APPENDIX E

SPECIALISTS' REPORTS

APPENDIX E1: Aquatic Compliance Statement

Aquatic Compliance Statement for the proposed Rhino Solar PV Facility, North West

04 MAY 2023

RUSTENBURG SOLAR PV CLUSTER, RUSTENBURG, NORTH WEST PROVINCE

Prepared by:

Dr Divan van Rooyen

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And:

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NITAI CONSULTING

SPECIALIST ENVIRONMENTAL CONSULTING

Authors	Qualification	Date	Signature	Version No.
Dr Divan van Rooyen	Ph.D. Environmental Science (NWU) (Can. Nat. Sci. Aquatic Science 151272)	06 May 2023		1.2
Denisha Ponnusamy	M.Sc. Hydrology (UniZulu) (Can. Nat. Sci. Environmental Science 155319)	08 May 2023		2.0
Reviewed by	**Qualification**	**Date**	**Signature**	**Version No.**
Elzet Human	M-Tech Nature Conservation (TUT) (Pri. Sci. Nat. Conservation Science 147031)	09 May 2023		3.0
Antoinette Bootsma	M.Sc. Environmental Science (UNISA) (Pri. Sci. Nat. Ecology & Botany 400222-09)	24 May 2023		4.0
Prepared for	Nemai Consulting (Pty) Ltd. 147 Bram Fischer Drive, Ferndale Randburg, 2194 NEMAI CONSULTING			

Table 1: Requirements of a Compliance Statement as set out in GN 320

Requirements of a Compliance Statement as set out in GN 320	**Rhino Solar PV Facility wetland specialist findings**
3.1 The compliance statement / assessment must be prepared by a suitably qualified specialist registered with the SACNASP, with expertise in the field of aquatic sciences.	Divan van Rooyen Ph.D. Environmental Science (Aquatic Ecosystem Health) NWU, SACNASP Reg. No. 151272 (Aquatic Sciences) Expertise in the field of aquatic sciences evident from CV (appendix A)
3.2. The compliance statement / assessment must	
3.2.1. be applicable to the preferred site and the proposed development footprint;	A specialist assessment was conducted on the site earmarked for the proposed Rhino Solar PV Facility.
3.2.2. confirm that the site is “low” sensitivity for aquatic biodiversity; and	Please refer to Section 5 for the confirmation of Low sensitivity.
3.2.3. indicate whether or not the proposed development will have an impact on the aquatic features.	Refer to Section 5 and 6 for Results and Sensitivity.
3.3. The compliance statement must contain, as a minimum, the following information:	
3.3.1 contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix 1
3.2.2. a signed statement of independence by the specialist;	Appendix 4
3.3.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Site assessments were conducted in Summer (January 2023).
3.3.4. a baseline profile description of biodiversity and ecosystems of the site;	Please refer to Section 2 of this Compliance Statement.
3.3.5. the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant;	Please refer to Section 3 of this Compliance Statement for a brief detailed description of the methodology used to undertake the site inspection and specialist assessment.
3.3.6. in the case of a linear activity, confirmation from the aquatic biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed,	Please refer to Section 7 of this Compliance Statement for a discussion on rehabilitation.

the land can be returned to the current state within two years of completion of the construction phase;	
3.3.7. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	None. No freshwater features were identified during the site visits.
3.3.8. a description of the assumptions made, any uncertainties or gaps in knowledge or data;	Please refer to Section 4 of this Compliance Statement.
3.3.9. any conditions to which this statement is subjected.	It needs to be confirmed whether the proposed development will require authorisation in terms of the National Water Act (Section 21 (c) and (i) water uses).

1 INTRODUCTION & PROJECT DESCRIPTION

1.1 Introduction

Nitai Consulting (Pty) Ltd. was appointed by Nemai Consulting (Pty) Ltd. to undertake an Aquatic Compliance Statement for the proposed Rhino Solar Photovoltaic Facility (hereafter referred to as the study area), North West Province, South Africa. The study area has been classified as Low sensitivity in terms of the Aquatic Biodiversity Theme in terms of the Department of Forestry, Fisheries and the Environment (DFFE) Environmental Screening Tool.

The scope of this assessment is guided by the requirements of the National Environmental Management Act (Act No. 107 of 1998) and the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (Government Notice No. 320 in Government Gazette No. 43110 of 20 March 2020) (see Table 1 above for the requirements).

1.2 Background

Rhino Solar PV (Pty) Ltd. (hereafter referred to as the proponent) proposes the construction of the Rhino Solar PV and associated infrastructure which is situated in the near Rustenburg in the North West Province of South Africa (Figure 1). The Solar PV will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 65 MW. The proposed development will include PV modules, mounting structures, a substation, Batter Energy Storage System (BESS), site and internal roads, office/parking and a temporary and permanent laydown area.

Two alternative layouts (Figure 2 and Figure 3) for a Solar PV facility (known as Rhino) are proposed by the proponent. Alternative 1 is located on Portion 11 of the Farm Rhebokhoek No. 101 and Portions 26 and 31 of the Farm Stroomrivier No. 236, north west of Rustenburg, in the North West Province (Figure 2 & Figure 3).

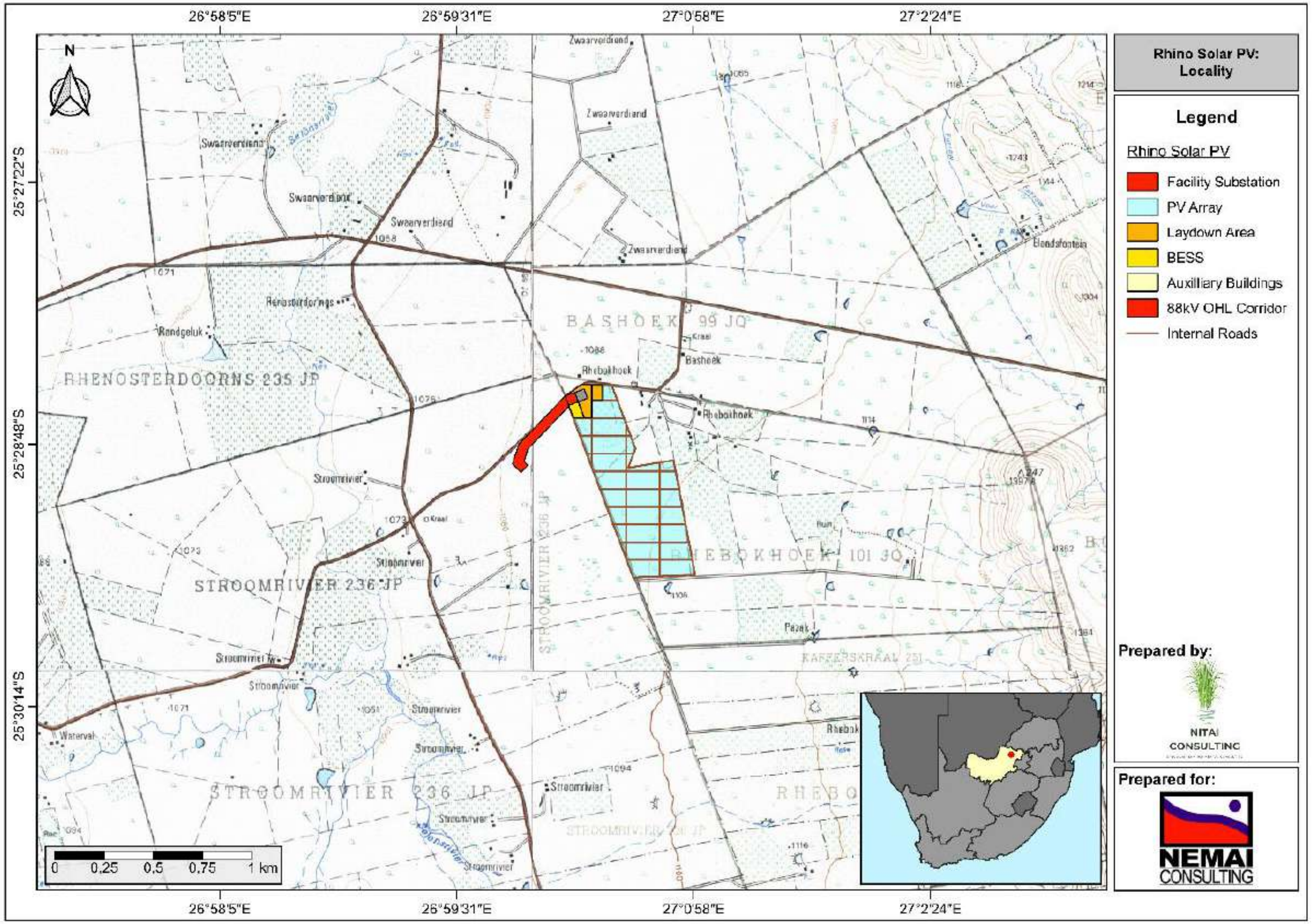


Figure 1: Locality map of the Rhino Solar PV and associated infrastructure

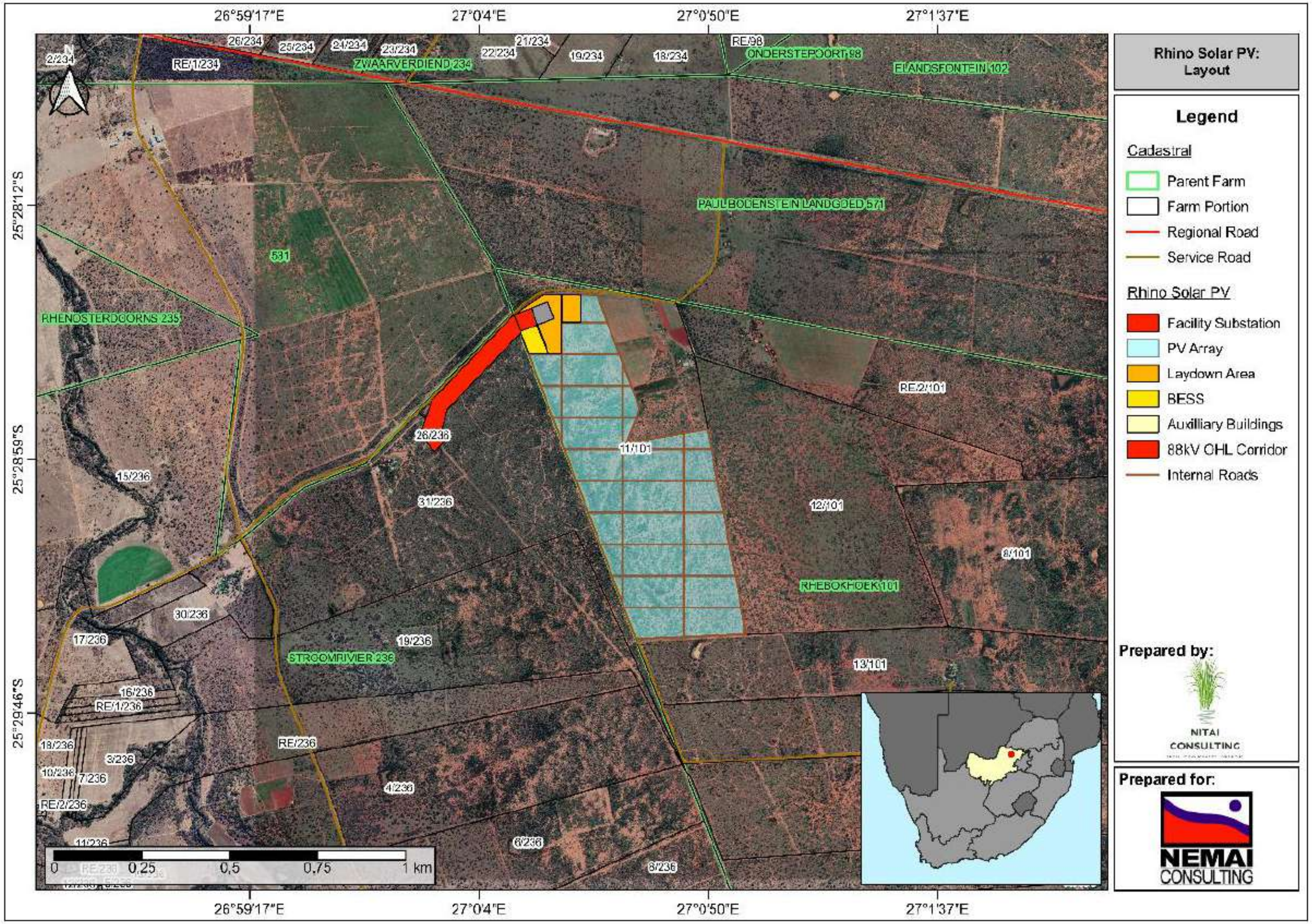


Figure 2: Layout of the Rhino Solar PV Facility (Alternative 1)

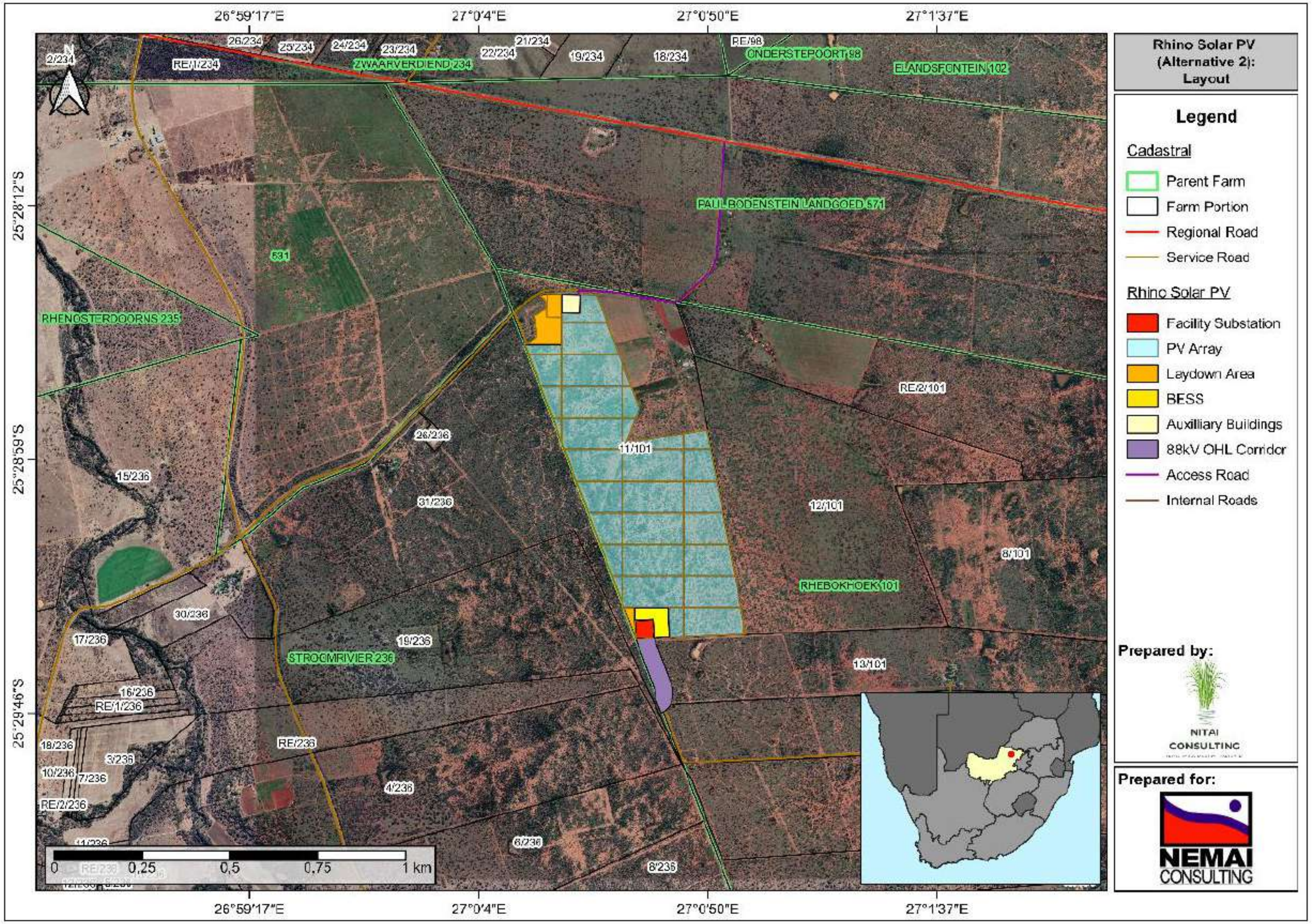


Figure 3: Layout of the Rhino Solar PV Facility (Alternative 2)

2 DESCRIPTION OF THE STUDY AREA

The study area is located in the North West Province of South Africa and is within the BSh (cold semi-arid steppe) climate according to the Koppen-Geiger classification. The area is characterized with summer rainfall with very dry winters. The mean annual precipitation is between 550 – 650 mm with a mean monthly maximum and minimum temperatures of 35.2 °C and –0.4 °C, respectively (Mucina & Rutherford, 2006).

The underlying geology of the study area consists of Sedimentary and Shale of the Pretoria sub-group. The whole study area consists of various different land types (Ae, Fb and Ib) with different soil types (Glenrosa, Arcadia, Shortland and Hutton). The soils are typically red-yellow, apedal and freely drained (Mucina & Rutherford, 2006). These soils also rarely show any redox morphology characteristics and mottling, or is unlikely to show redox characteristics (van der Waals *et al*., 2019).

The study area is located within the Limpopo Water Management Area and within the A22D Quaternary Catchment. Furthermore, the study area is located to the east of the Selons River, and no non-perennial rivers are in close proximity to the study area (Figure 4 and Figure 5). According to the North West Biodiversity Sector Plan the proposed development is also not located within any Critical Biodiversity or Ecological Support Area's (Desmet & Shaller, 2015). There are several agricultural dams located near the study area. Importantly, there is no aquatic feature located within the proposed development (Figure 4 and Figure 5).

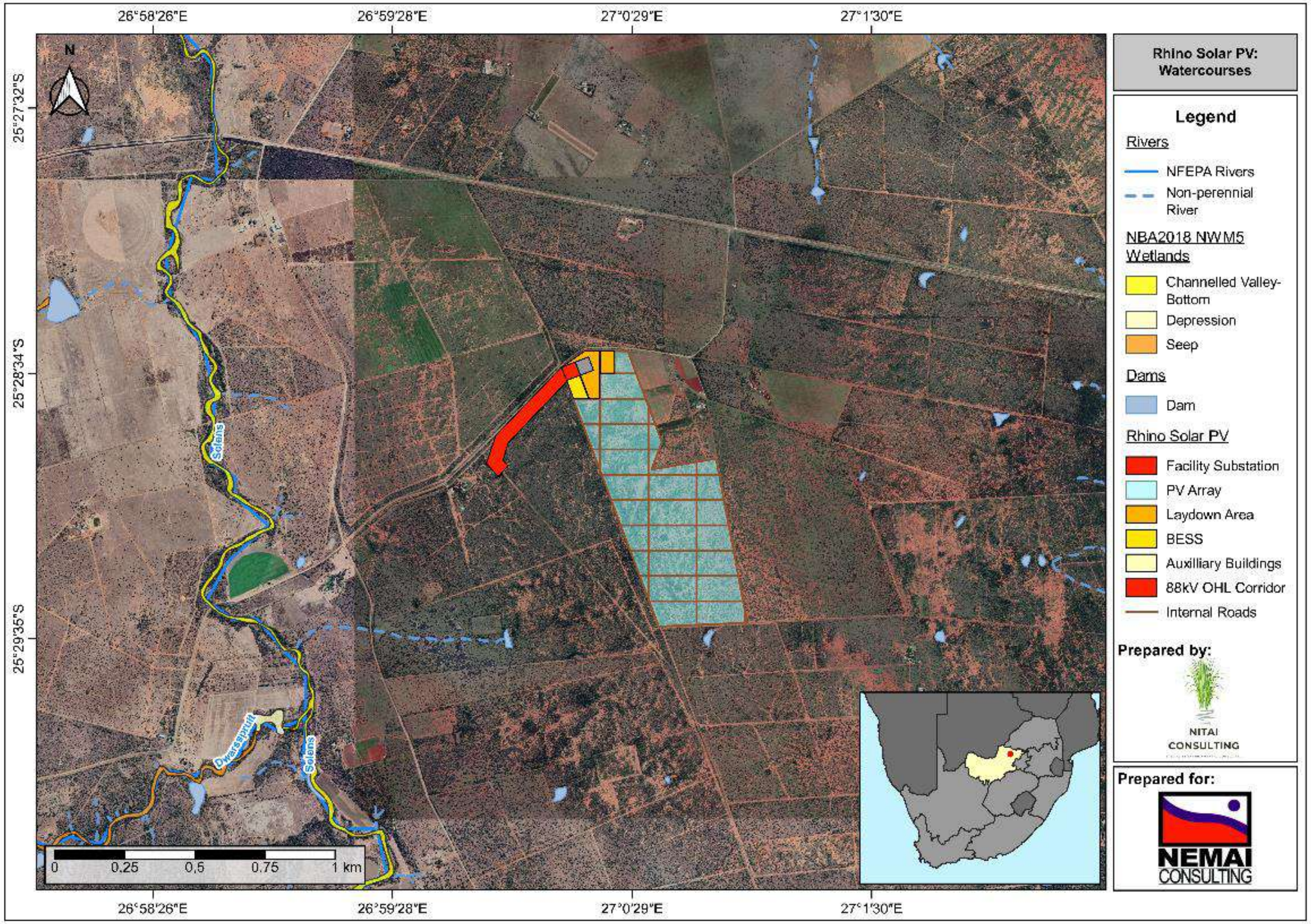


Figure 4: All watercourses associated with Alternative 1

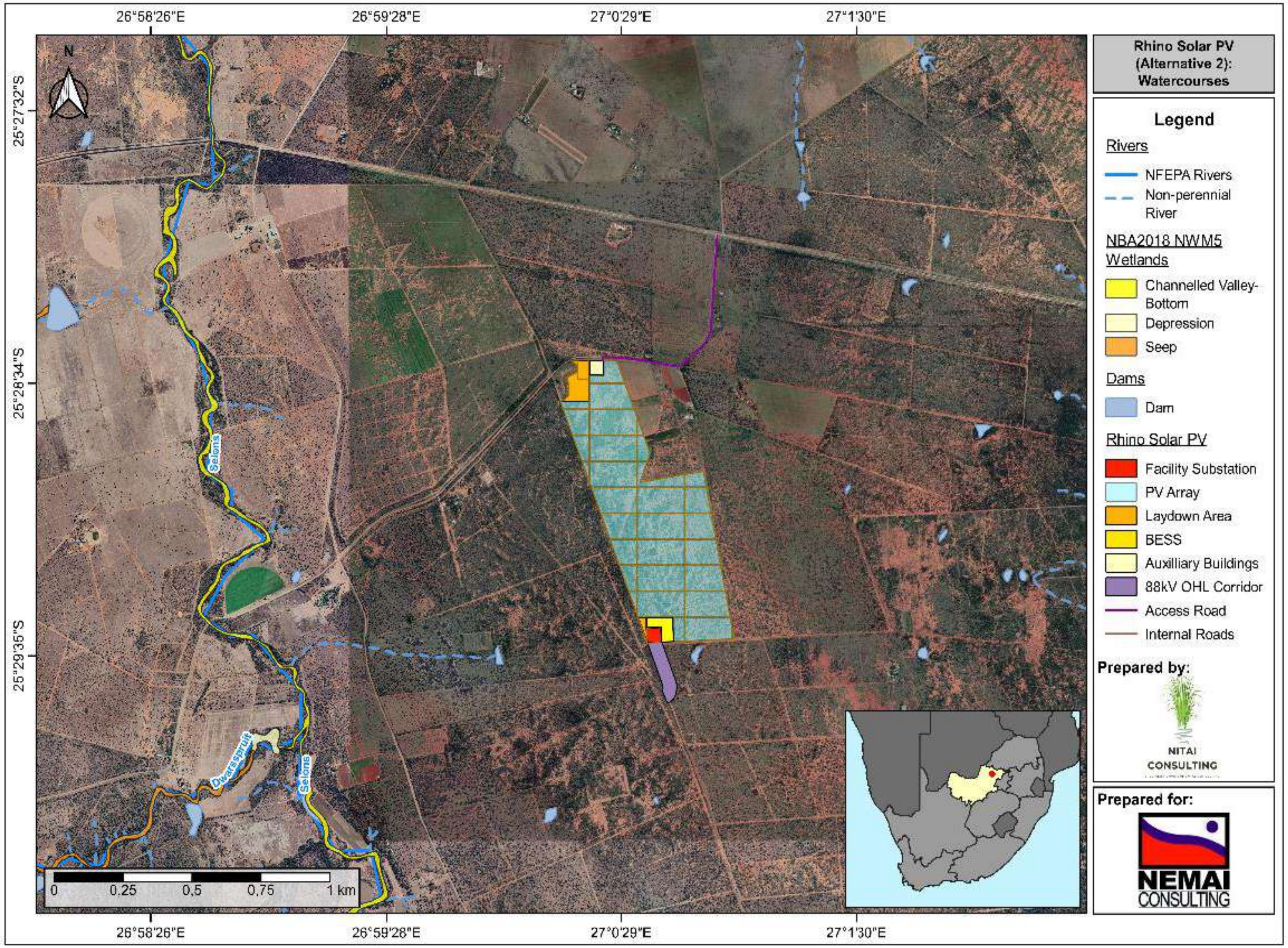


Figure 5: All watercourses associated with Alternative 2

3 METHODOLOGY AND APPROACH

The following approach was adopted in order to determine and confirm site sensitivity for aquatic biodiversity within the footprint of the Solar PV site:

- In the event that the site sensitivity within the project footprint will be confirmed Very High, a full Aquatic Biodiversity Specialist Assessment will be required; and
- In the event that the site sensitivity within the project footprint would be confirmed as Low, an Aquatic Compliance Statement would be required.

Site sensitivity was determined by conducting a Desktop Study through using the latest Satellite Imagery as well as various different types of spatial data. Spatial data include the following:

- National Freshwater Ecosystem Priority Areas (NFEPA) (rivers and wetlands) (Nel *et al*., 2011);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (van Deventer *et al*., 2018);
- 5m Contours;
- North West Critical Biodiversity Areas (CBA's) and Ecological Support Areas (ESA's) (Showno & Desmet, 2008); and,
- Strategic Water Source Areas (SWA's) (Nel *et al*., 2013).

Furthermore, a site visit was conducted on 19 January 2023 and 31 January 2023 during which the following was confirmed on site:

- Identify all areas of interest identified during the Desktop study;
- Identify and classify all watercourses according to the method of Ollis *et al*. (2013); and,
- Identify any hydrophytic plant species that may indicate the presence of wetlands.

4 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany this assessment:

- This report is based on the information and layout received from the proponent;
- The findings, observations, conclusions and recommendations are based on the author's best professional and scientific knowledge; and
- **The assessment of wetlands presented in this report is limited to the proposed project footprint and does not include the extended 500 m radius regulated area of the Rhino Solar PV Facility. This report is therefore not sufficient for use in a General Authorisation application.**

5 SITE SENSITIVITY VERIFICATION: AQUATIC BIODIVERSITY THEME

During the desktop study for the proposed Rhino Solar PV development the Environmental Screening tool from Department of Forestry, Fisheries & the Environment (DFFE) was queried. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation. The report identified that the Aquatic Biodiversity Theme for the study area is of **Low** sensitivity (Figure 6).

During site visits to the study area earmarked for the proposed Rhino Solar PV facility, the following areas of interest were inspected (Figure 7) to confirm the sensitivity. As such, this specialist confirms with the Low sensitivity of the study area.

