



**An Impact Assessment of the biodiversity of the proposed
Mayogi PV site at Kirkwood, Eastern Cape**

May 2023



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.by

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and

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May 2023

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a <i>curriculum vitae</i> ;	Title page Chapter 10 p125-130
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 8
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Chapter 2 Page15-17
(cA) an indication of the quality and age of base data used for the specialist report;	Chapter 4 Page 23-29 and Chapter 5
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Chapter 3 P18-23 and Chapter 5 and Chapter 7
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Chapter 4.1 2 p23 and Chapter 4.2 p26
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Chapter 4 P23-29
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Paragraphs 5.2 p34-48 and 5.3 P 49--53
p(g) an identification of any areas to be avoided, including buffers;	Paragraph 5.2 P34-48
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	P35-36
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	Chapters 5, 6 and 7
(k) any mitigation measures for inclusion in the EMPr;	Chapter 7 Impact table P93-116
(l) any conditions for inclusion in the environmental authorisation;	No-Go areas
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Monitor success of rehabilitation

<p>(n) a reasoned opinion—</p> <p>i. whether the proposed activity, activities or portions thereof should be authorised;</p> <p>iA. Regarding the acceptability of the proposed activity or activities; and</p> <p>ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;</p>	<p>Paragraph 7.3 and Chapter 8</p>
<p>(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and</p>	<p>N/A -No feedback has yet been received from the public participation process regarding the visual environment</p>
<p>(p) any other information requested by the competent authority</p>	<p>N/A. No information regarding the visual study has been requested from the competent authority to date.</p>
<p>(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.</p>	<p>N/A</p>

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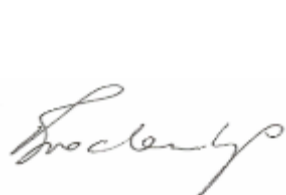
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DECLARATION OF INDEPENDENCE

We, George Johannes Bredenkamp, Id 4602105019086, SACNASP Reg No 400086/83 and Jacobus Casparus Petrus Van Wyk, Id 680804 5041084, SACNASP Reg No 400062/09 declare that we:

- Hold higher degrees (MSc and DSc) in the biological sciences, which allowed registration by South African Council for National Scientific Professions as Professional Ecologist that sanction me to function independently as specialist scientific consultant;
- Act as an independent specialist consultant in the field of ecology, vegetation science, botany zoology and wetlands;
- Are employed by Eco-Agent CC, CK 95/37116/23, of which GJ Bredenkamp is the owner;
- Abide by the Code of Ethics of the SACNASP;
- Are committed to biodiversity conservation but concomitantly recognize the need for economic development;
- Are assigned as specialist consultants by Pierre Joubert Landscape Architect and Environmental Planner for the project “**An Impact Assessment of the biodiversity of the proposed Mayogi PV site at Kirkwood, Eastern Cape**” described in this report;
- Declare that, as per prerequisites of the Natural Scientific Professions Act (Act No. 27 of 2003), as amended by the Science and Technology Laws Amendment Act (Act 7 of 2014), this investigation of vegetation exclusively reflects our own observations and unbiased scientific interpretations, and was executed to the best of our ability;
- Within our fields of expertise, we reserve the right to form and hold our own opinions within the constraints of our training and experience and therefore will not submit willingly to the interests of other parties or change our statements to appease or unduly benefit them;
- Do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work performed;
- Do not have, and will not have any vested or conflicting interests in the proposed development;
- Undertake to disclose to the client and the competent authority any material information that have or may have the potential to influence the decision of the competent authority with regard to the Environmental Impact Assessment requirements;
- Will provide the client and competent authority with access to all information at our disposal, regarding this project, whether favourable or not;
- Reserve the right to only transfer our intellectual property contained in this report to the client(s), (party or company that commissioned the work) on full payment of the contract fee. Upon transfer of the intellectual property, I recognise that written consent from the client(s) will be required for us to release any part of this report to third parties;
- In addition, remuneration for services provided by us is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.



GJ Bredenkamp



JPC van Wyk

DISCLAIMER:

Even though every care is taken to ensure the accuracy of this report, environmental assessment studies are limited in scope, time and budget. Discussions and proposed mitigations are to some extent made on reasonable and informed assumptions built on *bone fide* information sources, as well as deductive reasoning. Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and migrations. Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage. The vegetation team can thus not accept responsibility for conclusions and mitigation measures made in good faith based on own databases or on the information provided at the time of the directive. Although the author exercised due care and diligence in rendering services and preparing documents, he accepts no liability. The client, by receiving this document, indemnifies the authors against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of this document. This report should therefore be viewed and acted upon with these limitations in mind.

ABSTRACT

SiVEST was appointed to undertake the required Impact Assessment process for the proposed construction and operation of a PV facility at Kirkwood, Eastern Cape. The proposed project is to develop the PV facility, in two adjacent parts, namely the Mayogi PV1 and Mayogi PV2 facilities. The associated infrastructure *inter alia* include a BESS, site camp, substation and OHL, and O&M building for each part.

This report is an Impact Assessment on the biodiversity of both the proposed PV1 and PV2 facilities.

Eco-Agent CC was appointed by SiVEST to assess the biodiversity (fauna and flora) and ecological sensitivity, including the Impact Assessment for the **PV site** for this development.

This study was done in accordance with the National Environmental Management Act (Act 107 of 1998) Amendment of the Environmental Impact Assessment Regulations 2014, 7 April 2017. (GNR. 324, 325, 326 & 327: Listing Notices 1, 2, 3).

Furthermore, the results of the National Environmental Screening Tool (NEMA Government Notices 648 (2019) and 655 (2020)) indicate Very High sensitivity for Terrestrial Biodiversity and Low to Medium sensitivity for plant Species and Medium to High for Animal Species sensitivity.

The Terms of Reference for this assignment is interpreted as follows: Compile a study of the vegetation sensitivity, fauna and flora on the site, in accordance with all the requirements of relevant national and provincial authorities.

Vegetation

The relevant literature and databases were used to obtain data regarding threatened, protected, alien invasive and medicinal plant species, also regional vegetation, threatened status of vegetation types, protected and conservation areas, critical biodiversity areas, wetlands and water courses. Standard methods for vegetation surveys were applied. Plant communities were mapped and described including total floristic composition per plant community. All the above data were applied in analyses to determine conservation status and ecological sensitivity per plant community.

According to SANBI & DEAT (2009) and NEMBA, Government Notice 1002 (2011) and Government Notice 689 (2022) the Ecosystem Status for **Albany Alluvial** vegetation type is as **Endangered**. On the specific site the vegetation is mostly **transformed**, with very little original natural vegetation remaining. According to Mucina & Rutherford (2006, 2018) the Sundays Noorsveld and the Sundays Thicket vegetation types are classified as **Least Concern**. The **Sundays Arid Thicket** (= Sundays Noorsveld) is listed as **Vulnerable** in the 2022 NEMBA list of Threatened Ecosystems.

No Irreplaceable Critical Biodiversity Areas occur in the site area. Most of the site is regarded as **Ecological Support Area 1**, with a small patch of **Other Natural Areas**.

Eleven plant species of conservation concern could occur in the general area of the site, but none of these were recorded during the field survey.

The vegetation study of the proposed site resulted in the identification of six different plant communities (= ecosystems on the plant community level of organisation) that could be mapped. The terrestrial plant communities identified mostly have low to medium plant species richness, no threatened, red data or protected plant species were recorded on the site.

The results of the vegetation and flora study indicate that the **Valley with Drainage line** has High Ecological sensitivity, therefore **No-Go area**. The **Mesic Thicket with spekboom** has Medium-High ecological sensitivity and conservation value and this has also been marked as **No-Go area**. The rest of the terrestrial habitat areas have low, medium-low or medium ecological sensitivity.

Most of the terrestrial vegetation areas have low to medium plant species richness, no threatened or nationally protected plant species and low to medium conservation value.

Should the Valley with the Drainage Line be conserved and protected, and the Mesic Thicket with spekboom be at least partly conserved, it is suggested that the construction of the proposed PV facility can be supported.

Fauna

Although many mammal, bird and herpetofauna species may from time to time occur in the area of the site, only a few may be encountered or observed at any one time. This can be ascribed to very small species or low species density and individuals are therefore not easily seen. Many smaller mammals and herpetofauna are either secretive, nocturnal, hibernators and/or seasonal.

The Animal Sensitivity is regarded as **High** for the study site. However, the impression from this study is that the animal species sensitivity is rather **LOW** on the study site, because the habitats are mostly degraded or transformed. Note that Mayogi is (was) a game farm and several animal species (game species) occurred from time to time. There was a constant flow of animal species bought or bred and later sold. The Daniell Cheetah breeding project is located across the road. The many animals that are present on several nature reserves/game farms in the area **inflate** the estimate by the Screening Tool for Animal Species Sensitivity on this particular study site. Furthermore, Animal Species Sensitivity includes bird species, of which the Screening Tool provides a separate "Bird Species Sensitivity" result indicated as Low. The two mammal species have only Medium sensitivity. From a vertebrate fauna perspective, there is no objection against the development on condition that the development adheres to the condition concerning the protection of the Valley and Drainage Line on the site.

Impacts

The impacts of the proposed development on biodiversity will, without as well as with mitigation measures, be **Low** on the Arid Karoo and Dry Thicket with Euphorbia, in spite of these systems being regarded as threatened ecosystems. On the site both these systems are highly disturbed and even transformed, therefore it is suggested that, except for the no-Go areas, the proposed development can be supported. The impacts of the proposed development will be **Low** on the rest of the vegetation, plant species and fauna.

It is suggested that the cumulative impact on vegetation, plants and fauna of the Mayogi PV project, in relation to other possible PV developments, is rather low.

1. BACKGROUND AND ASSIGNMENT

The following information was provided by SiVEST SA (Pty) Ltd (hereafter referred to as “SiVEST”).

SiVEST was appointed to undertake the required Impact Assessment process for the proposed construction and operation of a PV facility at Kirkwood, Eastern Cape. The proposed project is to develop one or more PV facilities and associated infrastructure on the property, depending on site sensitivities. The associated infrastructure would include a BESS, site camp, substation and OHL, and O&M building.

From the DEA Screening Tool results, it is clear that the northern part of the property is the most suitable in terms of the solar theme sensitivity (Figure 1.1 below), therefore the focus area for PV development is the northern part of the property.

This report is an Impact Assessment on the biodiversity of both the proposed **PV1 and PV2 parts of the facility.**

The Skilpad Substation is located within the Mayogi PV1 site area of the property.

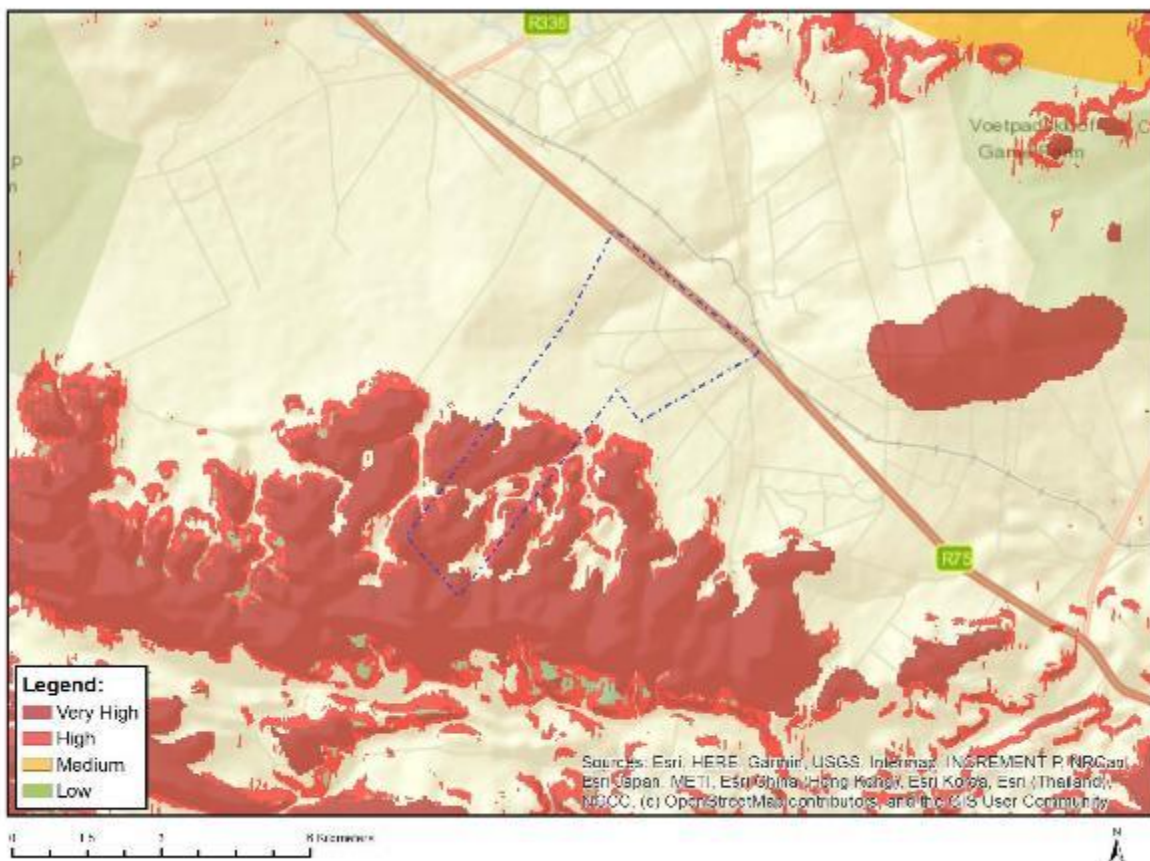


Figure 1.1: The DEA Screening Tool Relative Landscape (Solar) Theme Sensitivity. The proposed Mayogi PV 1 project is restricted to the northern part of the farm.

The proposed project is located approximately 7 km (as the crow flies) southwest of Kirkwood. The site for the proposed project is located on the R75 Road, approximately about 30 km north of Uitenhage (Kariega) within the in the Sundays River Valley Local Municipality, Sarah Baartman (Cacado) District Municipality (Figure 3.1), Eastern Cape Province. The site is located approximately 20 km southwest of the southern boundary of the Addo Elephant National Park. (Figure 3.2 and 3.3).

Eco-Agent CC was appointed by SiVEST to assess the biodiversity (fauna and flora) and ecological sensitivity for the site relevant for this development. This investigation is in accordance with the EIA Regulations No. R982-985, Department of Environmental Affairs and Tourism, 4 December 2014. emanating from Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), and the Amendment of the Environmental Impact Assessment Regulations, 7 April 2017. (GNR. 324, 325, 326 & 327: and the Eastern Cape conservation regulations. It is also in accordance with Government Notice 648 Government Gazette 45421, 10 May 2019 (Biodiversity) and Government Notice 655 Government Gazette 42946, 10 January 2020 (Plants and Animals)(NEMA).

In accordance with the Natural Scientific Professions Act (Act 27 of 2003; and Science and Technology Laws Amendment Act (Act 7 of 2014) only a person registered with the South African Council for Natural Scientific Professions may practice in a consulting capacity. Prof GJ Bredenkamp and Mr JPC van Wyk of EcoAgent CC undertook an independent and professional assessment of the biodiversity and ecological sensitivity.

The Terms of Reference for this assignment is interpreted as follows: Compile a study of the biodiversity and consequently the ecological sensitivity of the site, in accordance with all the above requirements. Then do an Impact Assessment of the proposed development on the biodiversity.

In the light of the above. the following had to be done:

1.1. Initial preparations:

Obtain all relevant maps and information on the natural environment of the concerned area.

These include:

- Results of the **National Environmental Screening Tool** with relevance to biodiversity, plant species and animal species, and where relevant of aquatic systems.
- Regional **Vegetation Types**
- Information (maps) with regard to **Critical Biodiversity Areas and Ecological Support Areas, Conservation Areas, Protected Areas and hydrology (wetlands)**, and any other environmentally / ecologically sensitive areas in relation to the study site.
- Information on **Red Data** listed plant species and other plant species of conservation concern that may occur in the area.
- Delimit the various **plant communities** as relatively homogeneous vegetation-cum-habitat (ecosystem) mapping units that can be recognised on aerial photographs / Google Earth images of the site.

1.2. Vegetation and habitat survey:

- List the plant species (trees, shrubs, grasses and herbaceous species) present in each relatively homogeneous vegetation-cum-habitat (ecosystem) mapping unit, for floristic confirmation and description of plant communities (ecosystems) and for vegetation status assessment.

- Identify suitable habitat for any Red Data listed plant species that may possibly occur on the site.
- Identify from this list any red data plant species, protected plant species, alien plant species, and medicinal plants that occur or may potentially occur on the study areas.

1.3. Plant community delimitation and description

- Process data (vegetation-cum-habitat classification) to identify the plant communities that are present on the site, on an ecological basis.
- Prepare a vegetation map of the area.
- Describe the vegetation and habitat of each mapping unit.
- Determine the sensitivity of each mapping unit in terms of biodiversity and presence of threatened or protected plant species, alien and weedy species.
- Determine the ecological status of each plant community in terms of primary, secondary, disturbed, degraded, transformed vegetation.
- Prepare a Site Sensitivity Verification Statement as required by Government Notice 648 (2019) and Government Notice 655 (2020) (Screening Tool).

1.4. Fauna survey

- List fauna species present on the site or that may occur on the site.
- List **Red Data** fauna species that occur or may possibly occur on the site.

This report resulted from a site visit by the EcoAgent team on 15-17 November 2022 to assess the vegetation, flora and fauna, and ecological sensitivity.

2. RATIONALE AND SCOPE

2.1 Rationale

It is widely recognised that to conserve natural resources it is of the utmost importance to maintain ecological processes and life support systems for plants, animals and humans. To ensure that sustainable development takes place, it is therefore important that possible impacts on the environment are considered before relevant authorities approve any development. This led to legislation protecting the natural environment. In 1992, the Convention of Biological Diversity, a landmark convention, was signed by more than 90 % of all members of the United Nations. In South Africa, the Environmental Conservation Act (Act 73 of 1989), the National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998) and the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004) ensure the protection of ecological processes, natural systems and natural beauty, as well as the preservation of biotic diversity within the natural environment. They also ensure the protection of the environment against disturbance, deterioration, defacement or destruction as a result of man-made structures, installations, processes, products or activities. In support of these Acts, a draft list of Threatened Ecosystems was published (Government Gazette 2009), as part of the National Environmental Management Biodiversity Act, 2004 (Act 10 of 2004), and these Threatened Ecosystems are described by SANBI & DEAT (2009) and a list of Threatened or Protected Species (TOPS) regulations is also available (NEMBA Notice 388 of 2013). International and national Red Data lists have also been produced for various plant and animal taxa.

All components of the ecosystems (physical environment, vegetation, animals) at a site are interrelated and interdependent. **A holistic approach is therefore imperative** to effectively include the development, utilisation and, where necessary, conservation of the given natural resources into an integrated development plan, which will address all the needs of the modern human population (Bredenkamp & Brown 2001).

It is therefore necessary to make a thorough inventory of the plant communities, flora and fauna on the site, to evaluate the plant diversity and possible presence of plant and fauna species of conservation concern, red listed plant and fauna species and protected plant and fauna species, alien species, invader species and weedy species. From the results of this evaluation the **sensitivity** of the vegetation and the conservation value can be determined.

2.2 Legal Framework

Authoritative legislation that lists impacts and activities on biodiversity and wetlands and riparian areas that requires authorisation includes *inter alia*:

- Conservation of Agriculture Resources Act, 1983 (Act 43 of 1983);
- Government Gazette 34809 Threatened Terrestrial Ecosystems of South Africa 9 December 2011 NEMBA)
- Government Notice Regulation 1182 and 1183 of 5 September 1997, as amended (ECA);
- Government Notice Regulation 385, 386 and 387 of 21 April 2006 (NEMA);
- Government Notice Regulation 392, 393, 394 and 396 of 4 May 2007 (NEMA);
- Government Notice Regulation 398 of 24 March 2004 (NEMA);
- Government Notice Regulation 544, 545 and 546 of 18 June 2010 (NEMA)
- Government Notice Regulation 982, 983, 984 and 985 of 4 December 2014 (NEMA).
- National Environmental Management Act (Act 107 of 1998) Amendment of the Environmental Impact Assessment Regulations 2014, 7 April 2017. (Government Notice Regulations. 324, 325, 326 & 327: Listing Notices 1, 2, 3).
- National Environmental Management Act, 1998 (Act No. 107 of 1998)(including all later amendments and additions);
- National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)(including all later amendments and additions);
- National Environmental Management: Protected Areas Act 2003 (Act 57 Of 2003) (as Amendment Act 31 of 2004 and Amendment Act 15 of 2009)
- National Forests Act, 1998 (Act 84 of 1998);
- National Water Act, 1998 (Act 36 of 1998);
- The older Environment Conservation Act, 1989 (Act 73 of 1989);
- Government Notice 655 Government Gazette 42946, 10 January 2020 (Plants and Animals)(NEMA).
- Government Notice 648 Government Gazette 45421, 10 May 2019 (Biodiversity)(NEMA).
- Government Notice 689 Government Gazette 47526, 18 November 2022. The Revised National List of Ecosystems that are Threatened and in need of Protection.

2.3 The Scope and objectives

The Scope of this study is therefore:

- To identify describe and map the vegetation and plant communities (ecosystems) that occur on the site;
- To assess the ecological sensitivity of these ecosystems and comment on ecologically sensitive areas, in terms of their plant diversity and where needed ecosystem function;
- To provide a list of plant species that do occur in each plant community that occurs on site and that may be affected by the development;
- To assess the qualitative and quantitative significance of the fauna habitat components and current general conservation status of the property;
- To identify fauna and flora species of conservation concern that may occur on the site;
- Compile a list of fauna that occur on the site or may from time to time occur on the site;
- Confirm or dispute the environmental sensitivity as identified by the National web-based environmental screening tool;
- If relevant, provide management recommendations that might mitigate negative and enhance positive impacts, should the proposed development be approved.

2.4 Limitations

A limitation was that at the time of the survey (November 2022), the vegetation was still fairly dry after the winter season and only limited summer rains have fallen in the area.

3. STUDY SITE

3.1 Location and the receiving environment

The proposed project is located on Farm 692 (the original farm is Springbokvlakte 142) located on the R75 Road, approximately 7 km (as the crow flies) southeast of Kirkwood, and about 30 km north of Uitenhage (Kariega) within the in the Sundays River Valley Local Municipality, Sarah Baartman (Cacado) District Municipality (Figure 3.1), Eastern Cape Province. The site is located approximately 20 km southwest of the southern boundary of the Addo Elephant National Park. (Figure 3.2 and 3.4).

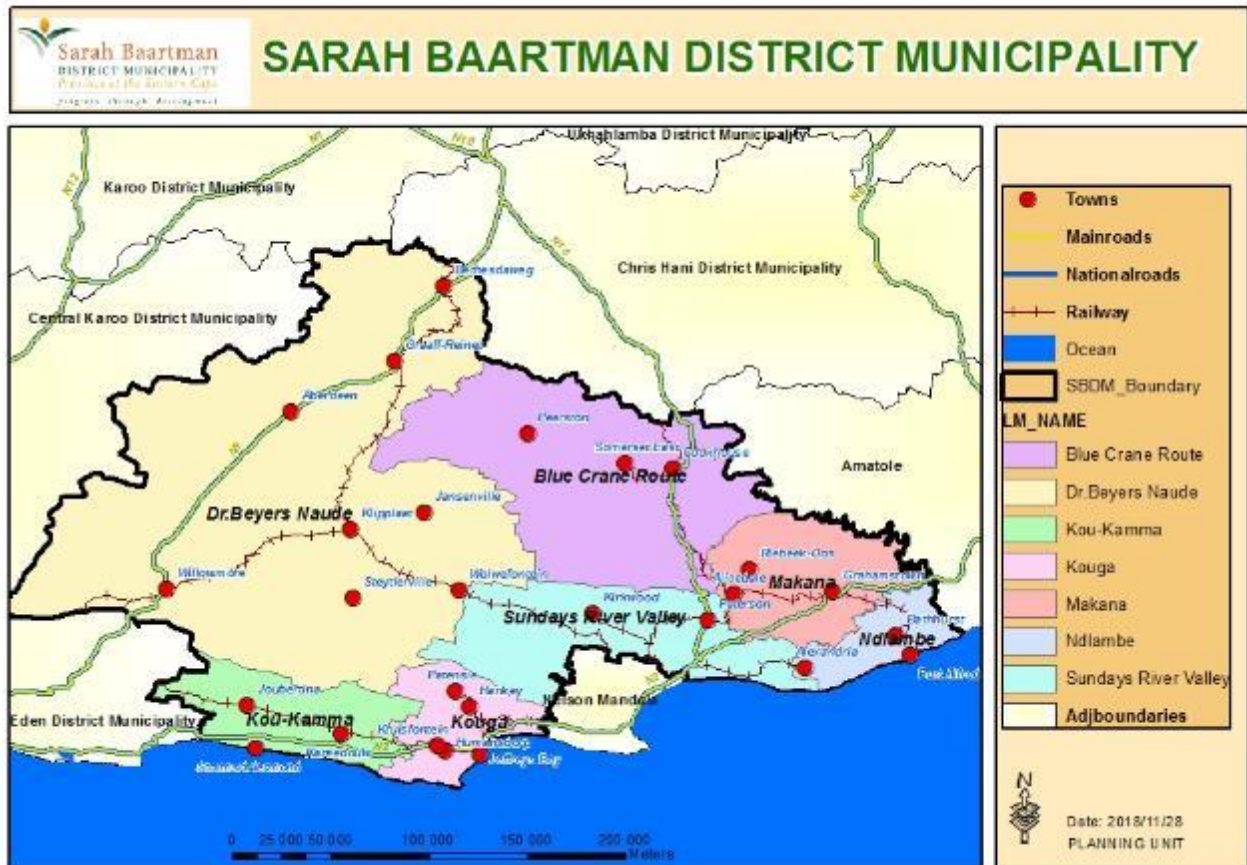


Figure 3.1: The location of the Sundays River Valley Local Municipality within the Sarah Baartman District Municipality.



