrhenia hirta*	3222BC, 3222BD	LC
Poaceae	*Karroochloa purpurea*	3222BC	LC
Poaceae	*Koeleria capensis*	3222BC	LC
Poaceae	*Leptochloa fusca*	3222BD	LC
Poaceae	*Melica decumbens*	3222BC	LC
Poaceae	*Melinis repens ssp. grandiflora*	3222BD	LC
Poaceae	*Melinis repens ssp. repens*	3222BD	LC
Poaceae	*Merxmuellera arundinacea*	3222BC	LC
Poaceae	*Merxmuellera disticha*	3222BC	LC
Poaceae	*Oropetium capense*	3222BD	LC
Poaceae	*Panicum maximum*	3222BC	LC
Poaceae	*Pennisetum setaceum*	3222BD	LC
Poaceae	*Pentameris airoides ssp. airoides*	3222BC	LC
Poaceae	*Pentameris setifolia*	3222BC	LC
Poaceae	*Phragmites australis*	3222BC, 3222BD	LC
Poaceae	*Polypogon monspeliensis*	3222BC	LC
Poaceae	*Schismus barbatus*	3222BD	LC
Poaceae	*Setaria verticillata*	3222BD	LC
Poaceae	*Sporobolus fimbriatus*	3222BD	LC
Poaceae	*Sporobolus ioclados*	3222BD	LC
Poaceae	*Sporobolus tenellus*	3222BC	LC
Poaceae	*Stipagrostis ciliata var. capensis*	3222BD	LC
Poaceae	*Stipagrostis namaquensis*	3222BD	LC
Poaceae	*Stipagrostis obtusa*	3222BC, 3222BD	LC
Poaceae	*Stipagrostis uniplumis var. uniplumis*	3222BC	LC
Poaceae	*Tenaxia disticha*	3222BC	LC
Poaceae	*Themeda triandra*	3222BB, 3222BC	LC
Poaceae	*Tragus koelerioides*	3222BC	LC
Poaceae	*Tribolium purpureum*	3222BC	LC
Polygalaceae	*Polygala asbestina*	3222BC	LC
Polygalaceae	*Polygala ephedroides*	3222BC, 3222BD	LC
Polygalaceae	*Polygala leptophylla var. leptophylla*	3222BC	LC
Polypodiaceae	*Polypodium vulgare*	3222BC	LC
Portulacaceae	*Portulaca quadrifida*	3222BD	LC
Pottiaceae	*Pseudocrossidium crinitum*	3222BC	

Family	Taxon	QDG	Status
Pottiaceae	*Tortula atrovirens*	3222BC	LC
Pteridaceae	*Cheilanthes contracta*	3222BC	LC
Pteridaceae	*Cheilanthes eckloniana*	3222BC	LC
Pteridaceae	*Cheilanthes hirta var. brevipilosa*	3222BC	LC
Pteridaceae	*Cheilanthes hirta var. hirta*	3222BC	LC
Pteridaceae	*Cheilanthes induta*	3222BD	LC
Pteridaceae	*Pellaea calomelanos var. calomelanos*	3222BC	LC
Pteridaceae	*Pellaea leucomelas*	3222BC	LC
Ptychomitriaceae	*Ptychomitrium cucullatifolium*	3222BC	LC
Ranunculaceae	*Ranunculus multifidus*	3222BC, 3222BD	LC
Ranunculaceae	*Ranunculus trichophyllus*	3222BD	LC
Rhamnaceae	*Phylica purpurea*	3222BC	LC
Rhamnaceae	*Rhamnus prinoides*	3222BD	LC
Ricciaceae	*Riccia albolimbata*	3222BC	LC
Ricciaceae	*Riccia sorocarpa*	3222BC	LC
Rosaceae	*Cliffortia arborea*	3222BC	LC
Rosaceae	*Cliffortia crenata*	3222BB	LC
Rubiaceae	*Anthospermum spathulatum ssp. spathulatum*	3222BC	LC
Rubiaceae	*Galium capense ssp. capense*	3222BC	LC
Rubiaceae	*Galium capense ssp. garipense*	3222BC	LC
Rubiaceae	*Nenax microphylla*	3222BB	LC
Ruscaceae	*Eriospermum corymbosum*	3222BC	LC
Santalaceae	*Lacomucinaea lineata*	3222BC	LC
Santalaceae	*Thesium hystrix*	3222BC	LC
Santalaceae	*Viscum continuum*	3222BC	LC
Santalaceae	*Viscum rotundifolium*	3222BB, 3222BC	LC
Scrophulariaceae	*Aptosimum indivisum*	3222BC	LC
Scrophulariaceae	*Aptosimum procumbens*	3222BD	LC
Scrophulariaceae	*Aptosimum spinescens*	3222BC	LC
Scrophulariaceae	*Buddleja glomerata*	3222BC	NE
Scrophulariaceae	*Chaenostoma halimifolium*	3222BC, 3222BD	LC
Scrophulariaceae	*Chaenostoma macrosiphon*	3222BD	LC
Scrophulariaceae	*Diascia alonsooides*	3222BC	LC
Scrophulariaceae	*Diascia capsularis*	3222BC	LC
Scrophulariaceae	*Hebenstretia parviflora*	3222BC	NT
Scrophulariaceae	*Hebenstretia robusta*	3222BC	NT
Scrophulariaceae	*Jamesbrittenia atropurpurea*	3222BC	LC
Scrophulariaceae	*Jamesbrittenia atropurpurea ssp. atropurpurea*	3222BC	LC
Scrophulariaceae	*Jamesbrittenia tysonii*	3222BC	LC
Scrophulariaceae	*Limosella grandiflora*	3222BD	LC
Scrophulariaceae	*Limosella vesiculosa*	3222BD	LC
Scrophulariaceae	*Nemesia cynanchifolia*	3222BC	LC
Scrophulariaceae	*Nemesia foetens*	3222BC	LC
Scrophulariaceae	*Nemesia fruticans*	3222BD	LC
Scrophulariaceae	*Peliostomum leucorrhizum*	3222BC	LC
Scrophulariaceae	*Selago albida*	3222BC, 3222BD	LC
Scrophulariaceae	*Selago saxatilis*	3222BC,	LC