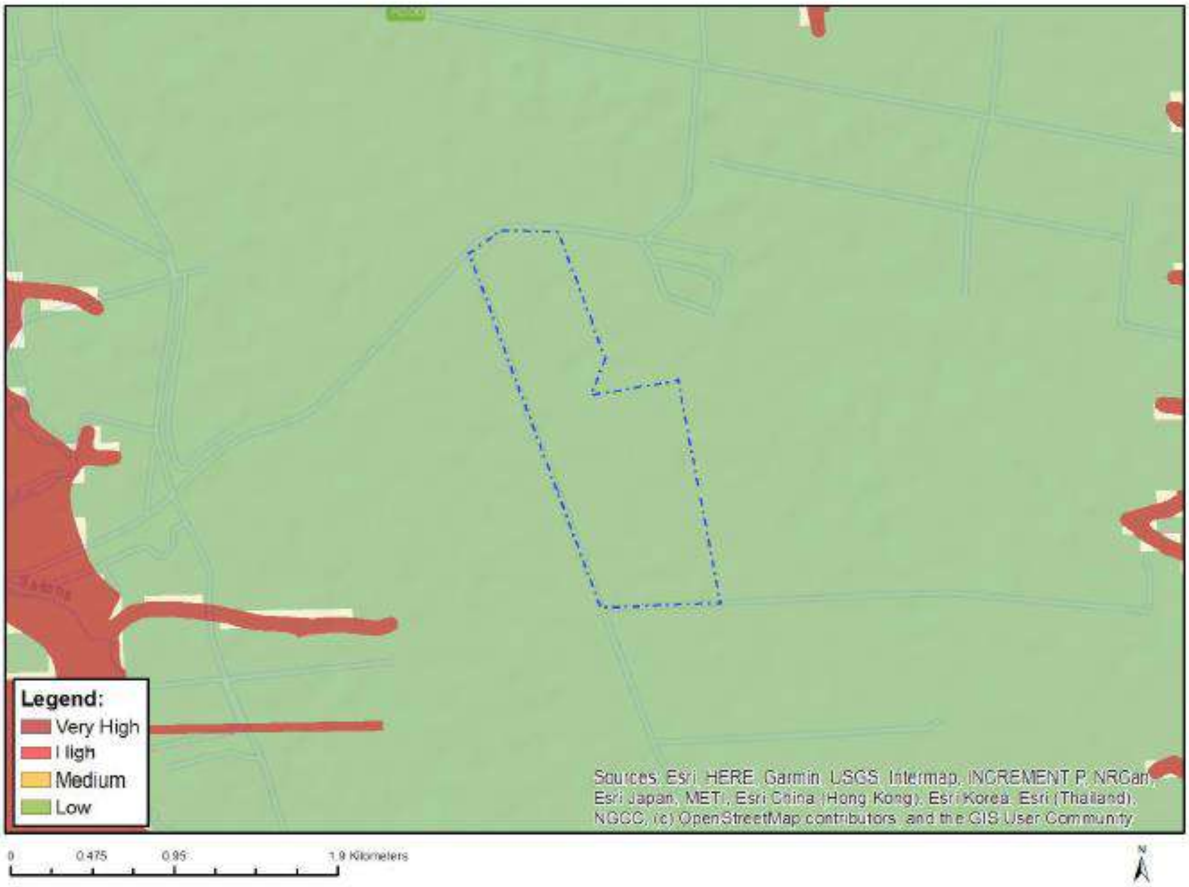


Figure 6: Aquatic Biodiversity Sensitivity Theme from the Department of Forestry, Fisheries & the Environment Screening Tool

6 RESULTS

The proposed site is situated in an agricultural landscape (small and large livestock). The site does not contain any sensitive freshwater features (drainage lines, streams, rivers and wetlands). The proposed site is comprised of indigenous terrestrial vegetation characteristics. No plants indicative of a moisture gradient were recorded in the target areas. Furthermore, there are two small agricultural rainwater-fed dams within the study area. These dams only contain water during the rainy season, however, remain dry for most of the year. See Figure 7 below for an overview of the environment within the proposed footprint.

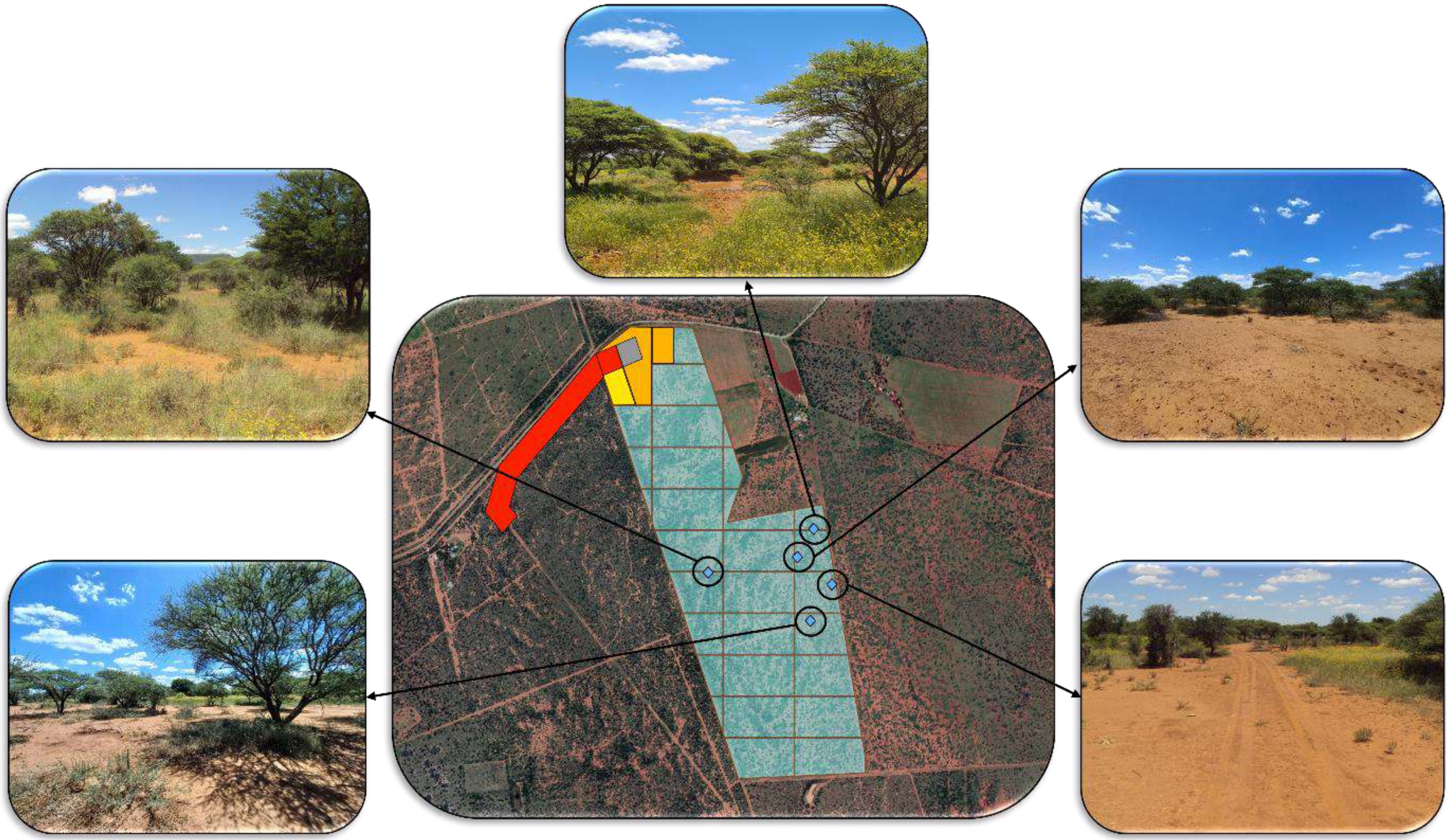


Figure 7: Photographs indicating the general environment within the proposed footprint of the Rhino Solar PV

7 CONCLUSION AND RECOMMENDATIONS

The proposed Rhino Solar PV facility is situated in the Kgetlengrivier Local Municipality within the North West Province. According to spatial data, no freshwater features are found within the study area. This was verified by the absence of wetland vegetation indicators as well as the absence of wetland soil indicators. The study area was comprised of Hutton soils. The vegetation recorded throughout the site is not associated with wetlands and rather with terrestrial vegetation. Therefore, we can conclude that no wetland or riparian habitat exists within the footprint of the proposed PV facility and that no watercourses will be affected.

The DFFE Screening Tool identified the area to have Low sensitivity from an Aquatic Biodiversity Theme perspective. This was confirmed by the specialist. As such, the specialist recommends that the development may proceed. Preference is given to the Layout Alternative 2 due to the small agricultural rainwater-fed dam.

8 REFERENCES

Department of Water Affairs and Forestry (DWAF). 2005. A practical field procedure for identification and delineation of wetlands and riparian areas.

Nel, J.L., Colvin, C., Le Maitre, D., Smith, J. & Haines, I. 2013. South Africa's Strategic Water Source Areas (SWSA's). Report for WWF-South Africa. March 2013. Report No. CSIT/NRE/ECOS/ER/2013/0031/A. CSIR, Stellenbosch, South Africa.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Nel, J., Colvin, C., Le Maitre, D., Smith, J. & Haines, I. 2013. South Africa's Strategic Water Source Areas. CSIR/NRE/ECOS/ER/2013/0031/A.

North West Department of Rural, Environment and Agricultural Development (READ). 2015. North West Biodiversity Sector Plan. North West Provincial Government, Mahikeng, December 2015.

North West Province of Rural, Environment and Agriculture Department. 2008. North West Aquatic Critical Biodiversity Areas. Compiled by A. Showno & P. Desmet.

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. *SANBI Biodiversity Series* 22. South African National Biodiversity Institute, Pretoria.

Skowno, A.L., Poole, C.J., Raimondo, D.C., Sink, K.J., Van Deventer, H., Van Niekerk, L., Harris, L.R., Smith-Adao, L.B., Tolley, K.A., Zengeya, T.A., Foden, W.B., Midgley, G.F. & Driver, A. 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, and entity of the Department of Environment, Forestry and Fisheries, Pretoria, p. 1 - 214.

Van Deventer, H., Smith-Adao, L., Peterson, C., Mbona, N., Showno, A. & Nel, J.L. 2018. Review of available data for a South African Inventory of Inland Aquatic Ecosystems (SAIIAE).

APPENDIX 1: SPECIALIST DETAILS, QUALIFICATIONS AND EXPERTISE

1 PERSONAL PARTICULARS

Profession:	Aquatic and Wetland Specialist
Date of Birth:	20 December 1993
Name of Firm:	Nitai Consulting
Name of Staff:	Divan van Rooyen
Nationality:	RSA
Membership of Professional Societies	SACNASP (Can. Sci. Nat. 151272), IAIAsa (7063)

2 EDUCATION:

- Ph.D. Environmental Science (Aquatic Ecosystem Health), NWU, South Africa, 2022
- M. Sc. Environmental Science (Ecological Remediation and Sustainable Development), NWU, South Africa, 2017
- B.Sc. Hons Environmental Science (Ecological Remediation and Sustainable Development), NWU, South Africa, 2015
- B.Sc. Tourism, Geography and Zoology, NWU, South Africa, 2014

Publications:

- Schaeffner, B.C. van Rooyen, D., Gerber, R., Scholz, T. & Smit, N.J. 2020. *Wenyonia gracilis* sp. n. (Cestoda: Caryphyllidea) from *Synodontis zambezensis* (Siluriformes: Mochokidae): the first native caryophyllidean tapeworm from southern Africa. Folia Parasitologica, 67: 035.
- van Rooyen, D., Gerber, R., Smit, N.J. & Wepener, V. 2022. An assessment of water and sediment quality of aquatic ecosystems within South Africa's largest floodplain. *African Journal of Aquatic Sciences, 474 – 488*.

3 EMPLOYMENT RECORD:

- 2022 – Present Aquatic and Wetland Specialist, Nitai Consulting

  Conduct Wetland Delineations and Impact Assessments;

  Conduct Aquatic Ecological Assessments;

SASS5 Assessments;

Aquatic and Wetland Monitoring Programs; and,

GIS Mapping

- March 2022 – November 2022 Environmental Consultant and Aquatic Specialist, Enviroworks

  Environmental Control Officer;

  Water Use Licensing;

  Environmental Auditing;

  Report Writing.

- January 2022 – February 2022 Environmental Intern, ABS-Africa (PTY) Ltd

  Environmental Auditing;

  Groundwater quality monitoring;

  Data interpretation and evaluation; and

  Report writing

- 2017 – 2021 Research and Field Assistant, North West University (NWU-Water Research Group)

  Assisting UNISA and NWU Zoology students with module practical's;

  Supervisor to 3rd year Zoology students on a Water Quality Project;

  Fish specialist for a fish translocation study at Lethabo Power Station (ESKOM);

  Junior Aquatic Specialist for aquatic biomonitoring at Khumba Iron Ore Mining (Joint Amanzi Aquatics and NWU-WRG);

  Junior Aquatic Specialist for biomonitoring at a WWTW (Ecosphere & NWU-WRG); and

  Assisted students with aquatic biomonitoring assessments (FRAI, MIRAI, FROC, Fish identification and SASS under the supervision of Dr. Wynand Malherbe).

4 SELECTED CONSULTANCIES

4.1 Fish Translocation study (NWU – WRG), Lethabo Power Station (ESKOM)

2016 - 2021 – Fish Specialist, Fish Translocation at ESKOM, South Africa, Sampling of fish species in ESKOM Cooling Towers and translocating them to the NWU.

4.2 Aquatic Biomonitoring at Khumba Iron Ore Mining (Joint with Amanzi Aquatics and NWU – WRG)

2019, Junior Aquatic Specialist, Aquatic Biomonitoring at Khumba Iron Ore Mining (Joint Amanzi Aquatics and NWU – WRG), South Africa, Undertake aquatic biomonitoring in nearby rivers surrounding Khumba Iron Ore to assess fish community structures.

4.3 Aquatic Biomonitoring at a WWTW near Greylingstad (Joint with Ecosphere and NWU – WRG)

2022, Junior Aquatic Specialist, Aquatic biomonitoring (SASS5, water and sediment quality and fish community structure), South Africa, Undertake aquatic biomonitoring in nearby rivers surrounding Khumba Iron Ore to assess fish community structures.

4.4 Kroonstad Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Vals River.

4.5 Kroonstad South Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the five solar PV facilities as well as perform aquatic biomonitoring of the Blomspruit.

4.6 Proposed Nketoana Regional Bulk Water Scheme Project

2022, Aquatic and Wetland Specialist, Nketoana Local Municipality is experiencing severe water shortages in its towns Reitz/Petsana/ Petrus Steyn/ Mamafubedu/ Arlington/ Leratswana and Lindley. Solutions to the water shortages are the proposed Nketoana Regional Bulk Water Scheme Pipeline, South Africa, Perform aquatic biomonitoring and assessing all wetlands within a 500m radius of the bulk water scheme project.

4.7 Rustenburg Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Elands River.

4.8 Grootvlei Solar PV Facility

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all wetlands associated with the one solar PV facility.

4.9 400kV Transmission and 132kV distribution power lines for the Apollo-Lepini-Mesong Project

2023, Aquatic and Wetland Specialist, Proposed development of a 400kV transmission and 132kV power lines for the Apollo-Lepini-Mesong Project, Gauteng Province, South Africa, Undertake and Aquatic and Wetland Impact Assessment along the proposed routes for the 400kV and 132kV power lines.

4.10 CCUS 3D Seismic Survey & Drilling

2023, Wetland Specialist. Proposed 3D Seismic Survey within the Leandra area, Mpumalanga Province, South Africa, Assess and map all wetlands within the footprint of the survey area.

4.11 Paulputs 400 kV Strengthening (Transmission Line Loop in Loop Out) Project

2022, Aquatic and Wetland Specialist, Proposed Paulputs 400kv Strengthening Project (Transmission Line Loop In Loop Out From Aries – Kokerboom Transmission Line), South Africa, Assess and map all wetlands associated with the power line as well as aquatic biomonitoring.

4.12 Seelo Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Mooirivierloop.

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – excellent speaking, reading and writing

1 Personal Particulars

Profession:	Environmental Officer
Date of Birth:	25 March 1998
Name of Firm:	Nemai Consulting (Pty) Ltd.
Name of Staff:	Denisha Ponnusamy
Nationality:	South African
Membership of Professional Societies	SACNASP (Can. Sci. Nat. 155319)

2 Education:

- M. Sc. Hydrology (Summa Cum Laude), UniZulu, South Africa, 2021
- B. Sc. Hons. Hydrology, UniZulu, South Africa, 2019
- B.Sc. Hydrology and Microbiology (Cum Laude), UniZulu, South Africa, 2018

Publications:

- Mapping of potential groundwater recharge zones: a case study of Maputaland Coastal plain, South Africa (2021). Denisha Ponnusamy, N. Rajmohan, Peiyue Li, M. Thirumurugan, Chidambaram Sabarathinam, Vetrimurugan Elumalai. Environmental Earth Sciences.

3 Employment Record:

- November 2022 – Present Environmental Officer, Nemai Consulting
  Water Use Licence Applications.

  Perform Wetland delineation and hydrological assessments.

  Compile various environmental reports.
- July 2019 – November 2019 Geographical Information Systems Tutor, Unizulu
  Provide assistance to students enrolled on the GIS module through practical examples (tutorials).

  Train students technically to carry out assignments through topographical mapping, capturing of GIS data, analyzing data, processing images, 3D mapping, geodatabase maintaining etc.

  Provide support to students to fix any technical error whilst using the ArcGIS program.
- January 2019 – November 2019 Practical and lab demonstrator, UniZulu

Perform field demonstrations for groundwater exploration methods through the utilization of equipment for water quality and soil samples by on-site measurements such as turbidity, pH, TDS, EC etc.

Perform hydro geochemistry of water samples using a Chromatography machine (NEX ION 2000 ICP-MS) and maintain good housekeeping and admin of the hydrology lab.

Assist and oversee honours students' implementation of various research methodologies for their final research projects in the hydrology lab and keep minutes and records of meetings between supervisors and students.

4 Selected Consultancies

4.1 Rustenburg Solar PV Facilities

2022, Wetland Specialist, Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities.

4.2 Limpopo Academic Hospital

2022, Environmental Officer, Proposed Limpopo Academic Hospital, Limpopo Province, South Africa, Compilation of the Final EMPr report and forwarding of the final EMPr to Polokwane Local Municipality and Submission of the final EMPr to the DFFE.

4.3 Port of Durban Expansion

2023, Environmental Officer, Proposed expansion of the Port of Durban, KwaZulu-Natal Province, South Africa, Social Impact Assessment Interviews for the generation of the I&APs database

4.4 Seelo Solar PV Facilities

2022, Wetland Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities.

4.5 Parys Solar PV Facilities

2023, Environmental Officer, Development of three Solar PV facilities near Parys, Free State Province, South Africa, WULA

4.6 Bulk Water Supply Scheme

2023, Environmental Officer, Nketoana Bulk water supply scheme Phases 2, 6, 7 and 10 near Reitz, Free State Province, South Africa, WULAs.

4.7 Lanseria Outfall Sewer development

2023, Environmental Officer, Lanseria Outfall sewer – Johannesburg Water, Gauteng Province, South Africa, WULA

4.8 Craighall-Minerva Tower Refurbishments

2023, Environmental Officer, Craighall-Minerva 275 kv line Tower refurbishments, Gauteng Province, South Africa, WULA

4.9 Port of Richards Bay Expansion

2023, Environmental Officer, Proposed expansion of the Port of Richards Bay, KwaZulu-Natal Province, South Africa, Compilation of the Situation Assessment Report

4.10 Mokolo Crocodile River (West) Water Augmentation (MCWAP) Project

2023, Environmental Officer, Bulk Raw Water Transfer Systems, Limpopo Province, South Africa, Identification of triggers for the River Management System

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – fair speaking, reading and writing

APPENDIX 2: REVIEWERS DETAILS, QUALIFICATIONS AND EXPERTISE (ELZET HUMAN)

1. PERSONAL PARTICULARS

Profession:	Biodiversity Specialist
Date of Birth:	13 March 1987
Name of Firm:	Nitai Consulting
Name of Staff:	Elzet Human
Nationality:	RSA
Membership of Professional Societies	SACNASP (Pr. Sci. Nat. 147031)

2. EDUCATION:

- M-Tech Nature Conservation, (Plant DNA Barcoding and phylogenetics), TUT, South Africa, 2021
- B-Tech Nature Conservation, (Resource Management, Vegetation ecology and rehabilitation) TUT, South Africa, 2011
- N. Dip Nature Conservation, TUT, South Africa, 2008

3. EMPLOYMENT RECORD:

- 2022 – Present Biodiversity Specialist, Nitai Consulting

  Conduct Biodiversity Impact Assessments.

  Conduct Plant Ecological Assessments.

  Conduct Animal Ecological Assessments

  Biodiversity monitoring programs; and,

  GIS Mapping

- 2013 – 2022 Lecturer: Nature Management, Centurion academy

  Lectured various subjects for undergraduate students in Nature Management:

  Botany and Vegetation Ecology, Zoology, Animal Health, Conservation Development, Ecology, Game Ranch Management, Biostatistics, Research Methodology, Genetics, Soil Science

- 2009 – 2013 HOD Rangers Department, Zebula Gold Estate and Spa

  Ecological Monitoring, Reserve Maintenance, Animal Husbandry, Neonatal care of Endangered carnivore species, Zoological display, and permit compliance

- 2008 – Conservation Student, Ann van Dyk Cheetah Research Centre

  Neonatal Care of Carnivore species,

  Veterinary assistance work – vaccine, diets, Endo scoping, pregnancy tests, health monitoring, quarantine care of species, emergency c-sections, bleeding procedures on vultures

  Enclosure Maintenance

  Tracking wild cheetahs

  Rewilding cheetahs

  Anatolian Shepard project assistance

4. SELECTED CONSULTANCIES

4.1 Ecological assessment for Victorius Game farm, Visgat, Ellisras, Limpopo

2018, Ecologist, Ecological condition assessment and game carrying capacity for game farm. Habitat evaluation and rehibition program for problem areas

4.2 Elephant impact study on Mabula Game Reserve, Bela-Bela, Limpopo,

2019, Ecologist, Ecological impact study on Private Nature reserve to see extent of elephant utilisation and impact. Woody species analysis – structure classification and net primary production. Elephant movement patterns and carrying capacity. Identification of vulnerable habitats and management program.

4.3 Faan Meintjies Municipal Nature Reserve, Matlosana, North West

2018-2022, Ecologist, Habitat assessments, game carrying capacities, ecological condition assessments, game counts and game recommendations, ecological rehabilitation programs, white rhino monitoring, anti-poaching programs, Environmental Education programs.

4.4 Kroonstad Solar PV Facilities

2022, Biodiversity Specialist. Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Vals River.

4.5 Kroonstad South Solar PV Facilities

2022, Biodiversity Specialist. Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the five solar PV facilities as well as perform aquatic biomonitoring of the Blomspruit.

4.6 Proposed Nketoana Regional Bulk Water Scheme Project

2023, Biodiversity Specialist. Nketoana Local Municipality is experiencing severe water shortages in its towns Reitz/Petsana/ Petrus Steyn/ Mamafubedu/ Arlington/ Leratswana and Lindley. Solutions to the water shortages are the proposed Nketoana Regional Bulk Water Scheme Pipeline, South Africa, Assess and map all biodiversity, plant and animal features associated within the footprint of the bulk water scheme project.

4.7 Rustenburg Solar PV Facilities

2023, Biodiversity Specialist. Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the three solar PV facilities.

4.8 Grootvlei Solar PV Facility

2023, Biodiversity Specialist. Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the one solar PV facility.

4.9 400kV Transmission and 132kV distribution power lines for the Apollo-Lepini-Mesong Project

2023, Biodiversity Specialist. Proposed development of a 400kV transmission and 132kV power lines for the Apollo-Lepini-Mesong Project, Gauteng Province, South Africa, undertake assessments and map all biodiversity, plant, and animal features along the proposed routes for the 400kV and 132kV power lines.

4.10 CCUS 3D Seismic Survey & Drilling

2023, Biodiversity Specialist. Proposed 3D Seismic Survey within the Leandra area, Mpumalanga Province, South Africa Assess and map all biodiversity, plant and animal features within the footprint of the survey area.

4.11 Paulputs 400 kV Strengthening (Transmission Line Loop in Loop Out) Project

2023, Biodiversity Specialist. Proposed Paulputs 400kv Strengthening Project (Transmission Line Loop In Loop Out From Aries – Kokerboom Transmission Line), South Africa, Assess and map all biodiversity, plant and animal features within the power line footprint as well as perform biodiversity monitoring.

4.12 Seelo Solar PV Facilities

2023, Biodiversity Specialist. Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all biodiversity, plant, and animal features within the three solar PV facilities as well as perform biodiversity monitoring.

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – excellent speaking, reading and writing

Appendix 3: Reviewers details, qualifications and expertise (Antoinette Bootsma)

1. Professional Affiliations

- Professional Natural Scientist (SACNASP) # 400222-09 Botany and Ecology
- South African Wetland Society # NA6RY2FP
- Grassland Society of South Africa

2. Qualifications

- **M.SC** (Environmental Science), University of South Africa, 2017. *Awarded with distinction*. Project Title: Natural mechanisms of erosion prevention and stabilization in a Marakele peatland; implications for conservation management.

3. Publications

- A.A. Boostma, S. Elshehawi, A.P. Grootjans, P.L Grundling, S. Khosa, M. Butler, L. Brown, P. Schot. 2019. Anthropogenic disturbances of natural ecohydrological processes in the Matlabas mountain mire, South Africa. South African Journal of Science Volume 115| Number 5/6, May/June 2019, P1 to 8.

4. Employment History

- Director at Limosella Consulting (Pty) Ltd - 2009 – ongoing
- Senior Wetland Specialist at Strategic Environmental Focus – 2007 to 2009
- Technical Assistant at the Conservation Ecology Research Unit, University of Pretoria, Richards Bay field station, 2005 to 2007.

5. Summary of Key skills

- Management of projects in terms of specialist input, including quotations, planning, technical review, submission of reports and invoicing;
- Fine scale wetland delineations and functional assessments;
- Strategic wetland assessments and open space management and planning;
- General Rehabilitation, Monitoring and Mitigation assessments;
- Wetland offset strategies;
- Hydropedological investigations; and
- Implementation of wetland assessment tools including the DWS (2016) Risk Assessment, Present Ecological Status (PES) Macfarlane et al, (2020), Ecological Importance and Sensitivity (EIS) (DWAF, 1999), Recommended Ecological Category (REC) Rountree et al (2013), Riparian Vegetation Response Assessment Index (VEGRAI) (Kleynhans et al, 2007) and QHI (Quick Habitat Integrity).

6. Short summary of Experience

- Numerous external peer reviews as part of mentorship programs for companies including Galago Environmental Consultants, Lidwala Consulting Engineers, Bokamoso Environmental Consultants, Gibb, 2009 – ongoing;
- Wetland specialist input into the Kloof Mine wetland sediment interim management, remediation and rehabilitation plan, 2022;
- Wetland Assessments for the upgrade of 7 culverts and bridges in Vereeniging, Gauteng, July 2021
- Input into the Environmental Management Plan for repair to 90 bridges in the City of Johannesburg, 2020;
- Wetland specialist input into the City of Tshwane Open Space Framework, 2019;
- Wetland specialist input into the North West Environmental Outlook, 2018;
- Wetland specialist input into the Gauteng Environmental Outlook, 2017;
- Wetland specialist input into the Open Space Management Framework for Kyalami and Ruimsig, City of Johannesburg, 2016;
- Kangra Maquasa East and Maquasa West and Nooitgesien Mine, Mpumalanga Province: Rehabilitation and Monitoring Assessment. June 2018; and
- Mbuyelo Coal Welstand Reserve Amendment: Wetland assessment. June 2017.

APPENDIX 4: SIGNED DECLARATION INDEPENDENCE

I, **Divan van Rooyen**, declare that –

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

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

04/05/2023

Dr. Divan van Rooyen (Can. Sci. Nat. 151272) **Date**

Aquatic and Wetland Specialist

I, **Denisha Ponnusamy**, declare that –

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

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

05/05/2023

Denisha Ponnusamy (Can. Sci. Nat. 147031) **Date**

Environmental Officer

I, **Elzet Human**, declare that –

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

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

09/05/2023

Elzet Human (Pri. Sci. Nat. 147031) **Date**

Terrestrial Ecologist

I, **Antoinette Bootsma**, declare that –

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

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

__________________________________ **24/05/2023**

Antoinette Bootsma (Pri. Sci. Nat. 400222-09) **Date**

Wetland Specialist

APPENDIX E2: Terrestrial Biodiversity Compliance Statement

Proposed Solar PV project for Rhino Solar, Rustenburg, North West Province, RSA

TERRESTRIAL BIODIDVERSITY COMPLIANCE STATEMENT

03 May 2023

Submitted to : Nemai Consulting

Prepared by:

Helena Elizabeth Human (pr. Sci. Nat 147031)

Nitai Consulting (PTY) Ltd.