Figure 3.2: A Google Earth image the of the proposed Mayogi PV Facility site in relation to roads, Kirkwood town and broader topography. This development is restricted to the northern part of the site.



Figure 3.3: The northern section of the property, proposed for the development (Figure supplied by SiVest).

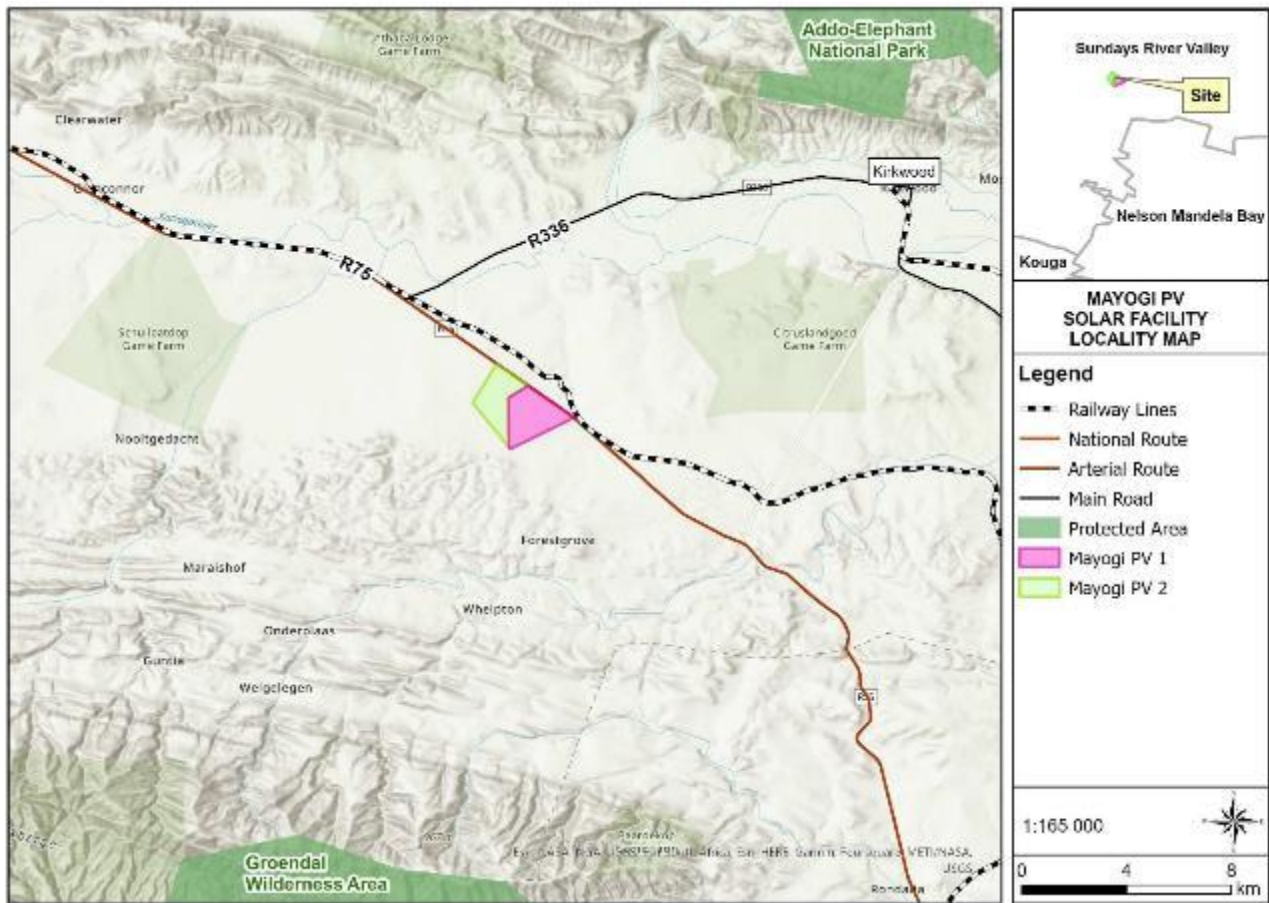


Figure 3.5: The locality of the proposed Mayogi PV 1 and PV 2 sites.

3.2 Geology, topography, drainage and soil

The two adjacent PV sites are located in the broad valley between the Groot Winterhoekberge in the south and the Klein Winterhoekberge in the north (Figure 3.2). The northern part of the site area is a flat to slightly undulating plain in the valley, about 180 masl, while the southern area is located on the lower northern foothills of the Groot Winterhoekberge, about 220 masl. Soils are usually red, loamy to clayey soils that are derived from the Sondagsrivier and Kirkwood formations.

The site area slopes gradually to the north, with minor drainage lines flowing northwards (Figure 3.6 below). A very small tributary of the Kariega River originates on the neighbouring Farm, Schilpadlaagte, located south-east of the study site. This tributary flows north-westwards and passes 150 m from the north-eastern corner of the study site. A minor drainage line from the study site flows past the Skilpad Substation, leave the study site, crosses the tarred R75 road and joins the tributary that flows to the Kariega River. No alluvium is present along this minor drainage line. In this vicinity the vegetation is heavily disturbed by the road, the Skilpad Substation and farming practiced. The small patch of Albany Alluvial vegetation that is mapped here, is totally degraded and not recognisable (Figure 5.1 below).

The main land types are Fc and Ib. (Mucina and Rutherford 2017).

3.3 Regional Climate

Non-seasonal rainfall dominates the region, with MAP between 159 mm and 550 mm. Frost is present between 3 and 44 days per year. The mean monthly maximum is 30.56 °C in January and the mean monthly minimum is 3.74 °C in July. Altitude ranges from 108 - 1467 masl. (Mucina and Rutherford 2017) .

3.4 Land-use

The area is used for agriculture and small towns or villages. This was similar over many years (decades).

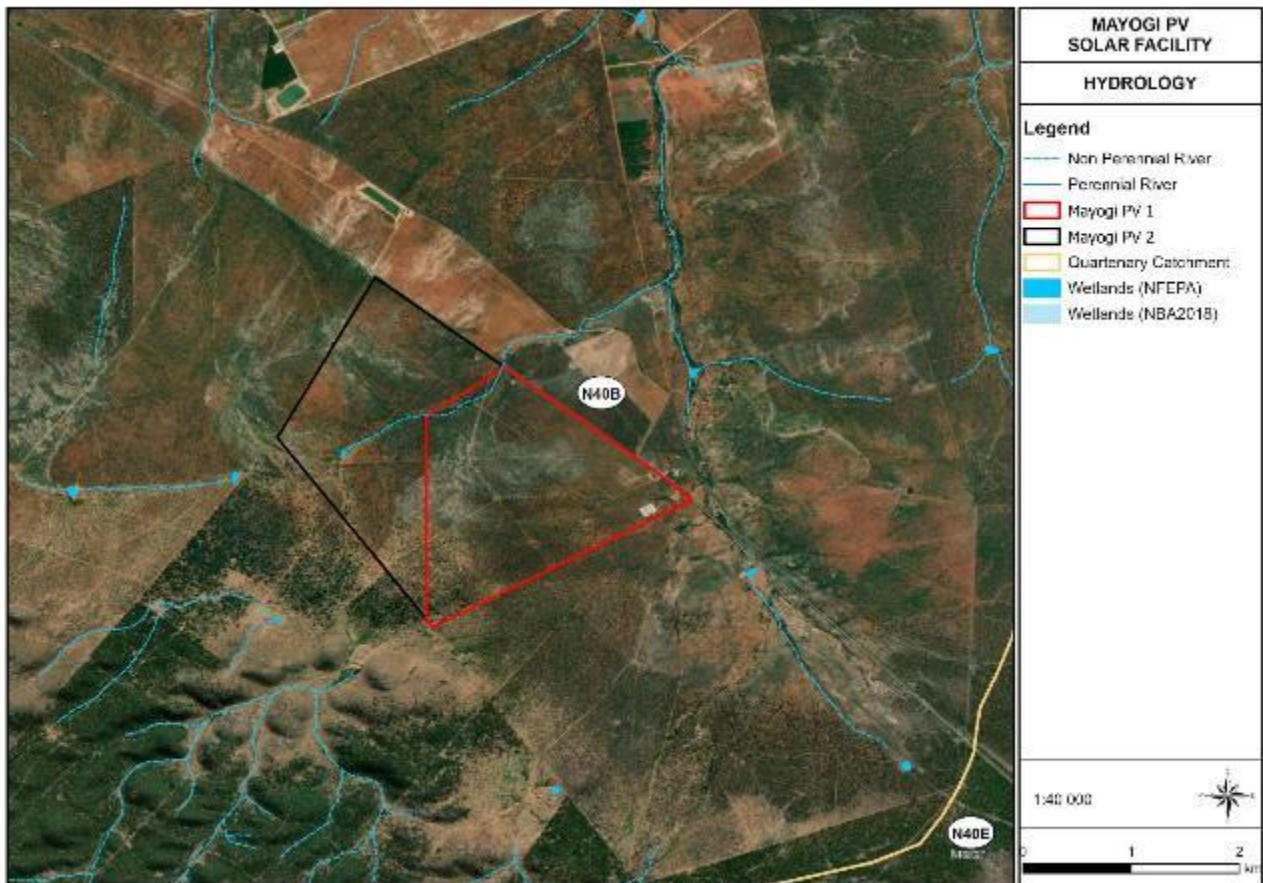


Figure 3.6: Hydrology in the area of the Mayogi PV site.

4. METHODS

4.1 VEGETATION AND FLORA

4.1.1 Literature studies and databases:

For background information, the relevant maps, aerial photographs, and other information on the natural environment of the concerned area were obtained through literature studies and data bases. These *inter alia* include:

- Results of the National Environmental **Screening Tool** with relevance to biodiversity, plant species and animal species, and where relevant of aquatic systems. (Government Notice 655 Government Gazette 42946, 10 January 2020 [Plants and Animals](NEMA) and Government Notice 648 Government Gazette 45421, 10 May 2019 (Biodiversity)(NEMA)].
- The relevant **vegetation types** in which the site is located using Mucina & Rutherford (2006, 2012).
- **Threatened ecosystems** are identified using Mucina & Rutherford (2006, 2012) SANBI & DEAT (2009) and NEMA Government Gazette 34809 (2011).
- Information (maps) about **Critical Biodiversity Areas and Ecological Support Areas**, and any other environmentally / ecologically sensitive areas in relation to the study site from the MTPA Conservation Plan.
- **Species of Conservation Concern**, including:
 - Information on **Red and Orange Data** listed plant species data from. SANBI and MTPA data bases.
 - Critically Endangered, Endangered, Vulnerable and Protected Species (**NEMBA species, TOPS species**) are evaluated against the list published in Department of Environmental Affairs and Tourism Notice No. 2007 (National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)).
 - **Nationally Protected Trees** as published in Government Notice No. 29062 3 (2006) (National Forests Act, 1998 (Act No. 84 Of 1998), as Amended (Department of Water Affairs Notice No 897, 2006).and that may occur in the area.
 - Other plant species of conservation concern, particularly **provincially protected species**.

4.1.2. Field studies: Vegetation and Flora surveys.

4.1.2.1 Vegetation and flora survey.

Prof GJ Bredenkamp, of EcoAgent, assisted by Dr CL Bredenkamp (plant taxonomist and editor and author of the three volume “Flora of the Eastern Cape Province” undertook the field survey on 15-17 November 2022, to assess the fauna, vegetation and flora and ecological sensitivity. This data is needed to eventually evaluate the possible impacts of the proposed development on the vegetation and plant and animal species, and to suggest possible mitigation options where needed.

A Google Earth image was used to stratify and map different units representing differences in cover and vegetation. At several sampling plots and transects within each mapping unit a description of the dominant and characteristic plant species found, was made. These descriptions were based on **total floristic** composition, following established vegetation survey techniques (Mueller-Dombois & Ellenberg 1974; Westhoff & Van der Maarel 1978; Brown *et al.* 2013). Data recorded resulted in a list of the plant species present, including trees, shrubs, grasses and forbs. A comprehensive species list was therefore derived for the site, but it is realised that some species could have been missed. These vegetation survey methods have been used as the basis of a national vegetation survey of South Africa (Mucina *et al.* 2000, Brown *et al.* 2013) and are considered an efficient method of describing vegetation and capturing species information. Within each mapping unit noted were made of relevant habitat features, with emphasis on topography and some soil properties Additional notes were made of any other features that might have had an ecological influence, e.g. previous utilization and disturbance.

From the floristic data an analysis of the presence of Alien and Invasive species on the site was made. Furthermore, the **ecological sensitivity** of each plant community was calculated by using plant species composition, plant species of conservation concern, habitat features and relevant legislation, including Critical Biodiversity Areas and the National Screening Tool. From this information an ecological sensitivity map was prepared.

Lastly an Impact Assessment was done by applying standard SiVEST assessment methods. (See Chapter 7 below)

4.1.2.2 Plant Species Status

Plant species recorded in each plant community with an indication of the status of the species by using the following symbols:

A Followed by Invasive category (1a, 1b, 2, 3) = Alien woody species

D = Dominant

d = subdominant

EG = Exotic Garden ornamental or Garden Escape

G = Indigenous Garden ornamental or Garden Escape

M= Medicinal plant species

N = Exotic, naturalized

P = Protected trees species

NP = nationally protected species (NEMBA)

p = provincially protected species

RD = Species of Conservation Concern, Red data listed plant

W = weed.

4.1.2.3 Species Richness

Species Richness is interpreted as follows: Number of indigenous species recorded in the sample plots representing the plant community. Alien woody species and weeds are not included (Table 4.1).

Table 4.1: Categories of plant species richness.

No of species	Category
1-24	Low
25-39	Medium
40-59	High
60+	Very High

4.1.2 4 Indigenous vegetation and Vegetation Status

Indigenous vegetation: According to NEMA (Act 107 of 1998, - Amendment of the Environmental Impact Assessment Regulations 2014, 7 April 2017 (GNR. 324, 325, 326 & 327: Listing Notices 1, 2, 3):Definitions) Indigenous vegetation refers to vegetation consisting of **indigenous plant species occurring naturally in an area**, regardless of the level of alien infestation **and where the topsoil has not been lawfully disturbed during the preceding ten years.**

The following criteria indicate vegetation status:

Primary vegetation is the **original indigenous vegetation** that occurred in the area, in this case the Eastern Highveld Grassland (Gm 12) vegetation type (Mucina & Rutherford 2012). The vegetation is *relatively undisturbed, or slightly disturbed*, though the vegetation **still consists of the original dominant, sub-dominant and associated plant species.**

Disturbed primary vegetation is where the **original indigenous vegetation** that occurred in the area is **disturbed but can still be identified by the original dominant, sub-dominant and most associated plant species.** Some of the species that were present may have disappeared, however, some other species (species of lower successional status or weedy species) increased in abundance or invaded into the original vegetation. Disturbed primary vegetation may recover when well-managed.

Degraded vegetation is where the **original indigenous vegetation** is so **severely disturbed by impacts (mostly man-induced) that the original dominant, sub-dominant and most associated plant species and vegetation structure are changed.** Some of the originally occurring species are **still sparsely present**, but they are mostly replaced by other species of lower successional status, alien invasive species or weedy species. Degraded vegetation **may not recover** without active application of rehabilitation measures. **Severely Degraded vegetation can be regarded as Transformed.**

Transformed vegetation is where the **original indigenous vegetation was destroyed with no or very little of the original plant species remaining**, e.g. cleared for development (construction, tilled for agriculture (e.g. maize), silviculture (e.g. pines, wattles, eucalypts), total cover by alien invasive plant species (e.g. black wattle), planted pasture (e.g. *Eragrostis*), sports fields (e.g. kikuyu grass). Transformed vegetation areas include areas where the topsoil has been disturbed during the **preceding ten years.** Recovery to the **original indigenous vegetation is almost impossible** though by active application of rehabilitation measures a vegetation cover (not representing or similar to the original indigenous vegetation!) can be established.

Secondary (indigenous) vegetation is where the original indigenous vegetation was destroyed but the transformed area was left unused and fallow for several years. Vegetation, different from the

original indigenous vegetation, can become (naturally) established and develop through successional processes to a specific plant community with a specific indigenous plant species composition and with good cover, hence secondary vegetation may fall within the definition of indigenous vegetation as provided for in NEMA, but it mostly represents **Transformed vegetation**, as the original vegetation has been destroyed. A good example is where species rich *Themeda triandra*-dominated indigenous grassland was transformed for agriculture, (e.g. maize production) and then left fallow. Through successional phases secondary *Hyparrhenia hirta* – dominated grassland can become established. By applying specific rehabilitation and management procedures, the development of secondary vegetation can be enhanced.

4.2 FAUNA

The field survey was conducted on 15-17 November 2022. The days were sunny, pleasant with a slight breeze of wind. During this visit, the observed and derived presence of mammals, birds, reptiles and amphibians associated with the recognised habitat types of the study site was recorded. This was done with due regard to the well-recorded global distributions of Southern African vertebrates, coupled with the qualitative nature of recognised habitats.

The 500 meters of adjoining areas were scanned for possible additional fauna habitats.

4.2.1 Field Surveys

During the site visit, mammals, birds, reptiles and frogs were identified by visual sightings through random transect walks. No trapping or mist netting was conducted as the terms of reference did not require such intensive work. In addition, mammals were also identified by means of spoor, droppings, burrows or roosting sites, and frogs by their calls.

4.2.2 Desktop Surveys

As many mammals and herpetofauna are either secretive, nocturnal, hibernators and/or seasonal, and some are seasonal migrators, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of such species based on authoritative tomes, scientific literature, field guides, atlases and data bases. This can be done with a high level of confidence irrespective of season.

The probability of the occurrence of mammal, reptile and amphibian species was based on their respective geographical distributional ranges and the suitability of on-site habitats:

High probability would be applicable to a species with a distributional range overlying the study site as well as the presence of prime habitat occurring on the study site. Another consideration for inclusion in this category is the inclination of a species to be common to the area, i.e. normally occurring at high population densities.

Medium probability pertains to a mammal and herpetofaunal species with its distributional range peripherally overlapping the study site, or its required habitat on the site being sub-optimal. The size of the site as it relates to its likelihood to sustain a viable breeding population, as well as its geographical isolation are taken into consideration. Species categorised as *medium* normally do not occur at high population numbers - but cannot be deemed as rare.

Low probability of occurrence would imply that the species' distributional range is peripheral to the study site and habitat is sub-optimal. Furthermore, some mammals, reptiles and amphibians categorised as low are generally deemed to be rare.

Mammals

Based on the impressions gathered during the site visit, as well as publications such as *The Mammals of the Southern African Subregion* (Skinner & Chimimba, 2005), *Smithers' Mammals of Southern Africa; A Field Guide* (Apps, 2012) and *Stuarts' Field Guide to Mammals of Southern Africa* (Stuart & Stuart, 2015), a list of species which may occur on the site was compiled. The latest taxonomic nomenclature was used. The vegetation type was defined according to the standard handbook by Mucina and Rutherford (eds) (2006).

Birds

A list of bird species expected to occur on site was initially derived from the quarter-degree grid records presented in an atlas of southern African birds (Tarboton, Kemp & Kemp, 1987; Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown, 1997 and www.sabap2.org.za). A further list of birds was obtained from SANPARKS for the Addo Elephant National Park. Based on an assessment of the **habitats** present at the site, *Birds of the Transvaal*. (Tarboton, Kemp & Kemp, 1987), *The Atlas of Southern African Birds. Vol. 1 & 2.* (Harrison, Allan, Underhill, Herremans, Tree, Parker & Brown (eds.). 1997), *Roberts – Birds of Southern Africa, VIIth ed.* (Hockey, Dean, & Ryan, (eds) 2005), *The Chamberlain Guide to Birding Gauteng* (Marais & Peacock 2008), *Sasol Birds of Southern Africa. 4th ed.* (Sinclair, Hockey, Tarboton & Ryan, 2011), *The Eskom Red Data book of birds of South Africa, Lesotho and Swaziland* (Taylor, Peacock & Wannless, 2015) & www.sabap2.org.za, the list was then reduced to those species that were judged as 'possible' or 'likely' to occur within those habitats as residents or regular visitors. Due to the considerable aerial mobility of birds, a number of additional species might be expected as infrequent nomads or vagrants, but these were not included on the list. It was judged that the habitats available would offer no significant material support or conservation assistance to these species, and that if they did occur, it would be temporarily and in insignificant numbers. 'Possible' refers to species that might use their mobility to make intermittent use of the habitats available when they are in a particular condition (during or after rain, flood, drought, burn, grazing, seeding, flowering) or season (regional, intra-African or inter-continental migrants). 'Likely' refers to species that are expected to make regular use of the site for feeding, roosting and/or breeding. Species actually recorded on site during the field survey are expected to fall into the latter category unless annotated otherwise.

No objective assessment was made of the carrying capacity of the habitat for any species, since this varies through time and birds are capable of arriving or departing as conditions change. Special attention was paid to species considered as threatened internationally or nationally (Taylor *et al.* 2015), and to those considered as species of conservation priority within Gauteng (GDARD 2014a & b). The category assigned to these species was raised to include infrequent visitors as 'likely', based on the precautionary principle. Further details of the extent and limits of various habitat types detected during the field survey and on adjacent properties were also obtained by study of satellite images from Google Earth.

A site visit took place on 15-17 November 2022, with approximately 12 hours spent on or the vicinity of the site. The weather during the visit was warm, partly cloudy and with little wind. During the site visit, birds occurring at the site were identified by walking transects. During walking transects all birds encountered (seen or heard) were identified, nests observed were identified, and the avian habitats present were assessed.

Herpetofauna

Herpetofauna is poikilothermic. The majority of herpetofauna are secretive, often nocturnal, hibernators and/or seasonal. Due to these facts, distributional ranges and the presence of suitable habitats were used to deduce the presence or absence of these species based on authoritative tomes, scientific literature, field guides, atlases and databases. Desktop surveys can be done irrespective of season.

The probability of the occurrence of reptile and amphibian species was based on their respective geographical distributional ranges and the suitability of on-site habitats.

High probability would be applicable to a species with a distributional range overlying the study site as well as the presence of prime habitat occurring on the study site. Another consideration for inclusion in this category is the inclination of a species to be common to the area, i.e. normally occurring at high population densities.

Medium probability pertains to a herpetofauna species with its distributional range peripherally overlapping the study site or required habitat on the site being sub-optimal. The size of the site as it relates to its likelihood to sustain a viable breeding population, as well as its geographical isolation is taken into consideration. Species categorised as *medium* normally do not occur at high population numbers, but cannot be deemed as rare.

Low probability of occurrence would imply that the species' distributional range is peripheral to the study site and habitat is sub-optimal. Furthermore, some reptiles and amphibians categorised as low are generally deemed to be rare.

For herpetofauna, a list of species which may occur on the site was compiled, based on the impressions gathered during the site visits. Publications such as FitzSimons' Snakes of Southern Africa (Broadley, 1990), Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998), A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007), Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates, Branch, Bauer, Burger, Marais, Alexander & De Villiers, 2014), A Complete Guide to the Snakes of Southern Africa (Marais, 2022), Amphibians of Central and Southern Africa (Channing 2001), Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (Minter, Burger, Harrison, Braack, Bishop & Kloepfer, 2004, 2004) and A Complete Guide to the Frogs of Southern Africa (Du Preez & Carruthers, 2017) Field Guide to the Frogs & other Amphibians of Africa Channing & Rödel 2019) were consulted to compile the list. The latest taxonomic nomenclature was used.

4.2.3 Specific Requirements

Mammals:

During the visit, the site was surveyed and assessed for the potential occurrence of the following threatened or rare mammal species as provided by the results of the Screening Tool for the site:

Species name	Common name
<i>Acinonyx jubatus</i>	Cheetah
<i>Philantomba monticola</i>	Blue duiker

Birds

To identify Red Data species likely to occur on the site and to express an opinion regarding their probable occurrence, based on specific habitat requirements and guided by the existing lists compiled for such species within the relevant quarter-degree grid and pentad cells by regional and national bird atlases (Tarboton *et al.* 1987; Harrison *et al.* 1997; www.sabap2.org.za) the most recent assessment of the threatened status of South Africa's avifauna, The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor, Peacock & Wanless, 2015), was used.

During the visit, the site was particularly surveyed and assessed for the potential occurrence of the following threatened or rare bird species as provided by the results of the Animal Sensitivity Screening Tool for the site. The Screening Tool for Bird Sensitivity does not indicate any sensitive bird species.

Species name	Common name
<i>Polemaetus bellicosus</i>	Martial Eagle
<i>Sagittarius serpentarius</i>	Secretary Bird
<i>Afrotis afra</i>	Southern Black Korhaan

Herpetofauna: During the visit, the site was checked and assessed for the potential habitat and occurrence of Red Data herpetofauna species in the Eastern Cape Province (Alexander and Marais, 2007; Minter, *et al.*, 2004, Bates, *et al.*, 2014, Du Preez & Carruthers, 2017 and Hofmeyr, M.D. & Boycott, R.C. 2018).