Family	Taxon	QDG	Status
		3222BD	
Scrophulariaceae	*Trieenea glutinosa*	3222BC	LC
Scrophulariaceae	*Zaluzianskya peduncularis*	3222BC	LC
Scrophulariaceae	*Zaluzianskya venusta*	3222BC	LC
Solanaceae	*Lycium cinereum*	3222BC	LC
Solanaceae	*Lycium hirsutum*	3222BC	LC
Solanaceae	*Lycium schizocalyx*	3222BC	LC
Solanaceae	*Solanum retroflexum*	3222BC, 3222BD	LC
Thymelaeaceae	*Gnidia polycephala*	3222BC	LC
Thymelaeaceae	*Lasiosiphon deserticola*	3222BC	LC
Thymelaeaceae	*Passerina corymbosa*	3222BC	LC
Typhaceae	*Typha capensis*	3222BD	LC
Urticaceae	*Forsskaolea candida*	3222BC	LC
Urticaceae	*Urtica lobulata*	3222BD	LC
Verbenaceae	*Lantana rugosa*	3222BC	LC
Zygophyllaceae	*Roepera incrustata*	3222BC	LC
Zygophyllaceae	*Roepera lichtensteiniana*	3222BC	LC
Zygophyllaceae	*Tetraena chrysopteros*	3222BC	LC
Zygophyllaceae	*Tetraena microcarpa*	3222BC	LC
Zygophyllaceae	*Tribulus terrestris*	3222BC	LC

Appendix 2: Mammal species recorded in quarter degree square 3222BB, 3222BC and 3222BD.