147 Bram Fischer Drive

Ferndale

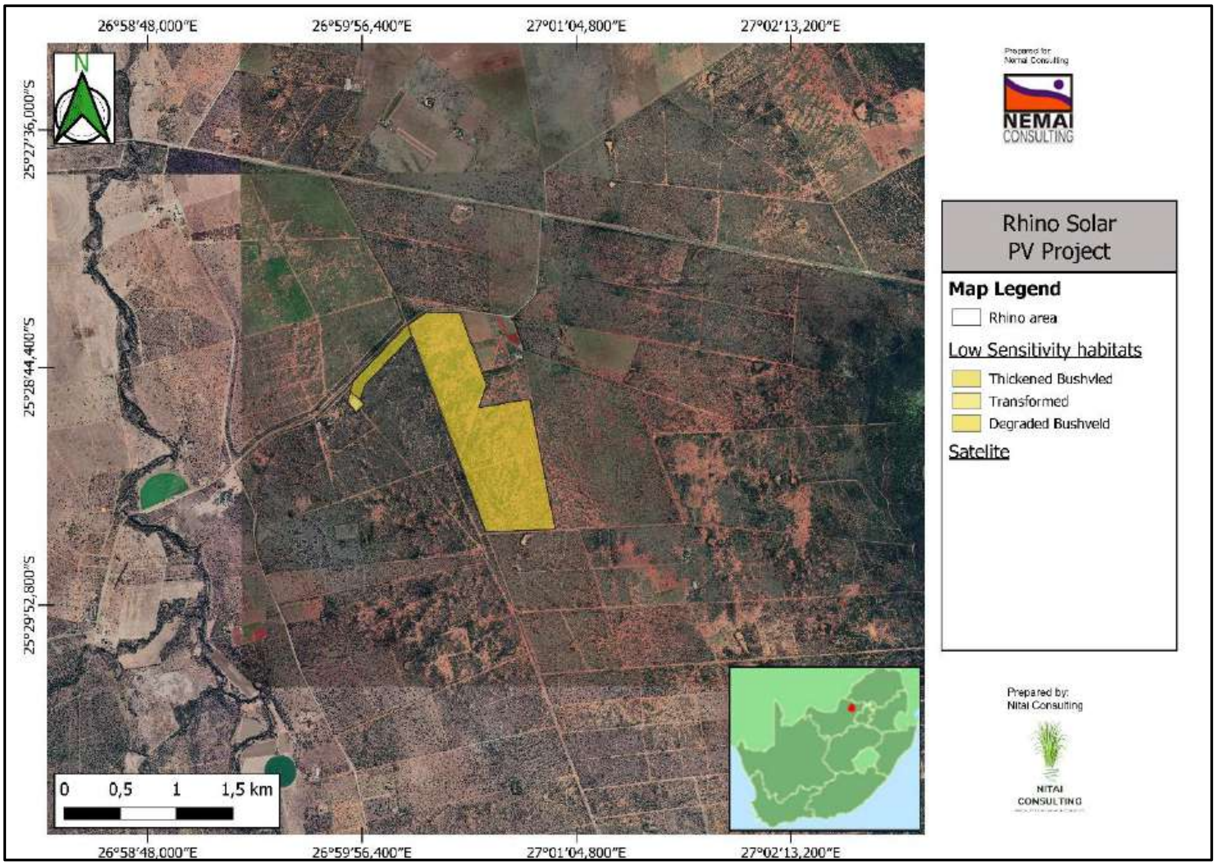
2194

Executive Summary

Nitai Consulting (Pty) Ltd. was appointed by Nemai Consulting (Pty) Ltd. to undertake a terrestrial biodiversity assessment for the proposed Rustenburg Rhino Solar PV project in the North West Province, South Africa.

According to the National Web Based Environmental Screening Tool (the "Screening Tool"), the terrestrial biodiversity sensitivity theme is "Very High" due to the presence of a Critical Biodiversity Area, Ecological Support Areas and Protected Areas expansion Strategy.

No sensitive biodiversity features were identified on site as the area is overgrazed by livestock.



The area has experienced long-term and continuous disturbance, mostly due to the agricultural grazing practices and associated impacts. The project area is modified and as such is assigned a sensitivity rating of 'Low'.

The screening report classified both the animal and plant theme sensitivity as 'Low' and 'Very High'. Following the field survey findings, the animal species themes may be re-classified as having 'Low' sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal SCC within the project area.

Completion of the Terrestrial Biodiversity Assessment led to a confirmation of 'Low' classification for the plant species theme sensitivity as allocated by the National Environmental Screening Tool but to a dispute of the 'Very High' classification for the animal and terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. The project area has instead been assigned a 'Low' sensitivity, because of the extent of environmental disturbance that has taken place, and the fact that limited SCC were observed and are unlikely to frequently occur within the project area.

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List of Abbreviations

CBA	Critical Biodiversity Area
CR	Critical
DFFE	Department of Forestry, Fisheries & the Environment
DWS	Department of Water and Sanitation
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
GDARD	Gauteng Department of Agriculture and Rural Development
GIS	Geographic Information System
GN	Government Notice
ha	Hectares
km	Kilometer (1 000m)
LC	Least Concern
MAP	Mean Annual Precipitation
m	Meters
NEMA	National Environmental Management Act (No. 107 of 1998)
NFEPA	National Freshwater Priority Areas
NWA	National Water Act
SANBI	South African National Biodiversity Institute
VU	Vulnerable

1 INTRODUCTION

1.1 Terms of Reference

1.1.1 Terrestrial Biodiversity

The specialist study is required to follow the published Protocols, provided in full below for the assessment of impacts on Terrestrial Biodiversity. Note that the Protocols require determination of the level of sensitivity, which then determines the level of assessment required, either a full assessment, or a Compliance Statement.

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

General information

1.1. An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of “very high sensitivity” for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.

1.2. An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being “low sensitivity” for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement.

1.3. However, where the information gathered from the site sensitivity verification differs from the designation of “very high” terrestrial biodiversity sensitivity on the screening tool and it is found to be of a “low” sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted.

1.4. Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a “low” terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted.

1.5. If any part of the proposed development footprint falls within an area of “very high” sensitivity, the assessment and reporting requirements prescribed for the “very high” sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.

Terrestrial Biodiversity Specialist Assessment

2.1. The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.

2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint.

2.3. The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:

2.3.1. a description of the ecological drivers or processes of the system and how the proposed development will impact these;

2.3.2. ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;

2.3.3. the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;

2.3.4. the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments;

2.3.5. a description of terrestrial biodiversity and ecosystems on the preferred site, including:

(a) main vegetation types;

(b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;

(c) ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and

(d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement

patterns identified;

2.3.6. the assessment must identify any alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification; and

2.3.7. the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:

2.3.7.1. terrestrial critical biodiversity areas (CBAs), including:

(a) the reasons why an area has been identified as a CBA;

(b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;

(c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);

(d) the impact on ecosystem threat status;

(e) the impact on explicit subtypes in the vegetation;

(f) the impact on overall species and ecosystem diversity of the site; and

(g) the impact on any changes to threat status of populations of species of conservation concern in the CBA;

2.3.7.2. terrestrial ecological support areas (ESAs), including:

(a) the impact on the ecological processes that operate within or across the site;

(b) the extent the proposed development will impact on the functionality of the ESA; and

(c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;

2.3.7.3. protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-

(a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;

2.3.7.4. priority areas for protected area expansion, including-

(a) the way in which the proposed development will compromise or contribute to the

expansion of the protected area network;

2.3.7.5. SWSAs including:

(a) the impact(s) on the terrestrial habitat of a SWSA; and

(b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);

2.3.7.6. FEPA sub catchments, including-

(a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;

2.3.7.7 indigenous forests, including:

(a) impact on the ecological integrity of the forest; and

(b) percentage of natural or near natural indigenous forest area lost and a statement on the

implications in relation to the remaining areas.

2.4. The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.

Terrestrial Biodiversity Specialist Assessment Report

3.1. The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:

3.1.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;

3.1.2. a signed statement of independence by the specialist;

3.1.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

3.1.4. a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;

3.1.5. a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;

3.1.6. a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);

3.1.7. additional environmental impacts expected from the proposed development;

3.1.8. any direct, indirect and cumulative impacts of the proposed development;

3.1.9. the degree to which impacts and risks can be mitigated;

3.1.10. the degree to which the impacts and risks can be reversed;

3.1.11. the degree to which the impacts and risks can cause loss of irreplaceable resources;

3.1.12. proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);

3.1.13. a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;

3.1.14. a substantiated statement, based on the findings of the specialist assessment, regarding the

acceptability, or not, of the proposed development, if it should receive approval or not; and

3.1.15. any conditions to which this statement is subjected.

3.2.The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.

3.3. A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

1.1.2 Terrestrial Plants

The specialist study is required to follow the published Protocols, provided in full below for the assessment of impacts on Terrestrial Plant Species. Note that the Protocols require determination of the level of sensitivity, which then determines the level of assessment required, either a full assessment, or a Compliance Statement.

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT SPECIES

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

1. General information

1.1 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial plant species, must submit a Terrestrial Plant Species Specialist Assessment Report.

1.2 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “medium sensitivity” for terrestrial plant species, must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.

1.3 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “low” sensitivity for terrestrial plant species, must submit a Terrestrial Plant Species Compliance Statement.

1.4 Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high” for terrestrial plant species sensitivity on the screening tool, and it is found to be of a “low” sensitivity, then a Terrestrial Plant Species Compliance Statement must be submitted.

1.5 Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial plant species sensitivity and it is found to be of a “very high” or “high” terrestrial plant species sensitivity, a Terrestrial Plant Species Specialist Assessment must be conducted.

1.6 If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol, means the area on which the proposed development will take place and includes the area that will be disturbed or impacted.

1.7 The Terrestrial Plant Species Specialist Assessment and the Terrestrial Plant Species Compliance Statement must be undertaken within the study area.

1.8 Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.

1.9 Where the nature of the activity is expected to have an impact on SCC beyond boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the PAOI, as determined.

2. Terrestrial Plant Species Specialist Assessment

2.1 The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP), within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.

2.2 The assessment must be undertaken within the study area.

2.3 The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline and must:

2.3.1 Identify the SCC which were found, observed or are likely to occur within the study area;

2.3.2 provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);

2.3.3 identify the distribution, location, viability and detailed description of population size of the SCC identified within the study area;

2.3.4 identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area;

2.3.5 determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, Red List of South African Plants, and/or other relevant databases;

2.3.6 determine the potential impact of the proposed development on the habitat of the SCC located within the study area;

2.3.7 include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;

2.3.8 identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems;

2.3.9 identify any potential impact on ecological connectivity within the broader landscape, and resulting impacts on the identified SCC and its long term viability;

2.3.10 determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC; and

2.3.11 discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species; and

2.3.12 identify any alternative development footprints within the preferred development site which would be of “low” sensitivity” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.

2.4 The findings of the assessment must be written up in a Terrestrial Plant Species Specialist Assessment Report.

3. Terrestrial Plant Species Specialist Assessment Report

3.1 This report must include as a minimum the following information:

3.1.1 contact details and relevant experience as well as the SACNASP registration number

of the specialist preparing the assessment including a curriculum vitae;

3.1.2 a signed statement of independence by the specialist;

3.1.3 a statement on the duration, date and season of the site inspection and the relevance

of the season to the outcome of the assessment;

3.1.4 a description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;

3.1.5 a description of the assumptions made and any uncertainties or gaps in knowledge or data;

3.1.6 a description of the mean density of observations/number of samples sites per unit area of site inspection observations;

3.1.7 details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;

3.1.8 the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;

3.1.9 the location of areas not suitable for development and to be avoided during construction where relevant;

3.1.10 a discussion on the cumulative impacts;

3.1.11 impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);

3.1.12 a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and

3.1.13 a motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate.

3.2 A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

Terrestrial plant species compliance statement

Where the sensitivity in the Screening Report from the web-based Online Screening Tool has been confirmed to be LOW, a Plant Species Compliance Statement is required, either (1) for areas where no natural habitat remains, or (2) in natural areas where there is no suspected occurrence of SCC.

The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science).

<u>The compliance statement must:</u>

- be applicable within the study area
- confirm that the study area is of “low” sensitivity for terrestrial plant species; and
- indicate whether or not the proposed development will have any impact on SCC.

The compliance statement must contain, as a minimum, the following information:

1. contact details of the specialist, their SACNASP registration number, their field of

expertise and a curriculum vitae;

2. a signed statement of independence by the specialist;

3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

4. a baseline profile description of biodiversity and ecosystems of the site;

5. the methodology used to verify the sensitivities of the terrestrial biodiversity and plant species features on the site including the equipment and modelling used where relevant;

6. in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;

7. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;

8. a description of the assumptions made as well as any uncertainties or gaps in knowledge or data; and

9. any conditions to which this statement is subjected.

A signed copy of the compliance statement must be appended to the Basic Assessment

Report or Environmental Impact Assessment Report

1.1.3 Terrestrial Animals

The specialist study is required to follow the published Protocols, provided in full below for the assessment of impacts on Terrestrial Animal Species. Note that the Protocols require determination of the level of sensitivity, which then determines the level of assessment required, either a full assessment, or a Compliance Statement.

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR

ENVIRONMENTAL IMPACTS ON TERRESTRIAL ANIMAL SPECIES

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

1. General information

1.1 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “very high” or “high” sensitivity for terrestrial animal species, must submit a Terrestrial Animal Species Specialist Assessment Report.

1.2 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “medium sensitivity” for terrestrial animal species, must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.

1.3 An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “low” sensitivity for terrestrial animal species, must submit a Terrestrial Animal Species Compliance Statement.

1.4 Where the information gathered from the site sensitivity verification differs from the screening tool designation of “very high” or “high” for terrestrial animal species sensitivity on the screening tool, and it is found to be of a “low” sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted.

1.5 Where the information gathered from the site sensitivity verification differs from the screening tool designation of “low” terrestrial animal species sensitivity and it is found to be of a “very high” or “high” terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted.

1.6 If any part of the development falls within an area of confirmed “very high” or “high” sensitivity, the assessment and reporting requirements prescribed for the “very high” or “high” sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol, means the area on which the proposed development will take place and includes the area that will be disturbed or impacted.

1.7 The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area.

1.8 Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.

1.9 Where the nature of the activity is expected to have an impact on SCC beyond boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the PAOI, as determined.

2. Terrestrial Animal Species Specialist Assessment

2.1 The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP), within a field of practice relevant to the taxonomic groups (“taxa”) for which the assessment is being undertaken.

2.2 The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline and must:

2.2.1 Identify the SCC which were found, observed or are likely to occur within the study area;

2.2.2 provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3);

2.2.3 identify the distribution, location, viability and detailed description of population size of the SCC identified within the study area;

2.2.4 identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area;

2.2.5 determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases;

2.2.6 determine the potential impact of the proposed development on the habitat of the SCC located within the study area;

2.2.7 include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;

2.2.8 identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fireprone systems;

2.2.9 identify any potential impact on ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long term viability;

2.2.10 determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;

2.2.11 discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species, or roosting and breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and

2.2.12 identify any alternative development footprints within the preferred development site which would be of “low” or “medium” sensitivity as identified by the screening tool and verified through the site sensitivity verification.

2.3 The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report.

<u>3. Terrestrial Animal Species Specialist Assessment Report</u>

3.1 This report must include as a minimum the following information:

3.1.1 contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;

3.1.2 a signed statement of independence by the specialist;

3.1.3 a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

3.1.4 a description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;

3.1.5 a description of the mean density of observations/number of samples sites per unit area of site inspection observations;

3.1.6 a description of the assumptions made and any uncertainties or gaps in knowledge or data;

3.1.7 details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;

3.1.8 the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;

3.1.9 the location of areas not suitable for development and to be avoided during construction where relevant;

3.1.10 a discussion on the cumulative impacts;

3.1.11 impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);

3.1.12 a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered, and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and

3.1.13 a motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate.

3.2 A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

4. Terrestrial Animal Species Compliance Statement

4.1 The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science).

4.2 The compliance statement must:

4.2.1 be applicable within the study area;

4.2.2 confirm that the study area is of “low” sensitivity for terrestrial animal species; and

4.2.3 indicate whether or not the proposed development will have any impact on SCC.

4.3 The compliance statement must contain, as a minimum, the following information:

4.3.1 contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae;

4.3.2 a signed statement of independence by the specialist;

4.3.3 a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;

4.3.4 a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant;

4.3.5 the mean density of observations/ number of samples sites per unit area;

4.3.6 where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr;

4.3.7 a description of the assumptions made and any uncertainties or gaps in knowledge or data;

4.3.8 any conditions to which the compliance statement is subjected.

A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report.

2 Legislation

Legislation relevant to this project is discussed below.

2.1 Convention on Biological diversity (CBD)

South Africa became a signatory to the United Nations Convention on Biological Diversity (CBD) in 1993, which was ratified in 1995. The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14 (a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

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

NEMA is the framework environmental management legislation, enacted as part of the government's mandate to ensure every person's constitutional right to an environment that is not harmful to his or her health or wellbeing. It is administered by the Department of Forestry, Fisheries and the Environment (DFFE) but several functions have been delegated to the provincial environment departments. One of the purposes of NEMA is to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment. The Act further aims to provide for institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state and to provide for the administration and enforcement of other environmental management laws. NEMA requires, inter alia, that:

- "development must be socially, environmentally, and economically sustainable";
- "disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied"; and
- "a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions".

NEMA states that "the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage."

2.3 National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEM:BA)

As the principal national act regulating biodiversity protection, NEM:BA, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner. In terms of NEM:BA, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA Regulations).
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area is in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

Chapter 4 of the Act relates to threatened or protected ecosystems or species. According to Section 57 of the Act, "Restricted activities involving listed threatened or protected species":

- A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7.

Such activities include any that are "of a nature that may negatively impact on the survival of a listed threatened or protected species".

<u>Alien and Invasive Species</u>

Chapter 5 of NEMBA relates to species and organisms posing a potential threat to biodiversity. The Act defines alien species and provides lists of invasive species. The Alien and Invasive Species (AIS) Regulations, in terms of Section 97(1) of NEMBA, was published in Government Notice R598 in Government Gazette 37885 in 2014 (NEMBA, 2014). The Alien and Invasive Species (AIS) lists were subsequently published in Government Notice R 864 of 29 July 2016 (NEMBA, 2016).

NEMBA regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Chapter 5 of the Act relates to species and organisms posing a potential threat to biodiversity. The purpose of Chapter 5 is:

a) to prevent the unauthorized introduction and spread of alien species and invasive species to ecosystems and habitats where they do not naturally occur;
b) to manage and control alien species and invasive species to prevent or minimize harm to the environment and to biodiversity in particular;
c) to eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats;

According to Section 65 of the Act, "Restricted activities involving alien species":

1) A person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7. Restricted activities include the following:
    a) Importing into the Republic, including introducing from the sea, any specimen of a listed invasive species.
    b) Having in possession or exercising physical control over any specimen of a listed invasive species. c. Growing, breeding or in any other way propagating any specimen of a listed invasive species, or causing it to multiply.
    c) Conveying, moving or otherwise translocating any specimen of a listed invasive species.
    d) Selling or otherwise trading in, buying, receiving, giving, donating or accepting as a gift, or in any other way acquiring or disposing of any specimen of a listed invasive species.
    e) Spreading or allowing the spread of any specimen of a listed invasive species.
    f) Releasing any specimen of a listed invasive species. h. Additional activities that apply to aquatic species.
2) A permit referred to in subsection (1) may be issued only after a prescribed assessment of risks and potential impacts on biodiversity is carried out.

An **"alien species**" is defined in the Act as:

a. a species that is not an indigenous species; or
b. an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by means of migration or dispersal without human intervention.

According to Section 71 of the Act, "**Restricted activities involving listed invasive species**":

1. A person may not carry out a restricted activity involving a specimen of a listed invasive species without a permit issued in terms of Chapter 7.
2. A permit referred to in subsection (1) may be issued only after a prescribed assessment of risks and potential impacts on biodiversity is carried out.

An "**invasive species**" is defined in the Act as any species whose establishment and spread outside of its natural distribution range:

a. threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and
b. may result in economic or environmental harm or harm to human health.

A **"listed invasive species**" is defined in the Act as any invasive species listed in terms of section 70(1). According to Section 73 of the Act, "Duty of care relating to listed invasive species":

2) A person who is the owner of land on which a listed invasive species occurs must:
   a) notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;
   b) take steps to control and eradicate the listed invasive species and to prevent it from spreading; and c) take all the required steps to prevent or minimize harm to biodiversity.

According to Section 75 of the Act, "Control and eradication of listed invasive species":

1. Control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs.
2. Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.
3. The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

<u>Government Notice No. 47526 of 2022: The revised National List of ecosystems that are threatened and in need of protection.</u>

This notice, published under Section 52(1)(a) of NEMBA, provides for the listing of threatened or protected ecosystems based on national criteria. The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the National Spatial Biodiversity Assessment (2004).

GNR 151: Critically Endangered, Endangered, Vulnerable and Protected Species List

Published under Section 56(1) of NEMBA.

GNR 1187: Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List
Published under Section 56(1) of NEMBA.

Government Notice No. 40733 of 2017: Draft National Biodiversity Offset Policy

Published under NEMA. The aim of the Policy is to ensure that significant residual impacts of developments are remedied as required by NEMA, thereby ensuring sustainable development as required by section 24 of the Constitution of the Republic of South Africa, 1996. This policy should be taken into consideration with every development application that still has significant residual impact after the Mitigation Sequence has been followed. The mitigation sequence entails the consecutive application of avoiding or preventing loss, then at minimizing or mitigating what cannot be avoided, rehabilitating where possible and, as a last resort, offsetting the residual impact. The Policy specifies that one impact that has come across consistently as unmitigatable is the rapid and consistent transformation of certain ecosystems and vegetation types, leading to the loss of ecosystems and extinction of species. The Policy specifically targets ecosystems where the ability to reach protected area targets is lost or close to being lost. However, the Policy states that *"[w]here ecosystems remain largely untransformed, intact and functional, an offset would not be required for developments that lead to transformation, provided they have not been identified as a biodiversity priority"*. Biodiversity offsets should be considered to remedy residual negative impacts on biodiversity of 'medium' to 'high' significance. Residual impacts of 'very high' significance are a fatal flaw for development and residual biodiversity impacts of 'low' significance would usually not require offsets. The Policy indicates that impacts should preferably be 18 avoided in protected areas, Critical Biodiversity Areas (CBA), verified wetland and river features and areas earmarked for protected area expansion.

2.4 National Forests Act, Act no. 84 of 1998

Protected trees

According to this Act, the Minister may declare a tree, group of trees, woodland, or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'. Forests Prohibits the destruction of indigenous trees in any natural forest without a licence.

2.5 National Water Act, Act 36 of 1998

Any areas that are defined in the National Water Act as a water resource that might be impacted on by certain activities that are contemplated require authorisation (Section 21 of the National Water Act of 1998). A "watercourse" in terms of the National Water Act (Act 36 of 1998) means:

- River or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake, or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

2.6 Conservation of Agricultural Resources, Act No. 43 of 1983 as amended in 2001

Declared Weeds and Invaders in South Africa are categorised according to one of the following categories:

- Category 1 plants: are prohibited and must be controlled.
- Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.
- Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

2.7 National Veld and Forest Fire Act, Act No. 101 of 1998

Provides requirements for veldfire prevention through firebreaks and required measures for fire-fighting. Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all landowners to acquire equipment and have available personnel to fight fires.

2.8 North West Biodiversity Management Act, No. 4 of 2016

This Act provides for the management and conservation of the North West Province's biophysical environment and protected areas within the framework of the National Environmental Management Act, 1998 (Act No 107 of 1998); to provide for the protection of species and ecological- systems that warrant provincial protection; to provide for the sustainable use of indigenous biological resources; and to provide for matters connected therewith.

Amongst other regulations, the following may apply to the current project:

- Various species are protected;
- The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. The Act provides lists of protected species for the Province.

The Act provides lists of protected species for the province. According to the Nort West Biodiversity Management Act, a permit is required for the removal of any species on this list.

3 Project Details

3.1 Project Background and Motivation

Rhino Solar PV (Pty) Ltd, proposes the development of a 65 MWac solar photovoltaic (PV) facility, as well as associated infrastructure on a site located near the town of Rasimone in the North West Province. The solar PV facility will be known as Rhino Solar PV. The study area falls within the jurisdiction of the Kgetlengrivier Local Municipality within the Bojanala Platinum District Municipality. At this stage it is envisaged for the project to be bid into the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).

The solar facility is proposed in response to identified objectives of the national and provincial government, and local and district municipalities to develop renewable energy facilities for power generation purposes.

3.2 Project Description

The Applicant, Rhino Solar PV (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as Rhino Solar PV) located on Portion 11 of the Farm Rhebokhoek No. 101, an access road crossing Farm No. 571 and grid connection infrastructure on Portion 31 of the Farm No. 236, Portion 13 of the Farm No. 101 and the Remaining Extent of Portion 7 of the Farm No. 101, approximately 10 km west of Rasimone in the North West Province. The solar PV facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 65 MW. The development area is situated within the Kgetlengrivier Local Municipality within the Bojanala Platinum District Municipality. The site is located approximately 10 km west of Rasimone in the North West Province and is accessible via existing roads, located adjacent to the development area.

The proposed Rhino Solar PV facility will cover approximately 125 ha and will include the following infrastructure:

PV modules and mounting structures

- Inverters and transformers
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Temporary and permanent laydown area
- Facility grid connection infrastructure, including:
    - 33 kV cabling between the project components and the facility substation
    - A 88 kV or 132 kV facility substation
    - 88 kV or 132 kV powerline between the facility substation and the exiting Eskom Rhino Substation

3.3 Technical Details of the Project

No.	Component	Description / Dimensions	
		Layout Alternative 1	**Layout Alternative 2**
1.	Height of PV panels	Up to 5 m	Up to 5.5 m
2.	Area of PV Array	Up to approximately 112 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems Area: Up to 115 ha
3.	Area occupied by substations	Up to 1 ha	It is estimated that the maximum size of the facility substation will not exceed 1 ha Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling)
4.	Capacity of on-site substation	High voltage (up to 132 kV)	The facility substation will collect the power from the facility and transform it from medium voltage (up to 33 kV) to high voltage (88 or 132 kV)
5.	BESS	Area up to ± 4 ha	Area up to ± 4 ha
6.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 5 ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 5 ha Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown)
7.	Area occupied by buildings	Up to 1 ha	Up to 1 ha

No.	Component	Description / Dimensions	
		Layout Alternative 1	**Layout Alternative 2**
8.	Length of internal roads	Up to 10 km	Up to 10 km
9.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10.	Proximity to grid connection	Approximately 750 m to the Eskom Rhino Substation	Approximately 410 m to connect to existing powerline
11.	Height of fencing	Up to 3.5 m	Up to 3.5m
12.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

3.4 <u>Location</u>

The Applicant, Rhino Solar PV (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as Rhino Solar PV) located on Portion 11 of the Farm Rhebokhoek No. 101 and grid connection infrastructure on Portion 31 of the Farm No. 236 and Portion 26 of the Farm No. 236, approximately 10 km west of Rasimone in the North West Province.