Reptile species include, for example,

Karoo Dwarf Tortoise (*Homopus boulengeri*), Salt Marsh Gecko (*Cryptactites peringueyi*), Albany Sandveld Lizard (*Nucras taeniolata*), Cottrell's Mountain Lizard (*Tropidosaura cottrelli*), Coppery Grass Lizard (*Chamaeasaura aenea*), Fitzsimons' Long Tailed Seps (*Tetradactylus fitzsimonsi*), Variable Legless Skink (*Acontias poecilus*), Pondo Dwarf Chameleon (*Bradypodion caffer*), Kentani Dwarf Chameleon (*Bradypodion kentanicum*), Kwazulu Dwarf Chameleon (*Bradypodion melanocephalum*), Elandsberg Dwarf Chameleon (*Bradypodion taeniabronchum*), Forest Thread Snake (*Leptotyphlops sylvicolus*), Albany Adder (*Bitis albanica*), Plain Mountain Adder (*Bitis inornata*), Kwazulu-Natal Black Snake (*Macrelaps microlepidotus*) and Eastern Green Mamba (*Dendroaspis angusticeps*).

Ampibia include Misbelt Chirping Frog (*Anhydrophryne ngongoniensis*), Hogsback Chirping Frog (*Anhydrophryne rattrayi*), Hewitt's Ghost Frog (*Heleophryne hewitti*), Amatola Toad (*Vandijkophrynus amatolicus*) Kloof Frog (*Natalbatrachus bonebergi*), Bilbo's Rain Frog (*Breviceps bagginsi*) and Knysna Leaf-folding Frog (*Afrixalus knysnae*).

5. RESULTS VEGETATION AND FLORA

5.1 RESULTS OF THE LITERATURE STUDY AND DATABASE SURVEY

5.1.1 Vegetation Type

"Thicket" vegetation was only recently recognized as a separate biome in South Africa (Pierce 2003). In the classical vegetation map of Acocks (1953, 1988), only three vegetation mapping units that relate to thicket (then classified as Karroid Bushveld) were recognized, namely Valley Bushveld, Noorsveld and Spekboomveld. Detailed studies under the Subtropical Thicket Ecosystem Planning (STEP) project (Vlok & Euston-brown 2002; Cowling *et al.*, 2003 and Pierce 2003), widened the concept of "Thicket" and recognized and described a wealth of vegetation types / plant communities that occur in "Thicket".

The latest understanding of subtropical thicket concept differs significantly from earlier descriptions. The most recent studies indicate that subtropical thicket covers some 47465 km², the three Acocks veld types, namely Valley Bushveld, Spekboomveld and Noorsveld, cover only 17257 km² (Pierce 2003).

Within the study site, three STEP vegetation types occur namely:

Sundays Noorsveld – (on the northern plain) The high cover of *Euphorbia coerulescens* – (soetnoors) (now known as *Euphorbia radyeri*), and sparse presence of *Boscia oleoides* trees (Witgat)) and an abundance of *Rhigozum obovatum* (wildegranaat) is typical of this vegetation unit. *Portulacaria afra* (Spekboom) is only found sparsely in the better-preserved veld, and never dominant in this vegetation. Grasses such as *Cenchrus ciliata*, *Fingerhuthia africana* and *Panicum maximum* used to be abundant, but are now sparse.

Sundays Spekboomveld – (on the southern hilly area) *Pappea capensis* (Doppruim) and *Portulacaria afra* are the dominant species while *Crassula ovata* is a common succulent plant, which distinguish this vegetation type. The relatively high cover of spekboom, doppruim and boerboon (*Schotia afra*) distinguish this spekboomveld from the adjacent noorsveld.

Southern Karoo Alluvia – (on the alluvium area) Characteristically a sparse woodland of *Acacia karroo* (sweet thorn) and *Lycium* sp (wolwedoring) The (dwarf) shrub layer is dominated by *Pentzia incana* (ankerkaroo) and *Salsola* sp (ganna). Grasses include *Stipagrostis* sp. and *Aristida* sp.

From this STEP work accrued the vegetation map of Mucina & Rutherford (2006). In this older map the Sundays Valley Thicket was known as Sundays Thicket (Vegetation Type AT6), while the Sundays Arid Thicket was known as Sundays Noorsveld (Vegetation Type AT5).

According to the Mucina & Rutherford (2018) revised map of Thicket vegetation, three vegetation types are present in the vicinity of the site, namely Sundays Valley Thicket (Vegetation Type AT51) on the hilly part south of the site, Sundays Arid Thicket (Vegetation Type AT49) on the northern

plains part and a small patch of Albany Alluvial Vegetation (Vegetation type Aza6) in the north-eastern corner of the site (Mucina & Rutherford 2018) (Figure 5.1 below).

The Mayogi PV 1 and PV 2 sites that are earmarked for this development is largely situated within the Sundays Arid Thicket (= Sundays Noorsveld) (Figure 5.1).

A very small patch in the **north-eastern corner** of the site mapped as Albany Alluvial Vegetation, which is more representative of a karroid vegetation and almost no elements typical of the original Albany Alluvial Vegetation are left (see paragraph 3.2 above). The vegetation is more typical of the Southern Karoo Alluvia (STEP)(Pierce 2003). The Skilpad substation is also situated within this alluvium vegetation.

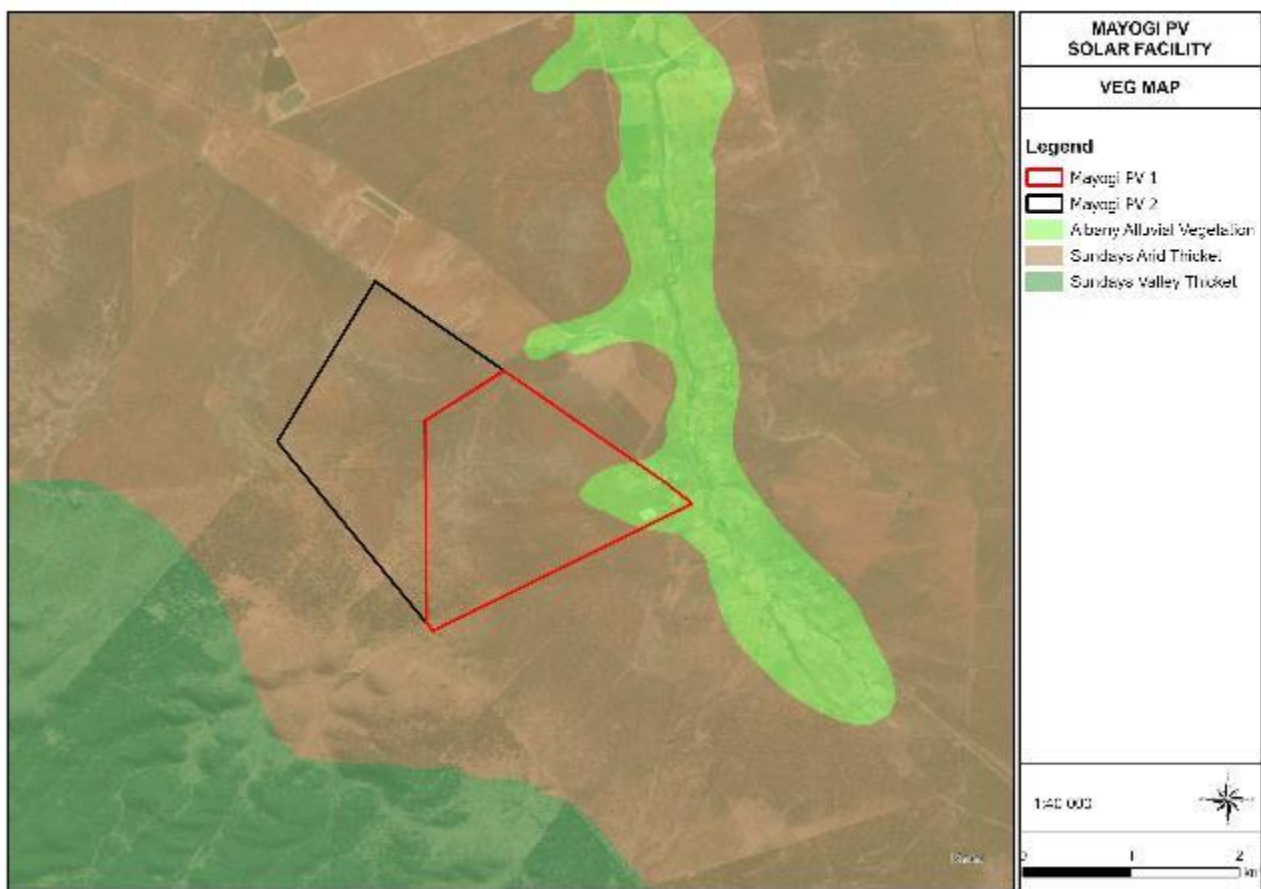


Figure 5.1: The vegetation types within the site (Mucina & Rutherford 2018).

5.1.2 Threatened Ecosystems

According to Mucina & Rutherford (2006, 2018) the Albany Alluvial Vegetation is classified as **Endangered**. Only 6% is statutorily conserved in the Addo Elephant National Park and other provincial conservation areas, and 2% in private conservation areas. About half has been transformed for agriculture, towns, roads and plantations (Mucina & Rutherford 2006). According to SANBI & DEAT (2009) and NEMBA, Government Notice 1002 (2011) and Government Notice 689 (2022) the Ecosystem status for this vegetation type is also classified as **Endangered**.

On the study site this vegetation is not typical Albany Alluvial Vegetation, but rather resembles Southern Karroo Alluvia (Pierce 2003). Alternatively it can be regarded as **transformed** by agriculture or heavy grazing, with little original indigenous vegetation remaining.

According to Mucina & Rutherford (2006, 2018) the Sundays Noorsveld and the Sundays Thicket vegetation types are classified as **Least Concern**. However, the Sundays Arid Thicket (= Sundays Noorsveld) is listed as **Vulnerable** in the 2022 NEMBA list of Threatened Ecosystems (Government Notice 689 Government Gazette 47526, 18 November 2022).

5.1.3 Critical Biodiversity Areas and Ecological Support Areas

No Irreplaceable CBAs occur in the site area. Most of the site is in Ecological Support Area 1 (Figure 5.2 below).

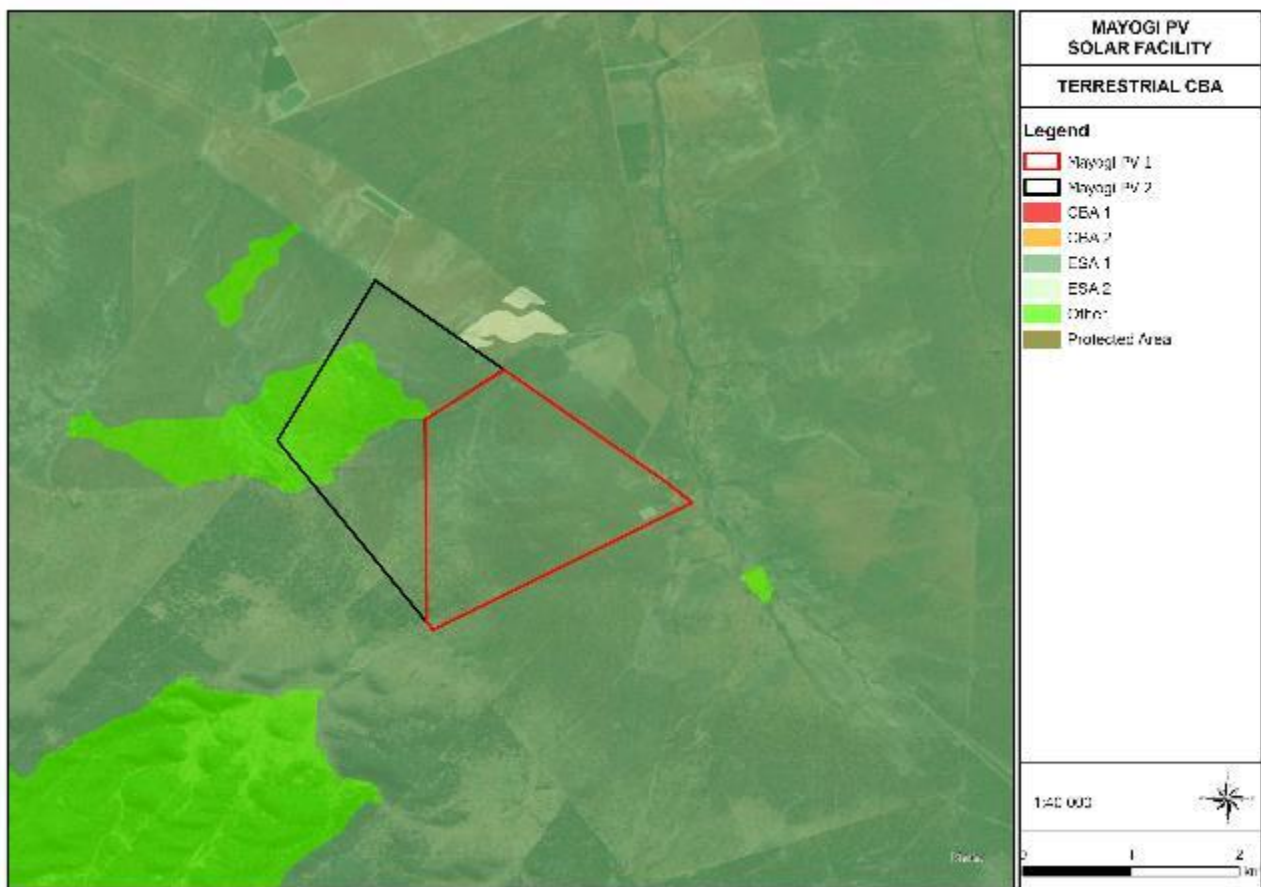


Figure 5.2: No “Irreplaceable” CBA,s occurs in the site area. Most of the site is classified as “Ecological Support Area 1” or “Other Natural Areas”.

5.1.4 Protected and Conservation Areas

The site is located approximately 20 km southwest of the southern boundary of the Addo Elephant National Park and about 20 km north of the Groendal Wilderness Area (Figure 3.1 and 3.2). There are also other private conservation areas and/or game farms in the general area.

5.1.5 Species of Conservation Concern (CCS), Red Listed plant species

Red Data listed plant species and Orange listed plant species (= plant species of conservation concern) are those plants that are important for South Africa's conservation decision making processes. These plants are nationally protected by the National Environmental Management: Biodiversity Act (Raimondo *et al*, 2009).

Threatened species (Red Data listed species) are those that are facing high risk of extinction, indicated by the categories Critically Endangered (CE), Endangered (EN) and Vulnerable (VU). Species of Conservation Concern include the Threatened Species.

Additionally, the Orange listed categories are Near Threatened (NT), Data Deficient (DD), (DDT = lack of taxonomic data), Critically Rare (CR), Rare (R) and Declining (D). This is in accordance with the Red List for South African Plants (Raimondo *et al*. 2009 upgraded on SANBI website).

Lists of Red Data plant species (Raimondo *et al* 2009) for the area in general were obtained from DEA Screening Tool, (2022), but the names may not be made public (Table 5.1 below).

Table 5.1 Sensitive plant species for the area, Screening Tool results

Sensitivity	Feature(s)
Medium	Sensitive species 1252
Medium	Sensitive species 1268
Medium	Sensitive species 779
Medium	<i>Duvalia pillansii</i>
Medium	<i>Strelitzia juncea</i>
Medium	<i>Corpuscularia lehmannii</i>
Medium	Sensitive species 1101
Medium	<i>Asparagus spinescens</i>
Medium	Sensitive species 1248
Medium	<i>Cotyledon tomentosa</i> subsp. <i>tomentosa</i>
Medium	Sensitive species 19

5.1.6 NEMBA / TOPS plant species

These species are evaluated against the list published in Department of Environmental Affairs and Tourism Notice No. 2007, Government Gazette 574 of 2013 and Notice 256 of 2015 and National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act 10 of 2004).

No NEMBA/TOPS plant species occur on the site.

5.1.7 Nationally Protected Trees

The National Forest Act, 1998 (Act No. 84 of 1998) enforces the protection of several indigenous trees. The removal, thinning or relocation of protected trees will require a permit from the Department of Agriculture, Forestry and Fisheries (DAFF) (Notice of the List of Protected Tree Species under the National Forests Act, 1998, Notice 835, Government Gazette 39741, No 19, 29 August 2014).

No protected trees occur on the site.

5.1.8 Provincially Protected Plants

No additional officially protected plant species were found on the site.

5.2 RESULTS OF THE VEGETATION AND FLORA SURVEY

Five plant communities were identified and mapped, (Table 5.2 below):

Table 5.2: List of mapping units with ecological sensitivity:

	Vegetation mapping unit	Sensitivity result
1	Arid Karoo Vegetation	Low
2	Dry Thicket with <i>Euphorbia</i>	Medium
3	Arid Thicket on limestone	Medium-Low
4	Disturbed Open Thicket	Medium-Low
5	Mesic Thicket with Spekboom	Medium-High
6	Valley with Drainage Line	High

A vegetation map showing the distribution of the mapping units is presented in Figure 5.3 (below) while the ecological sensitivity is given in Figure 5.4 (below).

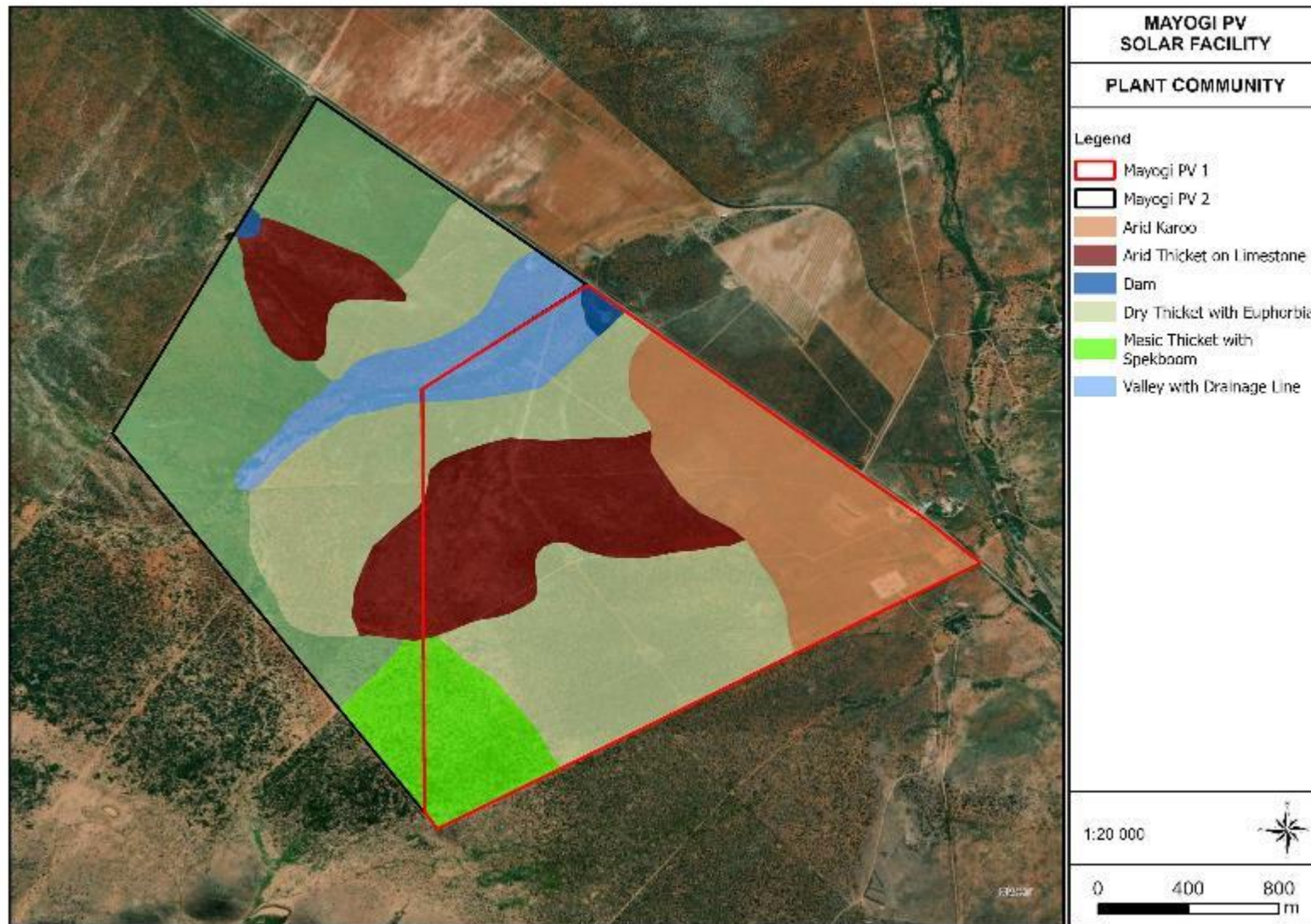


Figure 5.3: A vegetation map of the of the proposed Mayogi PV 1 and PV 2 Facility sites.

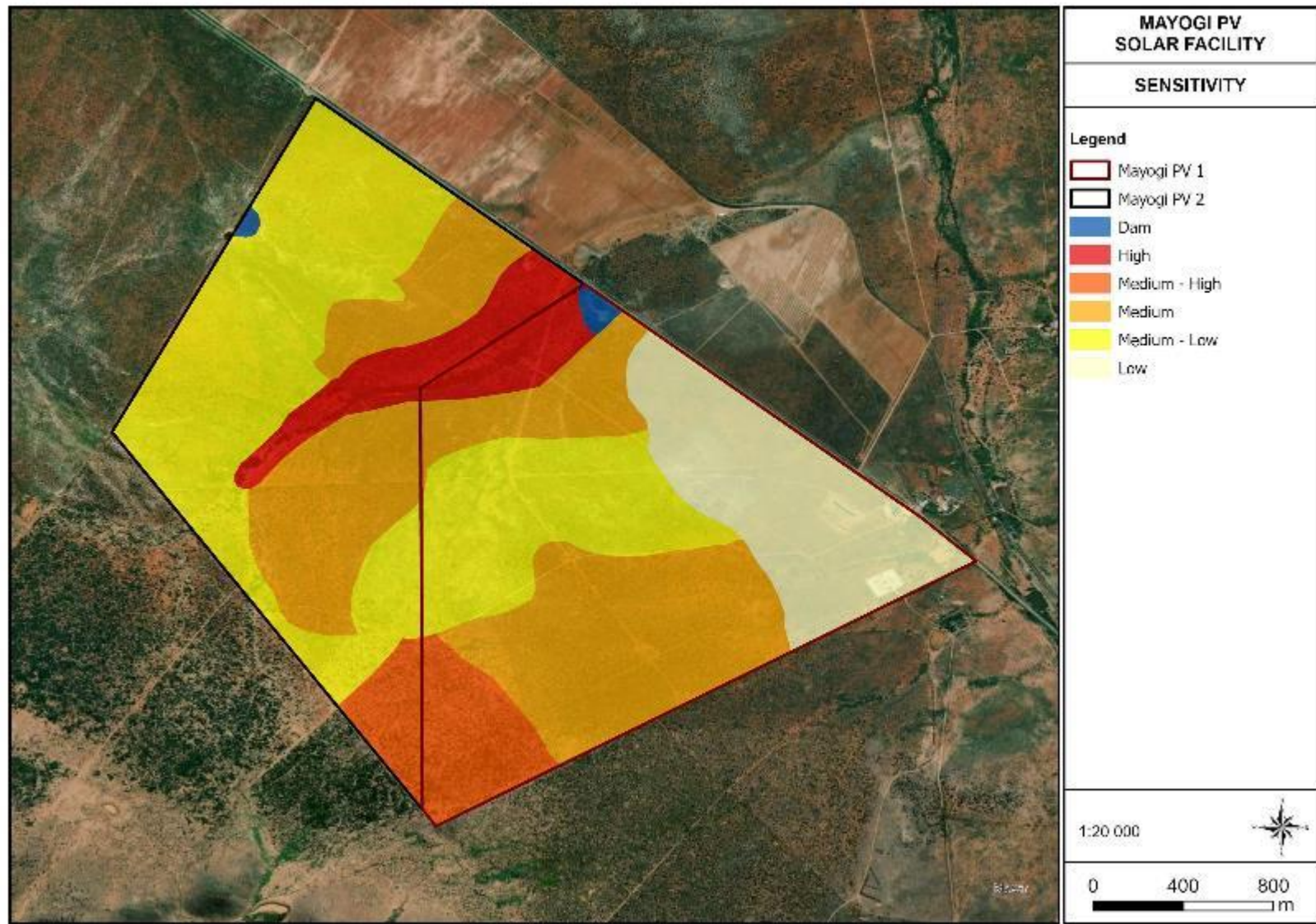


Figure 5.4: Ecological sensitivity of the of the proposed Mayogi PV 1 and PV 2 Facility sites.

5.2.1. Arid Karoo Vegetation

This very arid and disturbed Karoo-veld is limited to the lower-lying plains in the northern part of the Mayogi PV 1 site (Figure 5.3 above) and adjacent plains along the R75 Road. This plant community does not occur on the Mayogi PV 2 site. The existing Skilpad substation, Mayogi shop and auction venue are located within this plant community. This plant community is classified as the “Albany Alluvium Vegetation” vegetation type (Mucina & Rutherford 2006, 2018), which is regarded as **Endangered**. According to SANBI & DEAT (2009) and NEMBA Government Notice 1002, 2011 and Government Notice 689, 2022) the Ecosystem status for this vegetation type is also classified as **Endangered**.