Family	Scientific name	Common name	IUCN	QDGs
Bathyergidae	*Cryptomys hottentotus*	Southern African Mole-rat	LC (2016)	3222BC
Bovidae	*Aepyceros melampus*	Impala	LC	3222BC
Bovidae	*Alcelaphus buselaphus caama*	Red Hartebeest	LC (2008)	3222BC
Bovidae	*Antidorcas marsupialis*	Springbok	LC (2016)	3222BB, 3222BC
Bovidae	*Connochaetes gnou*	Black Wildebeest	LC (2016)	3222BC
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	LC (2016)	3222BC
Bovidae	*Hippotragus equinus*	Roan Antelope	EN (2016)	3222BC
Bovidae	*Oreotragus oreotragus*	Klipspringer	LC (2016)	3222BC
Bovidae	*Oryx gazella*	Gemsbok	LC (2016)	3222BC
Bovidae	*Pelea capreolus*	Vaal Rhebok	NT (2016)	3222BC
Bovidae	*Raphicerus campestris*	Steenbok	LC (2016)	3222BD, 3222BC
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	LC	3222BC
Bovidae	*Sylvicapra sp.*	Common Duiker	LC	3222BC
Bovidae	*Syncerus caffer*	African Buffalo	LC (2008)	3222BC
Bovidae	*Taurotragus oryx*	Common Eland	LC (2016)	3222BC
Bovidae	*Taurotragus oryx oryx*	Cape eland	LC (2016)	3222BC
Bovidae	*Tragelaphus scriptus*	Bushbuck	LC	3222BB, 3222BC
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	LC (2016)	3222BB, 3222BD, 3222BC
Canidae	*Canis mesomelas*	Black-backed Jackal	LC (2016)	3222BC
Canidae	*Otocyon megalotis*	Bat-eared Fox	LC (2016)	3222BC
Canidae	*Vulpes chama*	Cape Fox	LC (2016)	3222BD, 3222BC
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	LC (2016)	3222BB, 3222BC
Cercopithecidae	*Papio ursinus*	Chacma Baboon	LC (IUCN, 2016)	3222BB, 3222BC
Chrysochloridae	*Chlorotalpa sclateri*	Sclater's Golden Mole	LC (2016)	3222BC
Elephantidae	*Loxodonta africana*	African Bush Elephant	Vulnerable A2a (2008)	3222BC
Equidae	*Equus quagga*	Plains Zebra	NT (IUCN, 2016)	3222BC
Equidae	*Equus zebra zebra*	Cape Mountain Zebra	LC (2016)	3222BC
Felidae	*Caracal caracal*	Caracal	LC (2016)	3222BC
Felidae	*Felis nigripes*	Black-footed Cat	VU (2016)	3222BC
Felidae	*Felis silvestris*	Wildcat	LC (2016)	3222BC

Family	Scientific name	Common name	IUCN	QDGs
Felidae	*Panthera leo*	Lion	LC (2016)	3222BC
Gliridae	*Graphiurus (Graphiurus) ocularis*	Spectacled African Dormouse	LC	3222BC
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	LC (2016)	3222BC
Herpestidae	*Herpestes pulverulentus*	Cape Gray Mongoose	LC (2016)	3222BC
Herpestidae	*Suricata suricatta*	Meerkat	LC (2016)	3222BB, 3222BC
Hyaenidae	*Crocuta crocuta*	Spotted Hyaena	NT (2016)	3222BC
Hyaenidae	*Hyaena brunnea*	Brown Hyena	NT (2015)	3222BC
Hyaenidae	*Proteles cristata*	Aardwolf	LC (2016)	3222BC
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC	3222BB, 3222BC
Leporidae	*Bunolagus monticularis*	Riverine Rabbit	CR (2016)	3222BC
Leporidae	*Lepus capensis*	Cape Hare	LC	3222BC
Leporidae	*Lepus saxatilis*	Scrub Hare	LC	3222BC
Leporidae	*Pronolagus rupestris*	Smith's Red Rock Hare	LC (2016)	3222BC
Macroscelididae	*Elephantulus edwardii*	Cape Elephant Shrew	LC (2016)	3222BD, 3222BC
Macroscelididae	*Elephantulus rupestris*	Western Rock Elephant Shrew	LC (2016)	3222BC
Macroscelididae	*Macroscelides proboscideus*	Short-eared Elephant Shrew	LC (2016)	3222BD, 3222BC
Muridae	*Acomys (Subacomys) subspinosus*	Cape Spiny Mouse	LC	3222BD
Muridae	*Aethomys granti*	Grant's Rock Mouse	LC	3222BC
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	LC	3222BC
Muridae	*Desmodillus auricularis*	Cape Short-tailed Gerbil	LC (2016)	3222BD, 3222BC
Muridae	*Gerbilliscus paeba*	Paeba Hairy-footed Gerbil	LC (2016)	3222BD, 3222BC
Muridae	*Mastomys natalensis*	Natal Mastomys	LC (2016)	3222BD, 3222BC
Muridae	*Myomyscus verreauxi*	Verreaux's Mouse	LC	3222BD
Muridae	*Otomys irroratus*	Southern African Vlei Rat (Fynbos type)	LC (2016)	3222BD
Muridae	*Otomys saundersiae*	Saunders' Vlei Rat	LC	3222BC
Muridae	*Otomys sp.*	Vlei Rats		3222BC
Muridae	*Otomys unisulcatus*	Karoo Bush Rat	LC (2016)	3222BC
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	LC (2016)	3222BD, 3222BC
Mustelidae	*Ictonyx striatus*	Striped Polecat	LC (2016)	3222BB, 3222BC
Mustelidae	*Mellivora capensis*	Honey Badger	LC (2016)	3222BD, 3222BC
Nesomyidae	*Dendromus melanotis*	Gray African Climbing Mouse	LC (2016)	3222BC