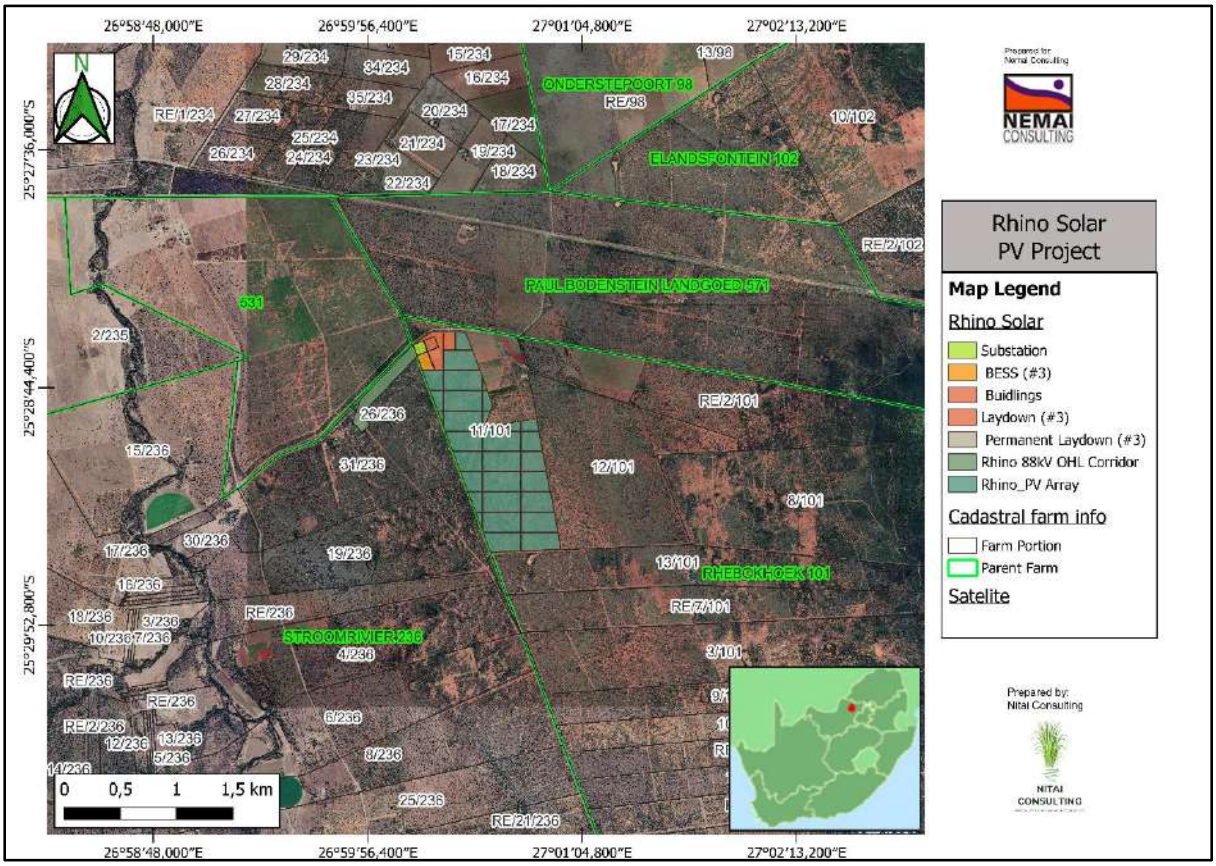

Figure 1: Project Locality

4 METHODS

4.1 Geographic Information Systems (GIS) Mapping

Existing data layers were incorporated into GIS software to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- North-West Biodiversity Sector Plan of 2015 (North West Provincial Government , 2015)
- 2022 National Biodiversity Assessment ((DFFE, 2022));
- Vegetation Map of South Africa, Lesotho and Swaziland ((Mucina & Rutherford, 2006);
- SA Protected and Conservation Areas Databases, 2022 (DFFE 2022);
- National Protected Areas Expansion Strategy, 2016 ((DEA, 2016));
- Important Bird and Biodiversity Areas, 2015 (Marnewick *et al.,* 2015);

Brief descriptions of the standardised methodologies applied are provided below. More detailed descriptions of survey methodologies are available upon request.

4.2 Desktop Vegetation and Botanical Assessment

The desktop vegetation and botanical assessment encompassed an assessment of all the vegetation units and habitat types within the project area. The focus was on an ecological assessment of pre-anthropogenic habitat types as well as the identification of any Red Data and protected species within the known distribution of the project area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA-POSA, 2019), which was used to access distribution records on Southern African plants and generate an expected species list (Figure 2). This new database replaces the old Plants of Southern Africa database which provided distribution data of flora at the quarter degree square resolution. The Red List of South African Plants website (SANBI, 2016) was used to provide the most current account of the national conservation status of flora.

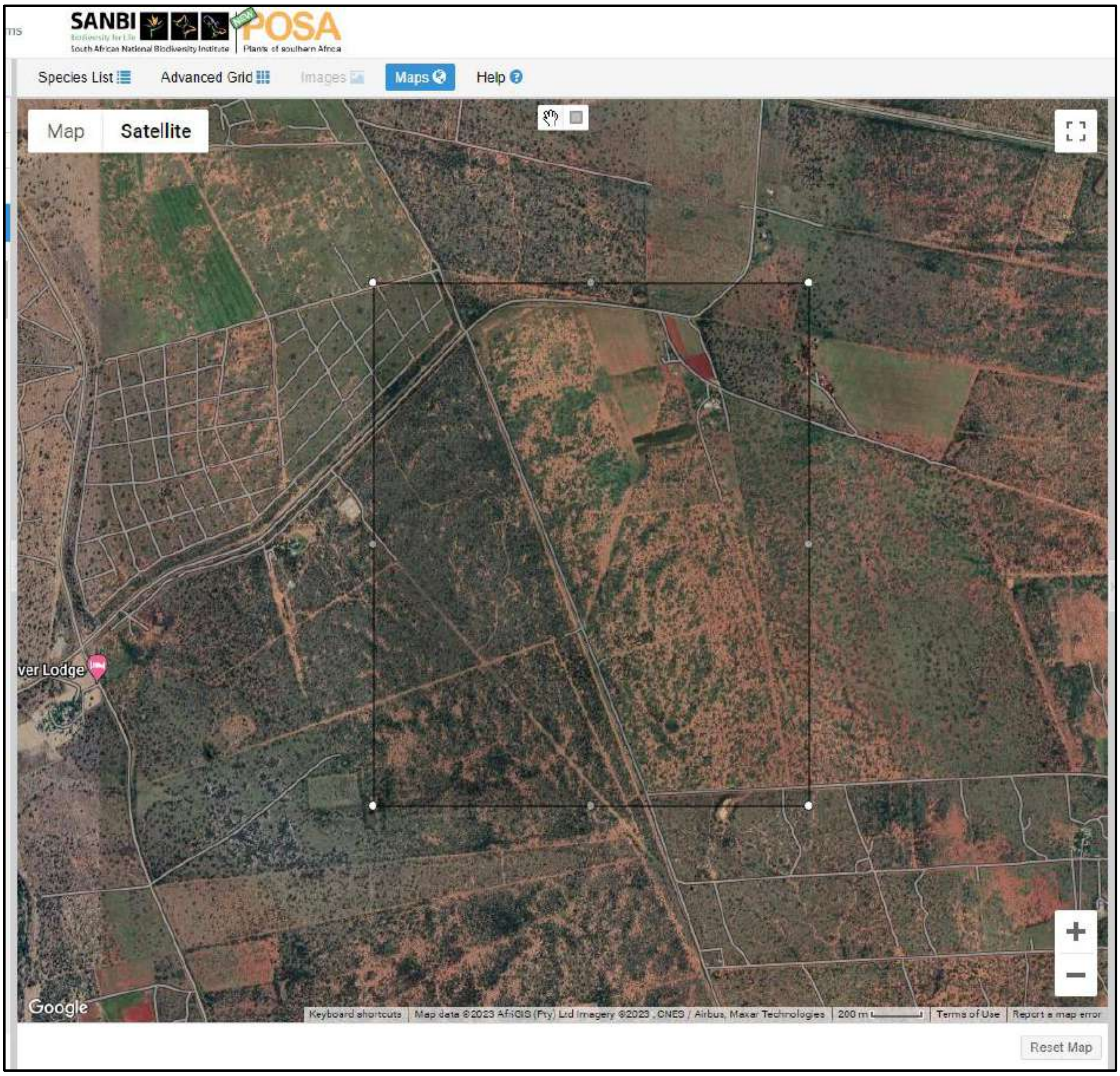

Figure 2: Plant distribution data.

Additional information regarding ecosystems, vegetation types, protected flora and Species of Conservation Concern (SCC) was obtained from the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012);
- Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2016); and
- List of Protected Tree Species (South African Government, 2014).

4.3 Floristic Fieldwork Survey and Analysis

The wet season fieldwork (completed during January 2023) and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field to perform a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for protected plants and flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed on any sensitive habitats overlapping with the proposed project area.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting protected plants and flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling observed flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff et al. (1982). Suitable habitat for SCC were identified according to Raimondo et al. (2009) and targeted as part of the timed meanders.

At each sample site, notes were made regarding current impacts (e.g., roads, erosion etc.), and this included the subjective recording of dominant vegetation species and any sensitive features (e.g., old lands, rock outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- A field guide to Wild flowers (Pooley, 1998);
- Field Guide to the Wild Flowers of the Highveld (van Wyk & Malan, 1998);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish et al., 2015); and
- Field guide to trees of Southern Africa, Struik Publishers (Van Wyk & Van Wyk, 1997).

The field work methodology included the following survey techniques:

<u>Timed meanders:</u>

- Sensitivity analysis based on structural and species diversity;
- Identification of protected floral species; and
- Identification of floral red-data or red-listed species (Species of Conservation Concern).

4.4 <u>Faunal Assessment</u>

4.4.1 Desktop Assessment

The faunal desktop assessment involved the following:

- Compilation of expected species lists;
- Identification of any red-data/red-listed species or Species of Conservation Concern potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national, and international conservation importance.

Distribution and SCC data is generally obtained from the following information sources:

- Animal Demography Unit (https://vmus.adu.org.za/)); and Southern African Bird Atlas Project 2 (SABAP2, 2019);
- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates et al., 2014);
- Red Data Book of Birds (Birdlife South Africa, 2015);
- Atlas and Red Data Book of Frogs of South Africa (Mintner et al., 2004);
- South Africa's official site for Species Information and National Red Lists (SANBI, 2022);
- The 2016 Red List of Mammals of South Africa (EWT, 2016); and
- The IUCN Red List of Threatened Species. Version 2021-3 (IUCN, 2021).

4.4.2 Field Survey

The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual observations (involving the use of binoculars and specialist camera equipment);
- Active hand-searches, used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.);
- Identification of tracks and signs; and the utilization of local knowledge.

Relevant field guides and texts consulted for identification purposes in the field during the survey may include the following:

- Roberts Bird Guide, Second Edition (Chittenden et al., 2016);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Spiders of Southern Africa (Leroy & Leroy, 2003); and

4.5 Site Ecological Importance

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of Species of Conservation Concern (SCC) and their ecosystem processes.

Site Ecological importance (SEI) is a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

BI = CI + FI

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN, 2016; Table 1).

Table 1:Conservation importance (CI) criteria

Conservation importance	Fulfilling criteria
Very high	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[23] or Critically Rare[24] species that have a global EOO of < 10 km^2.
	Any area of natural habitat[25] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[26]) of natural habitat of EN ecosystem type.
	Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.
	Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.
	Presence of Rare species.
	Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.
	Any area of natural habitat of threatened ecosystem type with status of VU.
	Presence of range-restricted species.
	> 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC.
	No confirmed or highly likely populations of range-restricted species.
	< 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	No confirmed and highly unlikely populations of SCC.
	No confirmed and highly unlikely populations of range-restricted species.
	No natural habitat remaining.

[23] For butterflies, as per Armstrong *et al*. (2013).
[24] For plants, as per Raimondo *et al*. (2009).
[25] This excludes areas of transformed habitat within a defined ecosystem even if these are partially restored, e.g. Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.
[26] This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: http://bgis.sanbi.org/Projects/Detail/49).
[27] Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.

Functional integrity (FI) of the receptor (e.g. the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions (Table 2).

Table 2:Functional integrity (FI) criteria.

Functional integrity	Fulfilling criteria
Very high	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

Recalling that biodiversity importance (BI) is a function of conservation importance (CI) and the functional integrity (FI) of a receptor, BI can be derived from a simple matrix of CI and FI as follows:

Table 3:Determining the BI

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Receptor resilience (RR) (Table 4) is defined here as: ‘The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention’.

Table 4: Resilience criteria

Resilience	Fulfilling criteria
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%[28] of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows (Table 5) and interpreted accordingly (Table 6):

Table 5: Determining the SEI.

Site ecological importance		Biodiversity importance				
		Very high	High	Medium	Low	Very low
Receptor resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

Table 6: Guidelines for interpreting SEI in the context of the proposed development activities.

Site ecological importance	Interpretation in relation to proposed development activities
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

4.6 Limitations and Assumptions

The following limitations and assumptions should be noted for the assessment:

- It is assumed that all information received from the client is accurate;
- All datasets accessed and utilised for this assessment are considered to be representative of the most recent and suitable data for the intended purposes;
- The handheld GPS utilised for the fieldwork had a maximum accuracy of 5 m. As such, any features spatially logged and mapped as part of this report may be offset by approximately 5 m; and
- Only a single season survey was conducted for the respective studies, this would constitute a wet season survey, however the data received is considered sufficient to derive a meaningful baseline;

5 Receiving Environment

5.1 Desktop Spatial Baseline

Table 7: Desktop Spatial features examined below has been produced in terms of the spatial data collected and analysed (as provided by various sources such as the national and provincial

environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or project area. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 7: Desktop Spatial features examined

Desktop Information considered	Relevant	Reasoning	Section
North-West Biodiversity Sector plan of (2015)	Yes	Project area overlaps with a CBA.	5.1.1
Ecosystem Protection Level (SANBI & DFFE, 2021)	Yes	The project falls within an ecosystem of “Least Concern”	5.1.2.1
National Protected Areas Expansion Strategy, 2016 (DEA, 2016)	Yes	The project area does overlap with a priority focus area	5.1.3
Important Bird and Biodiversity Areas, 2015	No	No IBAs occur nearby	-
South African Protected and Conservation Areas Databases, 2022	Yes	No Protected areas within 10km of the study site.	-

5.1.1 North-West Biodiversity Sector Plan

The North West Biodiversity Sector Plan (NWBSP) strives to improve landscape level conservation and management of biodiversity and ecosystems in the province. This is achieved by providing information on biodiversity in a standardised format that can be used to inform forward planning (e.g. Spatial Development Frameworks) and reactive management (e.g. environmental impact assessment) processes.

The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines.

- Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses.

  - The North West Biodiversity Sector plan (NWBSP) differentiates between **CBA 1 and CBA 2.**
    - CBA 1 areas include: Critical Patches: Ecosystem Status – Critically Endangered Ecosystems; irreplaceable Sites; Critical Biodiversity Corridors Linkages; Important Terrestrial Habitats: Expert Areas; and Important Terrestrial Habitats: Kloofs.
    - CBA2 areas include: Critical Patches: Ecosystem Status – Endangered and Vulnerable Ecosystems; Important Habitats: Features; and Important Habitats: Focus Wildlife Areas.

- Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

The project area does fall in a CBA and ESA category and is designated as “CBA 2” and “ESA1 and ESA 2” (Figure 3).

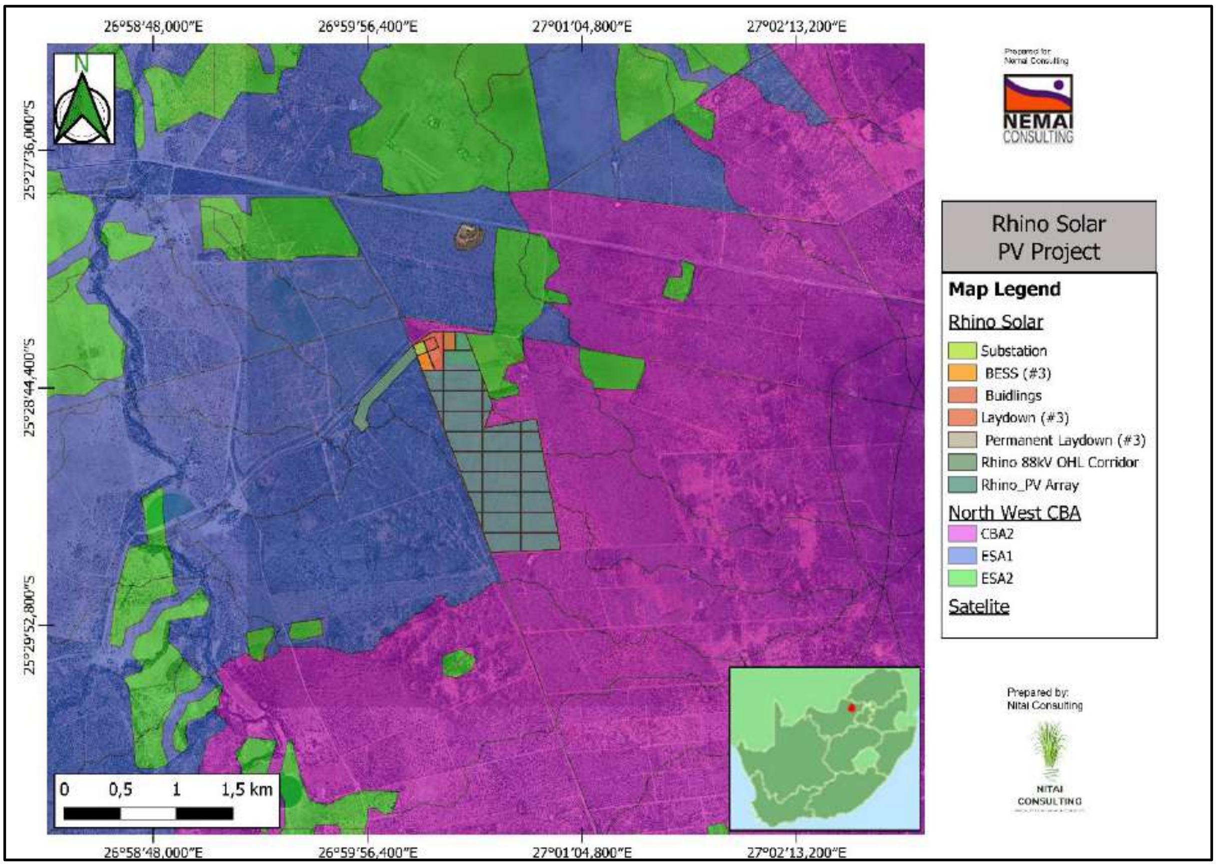

Figure 3: CBA areas for study site.

5.1.2 The National Biodiversity Assessment

5.1.2.1 Ecosystem Threat status

The 2011 list focussed on terrestrial ecosystems and is referred to in Listing Notice 3 (Government Notice R985, published under NEMBA in 2014) which identifies activities that require environmental authorisation when undertaken in a threatened ecosystem, as identified in the list.

The 2011 list has also been used throughout South Africa as a decision-making support tool, especially in environmental authorisation application processes and to inform bioregional planning. The revised list, known as the 2022 Red List of Ecosystems, was developed between 2016 and 2021, incorporating the best available information on terrestrial ecosystem extent, condition, pressures, and drivers of change.

The revised list is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa. The updated input data and alignment with global methods provides for a substantially improved list but also limits direct comparison between 2011 and 2022 because some ecosystem types have changed threat status category due to the change in methods, and others have changed due to land cover change or other pressures in the landscape.

Going forward, comparisons between versions of the list will be possible, facilitating trend analysis and monitoring. The 2022 Red List of Ecosystems identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types).

The project area was superimposed on the Ecosystem Protection Level map to assess the protection status of the terrestrial ecosystem associated with the project area. Based on the dataset, the ecosystem is rated as least concern and is likely not endemic (Figure 4 and Figure 5).

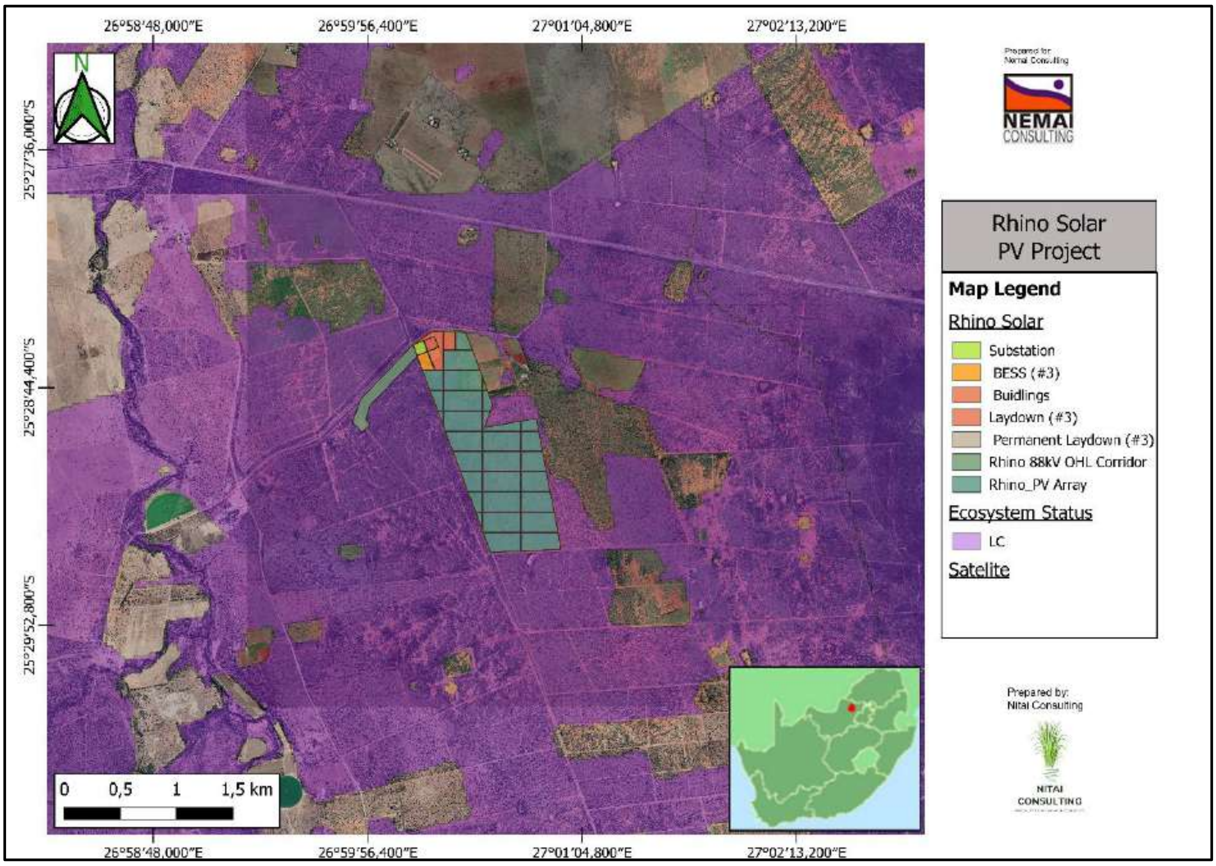

Figure 4: Red list Ecosystem status.

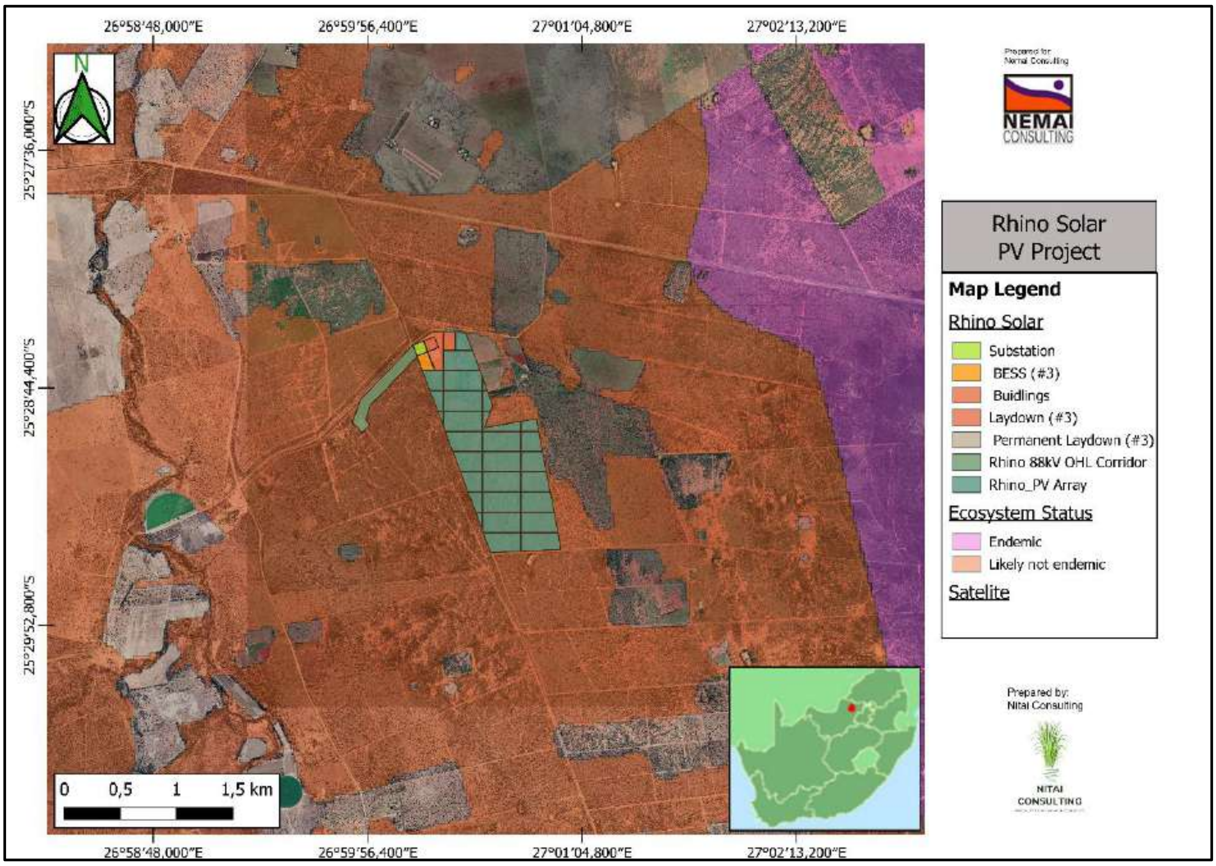

Figure 5: Ecosystem endemism status within the site.

5.1.3 South African Protected and Conservation Areas

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009. The NPAES is a 20-year strategy with 5-year implementation targets aligned with a 5-year revision cycle. (DEA, 2016).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DEA, 2016).

The project area does overlap with a priority focus area for expansion according to the 2016 NPAES dataset but is not under negotiation (Figure 6).

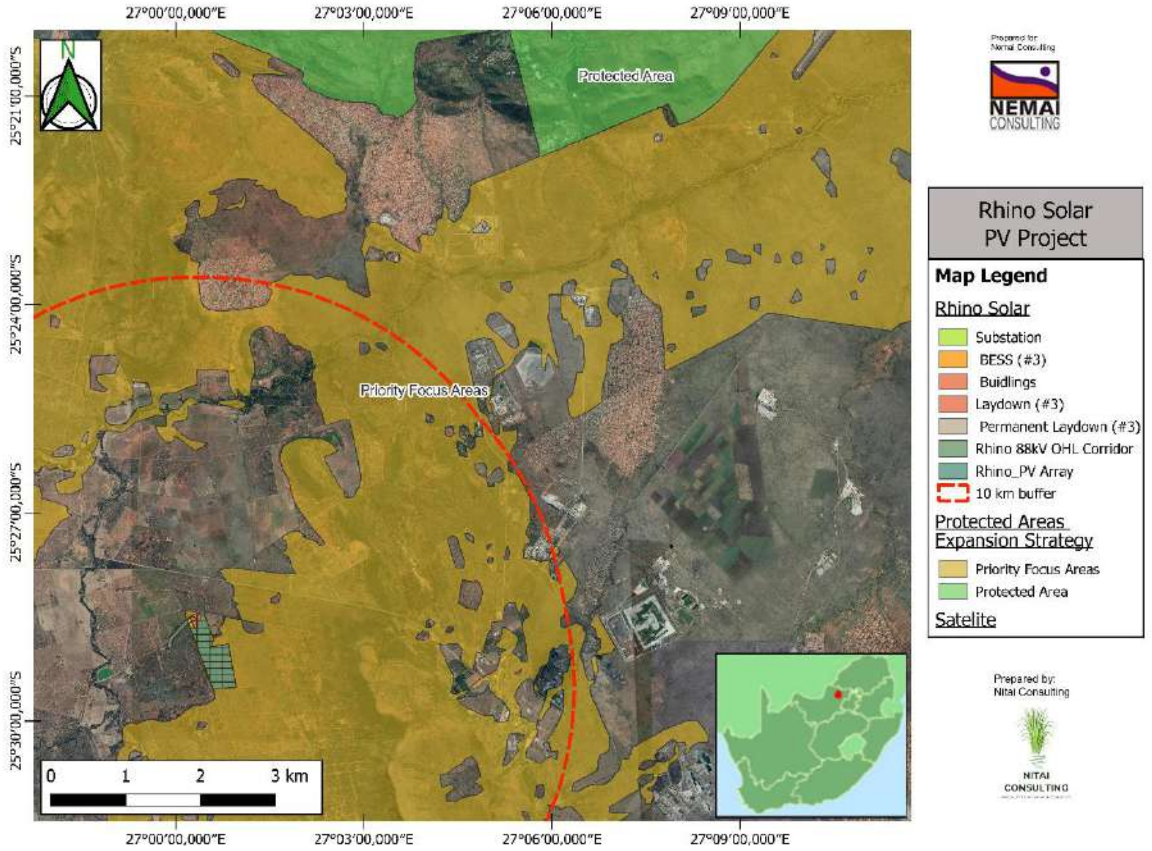

Figure 6: Protected Areas Expansion Framework for study site.