Within the study site this vegetation is **highly degraded** and is more representative of a karroid vegetation type with almost no elements typical of the original Albany Alluvial Vegetation left. The vegetation is more typical of the Southern Karoo Alluvia (STEP, Pierce 2003).

This vegetation on the study site is very dry and highly disturbed and degraded (Figure 5.5, below) and some of the dwarf shrubs are dead or dormant and could not be identified. The most abundant karroid dwarf shrub is *Pentzia incana* with *Lycium cinereum*, *Asparagus striatus* and *Salsola* sp also present. Two mesembs species (vygies) *Mesembryanthemum crystallinum* and *Mesembryanthemum aitonis* occurred prominently in this karoo veld, indicating the disturbed and trampled condition. Grass species that occur include *Aristida adscensionis*, *Aristida congesta*, *Chloris virgata*, *Eragrostis obtusa*, *Enneapogon desvauxii* and *Stipagrostis* sp. Much dry, dead remains of the previous season’s grass were present during the time of the survey. Currently the ecological biodiversity and sensitivity, based on vegetation and flora, is **Low**, and the resulting nature conservation value is also **Low**.



Figure 5.5: The Arid Karoo Vegetation. Note the Skilpad substation on the left photograph

Trees and Shrubs and dwarf shrubs

Asparagus striatus

Atriplex sp W

Cereus jamacaru A, 1b

Chrysocoma ciliata

Lycium cinereum

Pentzia incana

Grasses and sedges

Aristida adscensionis

Aristida congesta

Chloris virgata

Cynodon dactylon

Enneapogon desvauxii

Eragrostis obtusa

Stipagrostis sp

Small succulents and Forbs

Euphorbia ferox

Mesembryanthemum aitonis W

Mesembryanthemum crystallinum

Pachypodium succulentum

p

Table 5.3: Number of species recorded in disturbed grassland between the Agricultural lands

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	4	2	6	0	0	0
Grasses	7	0	7	0	0	0
Forbs	4	0	4	0	1	0
Total	15	2	17		1	0

The species richness is Low, with no species of conservation concern present, but several weed species present. It has low conservation value and low ecological sensitivity (Figure 5.3 above). This does not exclude occasional possible occurrence of species of conservation concern, this is however not likely, and the development will not be a threat for such a species.

Table 5.4: Summary of some characteristics of the Arid Karoo Vegetation within the proposed powerline

Arid karoo Vegetation: summary			
Status	Degraded, original vegetation disturbed and trampled		
Soil	deep yellow loam soil	Rockiness % cover	2
Conservation priority:	Low	Sensitivity:	Low
Species Richness	Low	Need for rehabilitation	Low
Dominant spp.	<i>Pentzia incana, Mesembryanthemum aitonis</i>		

Discussion

Although classified as Endangered, there is no sign of the original Albany Alluvial Vegetation, which has probably been transformed into a dry disturbed karroid vegetation. From a vegetation and flora point of view, there is no objection against the proposed development in this Arid Karoo Vegetation, which is already in a degraded condition.

5.2.2. Dry Thicket with *Euphorbia*

This plant community is typical Sundays Arid Thicket (vegetation type AT49, Mucina & Rutherford 2018), previously classified as Sundays Noorsveld (vegetation type AT5, Mucina & Rutherford 2006),

or as Sundays Noorsveld, STEP, Pierce 2003). According to Mucina & Rutherford (2006, 2018) the Sundays Noorsveld and the Sundays Thicket vegetation types are classified as **Least Concern**.

The Sundays Arid Thicket (= Sundays Noorsveld) is listed as **Vulnerable** in the 2022 NEMBA list of Threatened Ecosystems (Government Notice 689 Government Gazette 47526, 18 November 2022).

This plant community occurs on both PV 1 and PV 2 sites and occupies a large portion of the south-eastern plains and a small patch in the north (Figure 5.3 above).

The high cover of *Euphorbia radyeri* (soetnoors) (Figure 5.6 below) and presence of *Boscia oleoides*, *Pappea capensis* and *Rhigosum obovatum* is typical of this vegetation unit. *Portulacaria afra* (spekboom) is absent or sparsely present in good condition veld. The grass layer is scanty, much dry, dead remains of the previous season's grass were present during the time of the survey. Grasses such as *Cenchrus ciliata*, *Fingerhuthia africana* and *Panicum maximum* used to be abundant, but are now rather sparse.

The most abundant karroid dwarf shrub is *Pentzia incana* with *Lycium cinereum*, while the two mesembs species (vygies) *Mesembryanthemum crystallinum* and *Mesembryanthemum aitonis* occurred prominently, indicating the disturbed and trampled condition. Grass species that occur include *Aristida adscensionis*, *Aristida congesta*, *Eragrostis obtusa*, *Tragus berteronianus* and *Eragrostis lehmanniana*. Much dry, dead remains of the previous season's grass were present during the time of the survey. Currently the ecological biodiversity and sensitivity, based on vegetation and flora, is **Medium**, and the resulting nature conservation value is also **Medium**.



Figure 5.6: The Dry Thicket with *Euphorbia* vegetation.

Trees and Shrubs and dwarf shrubs

<i>Asparagus striatus</i>		<i>Lycium cinereum</i>	
<i>Asparagus suaveolens</i>		<i>Opuntia aurantiaca</i>	A1b
<i>Azima tetracantha</i>	M	<i>Opuntia humifusa</i>	A1b
<i>Boscia oleoides</i>	d	<i>Pappea capensis</i>	
<i>Cadaba aphylla</i>		<i>Pentzia incana</i>	
<i>Carissa haematocarpa</i>		<i>Putterlickia pyracantha</i>	
<i>Euclea undulata</i>	M	<i>Rhigosum obovatum</i>	d
<i>Euphorbia mauritanica</i>		<i>Schotia afra</i>	
<i>Euphorbia radyeri</i>	D	<i>Searsia longispina</i>	
<i>Gymnosporia polyacantha</i>		<i>Trichocereus stachianus</i>	A1b

Grasses and sedges

Aristida adscensionis
Aristida congesta
Chloris virgata
Cynodon dactylon

Enneapogon desvauxii
Eragrostis lehmanniana
Eragrostis obtusa
Tragus berteronianus

Forbs

Felicia muricata
Hermannia sp
Indigofera sessilifolia
Justicia spartioides

Lantana rugosa
Mesembryanthemum aitonis W
Mesembryanthemum crystallinum
Sansevieria aethiopica

Table 5.5: Number of species recorded in Dry Thicket with *Euphorbia*

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	17	3	20	0	0	2
Grasses	8	0	8	0	0	0
Forbs	8	0	8		0	0
Total	33	3	36		0	2

The species richness is Medium, with no species of conservation concern present, but several Alien species are present. This does not exclude occasional possible occurrence of species of conservation concern, this is however not likely, and the development will not be a threat for such a species.

Table 5.6: Dry Thicket with <i>Euphorbia</i> : summary			
Status	Disturbed Noorsveld		
Soil	yellow loam soil	Rockiness % cover	2
Conservation priority:	Medium	Sensitivity:	Medium
Species Richness	Medium	Need for rehabilitation	Low
Dominant spp.	<i>Euphorbia radyeri</i> , <i>Boscia oleoides</i> , <i>Rhigosum obovatum</i> , <i>Pentzia incana</i> , <i>Mesembryanthemum aitonis</i>		

Discussion

According to Mucina & Rutherford (2006, 2018) the Sundays Noorsveld and the Sundays Thicket vegetation types are classified as **Least Concern**. However, the Sundays Arid Thicket (= Sundays Noorsveld) is listed as **Vulnerable** in the 2022 NEMBA list of Threatened Ecosystems (Government Notice 689 Government Gazette 47526, 18 November 2022).

From a vegetation and flora sensitivity point of view, the conservation value and ecological sensitivity are Medium (Figure 5.4 above). On the site this vegetation has been utilized, trampled and disturbed,

limiting its conservation value. Development within this plant community can be supported though a part of this vegetation should be conserved.

5.2.3. Arid Thicket on limestone

This plant community mainly occurs on both the PV 1 and PV 2 sites (Figure 5.3 above). Limestone stones occur scattered to dense on the soil surface. The vegetation is extremely dry, with many dry, or dead trees and shrubs. The herbaceous layer is also very scanty, with much bare soil and with the weedy *Mesembryanthemum aitonis* being the dominant plant species over much of the area. This is regarded as a very dry variant of Noorsveld and is classified as Sundays Arid Thicket (vegetation type AT49, Mucina & Rutherford 2018). The plant species richness is very low in this plant community.

Few scattered individuals of *Euphorbia radyeri* (soetnoors) (Figure 5.7 below) and presence of *Euclea undulata* is typical of this vegetation unit.



Figure 5.7: The Arid Thicket on limestone with many dead trees and shrubs and poor herbaceous cover.

Trees and Shrubs and dwarf shrubs

<i>Asparagus striatus</i>		<i>Gymnosporia polyacantha</i>	
<i>Asparagus suaveolens</i>		<i>Lycium cinereum</i>	
<i>Azima tetracantha</i>	M	<i>Opuntia humifusa</i>	A1b
<i>Boscia oleoides</i>		<i>Pappea capensis</i>	
<i>Cadaba aphylla</i>		<i>Pentzia incana</i>	
<i>Euclea undulata</i>	dM	<i>Putterlickia pyracantha</i>	
<i>Euphorbia radyeri</i>		<i>Schotia afra</i>	

Grasses and sedges

<i>Aristida adscensionis</i>		<i>Cynodon dactylon</i>	
<i>Aristida congesta</i>		<i>Enneapogon desvauxii</i>	
<i>Chloris virgata</i>		<i>Tragus berteronianus</i>	

Forbs

<i>Felicia muricata</i>		<i>Lantana rugosa</i>	
<i>Hermannia</i> sp		<i>Mesembryanthemum aitonis</i>	

Table 5.7: Number of species recorded in Arid Thicket on limestone.

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	13	1	14	0	0	2
Grasses	6	0	6	0	0	0
Forbs	5	0	5		0	0
Total	24	1	25		0	2

The species richness is Low, with no species of conservation concern present, It is degraded with medium-low conservation value and medium-low ecological sensitivity (Figure 5.4 above).

Table 5.8: Arid Thicket on limestone: summary			
Status	Highly degraded		
Soil	yellow loam soil with limestone	Rockiness % cover	2
Conservation priority:	Medium-low	Sensitivity:	Medium-Low
Species Richness	Low	Need for rehabilitation	Low
Dominant spp.	<i>Euphorbia radyeri</i> , <i>Euclea undulata</i> <i>Mesembryanthemum aitonis</i>		

Discussion

From a vegetation and flora sensitivity point of view, development on this area can be supported.

5.2.4. Disturbed Open Thicket

This plant community occurs in the western and southern parts of the PV2 site and does not occur on the PV 1 site.(Figure 5.3 above). The woody vegetation is open, and it seems that many trees and shrubs have been removed, probably to improve the herbaceous layer for grazing. The herbaceous layer is, however, also scanty, with much bare soil and with the weedy *Mesembryanthemum aitonis* being the dominant plant species (Figure 5.8 below). This vegetation is disturbed Sundays Arid Thicket (vegetation type AT49, Mucina & Rutherford 2018).

No individuals of *Euphorbia radyeri* (soetnoors) occur here)and presence of scattered individuals of *Euclea undulata* and *Boscia oleoides* is typical of this vegetation unit.



Figure 5.8: The Disturbed Open Thicket with scattered trees and shrubs and poor herbaceous cover. With *Mesembryanthemum aitonis* and *M. crystallinum* dominant.

The following plant species were recorded:

Trees and Shrubs and dwarf shrubs

<i>Agave americana</i>	A1b	<i>Eucalyptus grandis</i>	A1b
<i>Aloe africana</i>		<i>Euclea undulata</i>	dM
<i>Asparagus suaveolens</i>		<i>Pappea capensis</i>	
<i>Boscia oleoides</i>		<i>Schotia afra</i>	
<i>Cadaba aphylla</i>			

Grasses and sedges

<i>Aristida adscensionis</i>	<i>Cynodon dactylon</i>
<i>Aristida congesta</i>	<i>Tragus berteronianus</i>

Forbs

<i>Felicia muricata</i>	<i>Mesembryanthemum crystallinum</i>
<i>Mesembryanthemum aitonis</i>	

Table 5.9: Number of species recorded in Disturbed Open Thicket

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	7	2	9	0	0	1
Grasses	4	0	4	0	0	0
Forbs	3	0	3		0	0
Total	14	2	16		0	1

The species richness is Low, with no species of conservation concern present, It is degraded with Medium-low conservation value and Medium-low ecological sensitivity (Figure 5.4 above).

Table 5.10: Disturbed Open Thicket: summary			
Status	Disturbed, cleared		
Soil	yellow loam soil	Rockiness % cover	2
Conservation priority:	Medium-low	Sensitivity:	Medium-Low
Species Richness	Low	Need for rehabilitation	Low
Dominant spp.	<i>Euclea undulata</i> <i>Mesembryanthemum aitonis</i>		

Discussion

From a vegetation and flora sensitivity point of view, development on this area can be supported.

5.2.5. Mesic Thicket with Spekboom

This plant community is a variation of Sundays Arid Thicket (vegetation type AT49, Mucina & Rutherford 2018), where *Portulacaria afra* (spekboom) is present, often dominant. This plant community occupies the south-eastern corner of the study site, on both the PV 1 and PV 2 sites (Figure 5.3 above). It occurs on the lower-lying plain but transitional to the hills on the southern part of the farm. (Figure 5.1 above) The vegetation is dense thicket 2-3 m tall, with only few scattered taller trees (Figure 5.9 below).

The relatively high cover of *Portulacaria afra* and the absence of *Euphorbia radyeri* (soetnoors) is typical of this plant community (Figure 5.9 below). Taller trees are only sparsely present. The grass layer is scanty, due to the high cover of the shrubs, particularly *Portulacaria afra*. Different *Crassula* species often occur here, e.g. *Crassula ovata*, *Crassula cultrata*, *Cotyledon orbiculata*. Shrubby species such as *Carissa bispinosa*, *Azima tetraacantha*, *Gymnosporia polyacantha* from dense bush. More species occur in this dense thicket, all were not noted during the survey, due to accessibility.



Figure 5.9: The dense Mesic Thicket with spekboom vegetation.

Trees and Shrubs and dwarf shrubs

<i>Asparagus suaveolens</i>		<i>Pappea capensis</i>	
<i>Azima tetraacantha</i>	M	<i>Portulacaria afra</i>	D
<i>Carissa bispinosa</i>		<i>Putterlickia pyracantha</i>	
<i>Euclea undulata</i>	M	<i>Schotia afra</i>	
<i>Gymnosporia polyacantha</i>		<i>Searsia longispina</i>	
<i>Opuntia ficus-indica</i>	A1b		

Grasses and sedges

<i>Chloris virgata</i>		<i>Eragrostis lehmanniana</i>	
<i>Cynodon dactylon</i>		<i>Eragrostis obtusa</i>	
<i>Enneapogon desvauxii</i>			

Forbs

<i>Cotyledon orbiculata</i>		<i>Indigofera sessilifolia</i>	
<i>Crassula cultrata,</i>		<i>Lantana rugosa</i>	
<i>Crassula ovata</i>		<i>Sansevieria aethiopica</i>	
<i>Hermannia sp</i>			

Table 5.11: Number of species recorded in Mesic Thicket with spekboom

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	10	1	11	0	0	2
Grasses	5	0	5	0	0	0
Forbs	7	0	7		0	0
Total	22	1	23		0	2

The species richness is Medium, with no species of conservation concern present, but several Alien species present. It has low conservation value and low ecological sensitivity (Figure 5.4 above). This does not exclude occasional possible occurrence of species of conservation concern, this is however not likely, and the development will not be a threat for such a species.

Table 5.12: Mesic Thicket with spekboom : summary			
Status	Dense thicket		
Soil	yellow loam soil	Rockiness % cover	2
Conservation priority:	Medium-High	Sensitivity:	Medium-High
Species Richness	Medium	Need for rehabilitation	Low
Dominant spp.	<i>Portulacaria afra</i>		

Discussion

From a vegetation and flora sensitivity point of view, development within **medium-high** sensitivity is normally **not suggested**. This area is therefore regarded as **No-Go** area.

5.2.6. Valley with Drainage Line

The valley with the drainage line is clearly indicated in Figures 3.4 and 3.5 (above). The valley is flat and shallow (Figures 5.10 and 5.11 below) This vegetation occurs on both the PV 1 and PV 2 sites (Figure 5.3 above). The vegetation is basically similar to that of the adjacent plant community, being Dry Thicket with *Euphorbia*. (Figure 5.3 above). There is no obvious, distinct riparian zone, though locally the vegetation seems to be somewhat denser. During the field study there was no water in the drainage line.

The presence of, *Boscia oleoides*, *Pappia capensis*, *Euclea undulata*, *Schotia afra*, *Euphorbia radyeri* and several spiny species such as *Carissa bispinosa*, *Azima tetraacantha*, *Searsia longispina* and *Gymnosporia polyacantha*, and the absence of *Portulacaria afra* are typical features. At the lower reaches the presence of *Vachellia karroo* is conspicuous. The grass layer is scanty, much dry, dead remains of the previous season's grass were present during the time of the survey.

The most abundant karroid dwarf shrub is *Pentzia incana*, while the two mesembs species (vygies) *Mesembryanthemum crystallinum* and *Mesembryanthemum aitonis* occurred prominently. Grass species that occur include *Aristida adscensionis*, *Aristida congesta*, *Eragrostis obtusa*, and *Eragrostis lehmanniana*.



Figure 5.10: The vegetation of the upper and middle reaches of the Valley with Drainage Line.



Figure 5.11: The vegetation of the lower reaches of the Valley with Drainage Line. Note the culvert under the tarred road.

The following plant species were noted:

Trees and Shrubs and dwarf shrubs

<i>Aloe africana</i>		<i>Opuntia ficus-indica</i>	A1b
<i>Asparagus suaveolens</i>		<i>Pappea capensis</i>	
<i>Azima tetraacantha</i>	M	<i>Pentzia incana</i>	
<i>Boscia oleoides</i>	d	<i>Putterlickia pyracantha</i>	
<i>Carissa bispinosa</i>		<i>Rhigosum obovatum</i>	d
<i>Cyphostemma</i> sp		<i>Rhoicissus digitata</i>	
<i>Euclea undulata</i>	M	<i>Schotia afra</i>	
<i>Euphorbia radyeri</i>		<i>Searsia longispina</i>	
<i>Gymnosporia polyacantha</i>		<i>Vachellia karroo</i>	
<i>Lycium cinereum</i>			

Grasses and sedges

Aristida adscensionis
Aristida congesta
Chloris virgata
Cynodon dactylon

Eragrostis lehmanniana
Eragrostis obtusa
Setaria

Forbs

Felicia muricata
Gomphocarpus fruticosus W
Hermannia sp
Indigofera sessilifolia
Lantana rugosa

Mesembryanthemum aitonis W
Mesembryanthemum crystallinum
Moraea polystachya
Sansevieria aethiopica

Table 5.13: Number of species recorded in the Valley with Drainage Line

	Indigenous	Aliens / Weeds	Total	Red Data	Protected	Medicinal
Trees and shrubs	18	1	19	0	0	2
Grasses	6	0	6	0	0	0
Forbs	8	1	9		0	0
Total	32	2	34		0	2

The species richness is Medium, with no species of conservation concern present .

Table 5.14: Valley with Drainage line : summary			
Status	Drainage line (wetland)		
Soil	yellow loam soil	Rockiness % cover	0
Conservation priority:	High	Sensitivity:	High
Species Richness	Medium	Need for rehabilitation	Low
Dominant spp.	<i>Euphorbia radyeri</i> , <i>Boscia oleoides</i> , <i>Rhigosum obovatum</i> . <i>Pentzia incana</i> , <i>Mesembryanthemum aitonis</i>		

Discussion

The Drainage Line has High conservation value and High ecological sensitivity (Figure 5.4 above). Occasional occurrence of species of conservation concern is possible but the development will not be a threat for such a species, as **the Drainage Line must be excluded from the development area**. From an ecological sensitivity point of view, development within this plant community **cannot be supported** and is regarded as **No-Go** area.

5.3 ANALYSIS

5.3.1 Alien and Invasive plants species

Declared weeds and invader plant species have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that these plants be controlled and eradicated by means of an eradication and monitoring program. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species (Henderson, 2001).

Previously declared weeds and invasive plants were controlled by regulations of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA). Later Alien and Invasive Species Regulations, as well as a new draft list of categories of invasive species in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) was published in the Government Gazette No. 32090, in April 2009. Several amendments followed. Considering Sections 66(1), 67(1) 70(1)(a), 71(3) and 71A of the National Environmental Management: Biodiversity Act (Act 10 of 2004) the latest Alien and Invasive plant **species list** was published in 2016 (Government Gazette 40166, Notice 864, 29 July 2016) This notice replaces and repeals any Alien and Invasive **species lists** published under the Act, including Notice 599 of 1 August 2014, (Government Gazette 37886) and Notice R507, 508 and 509 of 19 July 2013 (Government Gazette 36683).

Below is a brief explanation of the categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) and described in Regulation Gazette 10244, Vol 590, and No 37885 (1 August 2014):

Category 1a: Invasive species requiring **compulsory** control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. A person in control of a Category 1a Listed Invasive Species must **immediately** take steps to combat or **eradicate** listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of these listed invasive species. No permits will be issued.

Category 1b: Invasive species require **compulsory** control as part of an invasive species **control program** that will result in **removal and destruction** of all such listed species. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management program. No permits will be issued.

Category 2:

Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a **permit** to carry out a restricted activity within an area specified in the Notice or an area specified in the permit (e.g. a plantation, woodlot, orchard etc.), as the case may be.

Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.

A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.

If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.

Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, according to Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

In summary: Category 2 Invasive species are regulated within a specific **area**. A **permit** for this specific area is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. A landowner on whose land a Category 2 Listed Invasive Species occurs, or a person in possession of a permit, **must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.**

Category 2 Listed Invasive Species that occur outside the specified area contemplated, must, for purposes of these regulations, be considered as Category 1b listed invasive species and must be managed accordingly.

No permits will be issued for Category 2 species to exist in riparian zones. These are considered as Category 1b listed invasive plants species and must be managed accordingly.

Category 3: Invasive species regulated by activity. Category 3 Listed Invasive Species are species that are subject to **exemptions** in terms of section 71(3) and **prohibitions** in terms of section 71A of Act. This means that a permit to have these species on the particular property is **not required**, though the landowner is still responsible to control this species and is prohibited of growing, breeding or in any other way propagating these listed invasive species, or allow it to multiply and spread. Selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any way acquiring or disposing of any specimen of these listed invasive species are also prohibited.

Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered as a Category 1b Listed Invasive Species and must be managed accordingly.

In terms of the amendments to the regulations under the Conservation of Agriculture Resources Act, 1983 (Act No. 43 of 1983) and Regulation 598, Government Gazette 37885, August 2014) (Alien and Invasive Species Regulations), landowners are legally responsible for the control of alien species on their properties.

It should further be noted that the National Environmental Management: Biodiversity Act (2004), Chapter 5, Part 2, Section 73(2), states that a person who is the owner of land on which a listed invasive species occurs must notify any relevant competent authority in writing of the listed invasive species that occur on that land.

Furthermore, that according to the National Environmental Management: Biodiversity Act (2004), Alien and Invasive species Regulations (2017), Chapter 7, Section 29 (1), (2) and (3), the seller of any immovable property must, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed invasive species on that property.

Several listed alien and invasive woody plant species occur scattered over the site area, though fortunately none of these species occur abundantly. These should, however, all be removed and controlled.

Species name	Common name	Category
<i>Cereus jamacaru</i>	Queen of the night	1b
<i>Eucalyptus grandis</i>	Gum tree	2, 1b in biome
<i>Nicotiana glauca</i>	Wild tobacco	1b
<i>Opuntia aurantiaca</i>	Jointed cactus	1b
<i>Opuntia ficus-indica</i>	Prickly pear	1b
<i>Opuntia humifusa</i>	Creeping prickly pear	1b
<i>Trichocereus stachianus</i>	Torch cactus	1b (= <i>Echinopsis stachianus</i>)

5.3.2 Medicinal Plants

Only medicinal plants listed by Van Wyk, Van Oudtshoorn & Gericke (2005), and rare medicinal plants as indicated by Williams, Victor & Crouch (2013) were indicated with the letter “M” in the list of species for each plant community.

5.3.3 Ecological Sensitivity

It has been clearly demonstrated that vegetation not only forms the basis of the trophic pyramid in an ecosystem, but also plays a crucial role in providing the physical habitat within which organisms complete their life cycles (Kent & Coker 1992). Therefore, the vegetation of an area will largely determine the ecological sensitivity thereof.

The vegetation sensitivity assessment aims to identify whether the vegetation within the study area is of conservation concern and thus sensitive to development:

In order to determine the sensitivity of the vegetation (ecosystem) on the site, weighting scores are calculated per plant community. The following six criteria are used, and each allocated a value of 0-3.