Family	Scientific name	Common name	IUCN	QDGs
Nesomyidae	*Malacothrix typica*	Large-eared African Desert Mouse	LC (2016)	3222BC
Nesomyidae	*Petromyscus collinus*	Pygmy Rock Mouse	LC (2016)	3222BD, 3222BC
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	LC (2016)	3222BD, 3222BC
Nesomyidae	*Steatomys krebsii*	Kreb's African Fat Mouse	LC (2016)	3222BD
Procaviidae	*Procavia capensis capensis*	Cape Rock Hyrax	LC (IUCN 2015, global sp. level)	3222BC
Sciuridae	*Xerus inauris*	South African Ground Squirrel	LC	3222BD
Soricidae	*Crocidura flavescens*	Greater Red Musk Shrew	LC (2016)	3222BD
Soricidae	*Myosorex varius*	Forest Shrew	LC (2016)	3222BD, 3222BC
Soricidae	*Suncus varilla*	Lesser Dwarf Shrew	LC (2016)	3222BC
Vespertilionidae	*Cistugo lesueuri*	Lesueur's Wing-gland Bat	LC (2016)	3222BC
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	LC (2016)	3222BD, 3222BC
Vespertilionidae	*Pipistrellus melckorum*	Melcks' Serotine		3222BC
Viverridae	*Genetta genetta*	Common Genet	LC (2016)	3222BC

Family	Scientific Name	Common Name	IUCN	Combined QDGS	Combined sites
Bovidae	*Antidorcas marsupialis*	Springbok	Least Concern	3222BB, 3222BD	PV1, PV2, PV3, WEF
Bovidae	*Tragelaphus scriptus*	Bushbuck	Least Concern	3222BB	PV1, PV2, PV3, WEF
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern	3222BB, 3222BD	PV1, PV2, PV3, WEF
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	Least Concern	3222BB	PV1, PV2, PV3, WEF
Cercopithecidae	*Papio ursinus*	Chacma Baboon	Least Concern	3222BB	PV1, PV2, PV3, WEF
Herpestidae	*Suricata suricatta*	Meerkat	Least Concern	3222BB	PV1, PV2, PV3, WEF
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	Least Concern	3222BB	PV1, PV2, PV3, WEF
Mustelidae	*Ictonyx striatus*	Striped Polecat	Least Concern	3222BB	PV1, PV2, PV3, WEF
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern	3222BD	PV2, WEF
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	Least Concern	3222BD	PV2, WEF
Canidae	*Vulpes chama*	Cape Fox	Least Concern	3222BD	PV2, WEF
Macroscelididae	*Elephantulus edwardii*	Cape Elephant Shrew	Least Concern	3222BD	PV2, WEF

Macroscelididae	*Macroscelides proboscideus*	Short-eared Elephant Shrew	Least Concern	3222BD	PV2, WEF
Muridae	*Acomys (Subacomys) subspinosus*	Cape Spiny Mouse	Least Concern	3222BD	PV2, WEF
Muridae	*Desmodillus auricularis*	Cape Short-tailed Gerbil	Least Concern	3222BD	PV2, WEF
Muridae	*Gerbilliscus paeba*	Paeba Hairy-footed Gerbil	Least Concern	3222BD	PV2, WEF
Muridae	*Mastomys natalensis*	Natal Mastomys	Least Concern	3222BD	PV2, WEF
Muridae	*Myomyscus verreauxi*	Verreaux's Mouse	Least Concern	3222BD	PV2, WEF
Muridae	*Otomys irroratus*	Southern African Vlei Rat (Fynbos type)	Least Concern	3222BD	PV2, WEF
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	Least Concern	3222BD	PV2, WEF
Mustelidae	*Mellivora capensis*	Honey Badger	Least Concern	3222BD	PV2, WEF
Nesomyidae	*Petromyscus collinus*	Pygmy Rock Mouse	Least Concern	3222BD	PV2, WEF
Nesomyidae	*Saccostomus campestris*	Southern African Pouched Mouse	Least Concern	3222BD	PV2, WEF
Nesomyidae	*Steatomys krebsii*	Kreb's African Fat Mouse	Least Concern	3222BD	PV2, WEF
Sciuridae	*Xerus inauris*	South African Ground Squirrel	Least Concern	3222BD	PV2, WEF
Soricidae	*Crocidura flavescens*	Greater Red Musk Shrew	Least Concern	3222BD	PV2, WEF
Soricidae	*Myosorex varius*	Forest Shrew	Least Concern	3222BD	PV2, WEF
Vespertilionidae	*Neoromicia capensis*	Cape Serotine	Least Concern	3222BD	PV2, WEF