5.2 Ecological Desktop Baseline

5.2.1 Vegetation Assessment

The project area is situated within the Savanna Biome. The savanna vegetation of South Africa and Swaziland constitutes the southernmost extension of the most widespread biome in Africa. he macroclimatic patterns of the Savanna Biome region are tightly linked to climatic differences between the Atlantic and Indian Ocean coasts of the southern African subcontinent.

In South Africa, the Savanna Biome is located mostly in the north-eastern part of the country. The geology of this area is dominated by a very stable block of ancient continental crust, known as the Kaapvaal Craton. The Kaapvaal Craton began to form by a process of accretion over 3.5 billion years ago (gya) and has been largely unaffected by crustal processes, except on its fringes, for the last 2 ga.

The Savanna Biome contains six bioregions. The Central Bushveld Bioregion has the highest number of vegetation types and covers most of the high-lying plateau west of the main escarpment from the Magaliesberg in the south to the Soutpansberg in the north. The study area is found in the Zeerust Thornveld vegetation bioregion (Figure 7).

5.2.1.1 Zeerust Thornveld

Distribution: North-West Province: Extends along the plains from the Lobatsi River in the west via Zeerust, Groot Marico and Mabaalstad to the flats between the Pilanesberg and western end of the Magaliesberg in the east (including the valley of the lower Selons River).

Altitude: 1 000–1 250 m.

Vegetation & Landscape Features: Deciduous, open to dense short thorny woodland, dominated by Acacia species with herbaceous layer of mainly grasses on deep, high base-status and some clay soils on plains and lowlands, also between rocky ridges of SVcb 4 Dwarsberg-Swartruggens Mountain Bushveld.

Geology & Soils: Sediments of the Pretoria Group (Transvaal Supergroup) in this area, particularly the Silverton and Rayton Formations, are mostly shale with less quartzite and conglomerate. Carbonates, volcanic rocks, breccias and diamictites also occur in the Pretoria Group. Bronzite, harzburgite, gabbro and norite of the Rustenburg Layered Suite (Bushveld Igneous Complex) are also found. Soils are mostly deep, red-yellow, apedal, freely drained with high base status also with some vertic or melanic clays. Land types mainly Ae and Ea.

Climate: Summer rainfall with very dry winters. MAP has a relatively narrow range: 550–600 mm. Frost fairly frequent in winter. Mean monthly maximum and minimum temperatures for Marico-Irr weather station 36.7°C and –0.4°C for January and June, respectively.

Important Taxa

<u>Tall Trees:</u> *Acacia burkei (d), A. erioloba (d). Small Trees: Acacia mellifera subsp. detinens (d), A. nilotica (d), A. tortilis subsp. heteracantha (d), Rhus lancea (d), Acacia fleckii, Peltophorum africanum, Terminalia sericea. Tall Shrubs: Diospyros lycioides subsp. lycioides, Grewia flava, Mystroxylon aethiopicum subsp. burkeanum.*

<u>Low Shrubs:</u> *Agathisanthemum bojeri, Chaetacanthus costatus, Clerodendrum ternatum, Indigofera filipes, Rhus grandidens, Sida chrysantha, Stylosanthes fruticosa.*

<u>Graminoids:</u> *Eragrostis lehmanniana (d), Panicum maximum (d), Aristida congesta, Cymbopogon pospischilii.*

<u>Herbs:</u> *Blepharis integrifolia, Chamaecrista absus, C. mimosoides, Cleome maculata, Dicoma anomala, Kyphocarpa angustifolia, Limeum viscosum, Lophiocarpus tenuissimus.*

<u>Endemic Taxon Low Shrub:</u> *Rhus maricoana*.

Conservation Status: The ecosystem is rated as Least concern according to the 2022 Red List ecosystem data since there is 69% remaining of this ecosystem. It is not highly fragmented and 4.4% is currently formally protected (DFFE, 2022).

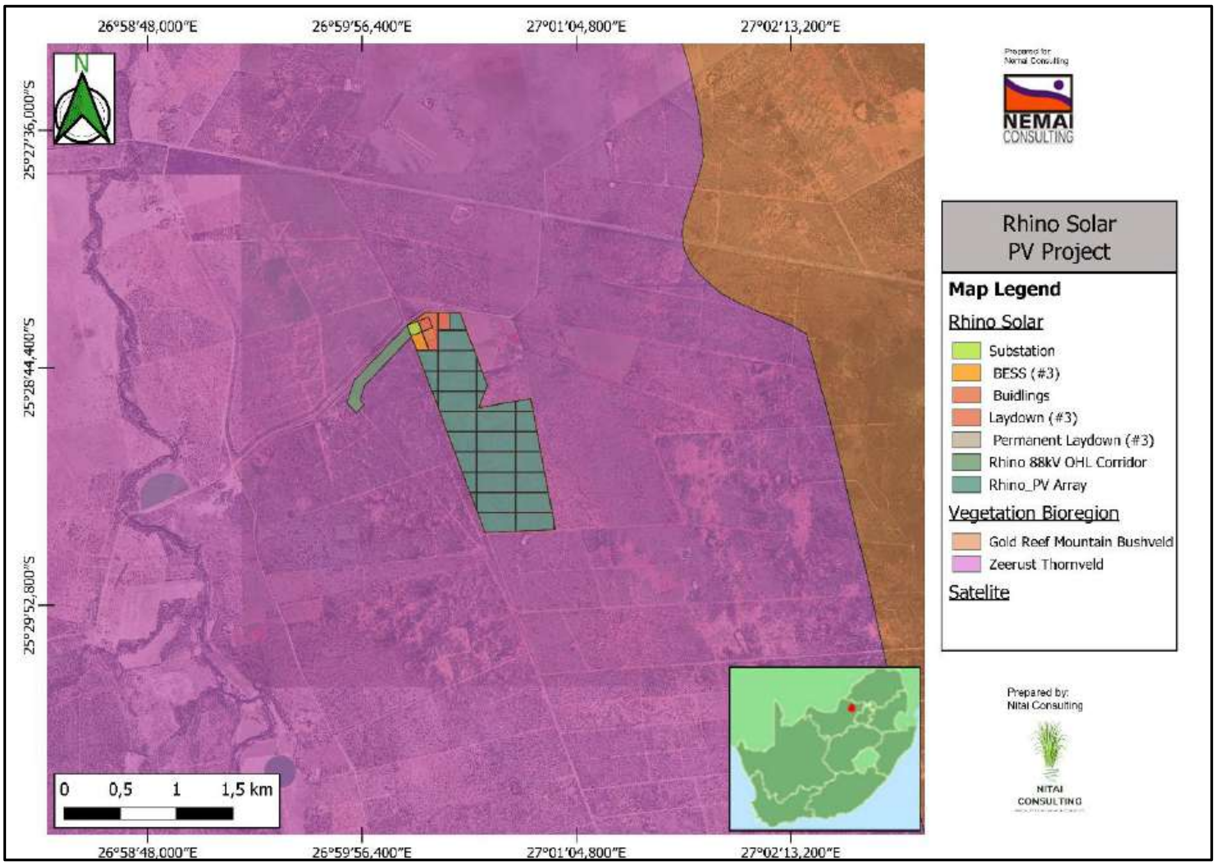

Figure 7: Vegetation region of study site.

5.2.1.2 Botanical Assessment

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, no species presence data is available for the study site. The screening tool identifies no potential SCC species and rated the area "Low".

5.2.2 Faunal Assessment

Largely based on the South African Bird Atlas Project Version 2 (SABAP2, 2022), IUCN Digital Distribution Maps (IUCN, 2016), and the Animal Demography Unit (ADU, 2020) databases, Table 8 summarises the total number of animal species that have the potential to occur in or around the project area, and the corresponding number of SCC.

Table 8: Total number of potential fauna species present, and corresponding SCC

Fauna type		Total potential number	Number of SCC
Avifauna		195	2
Mammals		58	6
Herpetofauna	Amphibians	14	0
	Reptiles	29	0

These numbers include animals that only occur within nature reserves and private reserves. Of the 2 avifaunal SCC, none are likely to be found resident in the project area due to a lack of suitable habitat and the associated modified nature of the project area and surrounds.

Of the 58 total mammals listed, none of the mammal SCC are likely to be found resident within the project area.

None of the herpetofauna SCC are likely to be found within the project area.

The general modified state of the area coupled with the with high levels of agricultural disturbance, results in a high level of disturbance degradation, and unsuitable environmental conditions.

5.3 Field Survey

This section details the observations recorded during an on-site field survey conducted to ground truth the floral, faunal, and habitat features of the project area. Sampling took place from 8:00 to 15:00 on Sunday 15 January 2023 and again on the 24th of January 2023 from 7:00 to 14:00.

5.3.1 Terrestrial Flora and Fauna

During the terrestrial survey the floral and faunal communities within the project area were assessed and photographs were captured, some of which are provided in this section of the report. For ease of reading, the observations and discussions pertaining to the floral and the faunal species recorded are separated below.

5.3.1.1 Flora and Vegetation Condition

The project area was found in a heavily modified condition, mainly attributed to the agricultural practices and its impacts associated, resulting in the area being largely disturbed in some way. Grazing practices, old lands and piospheres have degraded the veld severely. These aspects further limit the functional capacity of the project area. Much of the development footprint is located within or along roads or transformed areas and their associated servitudes, which are considered as very low sensitivity. No protected trees or SCC flora species were observed.

Refer to the images below for photographs showing the habitats and the overall state of the project area.

5.3.1.2 Fauna

Mammal activity was low, due to the extent of disturbance in general and cattle grazing the area, as well as the poor habitat condition. The species present are most likely not resident due to the modified state of the area. No SCC were observed during the field survey.

Figure 8: General condition of the study site

5.3.2 Habitat Survey and Site Ecological Importance

The main habitat types (Figure 9) identified across the project area were initially identified and pre-delineated largely based on aerial satellite imagery. These habitat types were then refined based on the field coverage and data collected during the survey.

The degraded habitat has been modified from its natural state, and it represents habitat that has been historically impacted, and has not recovered. This habitat is largely limited to areas that have been impacted through effects from agricultural grazing practices and associated impacts, roads, and land use, as well as mismanagement and inadequate rehabilitation procedures. These habitats are not entirely transformed, but exist in a constant degraded state, as they cannot recover to a more natural state, due to the ongoing disturbances and impacts received.

Transformed habitat was present in the form of the existing road, existing infrastructure, or any other areas devoid of vegetation, artificially. Due to the transformed nature of this habitat, it is regarded as having a very low sensitivity.

Bush thickened habitat was found on extensive areas of the property with areas denuded of vegetation. There is surface crust formation and evidence of water runoff due to extremely low herbaceous vegetation cover. Due to the disturbance of this area and ongoing incorrect grazing management this area is considered as having a very low sensitivity.

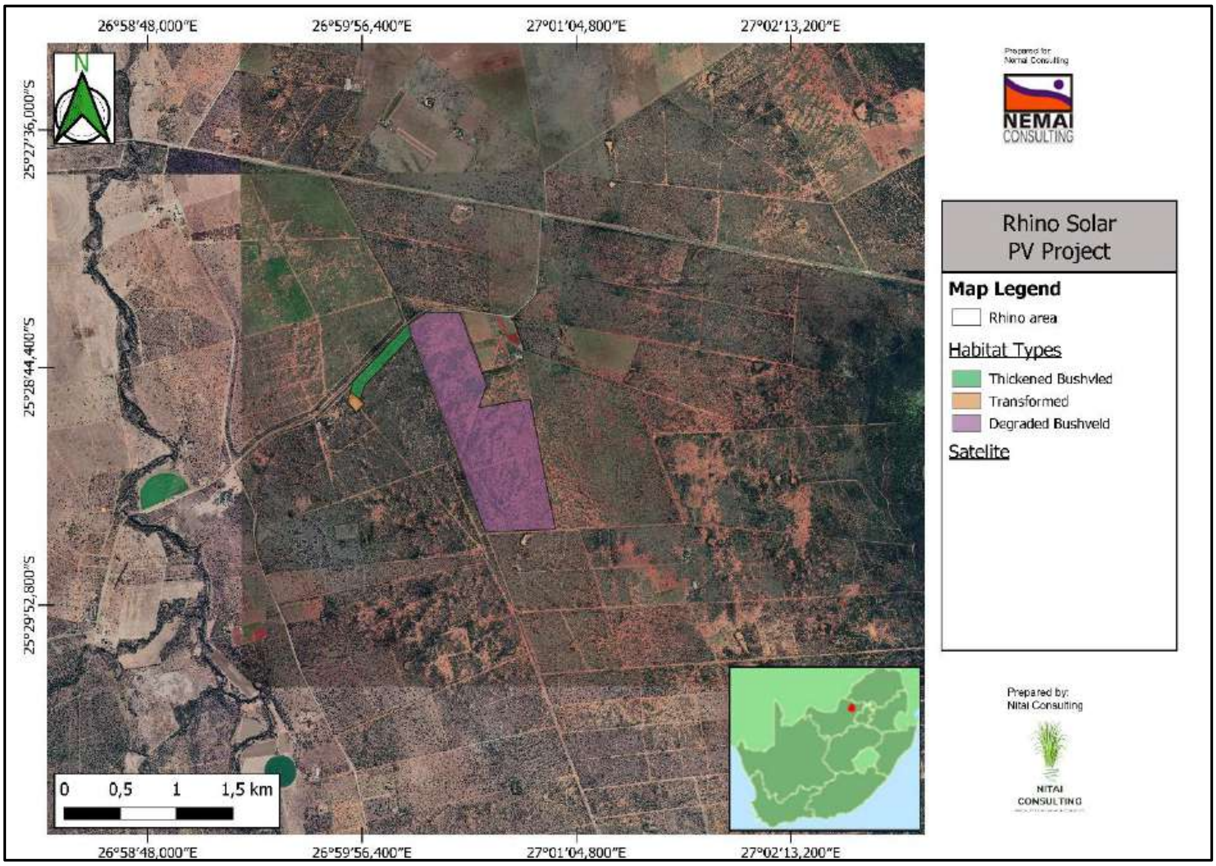

Figure 9: Habitat types found on Rhino Solar.

Based on the criteria provided in section 4.5 of this report, the three delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 9 below.

To identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped in Figure 10.

It is important to note that this map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 9: Site Ecological Importance assessment summary of the habitat types delineated within the project area.

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity importance	Receptor resilience	Site Ecological Importance
Degraded Savanna	Low	Medium	Low	Medium	Low
Transformed	Low	Medium	Low	Medium	Low
Thickened Savanna	Low	Medium	Low	Medium	Low

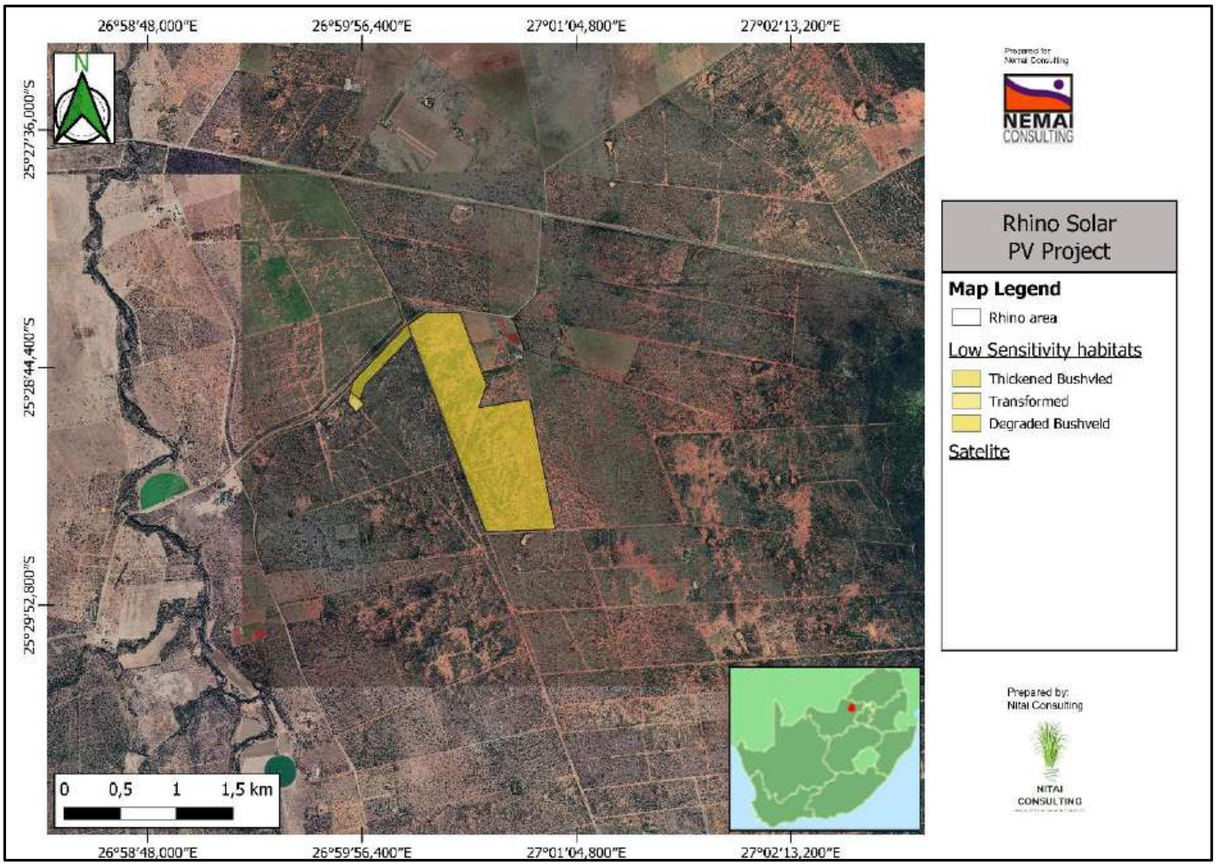

Figure 10:Biodiversity SEI delineation relevant to the project area

The terrestrial biodiversity theme sensitivity as indicated in the screening report (compiled by the National Web based Environmental Screening Tool) was derived to be ‘Very High’ (Figure 11).

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Ecological support area 1
Very High	Ecological support area 2
Very High	Protected Areas Expansion Strategy

Figure 11: Biodiversity Sensitivity of the project area according to the Screening Report.

The completion of the terrestrial desktop and field studies disputes the ‘Very High’ sensitivity presented by the screening report. As discussed above, the project area is largely modified and as such is assigned a sensitivity rating of ‘Low’.

The Screening Report further classified the sensitivity in terms of the Animal Species Theme as mostly ‘Medium’, apart from a small section of the power line route near the existing substation for Layout

Alternative 1 which is 'High'. In addition, the Screening Report indicates that the sensitivity in terms of Plant Species Themes is 'Low'. Following the field survey findings, both the animal and plant species themes may be classified as having 'Low' sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal SCC within the project area.

6 PROPOSED IMPACT MANAGEMENT PLAN'

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr) for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. Table 10 presents the recommended mitigation measures relative to the terrestrial study.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities within the CBA and ESA areas in the vicinity of the project area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of faunal species; and
- Prevent the direct and indirect loss and disturbance of floral and faunal species and communities (including any potential Species of Conservation Concern nearby).

Table 10: Mitigation measures from the terrestrial assessment.

Impact 1	**Destruction, fragmentation and degradation of habitats and ecosystems**	
Problem	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat. Daily operational activities will permanently damage habitat and fragment it further.	
Type	Direct	
Nature	Negative	
Phases	Construction and operational	
Mitigation actions		

Recommendations	1. Restrict impact to development footprint only and limit disturbance in surrounding areas. 2. Prior to commencement of construction, compile a Rehabilitation Plan including monitoring specifications, to be included into the EMPr during final approval. 3. Prior to commencement of construction, compile an Alien Plant Management Plan, to be included into the EMPr during final approval.
Monitoring	
Recommendations	As per management plans
Impact 2	**Spread and/or establishment of alien and/or invasive species**
Problem	Establishment and continued spread of alien invasive plants due to the clearing and disturbance of indigenous vegetation
Type	Indirect
Nature	Negative
Phases	Construction and Operational
Mitigation actions	
Recommendations	1. Prior to commencement of construction, compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control, including monitoring specifications. 2. Undertake regular monitoring to detect alien invasions early so that they can be controlled. 3. Implement control measures.
Monitoring	
Recommendations	As per management plans
Impact 3	**Direct mortality of fauna**

Problem	Mortality of fauna due to higher traffic (Vehicles and staff) on site
Type	Direct
Nature	Negative
Phases	Construction and Operational
Mitigation actions	
Recommendations	Education and awareness of staff and construction personal regarding importance of faunal populations and ecosystem functioning
Monitoring	
Recommendations	Continued monitoring of faunal populations and awareness programs as per management plan
Impact 4	**Reduced dispersal/migration of fauna**
Problem	Internal roads, fencing and infrastructure will cut off migratory routes of faunal populations
Type	Direct
Nature	Negative
Phases	Construction and Operational
Mitigation actions	
Recommendations	Create corridors during construction phase for faunal species to move through artificial barriers
Monitoring	
Recommendations	Continuously monitor faunal populations as per management plans
Impact 5	**Environmental pollution due to water runoff, spills from vehicles and erosion**

Type	Direct and Indirect
Nature	Negative
Phases	Construction and Operational
Monitoring	
Recommendations	Diligence checks as per storage SOP according to management pans
Impact 6	**Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, and light pollution.**
Problem	Construction and maintenance vehicles moving around on site
Type	Direct and Indirect
Nature	Negative
Phases	Construction and Operational
Mitigation actions	
Recommendations	Keep within footprint, drive within speed limits, do no not idle vehicle for unnecessary periods
Monitoring	
Recommendations	Follow SOP's as set out in Management plan, monitor faunal populations
Impact 7	**Staff and others interacting directly with fauna (potentially dangerous) and flora or poaching of animals and plants**
Problem	Staff interacting/ killing/ poaching fauna or flora species
Type	Direct
Nature	Negative
Phases	Construction and Operational
Mitigation actions	

Recommendations	Awareness training for staff on site regarding sensitive fauna and flora species, including relevant laws for protection of species
Monitoring	
Recommendations	Monitoring of area for snares and disturbed soil (plant poaching), monitoring of personal effects of staff

The following mitigation measures are recommended to address known potential impacts:

- Restrict impact to development footprint only and limit disturbance in surrounding areas.
- Prior to commencement of construction, compile a Rehabilitation Plan including monitoring specifications, to be included into the EMPr during final approval.
- Prior to commencement of construction, compile an Alien Plant Management Plan, to be included into the EMPr during final approval.
- Prior to commencement of construction, compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control, including monitoring specifications.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled.
- Prior to commencement of construction, compile and implement a stormwater management plan including monitoring specifications.
- Monitor surfaces for erosion, repair and/or upgrade, where necessary.
- Prior to decommissioning commencing, compile a Rehabilitation Plan in compliance with the regulatory requirements at the time of decommissioning.

Specific monitoring recommendations should be provided in the Alien Invasive Management Plan, and the Rehabilitation Plan. The following are broad recommendations:

Alien Invasive Species:

- Monitor for early detection, to find species when they first appear on site. This should be as per the frequency specified in the management plan and should be conducted by an experienced botanist. Early detection should provide a list of species and locations where they have been detected. Summer (vegetation maximum

- growth period) is usually the most appropriate time, but monitoring can be adaptable, depending on local conditions – this must be specified in the management plan.
- Monitor for the effect of management actions on target species, which provides information on the effectiveness of management actions. Such monitoring depends on the management actions taking place. It should take place after each management action.
- Monitor for the effect of management actions on non-target species and habitats.

Rehabilitated areas:

- Rehabilitation Plan must be compiled by an approved ecologist prior to achieving COD and prior to the start of decommissioning.
- All management actions associated with rehabilitation must be recorded after each management action has taken place.
- All rehabilitated areas should be monitored to assess vegetation recovery. This should be for a minimum of three years after post-construction rehabilitation, but depends on the assessed trajectory of rehabilitation (whether it is following a favourable progression of vegetation establishment or not – this depends on the total vegetation cover present, and the proportion that consists of perennial growth of desired species). For each monitoring site, an equivalent comparative site in adjacent undisturbed vegetation should be similarly monitored. Monitoring data collection should include the following:
    - total vegetation cover and height, as well as for each major growth form;
    - species composition, including relative dominance;
    - soil stability and/or development of erosion features;
    - representative photographs should be taken at each monitoring period.
- Monitoring of rehabilitated areas should take place at the frequency and for the duration determined in the rehabilitation plan, or until vegetation stability has been achieved.

7 Conclusion

The area has experienced long-term and continuous disturbance, mostly due to the agricultural grazing practices and associated impacts. The project area is modified and as such is assigned a sensitivity rating of ‘Low’.

The Screening Report further classified the sensitivity in terms of the Animal Species Theme as mostly 'Medium', apart from a small section of the power line route near the existing substation for Layout Alternative 1 which is 'High'. In addition, the Screening Report indicates that the sensitivity in terms of Plant Species Themes is 'Low'. Following the field survey findings, the plant species theme is confirmed as 'Low' but the animal theme may be re-classified as having 'Low' sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal SCC within the project area.

Completion of the Terrestrial Biodiversity Assessment led to a dispute of 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool and to a dispute of the 'High' classification for the animal theme sensitivity as allocated by the National Environmental Screening Tool. The project area has instead been assigned a 'Low' sensitivity, because of the extent of environmental disturbance that has taken place, and the fact that limited SCC were observed and are unlikely to frequently occur within the project area.

7.1 Specialist Statement

The development of the project area is likely to result in negligible negative impacts, especially considering the extent of 'Low' sensitivity areas confirmed. Therefore, the specialist is of the opinion that the development of the project area may be favourably considered for environmental authorisation, provided that the mitigation measures and recommendations presented above be adhered to.

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities:

- Very Low: Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

8 References

DEA. (2016). *National Protected Areas Expansion Strategy for South.* Pretoria: Department of Environmental Affairs.

DFFE. (2022). *Revised national list of ecosystems that are threatened and in need of protection.* Pretoria: S.A. Government.

Mucina, L., & Rutherford, M. (2006). *The Vegetaion of South Africa, lesotho and Swaziland.* (Vol. Strelitzia 19). Pretoria: SANBI.

North West Provincial Government . (2015). *North West Biodiversity Sector Plan.* Mafikeng: READ.

SANBI, & DFFE. (2021). *Red List of Terrestrial Ecosystems of South Africa.* Pretoria, South Africa: South African National Biodiversity Institute.

Skinner, J. C. (2005). *The mammals of the Southern African subregion.* United Kingdom: Cambridge University Press.

South African Government. (2004). *National Environmental Biodiversity Managament Act (Act 10 of 2004): Threatened or Protected Species Regulations.* Pretoria: Government Printing Works.