- Conservation status of a regional vegetation unit;
- Conservation importance (e.g. untransformed and un-fragmented natural vegetation, high plant species richness, important habitat for rare fauna species, Critical Biodiversity Areas).
- Listed ecosystem (e.g. wetlands, hills and ridges etc)
- Legislative protection (e.g. threatened ecosystems, SANBI & DEAT 2009, Government Gazette NEMA 2011)
- Plant species of conservation concern (e.g. red listed, nationally or provincially protected plant species, habitat or potential habitat to plants species of conservation concern, protected plants or protected trees);
- Situated within ecologically functionally important features (e.g. wetlands or riparian areas; important habitat for rare fauna species);

Sensitivity is calculated as the sum the values of the criteria. The vegetation with the lowest score represents the vegetation that has the least / limited sensitivity). A maximum score of 18 can be obtained, a score of 15-18 indicated high sensitivity. The sensitivity scores are as follows (Table 5.15):

Table 5.5: Sensitivity Weighting scores for vegetation.

Scoring	15-18	12-14	9-11	6-8	0-5
Sensitivity	High	Medium-High	Medium	Medium-Low	Low
SiVest Categories	No-Go	High	Medium	Low	Low

Development on vegetation that has High sensitivity will normally not be supported, except that specific circumstances may still lead to support of the proposed development. Portions of vegetation with Medium-High or Medium sensitivity should be conserved. Development may be supported on vegetation considered to have Medium-Low or Low sensitivity.

The result of the sensitivity assessment (Table 5.16 below) indicates that **the Valley with Drainage Line has High ecological sensitivity.** This is because all wetlands, including dry seasonal drainage lines in South Africa enjoy legal protection to conserve and manage all water resources. Drainage lines act as transport lines for water, and also as migration corridors for fauna and flora. This area should therefore be excluded from any development. **the Mesic Thicket with spekboom has Medium High ecological sensitivity.** This implies that at least a part of this plant community should be conserved. However, this type of vegetation is indeed conserved on the large southern part of the farm, which is excluded from the current development. The Dry Thicket with *Euphorbia* has **Medium ecological sensitivity** and the Arid Thicket on limestone as well as the Disturbed Open Thicket have **Medium-Low ecological sensitivity**, while the Arid Karoo Vegetation has **Low ecological sensitivity**.

It is suggested that, based on vegetation ecology, the development of a PV facility on the entire study site, excluding the Valley with Drainage Line, and parts of the Mesic Thicket with spekboom may be supported.

Table 5.16: Scoring of vegetation that occurs within the study area (see Table 5.12).

Vegetation	Conservation Status of regional Vegetation unit	Listed Ecosystem	Legislated Protection	Species of conservation concern	Ecological Function	Conservation Importance	Total Score out of max of 18
5.2.1. Arid Karoo Vegetation	2	1	0	1	1	0	5 Low
5.2.2. Dry Thicket with <i>Euphorbia</i>	2	0	0	2	3	2	9 Medium
5.2.3. Arid Thicket on limestone	2	0	0	1	2	1	6 Medium-Low
5.2.4. Disturbed Open Thicket	2	0	0	1	2	1	6 Medium-Low
5.2.5 Mesic Thicket with Spekboom	2	2	1	2	3	3	13 Medium-High
5.2.6 Valley with Drainage Line	2	2	3	2	3	3	15 High

5.3.4 Conservation Value

The following **conservation value** categories were used for assessing the study site:

High: Ecologically sensitive and valuable land that should be conserved and no developed allowed. Due to high species richness and/or sensitive ecosystem functionality and/or red data species. The Valley with Drainage Line is placed in this conservation category.

Medium-high: Land where sections are disturbed but which is in general ecologically sensitive to development/disturbances. due to unique natural vegetation and unique species composition the Mesic Thicket with spekboom fall in this conservation category.

Medium: Land on which low impact development with limited impact on the vegetation / ecosystem could be considered for development. It is recommended that certain portions of the natural vegetation be maintained as open space. The natural vegetation of the Dry Thicket with *Euphorbia* falls in this conservation category.

Medium-low: Land of which small sections could be considered to conserve but where the area in general has little conservation value. The Arid Thicket on limestone as well as the Disturbed Open Thicket fall in this conservation category.

Low: Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation. The Arid Karoo plant community falls in this conservation category.

5.3.5 Assessment of Screening Tool Results

The results of the DEA Screening Tool are indicated in Figures 5.11-5.13 (below).

5.3.5.1 Plant Species Sensitivity

The Result of the DEA Screening Tool analysis for Plant Species Sensitivity for the proposed Mayogi development site is given in Figure 5.12 (below). The plant species sensitivity is shown as **Low** for most of the study site and **Medium** for the north-eastern part of the farm This is **confirmed** by the current biodiversity study. The Arid Karoo plant community in the north-eastern corner of the site is also indicated as having Medium plant species sensitivity, however this is **disputed** as this area is totally degraded/transformed.

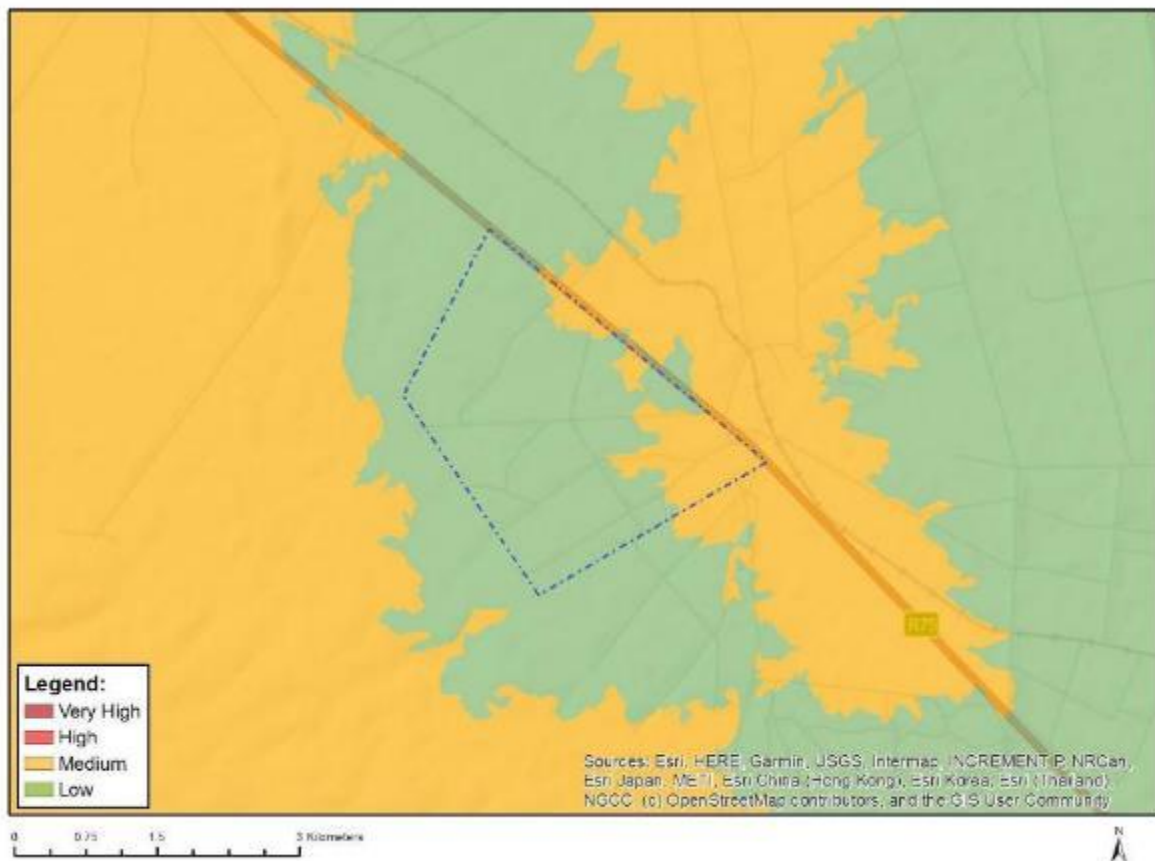


Figure 5.12: The Result of the DEA Screening Tool analysis for Plant Species Sensitivity for the study area.

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 1252
Medium	Sensitive species 1268
Medium	Sensitive species 779
Medium	Duvalia pillansii

Medium	Strelitzia juncea
Medium	Corpuscularia lehmannii
Medium	Sensitive species 1101
Medium	Asparagus spinescens
Medium	Sensitive species 1248
Medium	Cotyledon tomentosa subsp. tomentosa
Medium	Sensitive species 19

5.3.5.2 Animal Species Sensitivity

The Result of the DEA Screening Tool analysis for Animal Species Sensitivity for the for the proposed Mayogi development site is given in Figure 5.13 (below). This Sensitivity is regarded as **High**. Our impression is that the animal species sensitivity is rather **LOW** on the specific site, because the habitats in these parts are mostly degraded or transformed. Note that Mayogi is (was) a game farm and several animal species (game species) occurred from time to time. There was a constant flow of animal species bought or bred and later sold. The Daniell Cheetah breeding project is located across the road. **The many animals that are present on several nature reserves/game farms in the area inflate the estimate by the Screening Tool for Animal Species Sensitivity** on this particular study site. Furthermore, Animal Species Sensitivity includes bird species, of which the Screening Toll provides a separate “Bird Species Sensitivity” result (paragraph 5.3.5.3 below). The two mammal species have only Medium sensitivity.

The **High** Animal Species Sensitivity is therefore **disputed**.



Figure 5:13 The Result of the DEA Screening Tool analysis for Animal Species Sensitivity for the study area.

Sensitivity	Feature(s)
High	Aves-Polemaetus bellicosus
High	Aves-Sagittarius serpentarius
High	Aves-Afrotis afra
Medium	Aves-Afrotis afra
Medium	Sensitive species 5
Medium	Sensitive species 8

5.3.5.3 Bird species Sensitivity



Figure 5:14 The Result of the DEA Screening Tool analysis for Bird Species Sensitivity for the study area

The entire area has **Low** Bird Species Sensitivity (Figure 5.14, above). This is in stark contrast with the animal species sensitivity (see paragraph 5.3.5.2 above) where **four out of six** of the animals mentioned are actually birds!

5.3.5.4 Terrestrial Biodiversity Sensitivity

The Result of the DEA Screening Tool analysis for Terrestrial Biodiversity Sensitivity for the study is given in Figure 5.15 (below). This Sensitivity is regarded as **Very High**.



Figure 5.15: The Result of the DEA Screening Tool analysis for Terrestrial Biodiversity Sensitivity for the study area.

Screening Tool results for Terrestrial Biodiversity is regarded as only Low or Very High No intermediate values are considered by the Screening Toll. In this case the **Very High** Biodiversity Sensitivity is derived from the CBA-layer, which indicates that an Ecological Support Area occurs on the site, it is in a FEPA sub-catchment (see Aquatic Biodiversity) and contains the Albany Floodplain Endangered ecosystem, and Sundays Arid Thicket Vulnerable ecosystem.

However, the specific site proposed for the development (northern part of the farm) is quite disturbed to degraded and according to the current biodiversity study it cannot be regarded as having Very High Biodiversity sensitivity.

The result of the Screening Tool on terrestrial biodiversity sensitivity for the proposed site for development is therefore **disputed**.

5.4 Discussion and Conclusion

The results of the vegetation and flora study indicate that the Valley with Drainage line has High ecological sensitivity, The Mesic Thicket with spekboom has Medium-High ecological sensitivity and conservation value, though the vegetation in the southern part of the farm (excluded from this development) represents this vegetation type and will be conserved here. The rest of the terrestrial habitat areas have low, medium-low or medium ecological sensitivity.

Most of the terrestrial vegetation areas on the site have low to medium plant species richness, no threatened or nationally protected plant species and low to medium conservation value.

Should the Valley with the Drainage Line and part of the Mesic Thicket with spekboom be conserved and protected, it is suggested that the construction of the proposed PV facility can be supported.

6. RESULTS: FAUNA

The fauna assessment for the PV1 and PV2 sites are exactly the same.

6.1 MAMMALS

6.1.1 Mammal Habitat Assessment

Acocks (1988), Mucina and Rutherford (2006), Low and Rebelo (1996), Knobel and Bredenkamp (2006), SANBI & DEAT (2009) discuss vegetation types in broad terms. Rautenbach (1978 & 1982) found that mammal assemblages can at best be correlated with botanically defined biomes, such as those by Low and Rebelo (1996), and latterly by Mucina and Rutherford (2006, 2012) as well Knobel and Bredenkamp (2006). The definitions of biomes are basically similar, and both remain valid for mammals and are therefore recognised as a reasonable determinant of mammal distribution. It must however be mentioned that Thicket is only recently recognised as a Biome.

The local occurrences of mammals are, on the other hand, closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupicolous (rock-dwelling) and wetland-associated vegetation cover. It is thus possible to deduce the presence or absence of mammal species by evaluating the habitat types within the context of biome distribution ranges.

Two of the four major habitat types are well represented on the study site, namely terrestrial (the herbaceous layer, Figure 6.1) and arboreal (trees-living as habitat, Figure 6.2). Large tracks of terrestrial habitats are disturbed by anthropogenic activities, resulting in dominance of two seasonal *Mesembryanthemum* species (e.g. Figure 5.8 above). No significant rupicolous (rock) occur on the relevant northern part of the farm, but rock habitats are present on the southern part, where no development is proposed. Except for small, seasonal, man-made dams there is no wetland habitat within the study site.

At the time of the site visit, the vegetation cover was varied from locally fair to poor but could provide adequate nourishment and cover for small terrestrial mammals.

There are no caves suitable for cave-dwelling bats on the study site, although some of the nearby buildings may act as substitute daytime roosts. It is likely that common bats commute from roosting sites elsewhere to hawk for insects over the wetlands near the study site corridor.

The regional setting of the study site and its recent historical land-use have an important consequence regarding mammals that are or may have been present in the vicinity of the site. The relatively nearby Addo Elephant national Park and several other conservation areas or

game farms may create an overstated impression of the mammal species diversity that occur naturally in the area.



Figure 6.1: Terrestrial habitat for mammals



Figure 6.2: Arboreal habitat for mammals

6.1.2 Observed and Expected Mammal Species Richness

Large and medium-sized mammals (such as elephant, rhinoceros, buffalo, giraffe, black wildebeest, red hartebeest, eland, gemsbok, waterbuck, zebras and more) had been eradicated from the general veld areas and are now only seen in certain nature conservation areas, e.g. Addo Elephant National Park, the Daniell cheetah breeding facility and the several game farms in the area. Should the presence of many species of the larger and medium-sized mammals in these conservation areas be reflected in data bases, the possible mammal diversity on or in the vicinity of the study site will be over-emphasized. On the other hand, the specific study site has until recently been used as a game breeding and auction farm. It is assumed that there was a large turnover of many mammal species on the farm, by buying and selling game. These mammal species do not occur on the farm anymore.

However, several mammal species are expected to occur in thicket localities. These include several species of rodents, mongooses, porcupine and armadillo. A list of mammals that may occur on the site or the vicinity of the site, based on the known habitat preference and distribution of these species, was compiled from the existing mammal literature (Skinner & Chimimba 2006, Friedman 2005, Stuart 2015). In compiling the list, a precautionary principle was mostly applied.

It is estimated that 74 mammal species may have occurred from time to time on or near the study site area (Table 6.1), and nine were confirmed on or close to the site. Eleven of the species listed in Table 6.1 are listed as Red Data species.

Most of the species of the resident diversity (Table 6.1) are common and widespread (viz. scrub hares, multimammate mice, pygmy mice, genets, mongooses and others). Many of the species listed in Table 6.1 are robust, some with strong pioneering capabilities allowing them to invade and occupy new habitats. The reason for their survival success is predominantly seated in their remarkable reproduction potential (viz. multimammate mice species capable of producing ca. 12 pups per litter at intervals of three weeks), and to a lesser extent their reticent and cryptic nature (scrub hares, genets and mongooses).

Eighteen species are mice or rats. Not all species will occur at the same time, but some may occur from time to time on the site. Some species are nocturnal and are seldom seen.

The Southern African hedgehog occurs in a wide variety of habitat types but must have suitable vegetation cover. The study site has suitable habitat therefore this species may be present.

Twelve of the listed species are bats. Due to their ability to fly and to cover large distances, the distribution information on some bat species is insufficient. This has resulted in certain bat species being included as a precautionary measure. The Egyptian and free-tailed bats as well as the vespertilionid bats show remarkable adaptability by expanding their distributional ranges and population numbers significantly by capitalising on the roosting opportunities offered by manmade structures in the vicinity. The study site offers no caves or suitable structures answering to the exacting roosting requirements of cave-dwelling bats (e.g.

Rhinolophidae, Nycteridae), but it is likely that they have roosts elsewhere and during summer sunsets commute to the area of the site to hawk for invertebrates.

The genet species, the mongooses and Black-backed Jackal all have wide habitat tolerances, and, coupled with their catholic diets and reticent habits, render them persistent carnivores, even in or close to human settlements.

The study site falls in the natural **distribution range** and has, or historically may have had suitable habitat for the following eleven mammal red data species: fynbos golden mole, white-tailed rat, blue duiker, African striped weasel, African marsh rat? (some taxonomic issues), South African hedgehog, black-footed cat, brown hyena, grey rhebok, cheetah and leopard. These species may from time to time occur or have had occurred, on the study site or the vicinity of the site. Having noted this, it is clear that there is currently not suitable dense bush on the northern part of the farm (= the study site) for blue duiker, and likewise not adequate wetland for African marsh rat, while it is doubtful that there is habitat in the site for the fynbos golden mole.

From the **Screening Tool** results the following mammal species were noted as having medium sensitivity:

Species name	Common name
<i>Acinonyx jubatus</i>	Cheetah
<i>Philantomba monticola</i>	Blue duiker

Cheetah occurs on the Daniell Cheetah breeding project, located across the road. There is not suitable forest or dense bush on the site for blue duiker.

Table 6.1 (below) provides information on mammal species that may from time-to-time occur in the area.

Table 6.1: Mammal diversity of the study site.

The species observed or deduced to occupy the site. (Systematics and taxonomy as proposed by Skinner & Chimimba [2005], Apps [2012], Stuart & Stuart [2015] & Child *et.al.*[2016]).

Red Data species rankings as defined in Friedmann and Daly's S.A. Red Data Book / IUCN (World Conservation Union) (2004): CR= Critically Endangered, En = Endangered, Vu = Vulnerable, LR/cd = Lower risk conservation dependent, LR/nt = Lower Risk near threatened, DD = Data Deficient. All other species are deemed of Least Concern.

Probability:

High Definitely there or have a *high* probability to occur;

Medium probability to occur based on ecological and distributional parameters;

Low probability to occur based on ecological and distributional parameters.

SCIENTIFIC NAME	ENGLISH NAME	RD Status	Probability	Remarks
Order: AFROSORICIDA				
Family: Chrysochloridae	Golden Moles			
<i>Amblysomus corriae</i>	Fynbos Golden Mole	NT	Low	No possible habitat
Order: MACROSCELIDEA	Sengis			
Family: Macroscelididae				
<i>Macroscelides proboscidea</i>	Round-eared Sengi		Low	Restricted to rocky habitat, maybe on southern part of the farm
<i>Myosorex varius</i>	Forest Shrew		Medium	Dense bus in southern part of farm
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew		Medium	
<i>Crocidura flavescens</i>	Greater Red Musk shrew		Low	Habitat too dry
Order: TUBULIDENTATA				
Family: Orycteropodidae				
<i>Orycteropus afer</i>	Aardvark		high	
Order: LAGOMORPHA				
Family: Leporidae	Hares, Rabbits and Rock Rabbits			

SCIENTIFIC NAME	ENGLISH NAME	RD Status	Probability	Remarks
<i>Lepus saxatilis</i>	Scrub Hare		High	Seen in area
<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Rabbit			
Order: RODENTIA				
Family: Bathyergidae	Mole-Rats			
<i>Cryptomys hottentotus</i>	African Mole-Rat		High	Mound seen on the site
<i>Georchys capensis</i>	Cape Mole Rat		Medium	
Family: Hystricidae	Porcupines			
<i>Hystrix africaeaustralis</i>	Cape Porcupine		High	Signs observed
Family: Muridae	Rats and Mice			
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	Medium	
<i>Dendromus melanotus</i>	Grey Climbing Mouse		Medium	
<i>Saccostomus campestris</i>	Pouched Mouse		High	
<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil		Medium	
<i>Gerbilliscus paeba</i>	Pygmy Hairy-footed Gerbil		Medium	
<i>Rhabdomys pumilio</i>	Four-Striped Grass Mouse		High	
<i>Dasymys incomptus</i>	African March Rat	NT	Low	Not adequate wetland habitat
<i>Mus minutoides</i>	Pygmy Mouse		Medium	
<i>Mus musculus</i>	House Mouse		High	Introduced
<i>Grammomys dolichurus</i>	Woodland Thicket Rat		Medium	
<i>Mastomys natalensis</i>	Natal Multimammate Mouse		Medium	
<i>Mastomys coucha</i>	Southern Multimammate Mouse		High	
<i>Micaelamys namaquensis</i>	Namaqua Rock Mouse		Low	
<i>Rattus rattus</i>	House Rat		High	Introduced
<i>Parotomys brantsii</i>	Brant's Whisting Rat		Medium	
<i>Otomys sundersiae</i>	Sunders'ei Rat vlei Rat		Low	No habitat on site
<i>Otomys irroratus</i>	Vlei rat		Medium	No habitat on site
<i>Myotomys unisulcatus</i>	Bush Karoo Rat		Medium	

SCIENTIFIC NAME	ENGLISH NAME	RD Status	Probability	Remarks
Order: EULIPOTYPHA				
Family: Soricidae	Shrews			
<i>Myosorex varius</i>	Forest Shrew		Low	
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew		Medium	
Family Erinaceidae				
<i>Atelerix frontalis</i>	South African Hedgehog	NT	Medium	Utilise various habitats, probably present
Order: CHIROPTERA	Bats			See note on bats in text
Family: Pteropodidae	Fruit Bats			
<i>Eidolon helvum</i>	Straw-Coloured Fruit Bat		Low	
<i>Rousettus aegyptiacus</i>	Egyptian Fruit Bat		medium	
<i>Epomophorus wahlbergi</i>	Wahlberg's epouletted Fruit Bat		low	
Family: Emballonuridae	Sheath-Tailed Bats			
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat		Low	
Family: Molossidae	Free-Tailed Bats			
<i>Tadarida aegyptiaca</i>	Egyptian Free-Tailed Bat		High	
Family Miniopteridae	Long-fingered Bats			
<i>Miniopterus natalensis</i>	Natal Long-Fingered Bat		High	
Family: Vespertilionidae	Vesper Bats			
<i>Neoromicia capensis</i>	Cape Serotine Bat		High	
<i>Myotis tricolor</i>	Temminck's Hairy Bat		High	
<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat		Medium	
<i>Pipistrellus capensis</i>	Cape Serotine Bat		High	
Family: Nycteridae	Slit-Faced Bats			
<i>Nycteris thebaica</i>	Egyptian Slit-Faced Bat		High	
Family: Rhinolophidae	Horseshoe Bats			
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat		High	
Order: PRIMATES	Baboons and Monkeys			

SCIENTIFIC NAME	ENGLISH NAME	RD Status	Probability	Remarks
<i>Papio ursinus</i>	Chacma Baboon		High	
<i>Cercopithecus pygerythrus</i>	Vervet Monkey		High	
Order: CARNIVORA	Carnivores			
Felidae	Cats			
<i>Felis silvestris</i>	African Wild Cat		High	Observed
<i>Felis nigripes</i>	Small Spotted Cat (Black-footed)	VU	Low	
<i>Caracal caracal</i>	Caracal		High	
<i>Acinonyx jubatus</i>	Cheetah	VU	Low	In neighbouring Cheetah breeding farm
<i>Panthera pardus</i>	Leopard	VU	Medium	Noted in the vicinity by local people
Family: Viverridae	Civets and Genets			
<i>Genetta genetta</i>	Small-Spotted Genet		High	
<i>Genetta tigrina</i>	South African Large-Spotted Genet		Medium	
Family: Herpestidae	Suricates and Mongooses			
<i>Cynictis penicillata</i>	Yellow Mongoose		High	Seen on site
<i>Galerella pulverulenta</i>	Cape Grey Mongoose		High	
<i>Atilax paludinosus</i>	Marsh Mongoose		Medium	
<i>Suricata suricatta</i>	Meerkat		High	
Family Canidae	Jackals			
<i>Vulpes chama</i>	Cape Fox		Medium	
<i>Otocyon megalotis</i>	Bat-eared Fox		Low	
<i>Canis mesomelas</i>	Black-backed Jackal		High	Noted at close by area
Family: Mustelidae	Otters and Badgers			
<i>Aonix capensis</i>	African Clawless Otter		Low	Not suitable habitat
<i>Mellivora capensis</i>	Honey Badger		High	
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	Medium	
<i>Ictonix striatus</i>	Striped Polecat		High	
Family: Hyaenidae	Hyaenas			

SCIENTIFIC NAME	ENGLISH NAME	RD Status	Probability	Remarks
<i>Hyaena brunnea</i>	Brown Hyaena	NT	Low	Noted in the vicinity by local people
<i>Proteles cristatus</i>	Aardwolf		Low	
Order: HYRACOIDEA	Dassies			
Family: Procaviidae				
<i>Procavia capensis</i>	Rock Dassie		High	
ORDER RUMINANTIA				
Family Bovidae	Buffalo, Wildebeest and Antelopes			
<i>Tragelaphus strepticerus</i>	Greater Kudu		High	Noted in area
<i>Tragelaphus sylvaticus</i>	Bushbuck		Medium	
<i>Pelea capreolus</i>	Grey Rhebuck	NT	Medium	
<i>Oreotragus oreotragus</i>	Klipspringer		Medium	In southern part of the farm
<i>Raphicerus campestris</i>	Steenbok		High	Noted in area
<i>Raphicerus melanotis</i>	Cape Grysbok		High	
<i>Philantomba monticola</i>	Blue Duiker	VU	Low	Mentioned by DEA Screening Tool – Bush in southern part of the farm presents suitable habitat, but is probably too dry.
<i>Sylvicapra grimmia</i>	Common Duiker		High	Observed in the area

6.1.3.Conclusion

Although many mammal species may from time to time occur in the area of the site, only a few may probably be encountered or observed at any one time. This can be ascribed to very small species or low species density and individuals are therefore not easily seen. Many smaller mammals are either secretive, nocturnal, hibernators and/or seasonal, and some are seasonal migrators. However, by applying the standard methods of deducing probable presence by using the recognised literature on distribution and habitat preferences, and knowledge of habitats present on the site, a list of mammals could successfully be compiled with a high level of confidence.