Appendix 3: Reptiles found in quarter degree square 3222BB, 3222BC and 3222BD

Family	Scientific name	Common name	IUCN	QDG
Agamidae	*Agama aculeata aculeata*	Common Ground Agama	LC (SARCA 2014)	3222BB, 3222BC
Agamidae	*Agama anchietae*	Anchieta's Agama	LC (SARCA 2014)	3222BC
Agamidae	*Agama atra*	Southern Rock Agama	LC (SARCA 2014)	3222BB, 3222BD, 3222BC
Chamaeleonidae	*Bradypodion ventrale*	Eastern Cape Dwarf Chameleon	LC (SARCA 2014)	3222BB, 3222BC
Chamaeleonidae	*Chamaeleo namaquensis*	Namaqua Chameleon	LC (SARCA 2014)	3222BC
Colubridae	*Crotaphopeltis hotamboeia*	Red-lipped Snake	LC (SARCA 2014)	3222BC
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	LC (SARCA 2014)	3222BD, 3222BC
Colubridae	*Dipsina multimaculata*	Dwarf Beaked Snake	LC (SARCA 2014)	3222BD, 3222BC
Cordylidae	*Cordylus cordylus*	Cape Girdled Lizard	LC (SARCA 2014)	3222BC
Cordylidae	*Cordylus minor*	Western Dwarf Girdled Lizard	LC (SARCA 2014)	3222BB
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC (SARCA 2014)	3222BC
Cordylidae	*Pseudocordylus microlepidotus namaquensis*	Nuweveldberg Crag Lizard	LC (SARCA 2014)	3222BB, 3222BC
Cordylidae	*Pseudocordylus microlepidotus subsp. ?*	Cape Crag Lizard (subsp. ?)		3222BD, 3222BC
Elapidae	*Aspidelaps lubricus lubricus*	Coral Shield Cobra		3222BD, 3222BC
Elapidae	*Naja nivea*	Cape Cobra	LC (SARCA 2014)	3222BB, 3222BC
Gekkonidae	*Chondrodactylus angulifer*	Giant Ground Gecko	LC (IUCN 2009)	3222BC

Family	Scientific name	Common name	IUCN	QDG
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Gecko	LC (SARCA 2014)	3222BB, 3222BC
Gekkonidae	*Goggia braacki*	Braack's Pygmy Gecko	NT (SARCA 2014)	3222BC
Gekkonidae	*Lygodactylus capensis*	Common Dwarf Gecko	LC (SARCA 2014)	3222BC
Gekkonidae	*Pachydactylus capensis*	Cape Gecko	LC (SARCA 2014)	3222BD, 3222BC
Gekkonidae	*Pachydactylus geitje*	Ocellated Gecko	LC (SARCA 2014)	3222BD, 3222BC
Gekkonidae	*Pachydactylus kladaroderma*	Thin-skinned Gecko	LC (SARCA 2014)	3222BC
Gekkonidae	*Pachydactylus latirostris*	Quartz Gecko	LC (SARCA 2014)	3222BC
Gekkonidae	*Pachydactylus maculatus*	Spotted Gecko	LC (SARCA 2014)	3222BB, 3222BC
Gekkonidae	*Pachydactylus mariquensis*	Marico Gecko	LC (SARCA 2014)	3222BC
Gekkonidae	*Pachydactylus oculatus*	Golden Spotted Gecko	LC (SARCA 2014)	3222BC
Gekkonidae	*Pachydactylus purcelli*	Purcell's Gecko	LC (SARCA 2014)	3222BC
Gekkonidae	*Ptenopus garrulus maculatus*	Spotted Barking Gecko	LC (SARCA 2014)	3222BC
Gerrhosauridae	*Cordylosaurus subtessellatus*	Dwarf Plated Lizard	LC (SARCA 2014)	3222BC
Lacertidae	*Meroles suborbitalis*	Spotted Desert Lizard	LC (SARCA 2014)	3222BC
Lacertidae	*Nucras livida*	Karoo Sandveld Lizard	LC (SARCA 2014)	3222BC