South African Governmnent. (2004). *National Environmental Management: Biodiversity Act: (10 of 2004) Alien and Invasive species list.* Pretoria: Government printing works.

9 Appendix A: Specialist Declaration

I, **Helena Elizabeth Human**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be

taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

- all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

____________________________________ **02/05/2023**

Helena Elizabeth Human (Pr. Sci. Nat. 147031) **Date**

Terrestrial Biodiversity Specialist

10 APPENDIX B: SPECIALIST CV

1 PERSONAL PARTICULARS

Profession:	Biodiversity Specialist
Date of Birth:	13 March 1987
Name of Firm:	Nitai Consulting
Name of Staff:	Elzet Human
Nationality:	RSA
Membership of Professional Societies	SACNASP (Pr. Sci. Nat. 147031)

2 EDUCATION:

M-Tech Nature Conservation, (Plant DNA Barcoding and phylogenetics), TUT, South Africa, 2021

B-Tech Nature Conservation, (Resource Management, Vegetation ecology and rehabilitation) TUT, South Africa, 2011

N. Dip Nature Conservation, TUT, South Africa, 2008

3 EMPLOYMENT RECORD:

2022 – Present Biodiversity Specialist, Nitai Consulting

Conduct Biodiversity Impact Assessments.

Conduct Plant Ecological Assessments.

Conduct Animal Ecological Assessments

Biodiversity monitoring programs; and,

GIS Mapping

2013 – 2022 Lecturer: Nature Management, Centurion academy

Lectured various subjects for undergraduate students in Nature Management:

Botany and Vegetation Ecology, Zoology, Animal Health, Conservation Development, Ecology, Game Ranch Management, Biostatistics, Research Methodology, Genetics, Soil Science

2009 – 2013 HOD Rangers Department, Zebula Gold Estate and Spa

Ecological Monitoring, Reserve Maintenance, Animal Husbandry, Neonatal care of Endangered carnivore species, Zoological display, and permit compliance

2008 – Conservation Student, Ann van Dyk Cheetah Research Centre

Neonatal Care of Carnivore species,

Veterinary assistance work – vaccine, diets, Endo scoping, pregnancy tests, health monitoring, quarantine care of species, emergency c-sections, bleeding procedures on vultures

Enclosure Maintenance

Tracking wild cheetahs

Rewilding cheetahs

Anatolian Shepard project assistance

4 SELECTED CONSULTANCIES

4.1 Ecological assessment for Victorius Game farm, Visgat, Ellisras, Limpopo

2018, Ecologist, Ecological condition assessment and game carrying capacity for game farm. Habitat evaluation and rehibition program for problem areas

4.2 Elephant impact study on Mabula Game Reserve, Bela-Bela, Limpopo,

2019, Ecologist, Ecological impact study on Private Nature reserve to see extent of elephant utilisation and impact. Woody species analysis – structure classification and net primary production. Elephant movement patterns and carrying capacity. Identification of vulnerable habitats and management program.

4.3 Faan Meintjies Municipal Nature Reserve, Matlosana, North West

2018-2022, Ecologist, Habitat assessments, game carrying capacities, ecological condition assessments, game counts and game recommendations, ecological rehabilitation programs, white rhino monitoring, anti-poaching programs, Environmental Education programs.

4.4 Kroonstad Solar PV Facilities

2022, Biodiversity Specialist. Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Vals River.

4.5 Kroonstad South Solar PV Facilities

2022, Biodiversity Specialist. Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the five solar PV facilities as well as perform aquatic biomonitoring of the Blomspruit.

4.6 CCUS 3D Seismic Survey & Drilling

2023, Biodiversity Specialist. Proposed 3D Seismic Survey within the Leandra area, Mpumalanga Province, South Africa Assess and map all biodiversity, plant and animal features within the footprint of the survey area.

4.7 Rustenburg Solar PV Facilities

2023, Biodiversity Specialist. Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the three solar PV facilities.

4.8 Grootvlei Solar PV Facility

2023, Biodiversity Specialist. Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the one solar PV facility.

4.9 Paulputs 400 kV Strengthening (Transmission Line Loop in Loop Out) Project

2023, Biodiversity Specialist. Proposed Paulputs 400kv Strengthening Project (Transmission Line Loop In Loop Out From Aries – Kokerboom Transmission Line), South Africa, Assess and map all biodiversity, plant and animal features within the power line footprint as well as perform biodiversity monitoring.

4.10 400kV Transmission and 132kV distribution power lines for the Apollo-Lepini-Mesong Project

2023, Biodiversity Specialist. Proposed development of a 400kV transmission and 132kV power lines for the Apollo-Lepini-Mesong Project, Gauteng Province, South Africa, undertake assessments and map all biodiversity, plant, and animal features along the proposed routes for the 400kV and 132kV power lines.

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – excellent speaking, reading and writing

APPENDIX E3: Avifaunal Impact Assessment

Avifauna Impact Assessment for the proposed Rustenburg Rhino Solar PV Facility

Rasimone, Kgetlengrivier Local Municipality, North West Province.

April 2023

CLIENT

Prepared by:

The Biodiversity Company

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info@thebiodiversitycompany.com

wwww.thebiodiversitycompany.com

Report Name	**Avifauna Impact Assessment for the proposed Rustenburg Rhino Solar PV Facility**
Submitted to	NEMAI CONSULTING
Fieldwork	**Ernest Porter** Ernest has gained birding experience in the Northern Cape, North West, Mpumalanga, Limpopo, KwaZulu Natal, Free State, Western Cape and also Gauteng. He is a qualified FGASA NQF2 Field Guide and a committee member of Black Eagle Project Roodekrans and The Botanical Society of South Africa (Bankenveld Branch).
Fieldwork	**Pieter Erasmus** Pieter holds a BSC degree in Ecology and an honors degree in Zoology and Ecology from the University of Pretoria. They have worked for four years as an ecologist, conducting biodiversity surveys for both fauna and flora in South Africa. They also served as the chair of the wildlife committee for the Kamonande Private Game Reserve for two years. Additionally, they have completed a certification in South African environmental law from UNISA.
Report writing	**Leigh-Ann de Wet** Ms Leigh-Ann de Wet is Pr. Nat. Sci. registered (400233/12) and has extensive experience in assessing terrestrial biodiversity. She obtained her MSc in Botany from Rhodes University. She has over 14 years' experience conducting terrestrial biodiversity assessments (including both flora and fauna as well as specialist avifauna) throughout Southern Africa, West and Central Africa and Madagascar. She has experience in all 9 provinces of South Africa with a particular interest in KZN flora, and avifauna.
Report Reviewer	Mahomed Desai Mahomed Desai (Pr. Nat. Sci. registered number 134678) obtained his M.Sc. in Environmental Engineering and Ph.D. in Ecological Sciences and has over 12 years of experience in undertaking impact assessments for estuarine, freshwater and terrestrial biodiversity. Mahomed has extensive experience surveying for African fauna and flora as a researcher and consultant, through various national and international projects, including those requiring IFC Performance Standards.
Report Reviewer	**Andrew Husted** Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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List of Acronyms and Abbreviations

%	**Percent**
ADU	Animal Demography Unit
BESS	Battery Energy Storage System
BI	Biodiversity Importance
CAR	Coordinated Avifaunal Roadcounts
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
CWAC	Coordinated Waterbird Counts
DC	Direct Current
EAP	Environmental Assessment Practitioner
EGI	Electricity Grid Infrastructure
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMPr	Environmental Management Plan report
EN	Endangered
EOO	Extent of occurrence
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
FFG	Functional Feeding Guild
FI	Functional Integrity
GIS	Geographic Information Systems
ha	hectares
IBA	Important Bird and Biodiversity Area
KBA	Key Biodiversity Area
km	kilometres
kV	kilo Volt
LC	Least Concern
m	metres
m^2	square metres
MTS	Main Transmission Substation
MW	Mega Watt
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem priority Areas
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
ONA	Other Natural Areas
PAOI	Project Area of Influence
PV	Photo Voltaic
REDZ	Renewable Energy Development Zones
REEA	Renewable Energy EIA Application
RR	Receptor Resilience
SABAP2	South African Bird Atlas Project 2
SACAD	South African Conservation Areas Database
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SEI	Site ecological Importance
TBC	The Biodiversity Company
V	Volt
VU	Vulnerable

1 Introduction

The Biodiversity Company (TBC) was appointed to undertake an Avifauna Impact Assessment for the proposed Rustenburg Solar Photovoltaic (PV) project. The proposed project involves the development of three solar facilities and associated infrastructure, located between Sun City and the town of Rustenburg in the North West province (Figure 1-1). This report deals with one of the three solar facilities: Rustenburg Rhino, which is located in the Kgetlengrivier Local Municipality (Figure 1-2).

The National Web-based Environmental Screening Tool (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended) indicated that the Animal Species Theme Sensitivity was rated as 'High' due to the possible presence of Species of Conservation Concern (see section 2.2 of this report for the definition), including avifauna species. Accordingly, The Biodiversity Company was sub-contracted to undertake an Avifauna Impact Assessment to inform on the impact of the proposed PV to the avifauna community within the receiving environment. The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*" (Reporting Criteria). Based on the size of the PV and the risk associated with it, a Regime 2 assessment was undertaken (BirdLife South Africa, 2017).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Project Description

This project description is taken directly from Nemai (2022): A cluster of proposed Solar PC Projects are planned on sites near Rasimone, within the Rustenburg Local Municipality and the Kgetlengrivier Local Municipality, falling within the Bojanala Platinum District Municipality in the North West Province Nemai Consulting has been appointed as the independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Authorisation (EA) for the Proposed Solar PV Projects. The cluster of PV facilities and their associated Integrated Grid are shown in Figure 1-1. This report will be concentrating on the Rustenburg Rhino Solar PV Facility.

The Rhino PV Facility is located within the Kgetlengrivier Local Municipality (Figure 1-2) on Portion 11 of the farm Rhebokhoek 101. This facility will be up to 65MW on 125 ha. "The facility comprises the following Infrastructure (Figure 1-3 and Figure 1-4):

No.	Component	Description / Dimensions	
		Layout Alternative 1	Layout Alternative 2
1.	Height of PV panels	Up to 5 m	Up to 5.5 m
2.	Area of PV Array	Up to approximately 112 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems Area: Up to 115 ha
3.	Area occupied by substations	Up to 1 ha	It is estimated that the maximum size of the facility substation will not exceed 1 ha Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling)
4.	Capacity of on-site substation	High voltage (up to 132 kV)	The facility substation will collect the power from the facility and transform it from medium voltage (up to 33 kV) to high voltage (88 or 132 kV)

5.	BESS	Area up to ± 4 ha	Area up to ± 4 ha
6.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 5 ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 5 ha Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown)
7.	Area occupied by buildings	Up to 1 ha	Up to 1 ha
8.	Length of internal roads	Up to 10 km	Up to 10 km
9.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10.	Proximity to grid connection	Approximately 750 m to the Eskom Rhino Substation	Approximately 410 m to connect to existing powerline
11.	Height of fencing	Up to 3.5 m	Up to 3.5m
12.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

The proposed Solar PV project has a design life of a minimum of 25 years. The extension of the life of the plant will be considered when assessing the plant's economic viability to remain operational after the end of its life."

Two layout options were assessed as part of this avifauna assessment, the layout of the PV panels did not change, however, the position of an 88 kv OHL was changed, as well of the position of some ancillary infrastructure. Alternative 2 is the preferred alternative.

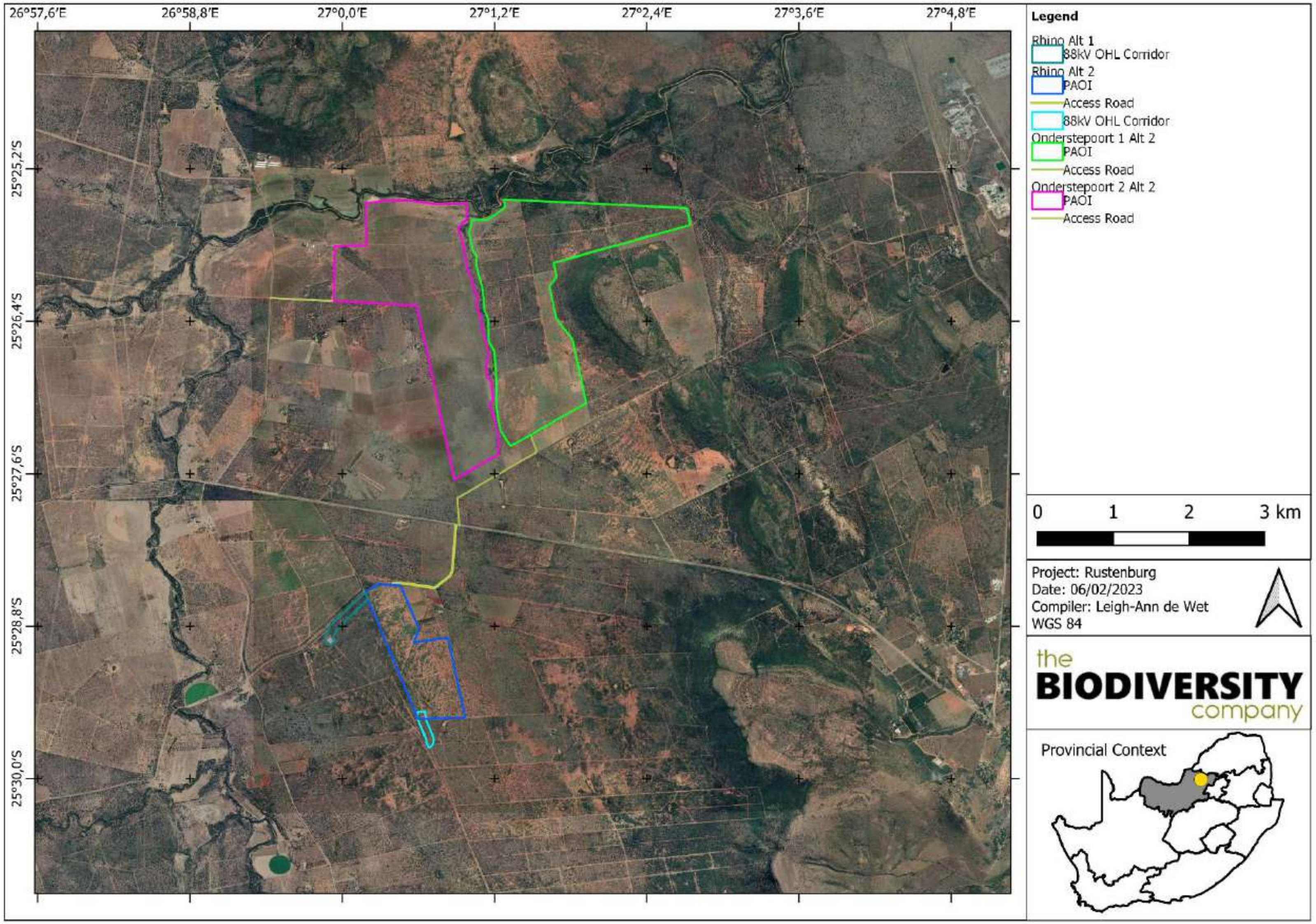


Figure 1-1 Map illustrating the location of the proposed PV Project in relation to the rest of the cluster components.

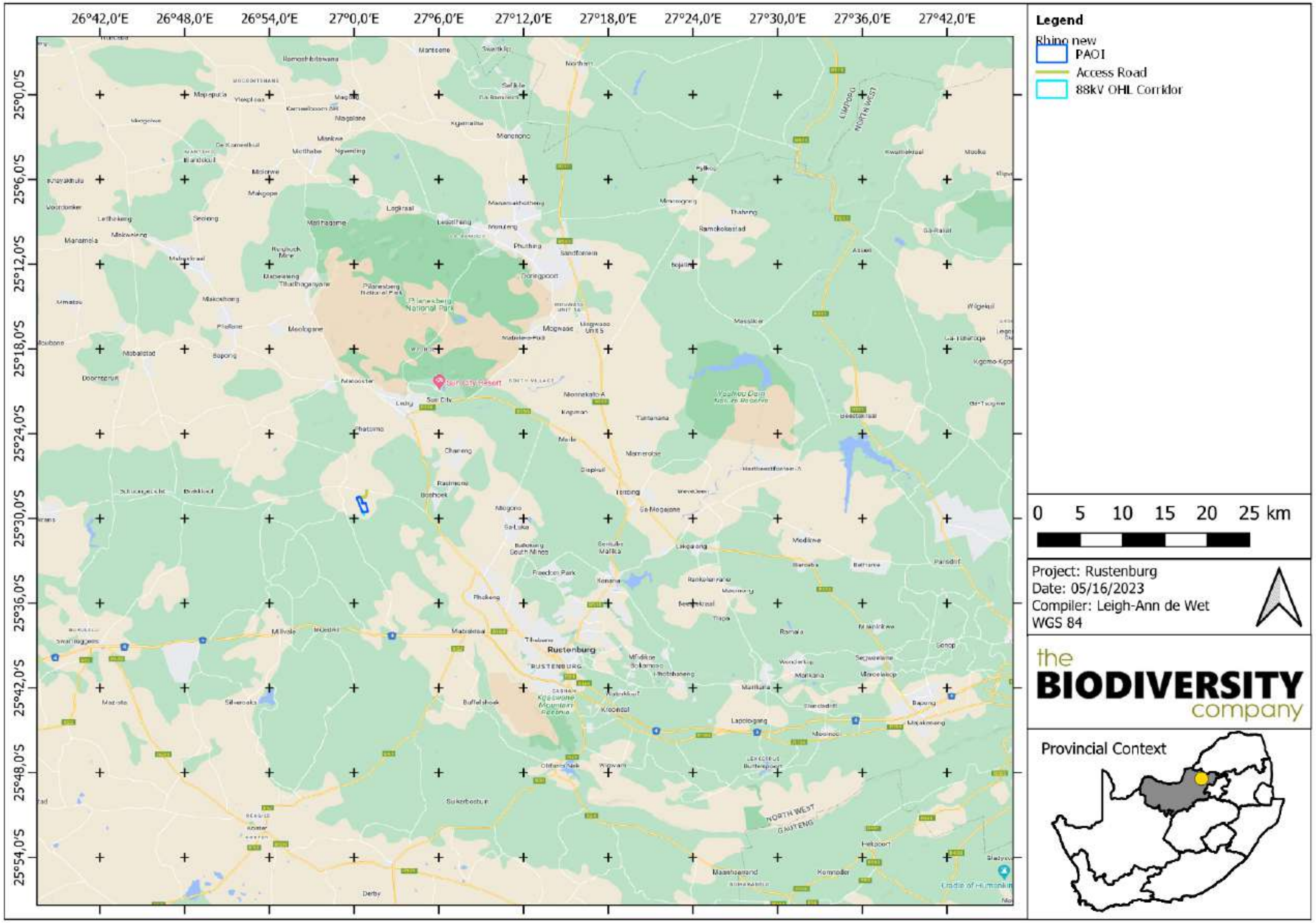


Figure 1-2 Map illustrating the location of the proposed PV Project

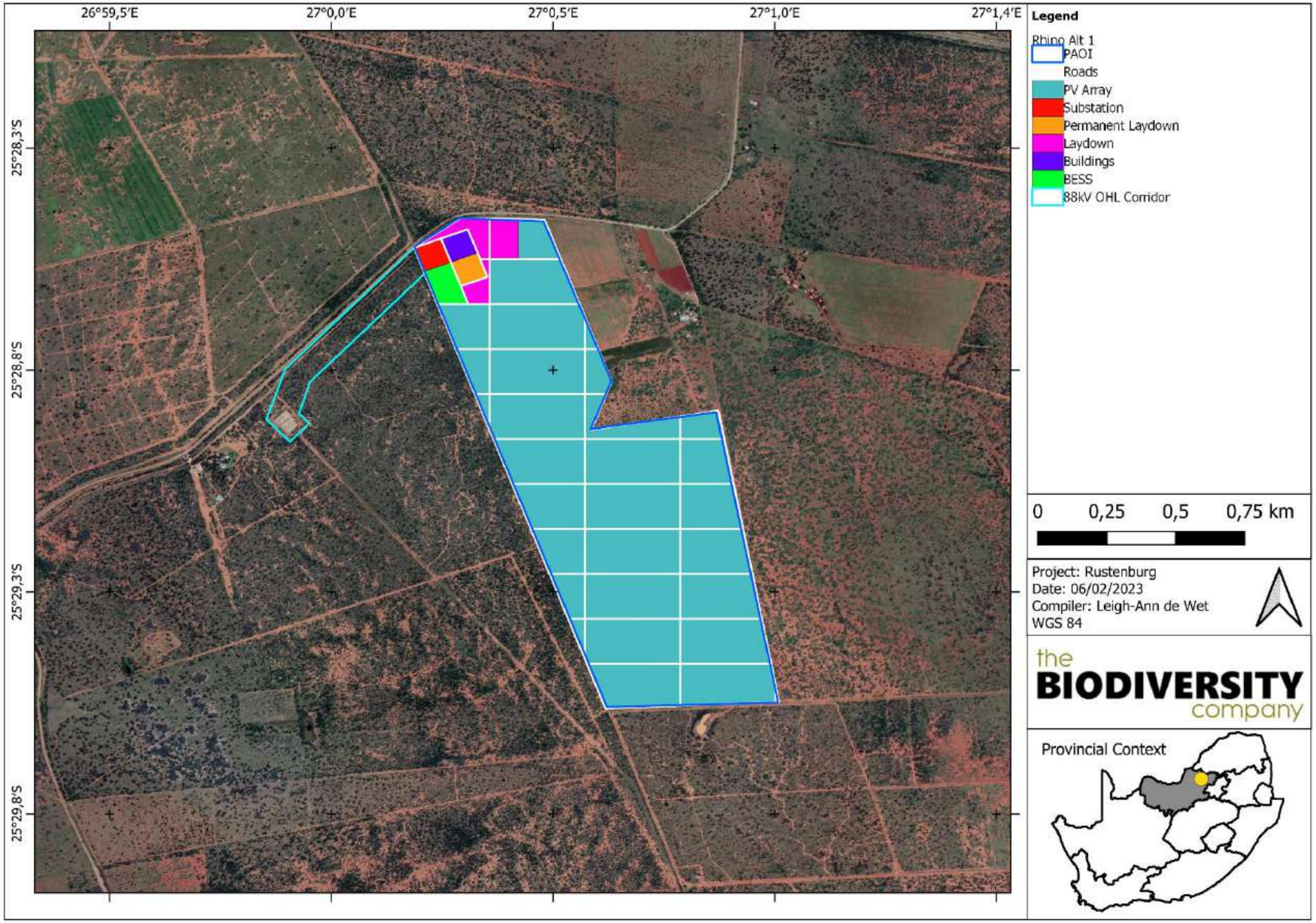


Figure 1-3 Proposed Rustenburg Rhino Solar Energy Facility infrastructure: Alternative 1

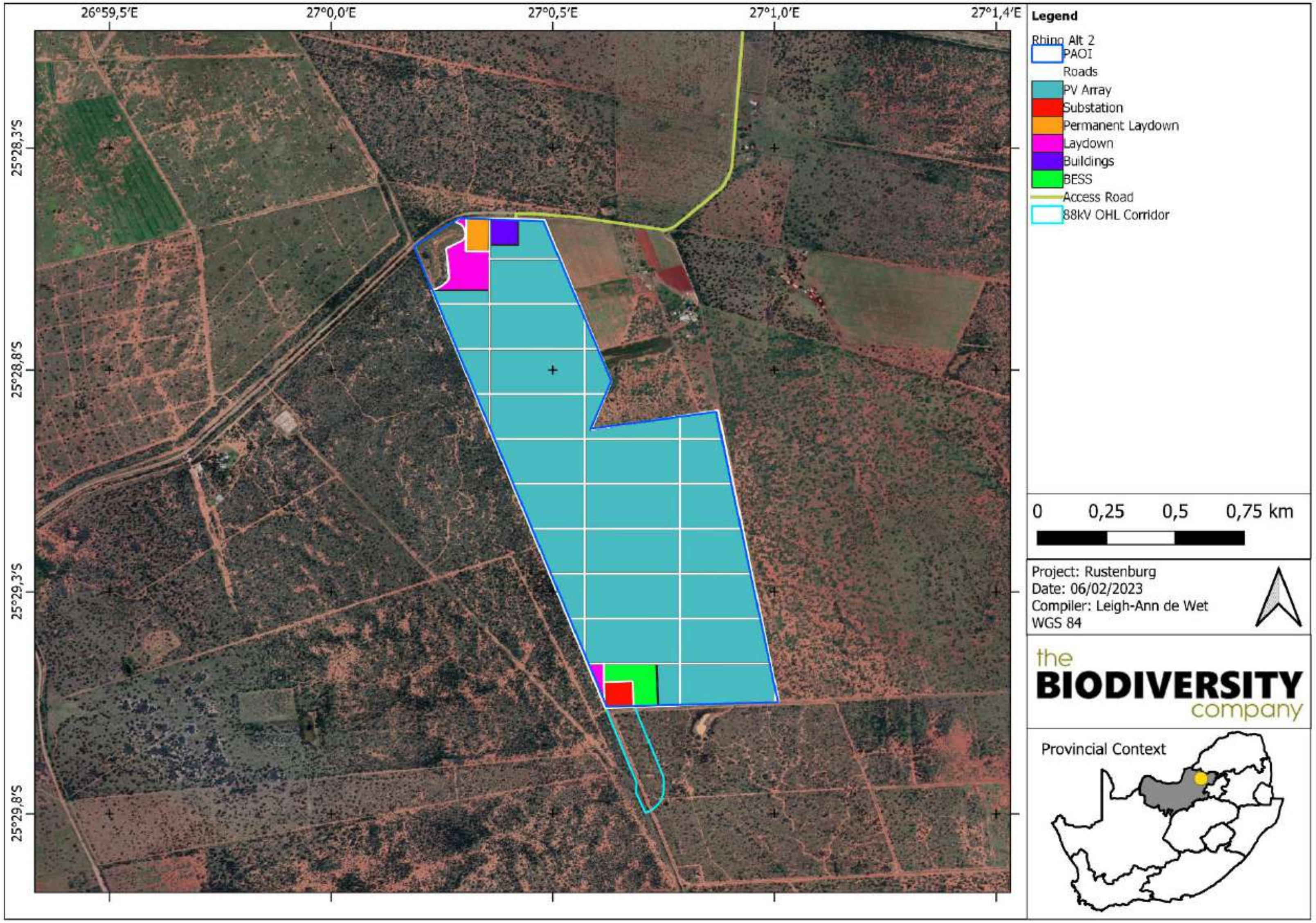


Figure 1-4 Proposed Rustenburg Rhino Solar Energy Facility infrastructure: Alternative 2

1.2 Scope of Work and Terms of Reference

The assessment was achieved under the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Section 24(5) (a) and (h) and 44 of NEMA ("the Protocols") promulgated in GN No. 320 of 20 March 2020. Where no specific environmental theme protocol has been prescribed, the level of assessment must be based on the findings of the site verification and must comply with Appendix 6 of the EIA Regulations of 2014 (as amended), and the best-practice guidelines and principles for Avifaunal Impact Assessments within the context of PVs as outlined by BirdLife South Africa (2017).

The scope of the Avifaunal Impact Assessment included the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the Project Area of Influence (PAOI) and surrounding landscape

- Desktop assessment to compile an expected species list and possible avifauna Species of Conservation Concern (SCC) that potentially occur within the PAOI;

- Description of the baseline avifauna species and Functional Feeding Guild (FFG) composition assemblage within the PAOI;

- Delineate site sensitivity or sensitivities i.e., the Site Ecological Importance (SEI) within the context of the avifauna species assemblage of the PAOI;

- Identify the manner that the proposed development impacts the avifauna community and evaluate the level of risk of these potential impacts; and

- Provide mitigation measures to prevent or reduce the possible impacts.