Some of the mammal species predicted to visit the area of the site, may be threatened by the construction or the phase of operation of the PV facility, but most of them are quite motile and will easily move away from danger. The area affected is too small to affect any of the mammal species in a critical manner.

From a mammal perspective, the PV-facility can be supported.

6.2 BIRDS

6.2.1 Bird Habitat Assessment

The habitats occupied by flighted birds differ from those of most terrestrial vertebrates in being explicitly three-dimensional, especially for aerial-feeding species and in the airspace above landscapes with low relief and short vegetation, such as occur on the site. In the two primarily terrestrial dimensions, most birds are also more dependent on vegetation structure, and substrate texture and colour, than they are on vegetation composition, with the exception of a minority of species with particular food requirements of foliage, flowers, fruit or seeds. However, although the vegetation biomes and units most recently described for South Africa are defined primarily on vegetation composition, they do offer good analyses of the abiotic factors that also underlie these divisions, such as topography, geology, soil types and climate, and on general structural features of vegetation types and landscapes.

The aerial mobility of birds also demands paying attention to the principal habitats surrounding the study site and their conservation status, not just those along the immediate borders but also more distant habitats that might provide sources for species visiting the site and sinks for those breeding on site.

Birds are also a relatively visible and audible group of homeothermic vertebrates, active throughout the year, and with habitat preferences that can be evaluated from experience, by reference to the comprehensive literature available and by the subset of species that can be detected by a field survey during a particular season and time of day. Such information and experience also inform and enable searches for particular species of conservation concern.

The principal habitat types detected on the site that are most relevant to bird ecology and community structure are:

1. Different thickets (arid, disturbed, dry and mesic)
2. Limited wetlands.

The habitats directly adjacent to the study site vary and consist mostly of degraded habitats and a provincial road.

6.2.2 Expected and Observed Bird Species Richness

Most of the expected species are typical generalists that might occupy the fabricated habitats available, especially the various transformed lands and other man-induced alterations such as buildings, while others are aerial feeders that mainly use the airspace above the habitats. Species typically inhabiting aquatic habitats would be likely to occur in significant numbers due to the limited presence of this habitat.

The disturbed and arid thickets are in poor to fair condition and not sufficient to support some species dependent on this habitat.

The disturbed nature of the habitat and the location which includes busy a tar road, collectively mean that avian diversity is lower than normal. The bird species that were deduced to occupy the site are listed in Table 2.

The study site lies mostly in two Pentads (3325-2515 & 3330-2515). A total of 116 & 111 species are expected or were recorded on these Pentads respectively (Table 2). These Pentads, together with Roberts Birds VII of Southern Africa, were used to compile a list of possible birds for the site (Table 2)

Table 6.2: Bird species diversity expected on and around the proposed site. Based on the national list and annotations of Birdlife South Africa (2011), sorted in the order of ‘Roberts VII’ (Hockey *et al.* 2005), with probability of occurrence and habitat preferences assessed and comparison with lists from SABAP 1&2 (Harrison *et al.*, 1997; www.sabap2.org).

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Grey-winged Francolin	<i>Scleroptila africanus</i>					M	
Red-winged Francolin	<i>Scleroptila levillantii</i>						L
Common Quail	<i>Coturnix coturnix</i>						L
Helmeted Guineafowl	<i>Numida meleagris</i>				H		
Egyptian Goose	<i>Alopochen aegyptiaca</i>				H		
South African Shelduck	<i>Tadorna cana</i>						L
Spur-winged Goose	<i>Plectropterus gambensis</i>						L
Cape Teal	<i>Anas capensis</i>						L
African Black Duck	<i>Anas sparsa</i>					M	
Yellow-billed Duck	<i>Anas undulata</i>				H		
Cape Shoveler	<i>Anas smithi</i>						L
Knob-billed Duck	<i>Sarkidiornis melanotos</i>						L
Red-billed Teal	<i>Anas erythrorhyncha</i>						L
Southern Pochard	<i>Netta erythrophthalma</i>						L
Greater Honeyguide	<i>Indicator indicator</i>						L
Lesser Honeyguide	<i>Indicator minor</i>					M	
Brown-back Honeybird	<i>Prodotiscus regulus</i>						L
Red-throated Wryneck	<i>Jynx ruficollis</i>					M	
Ground Woodpecker	<i>Geocolaptes olivaceus</i>						L
Cardinal Woodpecker	<i>Dendropicos fuscescens</i>					M	
Olive Woodpecker	<i>Dendropicos griseocephalus</i>						L
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>					M	
Acacia Pied Barbet	<i>Tricholaema leucomelas</i>					M	

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Black-collared Barbet	<i>Lybius torquatus</i>				H		
Crowned Hornbill	<i>Tockus alboterminatus</i>						L
African Hoopoe	<i>Upupa africana</i>				H		
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>						L
European Roller	<i>Coracias garrulus</i>	NT					L
Malachite Kingfisher	<i>Alcedo cristata</i>					M	
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>					M	
Giant Kingfisher	<i>Megaceryle maximus</i>						L
Pied Kingfisher	<i>Ceryle rudis</i>						L
European Bee-eater	<i>Merops apiaster</i>		B/NB M				L
Speckled Mousebird	<i>Colius striatus</i>				H		
Red-faced Mousebird	<i>Urocolius indicus</i>				H		
Jacobin Cuckoo	<i>Clamator jacobinus</i>		BM				L
Great Spotted Cuckoo	<i>Clamator glandarius</i>		BM				L
Red-chested Cuckoo	<i>Cuculus solitarius</i>		BM			M	
Black Cuckoo	<i>Cuculus clamosus</i>		BM				L
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>		BM				L
Diderick Cuckoo	<i>Chrysococcyx caprius</i>		BM		H		
Burchell's Coucal	<i>Centropus burchellii</i>						L
Alpine Swift	<i>Tachymarptis melba</i>					M	
Common Swift	<i>Apus Apus</i>		NBM				L
African Black Swift	<i>Apus barbatus</i>						L
Little Swift	<i>Apus affinis</i>		BM		H		
Horus Swift	<i>Apus horus</i>		BM				L
White-rumped Swift	<i>Apus caffer</i>		BM		H		
Barn Owl	<i>Tyto alba</i>						L
Marsh Owl	<i>Asia capensis</i>					M	
Cape Eagle-Owl	<i>Bubo capensis</i>						L
Spotted Eagle-Owl	<i>Bubo africanus</i>						L
Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>						L
European Nightjar	<i>Caprimulgus europaeus</i>		NBM				L
Rock Dove	<i>Columba livia</i>		I		H		
Speckled Pigeon	<i>Columba guinea</i>				H		
African Olive-Pigeon	<i>Columba arquatrix</i>						L
Emerald-spotted Wood-Dove	<i>Turtur chalcospilos</i>						L
Laughing Dove	<i>Streptopelia senegalensis</i>				H		
Cape Turtle-Dove	<i>Streptopelia capicola</i>				H		
Red-eyed Dove	<i>Streptopelia semitorquata</i>				H		
Namaqua Dove	<i>Oena capensis</i>						L
Tambourine Dove	<i>Turtur tympanistria</i>						L
Denham's Bustard	<i>Neotis denhami</i>	VU					L

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Ludwig's Bustard	<i>Neotis ludwigii</i>	EN					L
Kori Bustard	<i>Ardeotis kori</i>	NT					L
Southern Black Korhaan	<i>Afrotis afra</i>	VU					L
Blue Crane	<i>Anthropoides paradiseus</i>	NT			Confirmed		
Black Crane	<i>Amauornis flavirostra</i>					M	
African Purple Swamphen	<i>Porphyrio madagascariensis</i>						L
Common Moorhen	<i>Gallinula chloropus</i>				H		
Red-knobbed Coot	<i>Fulica cristata</i>				H		
African Snipe	<i>Gallinago nigripennis</i>						L
Marsh Sandpiper	<i>Tringa stagnatilis</i>						L
Common Greenshank	<i>Tringa nebularia</i>						L
Wood Sandpiper	<i>Tringa glareola</i>						L
Common Sandpiper	<i>Actitis hypoleucos</i>						L
Little Stint	<i>Calidris minuta</i>						L
Curlew Sandpiper	<i>Calidris ferruginea</i>						L
Ruff	<i>Philomachus pugnax</i>						L
Water Thick-Knee	<i>Burhinus vermiculatus</i>						L
Spotted Thick-knee	<i>Burhinus capensis</i>				H		
Black-winged Stilt	<i>Himantopus himantopus</i>						L
Pied Avocet	<i>Recurvirostra avosetta</i>						L
Common Ringed Plover	<i>Charadrius hiaticula</i>						L
Kittlitz's Plover	<i>Charadrius pecuarius</i>						L
Three-banded Plover	<i>Charadrius tricollaris</i>				H		
Blacksmith Lapwing	<i>Vanellus armatus</i>				H		
Black-winged Lapwing	<i>Vanellus melanopterus</i>						L
Crowned Lapwing	<i>Vanellus coronatus</i>				H		
Grey-headed Gull	<i>Larus cirrocephalus</i>						L
Whiskered Tern	<i>Chlidonias hybrida</i>						L
White-winged Tern	<i>Chlidonias leucopterus</i>						L
Black-shouldered Kite	<i>Elanus caeruleus</i>				H		
Yellow-billed Kite	<i>Milvus aegyptius</i>						L
African Fish-Eagle	<i>Haliaeetus vocifer</i>						L
African Marsh-Harrier	<i>Circus ranivorus</i>						L
Black Harrier	<i>Circus maurus</i>						L
African Harrier-Hawk	<i>Polyboroides typus</i>						L
Southern Pale Chanting Goshawk	<i>Melierax canorus</i>						L
Gabar Goshawk	<i>Melierax gabar</i>						L
African Goshawk	<i>Accipiter tachiro</i>						L
Little Sparrowhawk	<i>Accipiter minullus</i>						L
Rufous-chested Sparrowhawk	<i>Accipiter rufiventris</i>						L

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Black Sparrowhawk	<i>Accipiter melanoleucus</i>						L
Steppe Buzzard	<i>Buteo buteo</i>		NBM				L
Jackal Buzzard	<i>Buteo rufofuscus</i>					M	
Verreauxs' Eagle	<i>Aquila verreauxii</i>	VU					L
Booted Eagle	<i>Aquila pennatus</i>						L
Martial Eagle	<i>Polemaetus bellicosus</i>	EN					L
African Crowned Eagle	<i>Stephanoaetus coronatus</i>						L
Secretarybird	<i>Sagittarius serpentarius</i>	VU					L
Rock Kestrel	<i>Falco rupicolus</i>				H		
Lanner Falcon	<i>Falco biarmicus</i>	VU					L
Peregrine Falcon	<i>Falco peregrinus</i>						L
Little Grebe	<i>Tachybaptus ruficollis</i>				H		
African Darter	<i>Anhinga rufa</i>						L
Reed Cormorant	<i>Phalacrocorax africanus</i>					M	
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>					M	
Little Egret	<i>Egretta garzetta</i>					M	
Yellow-billed Egret	<i>Egretta intermedia</i>						L
Great Egret	<i>Egretta alba</i>						L
Grey Heron	<i>Ardea cinerea</i>				H		
Black-headed Heron	<i>Ardea melanocephala</i>				H		
Goliath Heron	<i>Ardea goliath</i>						L
Purple Heron	<i>Ardea purpurea</i>						L
Cattle Egret	<i>Bubulcus ibis</i>				H		
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>						L
Green-backed Heron	<i>Butorides striata</i>						L
Little Bittern	<i>Ixobrychus minutus</i>						L
Hamerkop	<i>Scopus umbretta</i>					M	
Hadeda Ibis	<i>Bostrychia hagedash</i>				H		
African Sacred Ibis	<i>Threskiornis aethiopicus</i>				H		
African Spoonbill	<i>Platalea alba</i>						L
Yellow-billed Stork	<i>Mycteria ibis</i>	EN					L
White Stork	<i>Ciconia ciconia</i>						L
Eurasian Golden Oriole	<i>Oriolus oriolus</i>						L
Black-headed Oriole	<i>Oriolus larvatus</i>						L
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>				H		
Blue-mantled Crested-Flycatcher	<i>Trochocercus cyanomelas</i>						L
African Paradise-Flycatcher	<i>Terpsiphone viridis</i>						L
Black-backed Puffback	<i>Dryoscopus cubla</i>					M	
Southern Tchagra	<i>Tchagra tchagra</i>						L
Southern Boubou	<i>Laniarius ferrugineus</i>				H		

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Bokmakierie	<i>Telophorus zeylonus</i>				H		
Olive Bush-Shrike	<i>Telophorus olivaceus</i>						L
Grey-headed Bush-Shrike	<i>Malaconotus blanchoti</i>						L
Cape Batis	<i>Batis capensis</i>					M	
Chinspot Batis	<i>Batis molitor</i>					M	
Cape Crow	<i>Corvus capensis</i>				H		
Pied Crow	<i>Corvus albus</i>				H		
White-necked Raven	<i>Corvus albicollis</i>					M	
Red-backed Shrike	<i>Lanius collurio</i>						L
Common Fiscal	<i>Lanius collaris</i>				H		
Grey Cuckooshrike	<i>Coracina caesia</i>						L
Black Cuckooshrike	<i>Campephaga flava</i>						L
Cape Penduline-Tit	<i>Anthoscopus minutus</i>						L
Southern Black Tit	<i>Parus niger</i>						L
Grey Tit	<i>Parus afer</i>						L
Brown-throated Martin	<i>Riparia paludicola</i>						L
Banded Martin	<i>Riparia cincta</i>						L
Barn Swallow	<i>Hirundo rustica</i>		NBM		H		
White-throated Swallow	<i>Hirundo albigularis</i>		BM		H		
Pearl-breasted Swallow	<i>Hirundo dimidiata</i>		BM			M	
Greater Striped Swallow	<i>Cecropis cucullata</i>		BM		H		
Lesser Striped Swallow	<i>Hirundo abyssinica</i>		BM			M	
Red-breasted Swallow	<i>Cecropis semirufa</i>		BM		H		
Rock Martin	<i>Hirundo fuligula</i>				H		
Common House-Martin	<i>Delichon urbicum</i>						L
Black Saw-wing	<i>Psalidoprocne</i>						L
Dark-capped Bulbul	<i>Pycnonotus tricolor</i>						L
Cape Bulbul	<i>Pycnonotus capensis</i>				H		
Sombre Greenbul	<i>Andropadus importunus</i>						L
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>						L
Fairy Flycatcher	<i>Stenostira scita</i>						L
Cape Grassbird	<i>Sphenoeacus afer</i>						L
Victorin's Warbler	<i>Cryptillas victorini</i>						L
Long-billed Crombec	<i>Sylvietta rufescens</i>					M	
Yellow-bellied Eremomela	<i>Eremonela icteropygialis</i>						L
Little Rush-Warbler	<i>Bradypterus baboecala</i>					M	
African Reed-Warbler	<i>Acrocephalus baeticatus</i>						L
Great Reed-Warbler	<i>Acrocephalus arundinaceus</i>						L
Yellow-throated Woodland-Warbler	<i>Phykoscopus ruficapilla</i>						L
Willow Warbler	<i>Phylloscopus trochilus</i>		NBM				L

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Chestnut-vented Tit-Babbler	<i>Parisoma subcaeruleum</i>					M	
Lesser Swamp-Warbler	<i>Acrocephalus gracilirostris</i>				H		
Cape White-eye	<i>Zosterops capensis</i>			(*)	H		
Lazy cisticola	<i>Cisticola aberrans</i>					M	
Grey-backed Cisticola	<i>Cisticola subruficapilla</i>					M	
Wailing Cisticola	<i>Cisticola lais</i>						L
Levaillant's Cisticola	<i>Cisticola tinniens</i>					H	
Neddicky	<i>Cisticola fulvicapilla</i>				H		
Zitting Cisticola	<i>Cisticola juncidis</i>				H		
Cloud Cisticola	<i>Cisticola tektrix</i>						L
Karoo Prinia	<i>Prinia maculosa</i>				H		
Bar-throated Apalis	<i>Apalis thoracica</i>					M	
Yellow-breasted Apalis	<i>Apalis flavida</i>						L
Green-backed Camaroptera	<i>Camaroptera brechyura</i>						L
Rufous-naped Lark	<i>Mirafra africana</i>						L
Cape Clapper Lark	<i>Mirafra apiata</i>						L
Eastern Longbilled	<i>Certhilauda semitorquata</i>						L
Red-capped Lark	<i>Calandrella cinerea</i>				H		
Red-capped Lark	<i>Calandrella cinerea</i>				H		
Cape Rock-Thrush	<i>Monticola rupestris</i>						L
Olive Thrush	<i>Turdus olivaceus</i>			(*)	H		
Southern Black Flycatcher	<i>Melaenornis pammelaina</i>						L
Fiscal Flycatcher	<i>Sigelus silens</i>			(*)	H		
Spotted flycatcher	<i>Muscicapa striata</i>		NBM				L
African Dusky Flycatcher	<i>Muscicapa adusta</i>						L
Cape Robin-Chat	<i>Cossypha caffra</i>				H		
Brown Scrub-Robin	<i>Cercotrichas signata</i>						L
White-browed Scrub-Robin	<i>Cercotrichas leucophrys</i>						L
Karoo Scrub-Robin	<i>Cercotrichas coryphoeus</i>					M	
African Stone Chat	<i>Saxicola torquatus</i>				H		
Familiar Chat	<i>Ceromela familiaris</i>						L
Ant-eating Chat	<i>Myrmecocichla formicivora</i>						L
Mocking Cliff-Chat	<i>Thamnolaea cinnamomeiventris</i>						L
Red-winged Starling	<i>Onychognathus morio</i>						L
Black-bellied Starling	<i>Lamprotornis corruscus</i>						L
Cape Glossy Starling	<i>Lamprotornis nitens</i>				H		
Violet-backed Starling	<i>Cinnyricinclus leucogaster</i>						L
Pied Starling	<i>Lamprotornis bicolor</i>				H		

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Wattled Starling	<i>Creatophora cinerea</i>						L
Common Starling	<i>Sturnus vulgaris</i>		I		H		
Grey Sunbird	<i>Cyanomitra veroxii</i>						L
Collared Sunbird	<i>Hedydipna collaris</i>						L
Amethyst Sunbird	<i>Chalcomitra amethystina</i>				H		
Malachite Sunbird	<i>Cinnyris afer</i>						L
Southern Double-collared Sunbird	<i>Cinnyris chalybeus</i>					M	
Greater Double-collared Sunbird	<i>Cinnyris afer</i>					M	
Spectacled Weaver	<i>Ploceus ocularis</i>					M	
Southern Masked-Weaver	<i>Ploceus velatus</i>				H		
Cape Weaver	<i>Ploceus capensis</i>				H		
Village Weaver	<i>Ploceus cucullatus</i>						L
Red-billed Quelea	<i>Quelea quelea</i>					M	
Southern Red Bishop	<i>Euplectes orix</i>				H		
Thick-billed Weaver	<i>Amblyospiza albifrons</i>						L
Red-collared Widowbird	<i>Euplectes ardens</i>				H		
African Quailfinch	<i>Ortygospiza atricollis</i>					M	
Red-headed Finch	<i>Amadina erythrocephala</i>						L
Sweet Waxbill	<i>Coccyzygia melanotis</i>					M	
Common Waxbill	<i>Estrilda astrild</i>				H		
Green-winged Pytilia	<i>Pytilia melba</i>						L
African Firefinch	<i>Lagonosticta rubricata</i>						L
Pin-tailed Whydah	<i>Vidua macroura</i>						L
Dusky Indigobird	<i>Vidua funerea</i>						L
House Sparrow	<i>Passer domesticus</i>		I		H		
Cape Sparrow	<i>Passer melanurus</i>				H		
Southern Grey-headed Sparrow	<i>Passer diffuses</i>				H		
Yellow-throated Petronia	<i>Petronia supercilialis</i>						L
African Pied Wagtail	<i>Motacilla aguimp</i>						L
Cape Wagtail	<i>Motacilla capensis</i>				H		
Cape Longclaw	<i>Macronyx capensis</i>					M	
African Pipit	<i>Anthus cinnamomeus</i>				H		
Plain-backed Pipit	<i>Anthus leucophrys</i>						L
Long-billed Pipit	<i>Anthus similis</i>						L
Bushveld Pipit	<i>Anthus caffer</i>						L
Cape Canary	<i>Serinus canicollis</i>				H		
Yellow-fronted Canary	<i>Crithagra mozambicus</i>					M	
Yellow Canary	<i>Crithagra flaviventris</i>						L
Brimstone Canary	<i>Crithagra sulphuratus</i>					M	
White-throated Canary	<i>Crithagra albogularis</i>						L

Common English Name	Scientific Name	Status Codes (see below)			Probability of occurrence (see 4.2 above)		
		R D	S	E	High	Medium	Low
Streaky-headed Seedeater	<i>Crithagra gularis</i>					M	
Cape Siskin	<i>Crithagra totta</i>						L
Cinnamon-breasted Bunting	<i>Emberiza tahapisi</i>					M	
Cape Bunting	<i>Emberiza capensis</i>					M	
Golden-breasted Bunting	<i>Emberiza flaviventris</i>						L

Red Status	Status in south Africa (S)	Endemism in South Africa (E)
NA = Not Assessed	BM = breeding migrant	Endemism in South Africa (E) (not southern Africa as in field guides)
LC = Least Concern	NBM = non-breeding migrant	
NT = Near-Threatened	V = vagrant	* = endemic
VU = Vulnerable	I = introduced	
EN = Endangered	R = rare	(*) = near endemic (i.e. ~70% or more of population in RSA)
CR = Critically Endangered	PRB = probable rare breeder	B* = breeding endemic
EX = Extinct Regionally	RB = rare breeder	B(*) = breeding near endemic
NR = Not Recognised	RV = rare visitor	W* = winter endemic
<p>Red Status is from <i>The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland</i>, Taylor (2015).</p>		

Table 6.2: Red-listed species whose possible presence at the site of the proposed development was evaluated during the assessment process.

Species	Scientific name	Red Data ¹	Assessment of likelihood of presence at site
Stork, Yellow-billed	<i>Mycteria ibis</i>	EN	Habitat not suitable - generally inhabits open, shallow water. Not recorded in the Pentads of the site (SABAP 2)
Stork, Black	<i>Ciconia nigra</i>	VU	Unlikely. Habitat not suitable. Recorded in the Pentads of the site (SABAP 2).
Secretarybird	<i>Sagittarius serpentarius</i>	VU	Possible, but unlikely. Site is too small and disturbed to host this species. Not recorded in the Pentads of the site (SABAP 2).
Bustard, Denham's	<i>Neotis den hami</i>	VU	Possible, but unlikely. Site and surroundings too disturbed to host this species. Not recorded in the Pentads of the site (SABAP 2).
Bustard, Ludwig's	<i>Neotis ludwigii</i>	EN	Possible. Recorded in the Pentads of the site (SABAP 2).
Bustard, Kori	<i>Ardeotis kori</i>	NT	Possible, but unlikely - requires large areas of suitable habitat and avoids disturbed landscapes. Recorded in the Pentads of the site (SABAP 2).
Tern, Caspian	<i>Sterna caspia</i>	VU	Extremely unlikely – no suitable habitat on site. Not recorded in the Pentads of the site (SABAP 2).
Falcon, Lanner	<i>Falco biarmicus</i>	VU	Occurrence possible, but the area is unlikely to be important hunting habitat. Not recorded in the Pentads of the site (SABAP 2).
Eagle, Verreaux's	<i>Aquila verreauxii</i>	VU	Unlikely. Largely confined to mountainous areas. However, occurs within 50 km of site, and therefore possible that birds traverse the area from time to time. Not recorded in the Pentads of the site (SABAP 2).
Eagle, Martial	<i>Polemaetus bellicosus</i>	EN	Possible, but unlikely - requires huge areas of suitable habitat and avoids disturbed landscapes. Recorded in the Pentads of the site (SABAP 2).
Marsh-harrier, African	<i>Circus ranivorus</i>	EN	Unlikely. Habitat not suitable. The site is too small and disturbed. Not recorded in the Pentads of the site (SABAP 2).
Finfoot, African	<i>Podica senegalensis</i>	VU	Extremely unlikely – requires slow-flowing water in large river systems. Habitat not suitable. The waterbodies are much too small and disturbed to hold this species. Not recorded in the Pentads of the site (SABAP 2).
Night Heron, White-backed	<i>Gorsachius leuconotus</i>	VU	Very unlikely. Requires clear, swift-or slow-flowing perennial rivers. Not recorded in the Pentads of the site (SABAP 2).