Family	Scientific name	Common name	IUCN	QDG
Lacertidae	*Pedioplanis burchelli*	Burchell's Sand Lizard	LC (SARCA 2014)	3222BC
Lacertidae	*Pedioplanis laticeps*	Karoo Sand Lizard	LC (SARCA 2014)	3222BC
Lacertidae	*Pedioplanis lineoocellata pulchella*	Common Sand Lizard	LC (SARCA 2014)	3222BC
Lacertidae	*Pedioplanis namaquensis*	Namaqua Sand Lizard	LC (SARCA 2014)	3222BC
Lamprophiidae	*Boaedon capensis*	Brown House Snake	LC (SARCA 2014)	3222BC
Lamprophiidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	LC (SARCA 2014)	3222BC
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	LC (SARCA 2014)	3222BC
Lamprophiidae	*Psammophis notostictus*	Karoo Sand Snake	LC (SARCA 2014)	3222BB, 3222BD, 3222BC
Lamprophiidae	*Pseudaspis cana*	Mole Snake	LC (SARCA 2014)	3222BC
Pelomedusidae	*Pelomedusa galeata*	South African Marsh Terrapin	LC (IUCN 2018)	3222BC
Scincidae	*Acontias meleagris*	Cape Legless Skink	LC (SARCA 2014)	3222BC
Scincidae	*Trachylepis capensis*	Cape Skink	LC (SARCA 2014)	3222BC
Scincidae	*Trachylepis homalocephala*	Red-sided Skink	LC (SARCA 2014)	3222BC
Scincidae	*Trachylepis occidentalis*	Western Three-striped Skink	LC (SARCA 2014)	3222BC
Scincidae	*Trachylepis sulcata sulcata*	Western Rock Skink	LC (SARCA 2014)	3222BB, 3222BC

Family	Scientific name	Common name	IUCN	QDG
Scincidae	*Trachylepis variegata*	Variegated Skink	LC (SARCA 2014)	3222BB, 3222BD, 3222BC
Testudinidae	*Chersina angulata*	Angulate Tortoise	LC (SARCA 2014)	3222BD, 3222BC
Testudinidae	*Chersobius boulengeri*	Karoo Padloper	NT (SARCA 2014)	3222BC
Testudinidae	*Homopus femoralis*	Greater Padloper	LC (SARCA 2014)	3222BB, 3222BC
Testudinidae	*Psammobates tentorius subsp. ?*	Tent Tortoise (subsp. ?)	LC (SARCA 2014)	3222BD, 3222BC
Testudinidae	*Psammobates tentorius tentorius*	Karoo Tent Tortoise		3222BC
Testudinidae	*Psammobates tentorius verroxii*	Verrox's Tent Tortoise		3222BC
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC (SARCA 2014)	3222BB, 3222BC
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	LC (SARCA 2014)	3222BB, 3222BD, 3222BC
Viperidae	*Bitis arietans arietans*	Puff Adder	LC (IUCN 2014)	3222BC

Appendix 4: Reptiles found in quarter degree square 3222BB, 3222BC and 3222BD

Family	Scientific name	Common name	IUCN	QDGs
Bufonidae	*Poyntonophrynus vertebralis*	Southern Pygmy Toad	LC	3222BA
Bufonidae	*Sclerophrys capensis*	Raucous Toad	LC	3222BA
Bufonidae	*Vandijkophrynus gariepensis*	Karoo Toad (subsp. gariepensis)	LC	3222BB, 3222AC, 3222BA
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC	3222BA
Pipidae	*Xenopus laevis*	Common Platanna	LC	3222BA
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	LC	3222BB, 3222AC, 3222BA
Pyxicephalidae	*Amietia poyntoni*	Poynton's River Frog	LC	3222BB, 3222BA
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC	3222BB, 3222BA
Pyxicephalidae	*Cacosternum karooicum*	Karoo Caco	LC	3222BA
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	LC	3222BA
Pyxicephalidae	*Tomopterna delalandii*	Cape Sand Frog	LC	3222BA, 3222AC