1.3 Assumptions and Limitations

The following assumptions and limitations should be noted for the assessment:

- The Project Area of Influence (PAOI) was based on the project footprint area as provided by the client, as well as a 500 m corridor around the powerlines. See section 2.1 of this report for additional details. Any alterations to the area and/or missing Geographic Information Systems (GIS) information pertaining to the assessment area would have affected the area surveyed and hence the results of this assessment;

- Two site visits were conducted for the purpose of this regime 2 assessment. The first was conducted in summer, over 4 days from the 5th to the 8th of January 2023, and the second, also in summer, over 4 days from the 13th to the 16th of March 2023. These two site visits are considered sufficient from a seasonal perspective and no additional season assessment is required;

- Some areas of the PAOI were inaccessible and could not be surveyed during either of the two site visits conducted. This is a significant gap that requires addressing prior to any environmental authorisation for the proposed development and associated complex;

- Whilst every effort was made to cover as much of the PAOI as possible it is possible that some species that are present within the PAOI were not recorded during the field investigations due to their secretive behaviour; and

- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features delineated may be offset by up to 5 m.

1.4 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-1 are applicable to the proposed project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-1 A list of key legislative requirements relevant to biodiversity and conservation in the North West Province

Region	Legislation / Guideline
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	North-West Biodiversity Sector Plan of 2015 (READ, 2015).

2 Definitions

2.1 Project Area of Influence (PAOI)

The Project Area of Influence (PAOI) encompasses the geographical extent of the potential impacts of the proposed development on the receiving environment. Essentially, the PAOI is defined according to the important ecosystem processes and functions that may be plausibly affected by the proposed development and its associated activities. In consideration that the project is not located within the Northern Strategic Transmission Corridor, the PAOI was delineated as the project border, and the OHL corridor supplied.

2.2 Species of Conservation Concern (SCC)

According to the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species with high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of conservation status categories, as illustrated in Figure 2-1.

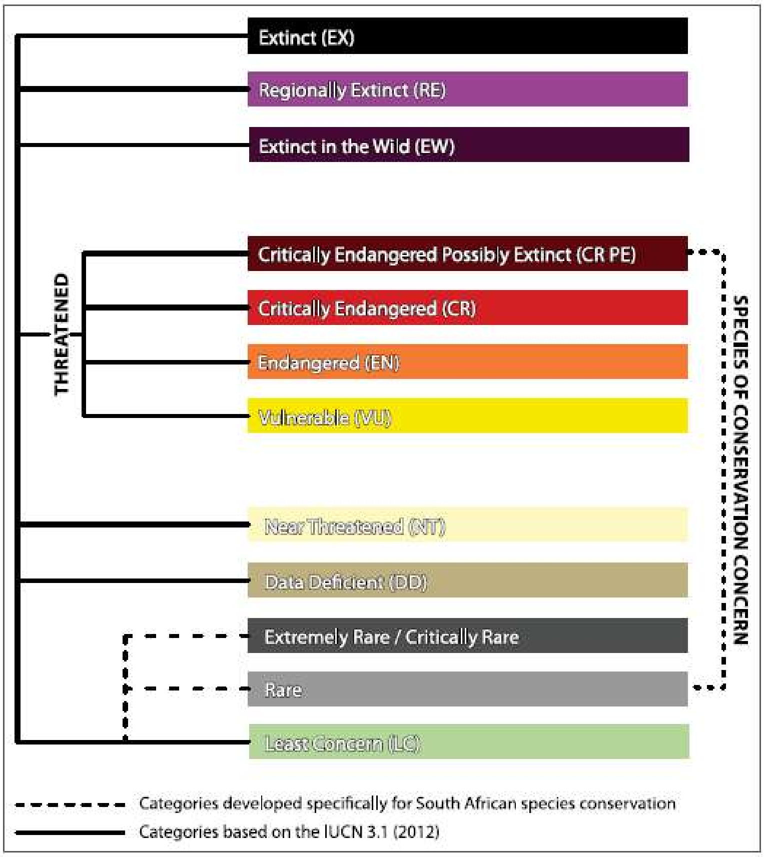


Figure 2-1 The different Species of Conservation Concern categories were modified from the IUCN's extinction risk categories. Source: SANBI (2020)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2021). This scientific system is designed to measure species' risk of extinction, and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna and the IUCN categories for this report.

2.3 Risk Species

Priority species are susceptible to impacts from energy developments (Ralston Paton *et al.* 2017). These species are typically susceptible to collisions. This list was developed initially for use with Wind Energy Facilities (Ralston Paton *et al.* 2017); however, the collision, electrocution and habitat loss risks are considered appropriate for renewable energy developments and so are utilised here. Also utilised here is the Eskom and Endangered Wildlife Trust (EWT) poster: Birds and Powerlines (Eskom & EWT, no date), which identifies birds most prone to collision and electrocution from powerlines. Some birds are not included in these lists but are considered by the TBC avifauna specialists as risk species for collisions, electrocutions and habitat loss as a result of Solar PV infrastructure. All of species are referred to collectively in this report as “Risk Species”.

3 Methods

3.1 Desktop Assessment

The desktop assessment was principally undertaken using GIS to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

3.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- Protected areas:
- South Africa Protected Areas Database (SAPAD) (DFFE, 2022) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (DFFE, 2021) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2022) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria;
- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is being done by means of a programme of regular mid-summer and mid-winter censuses at several wetlands. The database is located at https://cwac.birdmap.africa/index.php.
- Coordinated Avifaunal Roadcounts (CAR) – The Coordinated Avifaunal Roadcounts (CAR) were pioneered in July 1993 in a joint Cape Bird Club/Animal Demography Unit (ADU) project to monitor the populations of two threatened species: *Anthropoides paradiseus* (Blue Crane) and *Neotis denhamii* (Denham's Bustard). Presently it monitors 36 species of large terrestrial birds along 350 fixed routes covering over 19 000 km using a standardised method.
- The North-West Department of Rural, Environment, and Agricultural Development (READ), as custodian of the environment in the North West, is the primary implementing agent of the Biodiversity Sector Plan. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines (READ, 2015), and

- Hydrological Context
    - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.
    - National Freshwater Ecosystem Priority Area (NFEPA) (Nel *et al.,* 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

3.1.2 Expected Avifauna Species

The following resources were considered during the desktop assessment and for the compilation of the expected species list:

- South African Bird Atlas Project 2 (SABAP2). Full protocol data from 9 relevant pentads (2515_2655, 2515_2700, 2515_2705, 2520_2655, 2520_2700, 2520_2705, 2525_2705, 2525_2700, and 2525_2655) were used to compile the expected species list;

- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is done through a programme of regular mid-summer and mid-winter censuses at several wetlands. The database is located at https://cwac.birdmap.africa/index.php;

- Coordinated Avifaunal Roadcounts (CAR) – The Coordinated Avifaunal Roadcounts (CAR) were pioneered in July 1993 in a joint Cape Bird Club/ADU project to monitor the populations of two threatened species: *Anthropoides paradiseus* (Blue Crane) and *Neotis denhamii* (Denham's Bustard). Presently it monitors 36 species of large terrestrial birds along 350 fixed routes covering over 19 000 km using a standardised method;

- Important Bird and Biodiversity Areas (BirdLife South Africa, 2022) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria;

- Hockey *et al*. (2005), Roberts Birds of Southern Africa (7th edition). The primary source for species identification, geographic range, and life history information;

- Sinclair and Ryan (2010), Birds of Africa South of the Sahara. Secondary source for identification; and

- Taylor *et al*. (2015), Eskom Red Data Book of Birds of South Africa, Lesotho, and Swaziland. Used for conservation status, nomenclature, and taxonomical ordering.

3.2 Field Survey

Two field surveys were undertaken during the 5th to the 8th of January 2023 (wet season) (Survey 1) and the 13th to the 16th of March 2023 (wet season) (Survey 2). Sampling consisted of Standardised Point Counts as well as random diurnal incidental surveys. Standardised Point Counts (Buckland *et al*, 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The Standardized Point Count technique was utilised as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was run over a 10-minute period. The horizontal detection limit was set at 150 m. At each point the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for conservation important species. To supplement the species inventory with cryptic and illusive species that may not be detected during the rigid point count protocol, diurnal and nocturnal incidental searches were conducted. This involved the opportunistic sampling of species between point count periods, random meandering and road cruising. Effort was made to cover all the different habitat types within the limits of time and access (Figure 3-1).

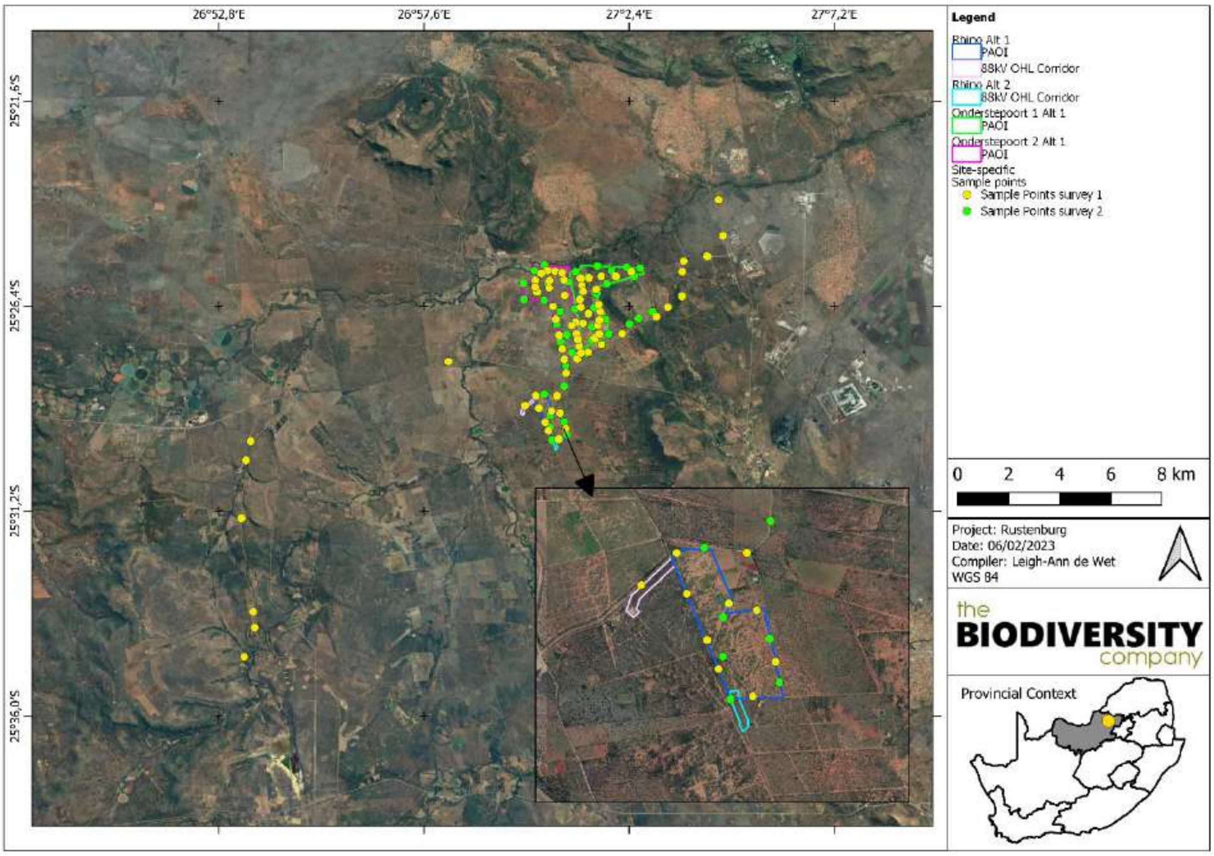


Figure 3-1 ***Map illustrating the field survey area and locations of Standardised Point Counts for the proposed Rustenburg Rhino Solar PV PAOI***

3.3 Data Analysis

The analyses described below only used the data collected from the Standardised Point Counts. Raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. Present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon / within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

3.4 Site Ecological Importance (SEI)

The different habitat types within the project area were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 3-1 and Table 3-2, respectively.

Table 3-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 3-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 3-3.

Table 3-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	High	Medium	Low	Very Low
Functional Integrity (FI)	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 3-4.

Table 3-4 Summary of Receptor Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 3-5.

Table 3-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed project is provided in Table 3-6.

Table 3-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa. For the purposes of this assessment, only avifauna were considered.

3.5 Environmental Impact Assessment

The significance of the identified impacts was determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and was assessed according to methodology as per the scale utilised for the evaluation of Environmental Impact Ratings in Table 3-7,

Table 3-8 and Table 3-9. First, the impact is assigned a score based on Likelihood descriptors Probability and Sensitivity (Likelihood = Probability + Sensitivity) (Table 3-7), and then assigned a Severity rating based on Consequence descriptors Severity, Scope and Duration (Severity = Severity + Scope + Duration) (

Table 3-8). Overall Consequence and Likelihood scores are then used to Determine the Significance Rating (Table 3-9).

Table 3-7 Environmental Impact Assessment: Likelihood Descriptors

Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**Rating**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

Table 3-8 Environmental Impact Assessment: Consequence Descriptors

Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**Rating**
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Duration of impact	**Rating**
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 3-9 Environmental Impact Assessment: Significance Rating Matrix

	CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Probability of impact + Sensitivity of receiving environment)	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Absent
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	Low
	3	6	9	12	15	18	21	24	27	301	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	Moderate
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	Moderately High
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	High
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	Critical
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

4 Results & Discussion

4.1 Desktop Assessment

4.1.1 Ecologically Important Landscape Features

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 4-1.

Table 4-1 Summary of relevance of the proposed project to ecologically important landscape features

Desktop Information Considered	Relevance	Section
Protected Areas	Irrelevant – The nearest protected area (Pilanesberg National Park) is located over 10 km from the project area	4.1.1.1
National Protected Areas Expansion Strategy	Relevant – The project area is located within a NPAES Focus Area	4.1.1.3
Important Bird and Biodiversity Area	Relevant – There are two IBA over 10 km from the PAOI	4.1.1.5
Coordinated Water Bird Counts	Relevant – Three CWAC sites are found just over 20 km away from the PAOI	4.1.1.7
Coordinated Avifaunal Roadcounts	Relevant – The closest CAR route is 64 km away from the PAOI	4.1.1.9
Critical Biodiversity Area	Relevant – the PAOI overlaps with CBA2, ESA1 and ESA2 areas	4.1.1.11
South African Inventory of Inland Aquatic Ecosystems	Relevant – No wetland systems are present within the PAOI	4.1.1.13
National Freshwater Ecosystem Priority Areas	Relevant – the PAOI does overlap with wetland systems within the NFEPA database.	4.1.1.13
Strategic Transmission Corridors	Relevant- The PAOI does not overlap with the Central EGI corridor	4.1.1.14
Renewable Energy Zones	Relevant -The project are does not fall within a REDZ zone	4.1.1.15

4.1.1.2 Protected Areas

According to the protected area spatial datasets from SAPAD (DFFE, 2022), the proposed development does not occur within any protected area. However, the closest Protected Area is the Pilanesberg National Park, located approximately 10 km north east of the proposed development (Figure 4-1).

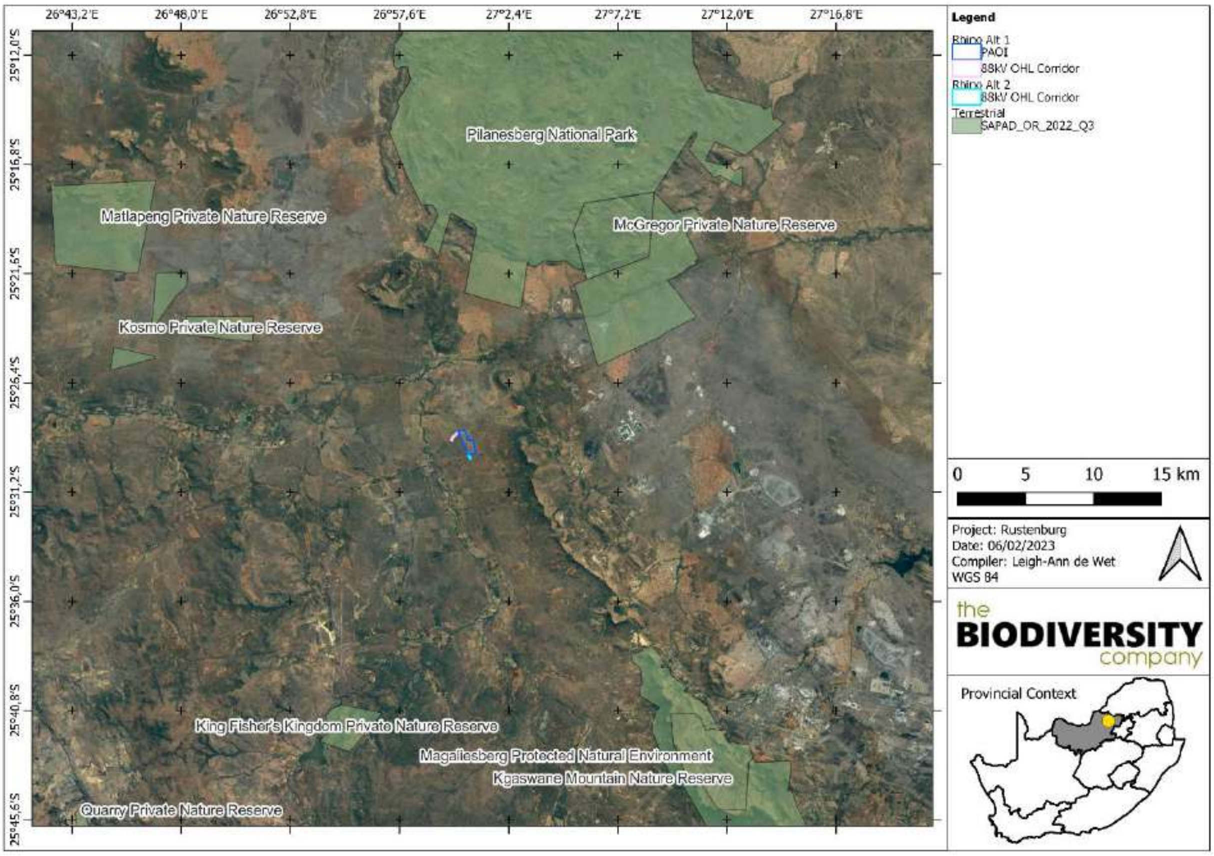


Figure 4-1 Map illustrating Protected Areas in relation to the proposed Rustenburg Rhino PV PAOI

4.1.1.4 National Protected Areas Expansion Strategy (NPAES) Focus Areas

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009 (DFFE, 2021).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DFFE, 2021). The PAOI overlaps with priority focus areas for expansion according to the 2017 NPAES dataset (Figure 4-2).

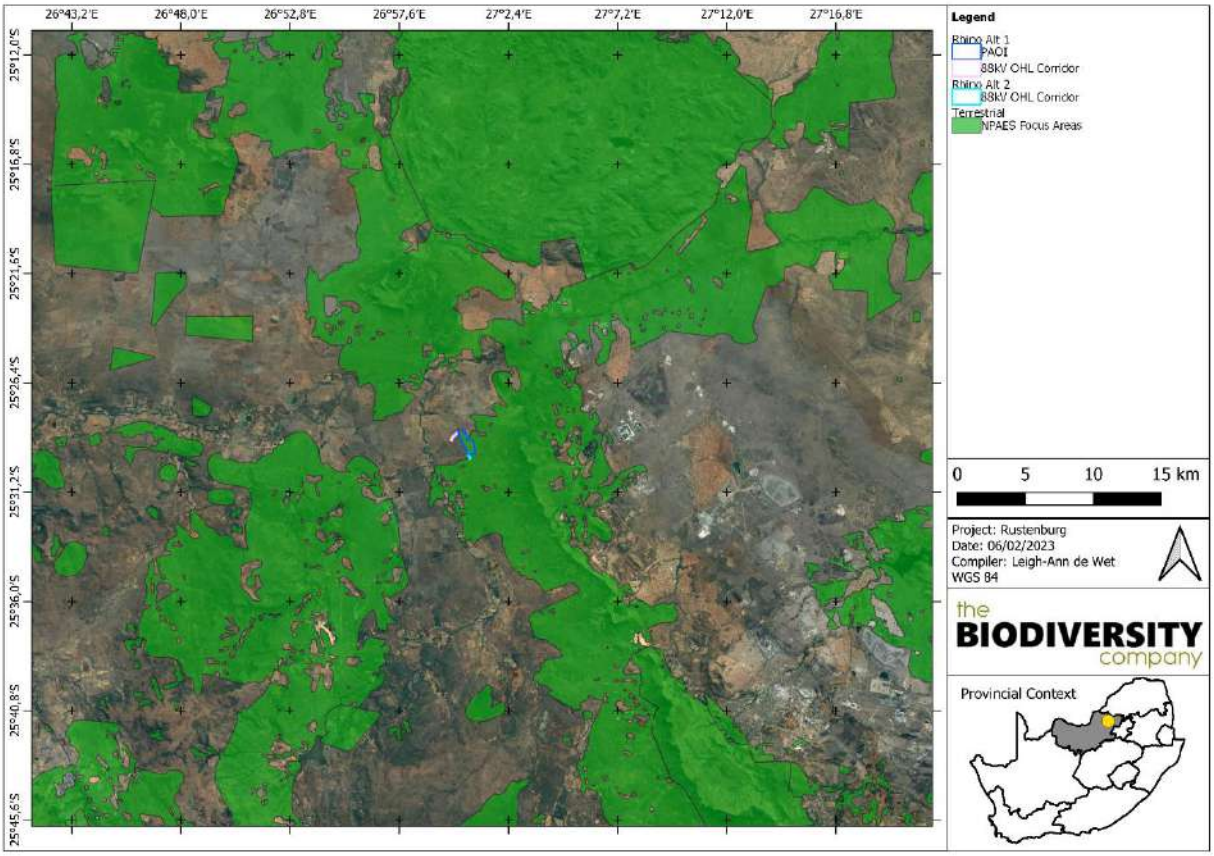


Figure 4-2 Map illustrating the NPAES Focus Areas in relation to the proposed Rustenburg Rhino PV PAOI

4.1.1.6 Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas (KBA); sites that contribute significantly to the global persistence of biodiversity.

The selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels.

Figure 4-3 illustrates that the proposed development does not overlap any IBAs. There are two IBAs over 10 km from the PAOI; The Pilansberg National Park IBA and the Magaliesberg IBA.

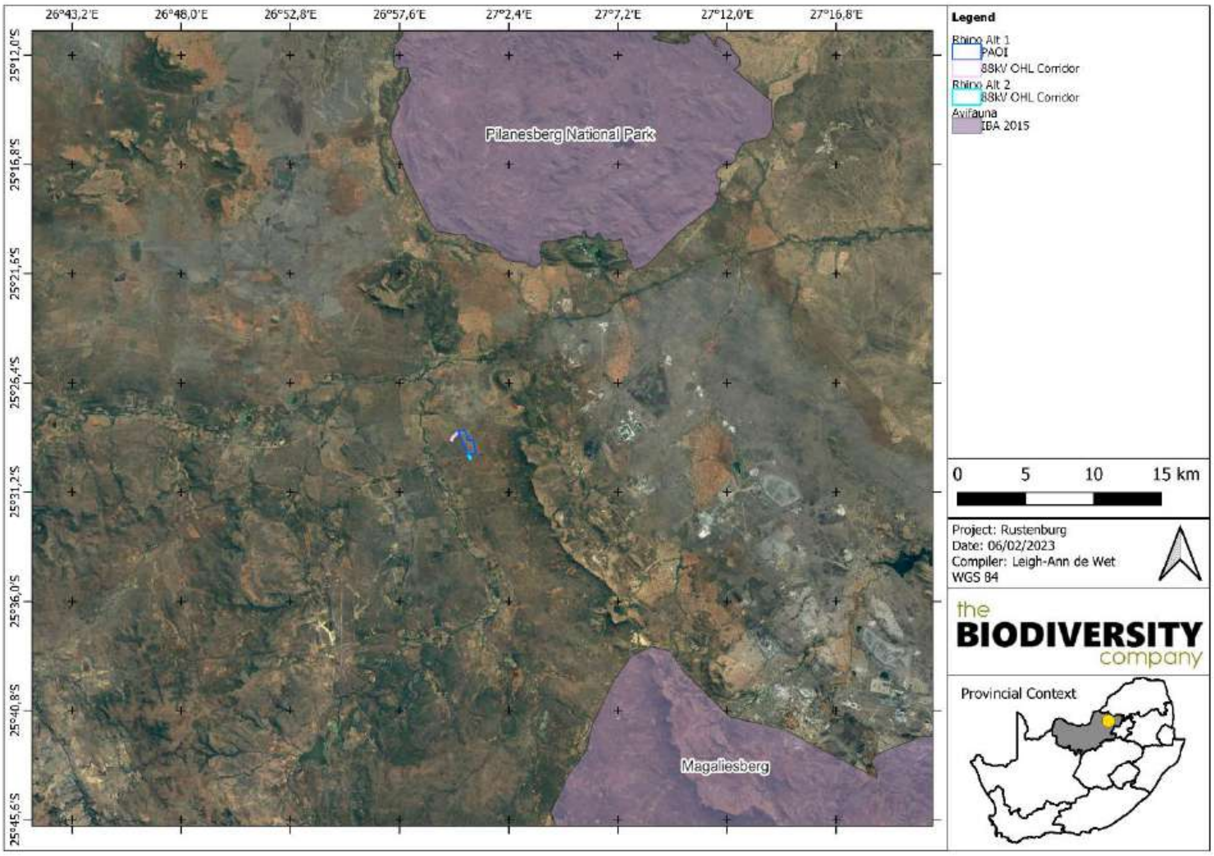


Figure 4-3 Map illustrating Important Bird and Biodiversity Areas in relation to the proposed Rustenburg Rhino PV PAOI

4.1.1.8 Coordinated Water Bird Counts (CWAC)

There are several CWAC sites located within 20 km and further away from the PAOI, these include the sites Rockwall Dam, Kroondal Dam, and Vallkop Dam (Figure 4-4).

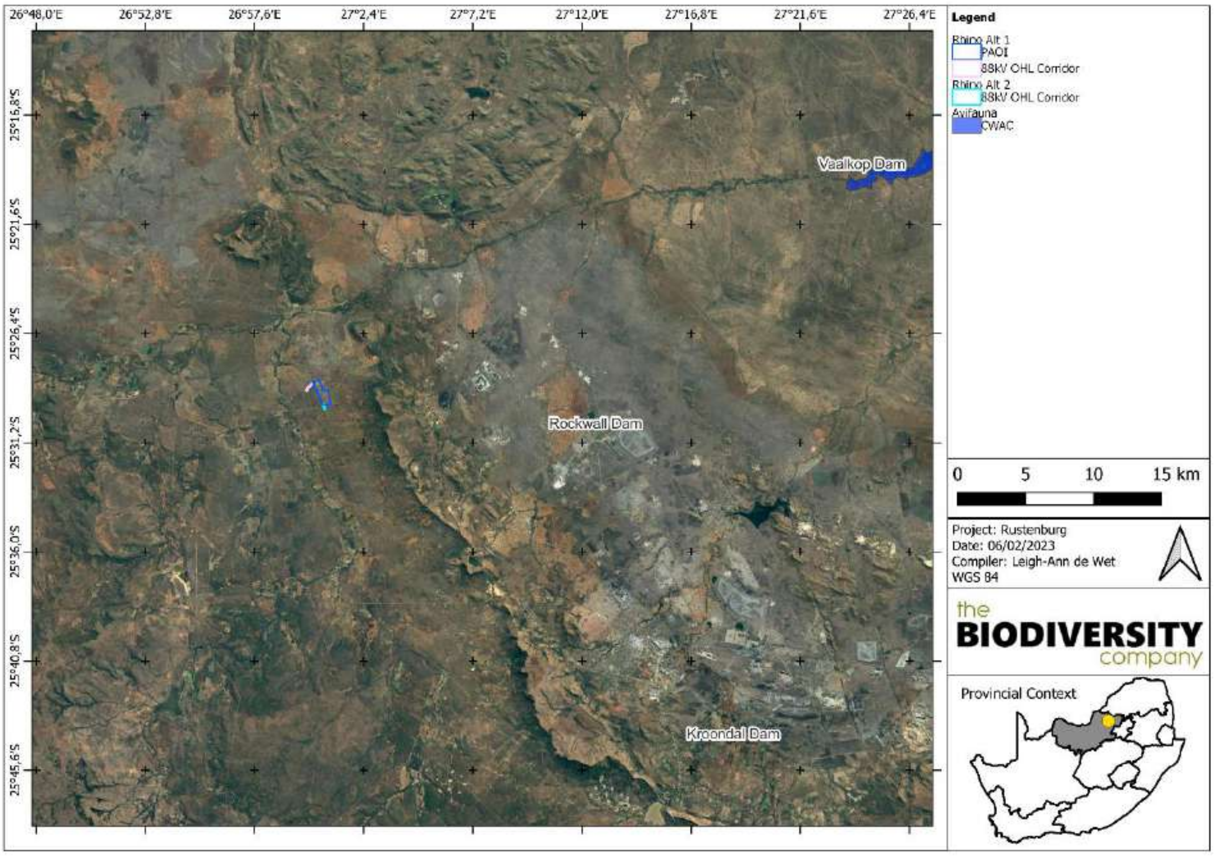


Figure 4-4 ***Map illustrating Coordinated Water Bird Counts (CWAC) locations in relation to the proposed Rhino PV PAOI***

4.1.1.10 Coordinated Avifaunal Roadcounts (CAR)

Figure 4-5 illustrates the location of CAR routes in relation to the PAOI. The closest CAR route is 64 km away from the PAOI. No recent information is available for these routes.