Species	Scientific name	Red Data ¹	Assessment of likelihood of presence at site
Crane, Blue	<i>Anthropoides paradiseus</i>	NT	Likely. Recorded in the Pentads of the site (SABAP 2). Two were observed in the area south of the site.
Korhaan, Southern Black	<i>Afrotis afra</i>	VU	Possible, but unlikely. Site too small and surroundings too disturbed to host this species. Recorded in the Pentads of the site (SABAP 2).
Painted-snipe, Greater	<i>Rostratula benghalensis</i>	NT	Unlikely. Habitat not suitable, prefers freshwater wetlands, where it prefers secluded muddy areas adjacent to concealing vegetation. Not recorded in the Pentads of the site (SABAP 2).
Kingfisher, Half-collared	<i>Alcedo semitorquata</i>	NT	Extremely unlikely. Habitat not suitable. The waterbodies are too shallow and/or slow-flowing with no riverine habitat. Not recorded in the Pentads of the site (SABAP 2).
Roller, European	<i>Coracias garrulus</i>	NT	Possible, but unlikely. Habitat not suitable. Not recorded in the Pentads of the site (SABAP 2).

¹Current (2015) IUCN Red List Status for South Africa, Lesotho and Swaziland (Taylor et al. 2015). NT = *Near Threatened*; VU = *Vulnerable*; EN = *Endangered*; CR = *Critically Endangered*

6.2.3 Threatened and Red Listed Bird Species

A total of 18 threatened or near-threatened species (Taylor, Peacock & Wanless, 2015) were previously recorded in the general area where the site is located (Table 6.3).

However, of these 18 species, only six were recorded in the Pentads of the study site (SAPAB 2), namely the Blue crane, Kori bustard, Ludwig's bustard, Black stork, Southern black korhaan and Martial eagle. Two blue cranes were observed during the site visit in the buffer area south of the site.

There are not many full protocols for these Pentads. The possibility exists that species such as the Secretary bird may from time to time occur on the site. However, for most Red Data species the nature of the site is such that their occurrence is unlikely (Table 3). Due to the limited extent and quality of the habitats, half the species are expected to be at best erratic visitors and the other half are only expected as infrequent vagrants, their inclusion being primarily due to the Precautionary Principle. As can be seen from the estimates of the habitats as support for the basic requirements of the species, they are considered at best as only mediocre for all the threatened species. The odd Verreaux's eagle may fly over the site, but the area is unlikely to be an important hunting or scavenging habitat.

6.2.4 Martial Eagle (*Polemaetus bellicosus*)

According to the Screening Tool Report on the Proposed development for the Mayogi PV Facility, Eastern Cape Province, scheduled for a solar farm, the Martial Eagle (*Polemaetus bellicosus*) has a high sensitivity.

The occurrence of the martial eagle on the site is very unlikely. The martial eagle requires huge areas of suitable habitat and avoids disturbed landscapes. The martial eagle is recorded in the Pentads of the site (SABAP 2).

The odd martial eagle may fly over the site, but the area is unlikely to be an important hunting or scavenging habitat. The martial eagle should not occur on the site as a breeding species.

6.2.5 Secretarybird (*Sagittarius serpentarius*)

According to the Screening Tool Report on the Proposed development for the Mayogi PV Facility, Eastern Cape Province, scheduled for a solar farm, the Secretarybird (*Sagittarius serpentarius*) has a high sensitivity.

The occurrence of the Secretarybird on the site is possible, but unlikely. The site is too small and disturbed to host this species. The Secretarybird is not recorded in the Pentads of the site (SABAP 2).

The odd Secretarybird may fly over the site, but the area is unlikely to be an important hunting or scavenging habitat. The Secretarybird should not occur on the site as a breeding species.

6.2.6 Southern Black Korhaan (*Afrotis afra*)

According to the Screening Tool Report on the Proposed development for the Mayogi PV Facility, Eastern Cape Province, scheduled for a solar farm, the southern black korhaan (*Afrotis afra*) has a high and medium sensitivity.

The occurrence of the southern black korhaan on the site is possible, but unlikely. The site is too small and disturbed to host this species. The southern black korhaan is recorded in the Pentads of the site (SABAP 2).

The site is too disturbed, and the area is unlikely to be an important habitat for this species. The southern black korhaan should not occur on the site as a breeding species.

6.3 HERPETOFAUNA

6.3.1 Herpetofauna Habitat Assessment

The local occurrences of reptiles and amphibians are closely dependent on broadly defined habitat types, in particular terrestrial, arboreal (tree-living), rupicolous (rock-dwelling) and wetland-associated vegetation cover. It is thus possible to deduce the presence or absence of reptile and amphibian species by evaluating the habitat types within the context of global distribution ranges.

From a herpetological habitat perspective, it was established that two of the four major habitat types are well represented on the study site, namely terrestrial (the herbaceous layer, Figure 6.1 above) and arboreal (trees-living as habitat, Figure 6.2 above). Most of the study site consists of terrestrial habitat, disturbed by anthropogenic activities, resulting in dominance of two seasonal *Mesembryanthemum* species (e.g. Figure 5.8 above). Some areas of the study site have been altered by agricultural activities, overgrazing by game, invasive plants, periodical veldfires, wire fences, gravel roads and powerlines. The study site is thus ecologically disturbed in most parts. No moribund termitaria were recorded on the study site. These structures are generally good indicators of the occurrence of small herpetofauna. Little rock-embedded limestone veld (Figure 6.5 below) occurs on the relevant northern part of the farm. Rock habitats are present on the southern part (Figure 6.4 below), where no development is proposed. Except for small, seasonal, man-made dams there is no wetland habitat within the study site.

Accordingly, it is estimated that the herpetofauna population density for the study site is low. The basal cover was poor in many places and would not provide adequate cover for small terrestrial herpetofauna. The herbaceous layer of the study site has been transformed in some areas and due to arid conditions, prey is probably sparsely distributed, so foraging grounds would need to be extensive to support some herpetofauna species populations.

Due to the presence of natural rupicolous habitat, some species like southern karusa lizard, western rock skink and rock agama were added to the species list in Table 6.4 (below).



Figure 6.4:A ridge just south of the site boundary.



Figure 6.5: Rock-embedded limestone veld.

There is one non-perennial drainage line on the site. Small temporary dams occur in the drainage line. At the time of the site visit the drainage line and the dams were basically dry.

6.3.2 Expected and Observed Herpetofauna Species Richness

Sixty-six reptile species (Table 6.4) and 17 amphibian species (Table 6.5) may possibly occur on the study site.

The American red-eared terrapin (*Trachemys scripta elegans*) and the Brahminy blind snake (*Indotyphlops braminus*) are the only two feral reptile or amphibian species known to occur or have occurred in South Africa (De Moor and Bruton, 1988; Picker and Griffiths, 2011), but with only a few populations, they are not expected to occur on this site.

The species assemblage is typical of what can be expected of habitat that is severely disturbed or transformed, but with sufficient habitat to sustain populations. Most of the reptile species of the resident diversity (Table 6.4) are fairly common and widespread (viz. common house snake, common sand lizard, southern karusa lizard, western rock skink, variegated skink, southern rock agama. Widespread Amphibia species (Table 6.5) include raucous toad and Boettger's Caco.

The expected herpetofauna species richness is low as only two habitat types are prominent on the site.

Table 6.4: The Reptile and Amphibia species deduced to from time to time reside the site. Systematic arrangement and nomenclature according to Branch (1998), Bates, *et.al* 2014 and Alexander & Marais (2007).

Probability:

High Definitely there or have a *high* probability to occur;

Medium probability to occur based on ecological and distributional parameters;

Low probability to occur based on ecological and distributional parameters.

	SCIENTIFIC NAME	ENGLISH NAME
	CLASS: REPTILIA	REPTILES
	Order: TESTUDINES	TORTOISES & TERRAPINS
	Family: Pelomedusidae	Side-necked Terrapins
Low	<i>Pelomedusa subrufa</i>	Marsh Terrapin
	Family: Testudinidae	Tortoises
Low	<i>Chersina angulata</i>	Angulate Tortoise
Low	<i>Homopus areolatus</i>	Parrot-Beaked Dwarf Tortoise
Low NT	<i>Homopus boulengeri</i>	Karoo Dwarf Tortoise
Low	<i>Psammobates tentorius</i>	Tent tortoise
High	<i>Stigmochelys pardalis</i>	Leopard Tortoise
	Order: SQUAMATA	SCALE-BEARING REPTILES
	Suborder: LACERTILIA	LIZARDS
	Family: Gekkonidae	Geckos
High	<i>Chondrodactylus bibronii</i>	Bibron's Gecko
Low	<i>Goggia essexi</i>	Essex's Pygmy Gecko
Low	<i>Hemidactylus mabouia</i>	Common Tropical House Gecko
Low	<i>Pachydactylus capensis</i>	Cape Gecko
Low	<i>Pachydactylus geitje</i>	Ocellated Gecko
Medium	<i>Pachydactylus maculatus</i>	Spotted Gecko

	SCIENTIFIC NAME	ENGLISH NAME
Medium	<i>Pachydactylus mariquensis</i>	Common Banded Gecko
	Family: Lacertidae	Old World Lizards or Lacertids
Medium	<i>Nucras lalandii</i>	Delalande's Sandveld Lizard
Low	<i>Nucras livida</i>	Karoo Sandveld Lizard
Low NT	<i>Nucras taeniolata</i>	Albany Sandveld Lizard
Low	<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard
High	<i>Pedioplanis lineocellata puchella</i>	Common Sand Lizard
Low	<i>Tropidosaura montana</i>	Common Mountain Lizard
	Family: Cordylidae	
Low	<i>Chamaesaura anguina</i>	Cape Grass Lizard
High	<i>Cordylus cordylus</i>	Cape Girdled Lizard
High	<i>Karusasaurus polyzonus</i>	Southern Karusa Lizard
Low	<i>Pseudocordylus microlepidotus</i>	Cape Craig Lizard
	Family: Gerrhosauridae	Plated Lizards
Medium	<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard
Low	<i>Tetradactylus tetradactylus</i>	Cape Long-Tailed Seps
	Family: Scincidae	Skinks
Low	<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink
Medium	<i>Acontias meleagris</i>	Cape Legless Skink
High	<i>Trachylepis capensis</i>	Cape Skink
Low	<i>Trachylepis sulcata</i>	Western Rock Skink
Medium	<i>Trachylepis varia</i>	Variable Skink
Low	<i>Trachylepis variegata</i>	Variegated Skink
Low	<i>Scelotes caffer</i>	Cape Dwarf Burrowing Skink
	Family: Varanidae	Monitors
Low	<i>Varanus albigularis</i>	Southern Rock Monitor
Low	<i>Varanus niloticus</i>	Nile Monitor
	Family: Chamaeleonidae	Chameleons
High	<i>Bradypodion ventrale</i>	Eastern Cape Dwarf Chameleon
	Family: Agamidae	Agamas
High	<i>Agama aculeata</i>	Western Ground Agama
High	<i>Agama atra</i>	Southern Rock Agama
	Suborder: SERPENTES	SNAKES
	Family: Typhlopidae	Blind Snakes
Medium	<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake
	Family: Leptotyphlopidae	Thread Snakes
High	<i>Leptotyphlops nigricans</i>	Black Thread Snake
	Family: Viperidae	Adders
High	<i>Bitis arietans</i>	Puff Adder
Low	<i>Bitis atropos</i>	Berg Adder
Medium	<i>Causus rhombeatus</i>	Rhombic Night Adder
	Family: Lamprophiidae	
Medium	<i>Aparallactus capensis</i>	Black-headed Centipede Eater
Low	<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake
High	<i>Boaedon capensis</i>	Common House Snake
Low	<i>Lamprophis aurora</i>	Aurora House Snake
Low	<i>Lamprophis fuscus</i>	Yellow-bellied Snake
Low	<i>Lamprophis guttatus</i>	Spotted Rock Snake
Low	<i>Lycodonomorphus inornatus</i>	Olive Ground Snake
Low	<i>Lycodonomorphus laevisissimus</i>	Dusky-Bellied Water Snake

	SCIENTIFIC NAME	ENGLISH NAME
Low	<i>Lycodonomorphus rufulus</i>	Brown Water Snake
Low	<i>Lycophidion capense</i>	Cape Wolf Snake
Medium	<i>Psammophis crucifer</i>	Cross-Marked Grass Snake
Low	<i>Psammophis notostictus</i>	Karoo Sand Snake
High	<i>Psammophylax rhombeatus</i>	Spotted Grass Snake
Low	<i>Duberria lutrix</i>	Common Slug Eater
Low	<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout
Medium	<i>Pseudaspis cana</i>	Mole Snake
	Family: Elapidae	Cobras, Mambas and Others
Low	<i>Aspidelaps lubricus</i>	Coral Shield Cobra
High	<i>Hemachatus haemachatus</i>	Rinkhals
Low	<i>Naja nivea</i>	Cape Cobra
	Family: Colubridae	
High	<i>Crotaphopeltis hotamboeia</i>	Red-Lipped Snake
Low	<i>Dasypeltis scabra</i>	Rhombic Egg Eater
Low	<i>Philothamnus occidentalis</i>	Western Natal Green Snake
Low	<i>Philothamnus semivariiegatus</i>	Spotted Bush Snake
Low	<i>Dispholidus typus</i>	Boomslang

Red Listed Reptiles of South Africa, Lesotho and Swaziland (2014) are indicated in the first column: **CR**= Critically Endangered, **En** = Endangered, **Vu** = Vulnerable, **NT** = Near Threatened, **DD** = Data Deficient. All other species are deemed of Least **Concern**

Table 6.5: The Amphibia species deduced to from time to time reside the site.

Systematic arrangement and nomenclature according to Minter, *et.al* (2004), Bates, *et.al* (2014) and Du Preez & Carruthers (2017).

Probability:

High Definitely there or have a *high* probability to occur;

Medium probability to occur based on ecological and distributional parameters;

Low probability to occur based on ecological and distributional parameters.

	CLASS: AMPHIBIA	AMPHIBIANS
	Order: ANURA	FROGS
	Family: Pipidae	Clawed Frogs
High	<i>Xenopus laevis</i>	Common Platanna
	Family: Bufonidae	Toads
High	<i>Sclerophrys capensis</i>	Raucous Toad
High	<i>Sclerophrys pardalis</i>	Eastern Leopard Toad
Low	<i>Vandijkophrynus gariiepensis</i>	Karoo Toad
	Family: Hyperoliidae	Reed Frogs
Low	<i>Hyperolius marmoratus</i>	Painted Reed Frog
Low	<i>Hyperolius semidiscus</i>	Yellow-striped Reed Frog
High	<i>Kassina senegalesis</i>	Bubbling Kassina
Low	<i>Semnodactylus wealii</i>	Rattling Frog
	Family: Brevicipitidae	Rain Frogs
Low	<i>Breviceps adspersus pentheri</i>	Bushveld Rain Frog
	Family: Phrynobatrachidae	Puddle Frog
Low	<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog
	Family: Pyxicephalidae	Striped Stream Frog
Medium	<i>Amietia delalandii</i>	Common River Frog
Low	<i>Amietia poyntoni</i>	Poynton's River Frog

High	<i>Strongylopus grayii</i>	Clicking Stream Frog
Low	<i>Strongylopus fasciatus</i>	
High	<i>Cocosternum boettgeri</i>	Boettger's Caco
Low	<i>Cocosternum nanum namum</i>	Bronze Caco
Low	<i>Pyxicephalus adspersus</i>	Giant Bullfrog
High	<i>Tomopterna tandy</i>	Tandy's Sand Frog
Low	<i>Tomopterna delalandii</i>	Cape Sand Frog

Red Data species rankings as defined in Minter, *et.al*, (2004) Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland (2004) and Bates, *et.al*, (2014) Atlas and are indicated in the first column: **CR**= Critically Endangered, **En** = Endangered, **Vu** = Vulnerable, **NT** = Near Threatened, **DD** = Data Deficient. All other species are deemed of Least **Concern**

6.3.3 Threatened and Red listed Reptile and Amphibian Species

The study site falls outside the natural range of the following terrestrial Eastern Cape Province Red Data herpetofauna species: Karoo dwarf tortoise, the Nile crocodile, salt marsh gecko, Cottrell's mountain lizard, coppery grass lizard, Fitzsimons' long-tailed seps, variable legless skink, Pondo dwarf chameleon, Kentani dwarf chameleon, Kwazulu dwarf chameleon, Elandsberg dwarf chameleon, forest thread snake, Albany adder, plain mountain adder, Kwazulu-Natal black snake, eastern green mamba, mistbelt chirping frog, Hogsback chirping frog, Hewitt's ghost frog, Amatola toad, kloof frog, Bilbo's rain frog and Knysna leaf-folding frog.

The study site lies near the centre of the distribution range of the Albany Sandveld Lizard (*Nucras taeniolata*) and there is a small possibility that this species, with the Red Data status of **Near Threatened**, may occur on the site.

6.4 General site assessment

The terrestrial habitat type on site has been altered by activities, clearing of vegetation, overgrazing by game, invasive plants, periodical veldfires, wire fences, gravel roads and powerlines.

Since the wetland system (one non-perennial drainage line) enjoys statutory protection, it is flagged as having a 'High Conservation Sensitivity'.

Screening Tool Animal species sensitivity is given as **High**. However, the author's impression is that the mammal species sensitivity is currently rather **Low** on the specific site, particularly on the northern part of the study site. Mayogi is (was) a game farm and several animal species (game species) occurred there from time to time. The Daniell Cheetah breeding project is located across the road. The many nature reserves/game farms in the area have inflated the estimate for animal species sensitivity:

Although Avian sensitivity is mentioned as **Low**, three bird species are mentioned under "**Animal species sensitivity**" as having medium sensitivity. A breeding pair of blue cranes were observed on the southern part of the area, which is excluded from this study.

From the vertebrate fauna perspective, sensitivity on site for the Terrestrial Biodiversity cannot be **Very High (disputed)** and is therefore regarded as being **Low**.

7. IMPACT ASSESSMENT

7.1: Planned Layout

JUWI provided the following layout plans via SiVest:

1. Red Rocket is going to construct a **new 132kV overhead** line across the property (Figure 7.1 below).



Figure 7.1: The new 132 kV Overhead line running across both the PV 1 and PV 2 sites.

2. Substations

There are three alternative locations for the PV 1 Substation:

Each substation location will consist of around 4ha and contain the proposed:

- O&M building
- Construction Laydown area
- Substation yard: IPP and Eskom (self-built side)
- BESS

Alternative 1:

Connect to the “Skilpad” substation on the northwest side (Figure 7.2 below). This implies to build a Substation containing the “IPP and Self-built side” to the **north** of the OHL. Then construct an “OHL as Self-built prospect to hand over one day” The OHL will connect the IPP/Self-built substation to the nearby Skilpad substation (Figure 7.3 below).

(Note: This will also imply a new OHL coming from the adjacent PV 2 site Substation).



Figure 7.2: Connect to the Skilpad Substation from the north-western side.



Figure 7.3: Substation containing the “IPP and Self-built side” to the **north** of the kV 132 OHL.

Alternative 2: Connect to the “Skilpad” substation on the south-western side (Figure 7.4 below). This will imply that PV1: substation will be directly **south-east** of the “Skilpad” substation (Figure 7.5 below).

(Note: This will imply that the PV2: substation will be 2km away and therefor need an OHL to connect the 132kV power line into the PV1 substation, onto a common 132kV busbar).



Figure 7.4: Connect to the Skilpad Substation from the south-western side.



Figure 7.5: The PV 1 substation close to, south-east of the Skilpad Substation.

Alternative 3: This is basically similar to Alternative 2, but the PV 2 substation will be incorporated into the PV 1 substation, i.e. on the same location. (Figure 7.6 below).



Figure 7.6: The PV 1 and PV 2 Substations built on the same locality

Apart from the above infrastructure and the No-Go Areas, [namely (i) the Mesic Thicket with spekboom in the south-eastern corner, (ii) the Daniell Cheetah Project area, (except the gate and access road) and (iii) the two Drainage Lines and their buffer areas] the rest of the available area will be used for the solar PV panels, associated roads cables and irrigation piping.

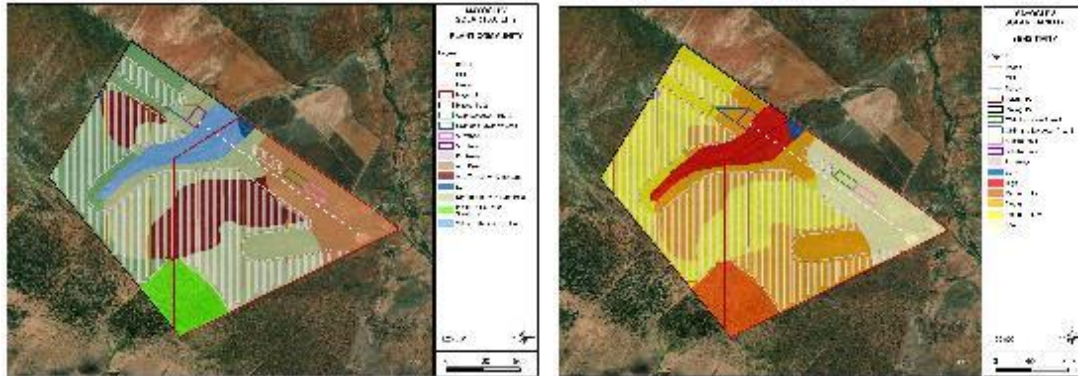


Figure 7.7: The final positions of the substations and other infrastructure over the plant community and sensitivity maps.

7.2 Methods

The following methodology was provided by SiVEST.

1. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

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. The total number of points scored for each impact indicates the level of significance of the impact.

1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;

- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

1.2.1 Rating System Used to Classify Impacts

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 be entirely 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 of the 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.
SIGNIFICANCE (S)		
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.		
The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
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.

The results of the Impact Assessment are presented in **Table 7.2** below.

As the Mesic Thicket with Spekboom and the Valley with Drainage Lines are both No-Go areas, and there will be no development, there will be no impacts in these two plant communities, therefore they are excluded from Table 7.2.

7.3 Results of Impact Assessment

Table 7.2: Impacts on Vegetation, Flora and Fauna for the Mayogi PV facility (both the PV 1 and PV 2 sites).

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
		Construction Phase																		
Although this Albany Alluvial Vegetation Type (present only on Mayogi PV 1 site) is regarded as Endangered , little or no elements typical remained on the small patch present on the site. The vegetation is totally transformed , the plant community identified is the Arid Karoo : Low species richness,	A fairly large part of this vegetation is regarded as restricted (No-Go) area e.g. around Daniell Cheetah Project, small drainage line and overhead powerline servitudes. However, there will be some development in the vicinity of the Skilpad substation, e.g. new Alternative 3 substation south of the Skilpad,	1	3	2	2	1	2	18	-18	Low	Except for the current Skilpad substation and planned developments leave the NO-GO areas in the north-eastern corner intact. Strictly control access to the No-Go area during construction phase. Avoid any grazing to allow recovery by natural succession. Disturb as little as	1	3	2	2	1	1	9	-9	Low

<p>Low ecological sensitivity.</p>	<p>substation or Alternative 1 north of the 132 kV Overhead powerline, maybe some solar PV panels, etc. in the remaining area. This will impact on vegetation and plant species</p>																														
<p>Vegetation and plant species in the Dry Thicket with Euphorbia on both the PV 1 and PV 2 sites): Medium species richness, Medium ecological sensitivity. Sundays Arid Thicket (= Sundays Noorsveld) is listed as Vulnerable in the 2022 NEMBA list.</p>	<p>Clearing of this vegetation for the solar PV panels and associated cables, access roads, water piping and other associated infrastructure will result in impacts on vegetation and plant species loss.</p>	1	3	3	2	1	2	20	-20	Low																					

												<ul style="list-style-type: none"> · During the construction phase workers must be limited to areas under construction and access to adjacent areas must be strictly controlled · Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas. · Plant only indigenous grass – no alien species. 								
Vegetation and plant species in the Arid Thicket on Limestone on both PV 1 and PV 2 sites: Low species richness, Medium-Low ecological sensitivity	Clearing of this vegetation for the solar panels and for Alternative 2 Substation solar PV panels and associated cables, access road, water piping and other associated infrastructure will	1	2	3	1	1	2	16	-16	Low	The clearing of vegetation must be kept to a minimum and remain within the footprint development – leave the rest of the area with natural vegetation intact, but there is very little, if any,	1	3	3	1	1	1	9	-9	Low

	<p>result in impacts on vegetation and plant species loss.</p>																														<p>natural vegetation left. Remove alien invasive species wherever possible Disturbed open areas must be rehabilitated immediately after construction has been completed · During the construction phase workers must be limited to areas under construction and access to adjacent areas must be strictly controlled · Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas. · Plant only indigenous grass – no alien species</p>
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<p>Vegetation and plant species in the Disturbed Open Thicket restricted to the PV 2 site: Low species richness, Medium-Low ecological sensitivity</p>	<p>Clearing of this vegetation for the solar PV panels and associated cables, access road, water piping and other associated infrastructure will result in vegetation and plant species loss.</p>	1	2	3	1	1	2	16	-16	Low	<p>The clearing of vegetation must be kept to a minimum and remain within the footprint development – leave the rest of the area with natural vegetation intact, but there is very little, if any, natural vegetation left. Remove alien invasive species wherever possible Disturbed open areas must be rehabilitated immediately after construction has been completed · During the construction phase workers must be limited to areas under construction and access to adjacent areas must be strictly controlled · Rehabilitated areas must be</p>	2	2	1	2	1	1	8	-8	Low
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											monitored to ensure the establishment of re-vegetated areas. · Plant only indigenous grass – no alien species									
Increase of alien and invasive plant species	Alien invasive plant species and weeds may encroach into any disturbed areas particularly areas cleared for the proposed development	2	2	2	2	1	2	18	-18	Low	An alien invasive management programme must be incorporated into the Environmental Management Programme; Ongoing alien plant control must be undertaken; Areas which have been disturbed will be quickly colonised by invasive alien species. An ongoing management plan must be implemented for the clearing/eradication of alien	2	1	1	2	1	1	7	-7	Low

												species. Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. Avoid planting of exotic plant species, use indigenous grass species.								
Mammals , unlikely to occur in the way of the construction, if present likely to move away.	Direct impacts on mammals and habitat loss by destruction	2	2	2	2	1	2	18	-18	Low	Should any mammal species be encountered or exposed during the construction phase, they should be removed and relocated to natural areas in the vicinity. The contractor must ensure that no indigenous mammal species are disturbed, trapped, hunted or killed during the construction	1	4	1	2	1	1	9	-9	Low

										<p>phase. Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance. The appropriate agency should implement an ongoing monitoring and eradication program for all invasive plant species growing on the site. Any post-development re-vegetation or landscaping exercise should use grass species indigenous to the area are preferred</p>								
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<p>The construction of the facility may lead to limited habitat loss and with little direct impacts on the birds</p>	<p>Direct impacts on birds and habitat loss</p>	2	2	2	2	1	2	18	-18	Low	<p>The spatial extent of construction activities be minimized, The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all construction activities remain within the demarcated footprint area. Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO). Provide adequate briefing for site personnel and residents prior to construction. breeding and foraging in the area should be</p>	2	1	1	1	1	1	6	-6	Low
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											minimized and controlled.									
Birds disturbance due to human activities	The presence of vehicles and construction workers will cause disturbance to avifauna, with the movement and activities of personnel on site and the associated noise, pollution and litter all having a negative effect on birds. In addition, the presence of construction workers will increase the probability of activities such as illegal hunting of	2	3	1	2	1	2	18	-18	Low	Movement of construction vehicles and workers beyond the boundary of the site must be minimized. In addition, workers must be instructed to minimize disturbance of birds at all times, and steps must be taken to ensure that no illegal hunting occurs. The boundaries of the development footprint areas are to be clearly	2	2	1	2	1	1	8	-8	Low

	birds. The permanent presence of a much larger number of people than presently occur at the site will result in greater disturbance of birds that use the area for foraging and breeding.										demarcated and it must be ensured that all activities remain within the demarcated footprint area. Disturbance by residents of birds breeding and foraging in the area should be minimized. Provide adequate briefing for site personnel. Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO) and residents should always be aware of the importance of birds in their built environment.									
Birds possibility of electrocution	Electrical infrastructure such as OHL pose a potential collision risk to	2	2	1	2	1	1	8	-8	Low	Normal safety measures for electrical	2	1	1	1	1	1	6	-6	Low

	flying birds, and a potential electrocution risk to perching birds. The magnitudes of these risks are much lower than the corresponding risks associated with large overhead transmission lines.										installations as used by Eskom									
Reptile or amphibia species may be influenced. The current habitat is mostly disturbed terrestrial habitat	Direct impact on herpetofauna and habitat destruction, unlikely to be present at PV construction site, Those present may move away, slower movement. The footprint for the proposed residential development will result in clearing most of the vegetation area. This will result in some loss of	2	2	2	2	1	2	18	-18	Low	Should any reptile or amphibia species are encountered or exposed during the construction phase, they should be removed and relocated to natural areas in the vicinity. The contractor must ensure that no indigenous herpetofauna species are disturbed, trapped, hunted or killed during	1	4	1	2	1	1	9	-9	Low

	herpetofauna habitat.																														
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Operational Phase																				
<p>Although this Albany Alluvial Vegetation Type is regarded as Endangered, little or no elements typical remained on the small patch present on the PV 1 site. The vegetation is totally transformed, the plant community identified is the Arid Karoo: Low species richness, Low ecological sensitivity.</p>	Maintenance of facility	1	3	2	1	4	1	11	-11	Low	<p>Except for the current Skilpad substation and planned developments leave the NO-GO areas in the north-eastern corner intact.</p> <p>Strictly control access to the No-Go area during operational phase.</p> <p>Avoid any grazing to allow recovery by natural succession. Disturb as little as possible in the powerline servitude</p>	1	2	2	1	4	1	10	-10	Low
<p>Vegetation and plant species in the Dry Thicket with Euphorbia: Medium species richness, Medium</p>	Maintenance of facility	1	3	2	1	4	1	11	-11	Low	<p>Remove alien invasive species wherever possible</p> <p>Disturbed open areas must be rehabilitated</p>	1	2	2	1	4	1	10	-10	Low

<p>ecological sensitivity. Sundays Arid Thicket (= Sundays Noorsveld) is listed as Vulnerable in the 2022 NEMBA list.</p>																															
<p>Vegetation and plant species in the Arid Thicket on Limestone: Low species richness, Medium-Low ecological sensitivity</p>	<p>Maintenance of facility</p>	<p>1</p>	<p>3</p>	<p>2</p>	<p>1</p>	<p>4</p>	<p>1</p>	<p>11</p>	<p>-11</p>	<p>Low</p>	<p>Remove alien invasive species wherever possible Disturbed open areas must be rehabilitated immediately after construction has been completed Rehabilitated areas must be monitored to ensure the establishment of re-vegetated areas. Plant only indigenous grass</p>	<p>2</p>	<p>1</p>	<p>2</p>	<p>1</p>	<p>4</p>	<p>1</p>	<p>10</p>	<p>-10</p>	<p>Low</p>											

										<p>Ongoing alien plant control must be undertaken; Areas which have been disturbed will be quickly colonised by invasive alien species. An ongoing management plan must be implemented for the clearing/eradication of alien species. Monitor all sites disturbed by construction activities for colonisation by exotics or invasive plants and control these as they emerge. Avoid planting of exotic plant species, use indigenous grass species.</p>								
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<p>Mammals, unlikely to occur in the way of the facility during operational phase, if present likely to move away.</p>	<p>Maintenance of facility</p>	2	1	1	1	4	1	9	-9	Low	<p>Should any mammal species be encountered or exposed during the operational phase, they should be removed and relocated to natural areas in the vicinity. The contractor must ensure that no indigenous mammal species are disturbed, trapped, hunted or killed during the operational phase. Conservation-orientated clauses should be built into contracts for personnel, complete with penalty clauses for non-compliance. The appropriate agency should implement an ongoing monitoring and</p>	2	1	1	1	4	1	9	-9	Low
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											eradication program for all invasive plant species growing on the site. Any post-development re-vegetation or landscaping exercise should use grass species indigenous to the area are preferred									
Birds habitat loss or direct impact	Maintenance of facility	2	1	1	1	4	1	9	-9	Low	Any bird nests that are found during the operational period must be reported to the Environmental Control Officer (ECO). Provide adequate briefing for site personnel and residents prior to construction. breeding and foraging in the area should be minimized and controlled.	2	1	1	1	4	1	9	-9	

Birds Disturbance due to human activities	Maintenance of facility	2	1	1	1	4	1	9	-9	Low	Movement of vehicles and workers beyond the boundary of the site must be minimized. In addition, workers must be instructed to minimize disturbance of birds at all times, and steps must be taken to ensure that no illegal hunting occurs. Disturbance of birds breeding and foraging in the area should be minimized. Provide adequate briefing for site personnel. Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO) and residents should	2	1	1	1	4	1	9	-9	
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											always be aware of the importance of birds in their built environment.									
Birds electrocution	Maintenance of facility	2	2	1	1	4	1	10	-10	Low	Normal safety measures for electrical installations as used by Eskom	2	1	1	1	4	1	9	-9	
Herpetofauna direct impact or habitat loss	Maintenance of facility	2	1	1	1	4	1	9	-9	Low	Should any reptile or amphibia species are encountered or exposed during the operational phase, they should be removed and relocated to natural areas in the vicinity. The contractor must ensure that no indigenous herpetofauna species are disturbed, trapped, hunted or killed during the operational phase. During the operational phase	2	1	1	1	4	1	9	-9	

											there may be increased surface runoff and a decreased water quality. The appropriate agency should implement an ongoing monitoring and eradication program for all invasive plant species growing on the site. Any post-development re-vegetation or landscaping exercise should use species indigenous to the area.									
Decommissioning Phase																				
Cumulative																				
The facility will only very slightly affect Broad-scale ecological processes	Transformation and presence of the facility will only slightly contribute to cumulative habitat loss and impacts	2	2	2	2	4	2	24	-24	Medium	See mitigation measures above	2	1	2	1	4	1	22	-22	Low

	on broad-scale ecological processes																		
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Table 7.3: Summary of impacts on biodiversity

No	Plant Community	Construction phase		Operational phase	
		Without mitigation	With mitigation	Without mitigation	With mitigation
1	Arid Karoo	-18 Low	-9 Low	-11 Low	-10 Low
2	Dry Thicket with Euphorbia	-20 Low	-10 Low	-11 Low	-10 Low
3	Arid Thicket on Limestone	-16 Low	-9 Low	-11 Low	-10 Low
4	Disturbed Open Thicket	-16 Low	-8 Low	-11 Low	-9 Low
	Alien, Invasive plants	-12 Low	-10 Low	-12 Low	-10 Low
	Mammals Habitat Loss	-18 Low	-9 Low	-9 Low	-9 Low
	Birds Habitat loss	-18 Low	-6 Low	-9 Low	-9 Low
	Birds Disturbance by human activities	-18 Low	-8 Low	-9 Low	-9 Low
	Birds Electrocutation	-8 Low	-6 Low	-10 Low	-9 Low
	Herpetofauna	-18 Low	-9 Low	-9 Low	-9 Low
	Cumulative	-24 Low	-22 Low		

From Table 7.3 it can be derived that the impacts of the proposed development on biodiversity will, without as well as with mitigation measures, be **Low** on the Arid Karoo and Dry Thicket with Euphorbia, in spite of these systems being regarded as threatened ecosystems. On the site both these systems are highly disturbed and even transformed, therefore it is suggested that, except for the No-Go areas, the proposed development can be supported (see chapter 5 on vegetation) The impacts of the proposed development will be **Low** on the rest of the vegetation, plant species and fauna.

7.3 Impact of other energy related developments within 35 km radius

No information)

It is suggested that the cumulative impact on vegetation, plants and fauna of the Mayogi PV 1 project, in relation to other possible PV developments, is rather low.

7.4 Comparative Assessment of the Three Alternative substations

All three alternatives are located within the Arid Karoo plant community, which falls within the Albany Alluvial vegetation type (see Figure 5.. According to SANBI & DEAT (2009) and NEMBA, Government Notice 1002 (2011) and Government Notice 689 (2022) the Ecosystem Status for **Albany Alluvial** vegetation type is as **Endangered**. On the specific site the vegetation is mostly **transformed**, with very little original natural vegetation remaining. The Option 3 is preferred, as the PV1 and PV 2 substations is consolidated on a single piece of land, causing less fragmentation and less OHLs. If this is not feasible, then Substation Option 2, located at the Skilpad substation is preferred.

PREFERRED Substation 3	Located at the Skilpad Substation, including substation od PV 2, on the Arid Karoo mapping unit that is degraded to transformed, less area used, less OHLs
FAVOURABLE Substation 2	- Located, at Skilpad substation, less area disturbed, less OHLs on the Arid Karoo mapping unit very favourable
LEAST PREFERRED Substation 1	- Located, north of the 132 kV OHL on the Arid Karoo mapping unit that is degraded to transformed, but more to the centre of the site, more area used for OHLs
NO PREFERENCE	

Alternative	Preference	Reasons (incl. potential issues)
SUBSTATION ALTERNATIVES		
Substation Option 1	Least Preferred	Option 1 is located north of the 132kV OHL in the Arid Karoo plant community in the centre of the area use more space and needs more OHLs
Substation Option 2	Very Favourable	Substation 2 is located, at Skilpad substation, less area disturbed, less OHLs.
Substation Option 3	Preferred	Located at the Skilpad Substation, including substation od PV 2 , on the Arid Karoo mapping unit, less area used, less OHLs

8. DISCUSSION AND CONCLUSION

8.1 Vegetation

The relevant literature and databases were used to obtain data regarding threatened, protected, alien invasive and medicinal plant species, also regional vegetation, threatened status of vegetation types, protected and conservation areas, critical biodiversity areas, wetlands and water courses.

Standard methods for vegetation surveys were applied. Plant communities were mapped and described including total floristic composition per plant community. All the above data were applied in analyses to determine conservation status and ecological sensitivity per plant community.

According to SANBI & DEAT (2009) and NEMBA, Government Notice 1002 (2011) and Government Notice 689 (2022) the Ecosystem Status for **Albany Alluvial** vegetation type is as **Endangered**. On the specific site the vegetation is mostly **transformed**, with very little original natural vegetation remaining. According to Mucina & Rutherford (2006, 2018) the Sundays Noorsveld and the Sundays Thicket vegetation types are classified as **Least Concern**. The **Sundays Arid Thicket** (= Sundays Noorsveld) is listed as **Vulnerable** in the 2022 NEMBA list of Threatened Ecosystems.

No Irreplaceable Critical Biodiversity Areas occur in the site area. Most of the site is regarded as **Ecological Support Area 1**.

Eleven plant species of conservation concern could occur in the general area of the site, but none of these were recorded during the field survey.

The vegetation study of the proposed site resulted in the identification of six different plant communities (= ecosystems on the plant community level of organisation) that could be mapped. The terrestrial plant communities identified mostly have low to medium plant species richness, no threatened, red data or protected plant species were recorded on the site.

The results of the vegetation and flora study indicate that the Valley with Drainage line has High Ecological sensitivity, therefore No-Go area. The Mesic Thicket with spekboom has Medium-High ecological sensitivity and conservation value and this has also been marked as No-Go area. The rest of the terrestrial habitat areas have low, medium-low or medium ecological sensitivity.

Most of the terrestrial vegetation areas have low to medium plant species richness, no threatened or nationally protected plant species and low to medium conservation value.

Should the Valley with the Drainage Line be conserved and protected, and the Mesic Thicket with spekboom be at least partly conserved, it is suggested that the construction of the proposed PV facility can be supported.

8.2 Fauna

Although many mammal, bird and herpetofauna species may from time to time occur in the area of the site, only a few may be encountered or observed at any one time. This can be

ascribed to very small species or low species density and individuals are therefore not easily seen. Many smaller mammals and herpetofauna are either secretive, nocturnal, hibernators and/or seasonal.

The Animal Sensitivity is regarded as **High** for the study site. However, the impression from this study is that the animal species sensitivity is rather **LOW** on the study site, because the habitats are mostly degraded or transformed. Note that Mayogi is (was) a game farm and several animal species (game species) occurred from time to time. There was a constant flow of animal species bought or bred and later sold. The Daniell Cheetah breeding project is located across the road. The many animals that are present on several nature reserves/game farms in the area **inflate** the estimate by the Screening Tool for Animal Species Sensitivity on this particular study site. Furthermore, Animal Species Sensitivity includes bird species, of which the Screening Toll provides a separate “Bird Species Sensitivity” result indicated as Low. The two mammal species have only Medium sensitivity.

From a vertebrate fauna perspective, there is no objection against the development on condition that the development adheres to the condition concerning the protection of the Valley and Drainage Line on the site.

8.3 Conclusion

It is suggested that the planned development be supported.

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10. CURRICULA

10.1 Abridged Curriculum Vitae: Prof George Johannes Bredenkamp

Born: 10 February 1946 in Johannesburg, South Africa.

Citizenship: South African

Marital status: Married, 1 son, 2 daughters

Present work address

EcoAgent CC

Ecological, botanical and biodiversity consultants

PO Box 25533, Monument Park, 0105, South Africa

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E-Mail: ecoagent@mweb.co.za

Previous work address:

Extra-ordinary Professor

Department of Plant Sciences, University of Pretoria, Pretoria, 0002, South Africa

Qualifications:

1963 Matriculation Certificate, Kempton Park High School

1967 B.Sc. University of Pretoria, Botany and Zoology as majors,

1968 B.Sc. Hons. (cum laude) University of Pretoria, Botany.

1969 H.E.D. (cum laude) Pretoria Teachers Training College.

1975 M.Sc. University of Pretoria, Plant Ecology .

1982 D.Sc. (Ph.D.) University of Pretoria, Plant Ecology.

Theses: (M.Sc. and D.Sc.) on plant community ecology and wildlife management in nature reserves in South African grassland and savanna.

Professional titles:

MSAIE&ES South African Institute of Ecologists and Environmental Scientists
- 1989-1990 Council member

MGSSA Grassland Society of Southern Africa
- 1986 Elected as Sub-editor for the Journal
- 1986-1989 Serve on the Editorial Board of the Journal
1990 Organising Committee: International Conference: Meeting Rangeland challenges in Southern Africa
- 1993 Elected as professional member

Pr.Sci.Nat. South African Council for Natural Scientific Professions **Reg No 400086/83**
1993-1997 **Chairman** of the Professional Advisory Committee: Botanical Sciences
- 1993-1997: **Council Member**
- 1992-1994: Publicity Committee
- 1994-1997: Professional Registration Committee
2017-2020: Council Member

Professional career:

- Teacher in Biology 1970-1973 in Secondary Transvaal Schools
- Lecturer and senior lecturer in Botany 1974-1983 at University of the North
- Associate professor in Plant Ecology 1984-1988 at Potchefstroom University for CHE
- Professor in Plant Ecology 1988-2008 at University of Pretoria.
- Founder and owner of the Professional Ecological Consultancy firms Ecotrust Environmental Services CC and Eco-Agent CC, 1988-present.

Academic career:

- Students:
 - Completed post graduate students: M.Sc. 57; Ph.D. 16.
- Author of:
 - about 200 scientific papers in refereed journals
 - >150 papers at national and international congresses
 - >1000 scientific (unpublished) reports on environment and natural resources
 - 17 popular scientific papers.
 - about 45 contributions in books
- Editorial Committees of
 - South African Journal of Botany,
 - Journal Grassland Society of Southern Africa,
 - Bulletin of the South African Institute of Ecologists.
 - Journal of Applied Vegetation Science.(Sweden)
 - Phytocoenologia (Germany)
- Highest FRD evaluation category: C1 (=leader in South Africa in the field of Vegetation Science/Plant Ecology)

Membership:

- International Association of Vegetation Science.
- International Society for Ecology (Intecol)
- Association for the Taxonomic study of the Flora of Tropical Africa (AETFAT).
- South African Association of Botanists (SAAB)
 - 1988-1993 Elected to the **Council** of SAAB.
 - 1989-1990 Elected as **Chairman** of the Northern Transvaal Branch
 - 1990 Elected to the Executive Council as **Vice-President**
 - 1990 Sub-editor Editorial Board of the Journal
 - 1991-1992 Elected as **President** (2-year period)
 - 1993 **Vice-President** and Outgoing President
- Wildlife Management Society of Southern Africa
- Suid-Afrikaanse Akademie vir Wetenskap en Kuns
(=South African Academy for Science and Art).
- Wildlife Society of Southern Africa
 - 1975 - 1988: Member
 - 1975 - 1983: Committee member, Pietersburg Centre
 - 1981 - 1982: **Chairman**, Pietersburg Centre
- Dendrological Society of Southern Africa

- 1984 - present: Member
- 1984 - 1988: Committee member, Western Transvaal Branch
- 1986 - 1988: **Chairman**, Western Transvaal Branch
- 1987 - 1989: Member, Central Committee (National level)
- 1990 - 2000: Examination Committee
- Succulent Society of South Africa
 - 1987 - present: Member
- Botanical Society of South Africa
 - 2000 – present: Member
 - 2001- 2008: Chairman, Pretoria Branch
 - 2009-present Committee member Pretoria Branch
 - 2002 – 2015: Chairman, Northern Region Conservation Committee
 - 2002- 2007: Member of Council
 - 2017-2017 President of Council

Special committees:

- Member or past member of 10 special committees re ecology, botany, rangeland science in South Africa.
- Member of the International Code for Syntaxonomical Nomenclature 1993-1996.

Merit awards and research grants:

- 1968 Post graduate merit bursary, CSIR, Pretoria.
- 1977-1979 Research Grant, Committee re Research Development, Dept. of Co-operation and Development, Pretoria.
- 1984-1989 Research Grant, Foundation for Research Development, CSIR, Pretoria.
- 1986-1987 Research Grant, Dept. of Agriculture and Water Supply, Potchefstroom.
- 1990-1997 Research Grant, Dept. of Environmental Affairs & Tourism, Pretoria.
- 1991-present Research Grant, National Research Foundation , Pretoria.
- Research Grant, Water Research Commission.
- 1999-2003 Research Grant, Water Research Commission.
- 2006 South African Association of Botanists Silver Medal for outstanding contributions to South African Botany

Abroad:

- 1986 Travel Grant, Potchefstroom University for Christian Higher Education, Potchefstroom
Visits to Israel, Italy, Germany, United Kingdom, Portugal.
- 1987 Travel Grant, Potchefstroom University for Christian Higher Education, Potchefstroom.
Visits to Germany, Switzerland, Austria, The Netherlands, United Kingdom.
- 1990 Travel Grant, FRD.
Visit to Japan, Taiwan, Hong-Kong.
- 1991 Travel Grant, FRD.
Visits to Italy, Germany. Switzerland, Austria, France, The Netherlands, United Kingdom.
- 1993 Travel Grant, University of Pretoria.
Visits to the USA, Costa Rica, Czech Republic, Austria.
- 1994 Travel Grant FRD.
Visits to Switzerland, The Netherlands, Germany, Czech Republic.
- 1995 Travel Grant FRD, University of Pretoria

Visits to the USA

Travel Grant, University of Pretoria, Visit to the UK.

Travel Grant University of Pretoria, Visit Czech Republic, Bulgaria

Travel Grant, University of Pretoria, Visit Czech Republic, Italy, Sweden

Travel Grant, University of Pretoria, Visit Hungary, Spain, USA

Travel Grant, University of Pretoria, Visit Poland, Italy, Greece.

Travel Grant, NRF, Visit Brazil

2006 German Grant Invited lecturer in Rinteln, Germany

Consultant

Founder and owner of Ecotrust Environmental Services CC and Eco-Agent CC

Since 1988 >1000 reports as consultant on environmental matters, including:

Game Farm and Nature Reserve planning,

Environmental Impact Assessments,

Environmental Management Programme Reports,

Vegetation Surveys,

Wildlife Management,

Veld Condition and Grazing Capacity Assessments,

Red data analysis (plants and animals).

10.2. Abridged Curriculum Vitae: Jacobus Casparus Petrus (Jaco) Van Wyk

Identity number 680804 5041 08 4
Gender Male
Date of birth 4 August 1968
Nationality South African
Home languages Afrikaans, fluent in English
Postal address P.O. Box 25085, Monument Park, Pretoria, 0105.
Tel no +27 12 347 6502, Cell +27 82 410 8871
E-mail jcpvanwyk@absamail.co.za
Present position Co-Department Head, Environmental Education & Life Sciences,
Hoërskool Waterkloof
Consultant Specialist Environmental Assessments, EIAs, writing, photo-recording
Qualifications **B.Sc.** (U.F.S.) **B.Sc. (Hon.)** (U.F.S.), **H.E.D** (U.F.S.), **M.Sc.** (U.F.S.)
Honours Foundation of Research Development bursary holder
Professional Natural Scientist (Zoology) – S.A Council for Natural
Scientific Professions, Registration # 400062/09
Notable Research Contribution In-depth field study of the giant bullfrog

Formal Courses Attended Outcomes Based Education, University of the South Africa
(2002)
Introductory Evolution, University of the Witwatersrand
(2008)
OBE, GET & FET training, 2002-2008, Education
Department

Employment history

2009 – Present Vertebrate surveys for different Environmental Companies.

2000 – 2018 Co-Department Head for Environmental Education & Life Sciences, Hoërskool Waterkloof, Pretoria.

1995 - 1999 Teaching Biology (Grades 8 – 12) and Physics / Chemistry (Grades 8 – 9) at the Wilgerivier High School, Free State. Duties included teaching, mid-level management and administration.

July 1994 – Dec 1994 Teaching Botany practical tutorials to 1st year students at the Botany & Zoology Department of the Qwa-Qwa campus of the University of Free State, plant collecting, amphibian research

1993 - 1994 Mammal Research Institute (University of Pretoria) research associate on the Prince Edward Islands: topics field biology and population dynamics of invasive alien rodents, three indigenous seals, invertebrate assemblages, censusing king penguin chicks and lesser sheathbills, and marine pollution

1991 - 1993 Laboratory demonstrator for Zoological and Entomological practical tutorials, and caring for live research material, University of the Free State

1986 - 1990 Wildlife management and eco-guiding, Mt. Everest Game Farm, Harrismith

Professional Achievement **Research:** Author and co-author of 52 scientific publications in peer-reviewed and popular subject journals, and >350

contractual EIA research reports. Extensive field work and laboratory experience in Africa

Public Recognition: Public speaking *inter alia* radio talks, TV appearances

Hobbies: Popular writing, travel, marathon running, climbing (viz Kilimanjaro), photography, biological observations, public speaking.