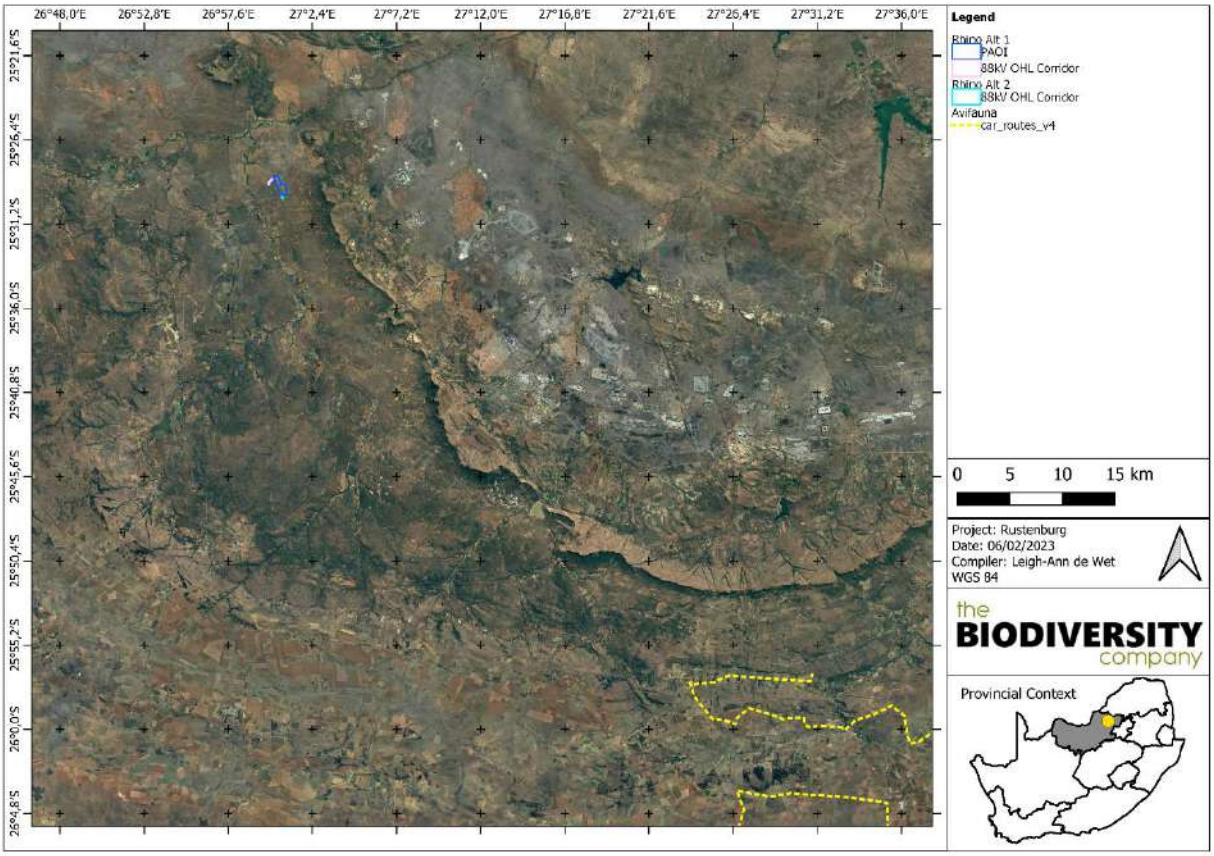


Figure 4-5 Map illustrating Coordinated Avifaunal Roadcounts (CAR) routes in relation to the proposed Rhino PV PAOI

4.1.1.12 North West Conservation Plan

The North-West Department of Rural, Environment, and Agricultural Development (READ), has developed the North West CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

Figure 4-6 indicates that the PAOI overlaps with CBA2 features and includes small areas of ESA1 and ESA2.

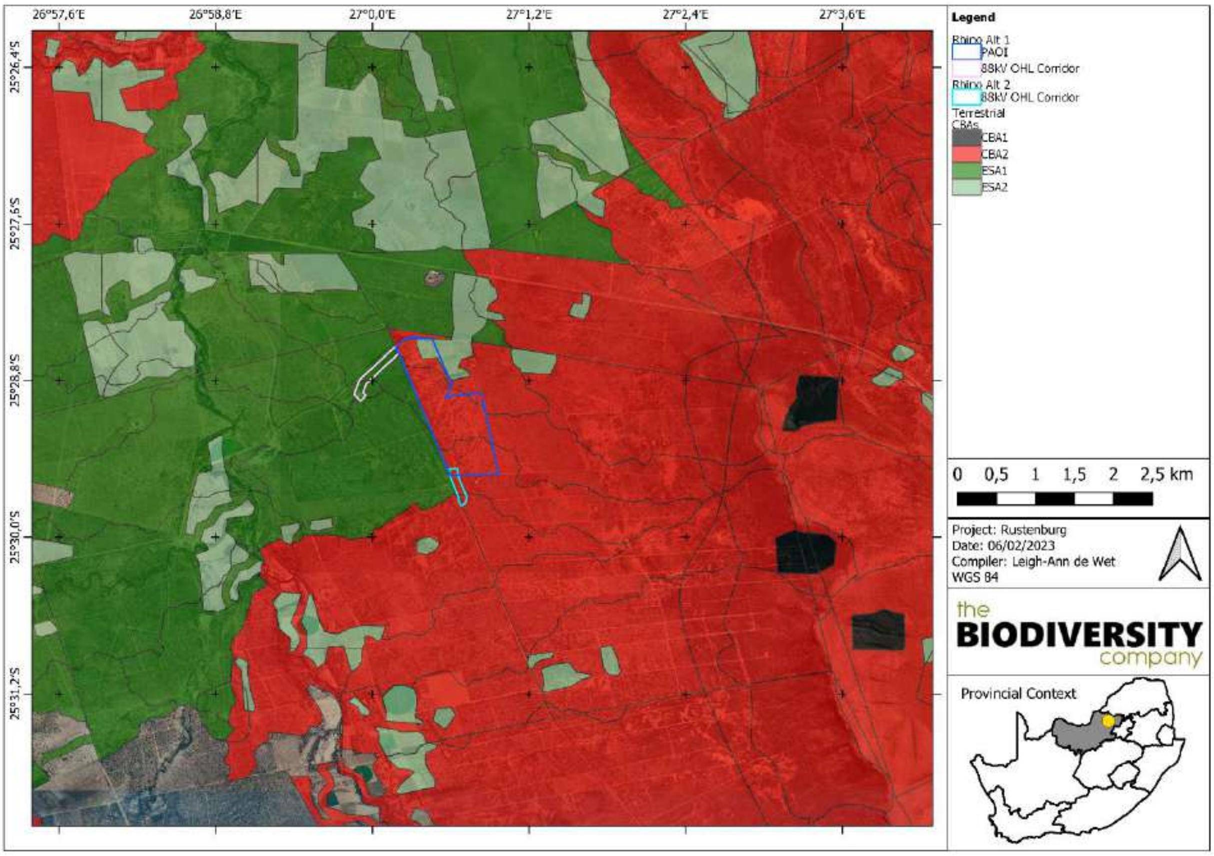


Figure 4-6 ***Map illustrating North West Conservation Plan features overlapping the proposed Rhino PV PAOI***

4.1.1.13 Hydrological Context

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT. Critically Endangered, EN and VU ecosystem types collectively referred to as ‘threatened’ (Van Deventer *et al.,* 2019; Skowno *et al.,* 2019). No SAIIAE wetland or river systems can be found within the PAOI (Figure 4-7).

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.,* 2011). The FEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act’s (NEM:BA) biodiversity goals (Nel *et al.,* 2011).

Figure 4-7 illustrates that the PAOI does not overlap with wetland systems within the NFEPA database, there is one small unclassified wetland to the south of the site outside of the site boundary.

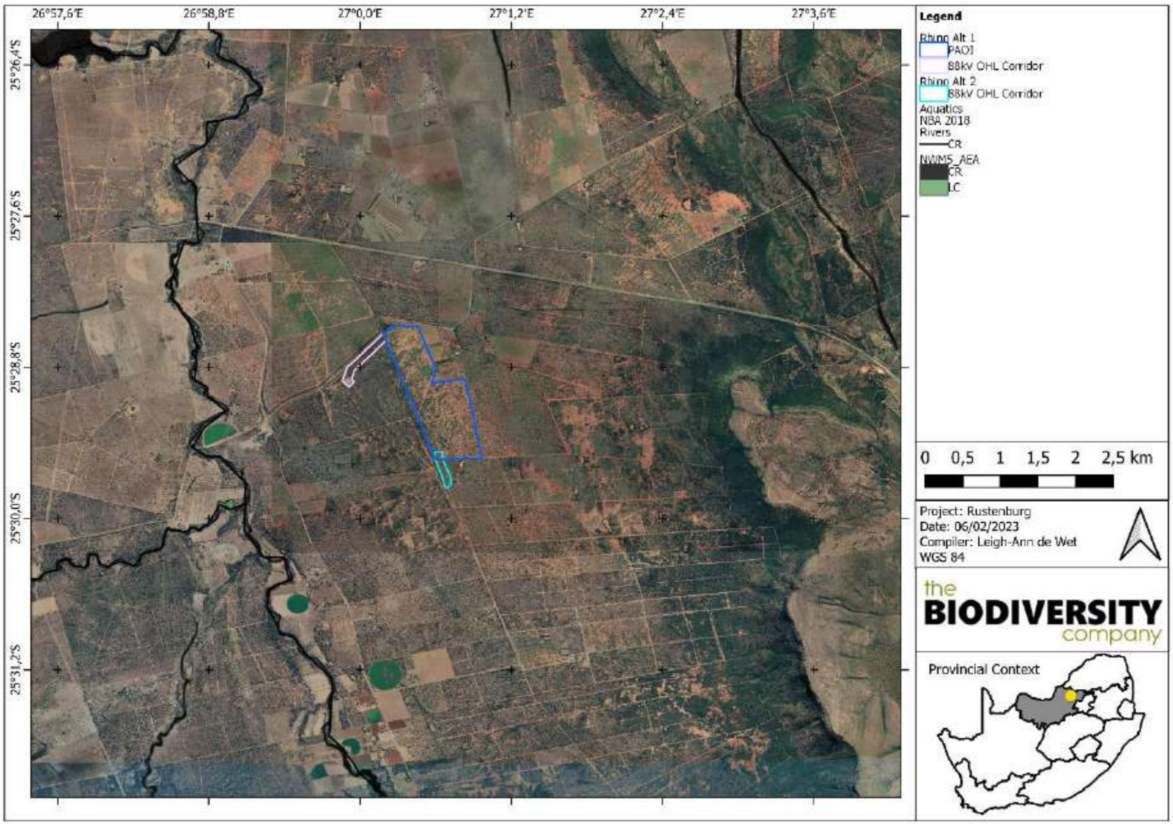


Figure 4-7 ***Map illustrating hydrological context (SAIIAE) of the proposed Rustenburg Rhino PV PAOI***

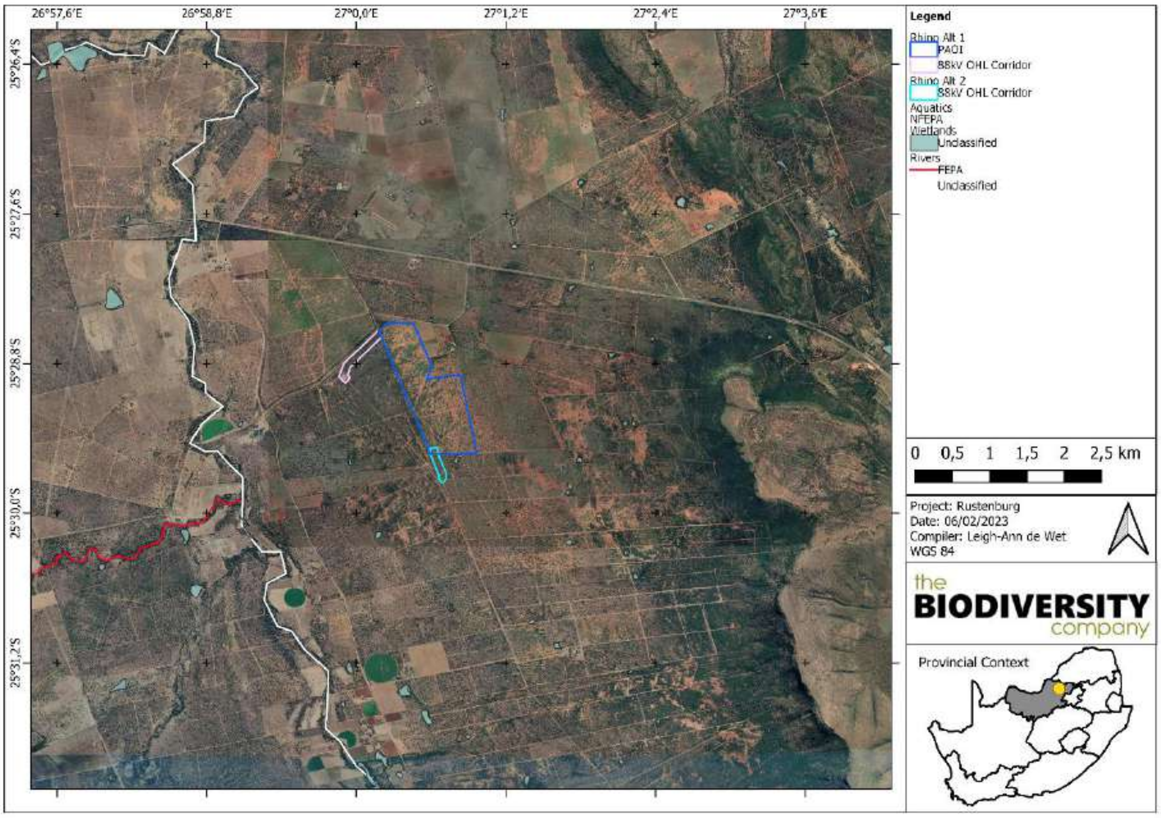


Figure 4-8 ***Map illustrating hydrological context (NFEPA) of the proposed Rustenburg Rhino PV PAOI***

4.1.1.14 Strategic Transmission Corridors (EGI)

On the 16 February 2018 minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi.

Figure 4-9 shows the PAOI does not overlap with the Central EGI corridor.

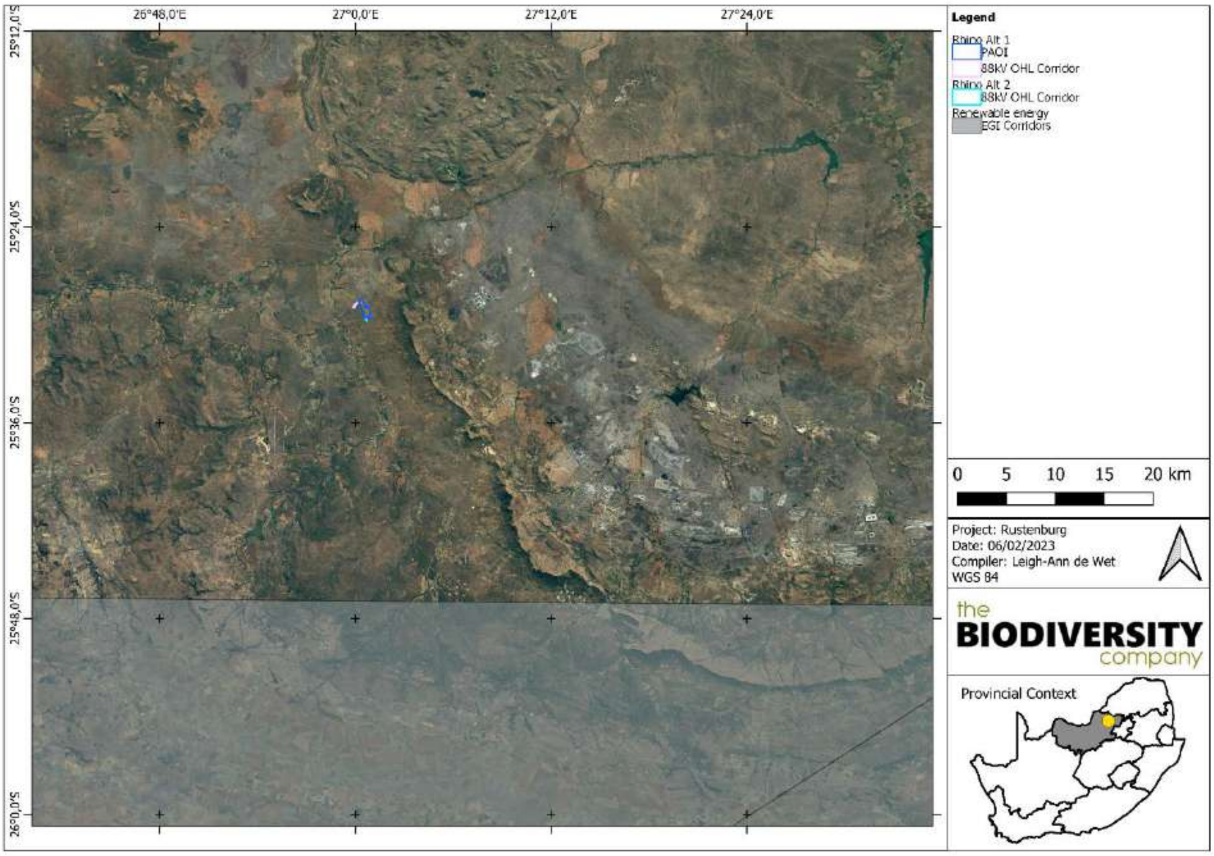


Figure 4-9 ***The proposed Rustenburg Rhino PV PAOI in relation to the strategic transmission corridors***

4.1.1.16 Renewable Energy Development Zones (REDZ)

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of large-scale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments.

More detailed information can be obtained from https://egis.environment.gov.za/redz. Information here includes the Government Notice No. 142, 144 and 145 in Government Gazette No. 44191 that specifies the procedures to be followed when applying for environmental authorisation for electricity transmission or distribution infrastructure or large-scale wind and solar photovoltaic energy facilities in these REDZs.

The project area does not fall within a REDZ (Figure 4-10).

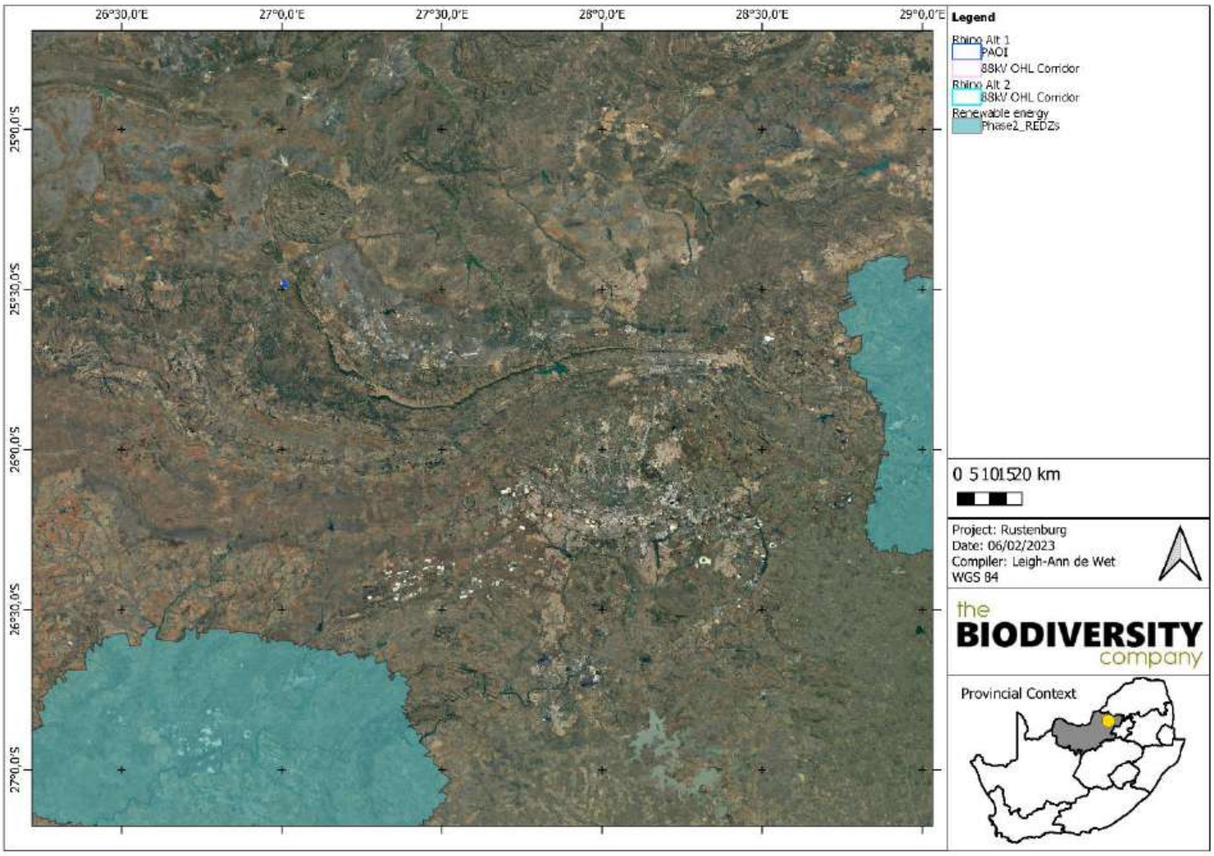


Figure 4-10 The proposed Rustenburg Rhino PV PAOI in relation to the Renewable Energy Development Zone dataset

4.1.2 Expected Species of Conservation Concern

The SABAP2 Data lists 394 indigenous avifauna species that could be expected to occur within the PAOI and surrounding landscape (Appendix A). Twenty-one (29) of these expected species are regarded as SCC (Table 4-2). These species are described below.

Table 4-2 Threatened avifauna species that are expected to occur within the project area CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable

Scientific Name	Common Name	Red List Regional*	Red List Global+	Likelihood of Occurrence
Alcedo semitorquata	Half-collared Kingfisher	NT	LC	Low
Aquila rapax	Tawny Eagle	EN	VU	Moderate
Aquila verreauxii	Verreaux's Eagle	VU	LC	Moderate

Scientific Name	Common Name	Red List Regional*	Red List Global+	Likelihood of Occurrence
Ardeotis kori	Kori Bustard	NT	NT	High
Calidris ferruginea	Curlew Sandpiper	LC	NT	Low
Ciconia abdimii	Abdim's Stork	NT	LC	Moderate
Ciconia nigra	Black Stork	VU	LC	Low
Circus macrourus	Pallid Harrier	NT	NT	Moderate
Circus ranivorus	African Marsh Harrier	EN	LC	Moderate
Coracias garrulus	European Roller	NT	LC	High
Falco biarmicus	Lanner Falcon	VU	LC	High
Glareola nordmanni	Black-winged Pratincole	NT	NT	Moderate
Grus paradisea	Blue Crane	NT	VU	High
Gyps africanus	White-backed Vulture	CR	CR	Moderate
Gyps coprotheres	Cape Vulture	EN	VU	Moderate
Hydroprogne caspia	Caspian Tern	VU	LC	Moderate
Leptoptilos crumenifer	Marabou Stork	NT	LC	Low
Mycteria ibis	Yellow-billed Stork	EN	LC	Low
Pelecanus rufescens	Pink-backed Pelican	VU	LC	Low
Phoeniconaias minor	Lesser Flamingo	NT	NT	Moderate
Phoenicopterus roseus	Greater Flamingo	NT	LC	Moderate
Podica senegalensis	African Finfoot	VU	LC	Low
Polemaetus bellicosus	Martial Eagle	EN	EN	High
Pterocles gutturalis	Yellow-throated Sandgrouse	NT	LC	High
Rostratula benghalensis	Greater Painted-snipe	NT	LC	Low
Sagittarius serpentarius	Secretarybird	VU	EN	High
Terathopius ecaudatus	Bateleur	EN	EN	Moderate
Torgos tracheliotos	Lappet-faced Vulture	EN	EN	Low
Tyto capensis	African Grass Owl	VU	LC	High

*****(Taylor *et al*. 2015), + (IUCN 2021)

Alcedo semitorquata (Half-collared Kingfisher) is listed as Near Threatened (NT) on a regional scale and occurs across a large range. This species generally prefers narrow rivers, streams, and estuaries with dense vegetation onshore, but it may also move into coastal lagoons and lakes (BirdLife International, 2023). It mainly feeds on fish (BirdLife International, 2023).

Aquila rapax (Tawny Eagle) is listed as VU on a global scale (BirdLife International, 2023) and EN on a regional scale (Taylor *et al*, 2015). This is a widespread raptor occurring over large areas of Sub-Saharan Africa, with isolated populations in North Africa, the Middle East and South Asia, albeit the African population is now becoming increasingly dependent on protected areas (BirdLife International, 2021a). The species occupies dry open from sea level to 3000 m and will occupy both woodland and wooded savannah. *Aquila rapax rapax* predates on mammals, birds, reptiles, insects, and occasionally fish and amphibians. It will also regularly consume carrion and pirate other raptors' prey. The African population is estimated at 73 860 pairs with a severely declining population at a rate of decline as > 60% over the past 50 years within South Africa, Lesotho and eSwatini. The main threats are secondary poisoning, direct persecution and collisions with powerlines (BirdLife International, 2023).

Aquila verreauxii (Verreaux's Eagle) is listed as VU on a regional scale and LC on a global scale. This species is locally persecuted in southern Africa where it coincides with livestock farms, but because the species does not take carrion, is little threatened by poisoned carcasses (BirdLife International, 2023). Where hyraxes are hunted for food and skins, eagle populations have declined (BirdLife International, 2023).

Ardeotis kori (Kori Bustard) is listed as NT on a regional and global scale (BirdLife International, 2023). This species has a large but disjunct range in sub-Saharan Africa, occurring from Ethiopia and Somalia south to Tanzania, and from southern Angola and Zimbabwe south to South Africa. The species occupies flat, arid, mostly open country such as grassland, karoo, bushveld, thornveld, scrubland and savanna but also including modified habitats such as wheat fields and firebreaks. The diet includes a wide range of plants and animals including insects, reptiles, small rodents, birds, carrion, seeds, berries and roots. It is largely sedentary but does undertake local movements. The global population size has not been quantified, but the population in South Africa has been estimated at 2 000-5 000 birds individuals (BirdLife International, 2023). A major threat is collision with overhead powerlines, but the causes of population declines and range losses in many parts of the distribution are unknown. These have been hypothesised to include persecution, rangeland degradation and bush encroachment.

Calidris ferruginea (Curlew Sandpiper) is migratory species which breeds on slightly elevated areas in the lowlands of the high Arctic, and may be seen in parts of South Africa during winter (BirdLife International, 2023). During winter, the species occurs at the coast, but also inland on the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded areas, dams and saltpans (BirdLife International, 2023).

Ciconia abdimii (Abdim's Stork) is listed as NT on a local and international scale and the species is known to be found in open grassland and savanna woodland often near water but also in semi-arid areas, gathering beside pools and water-holes (BirdLife International, 2023). Non-breeding visitor to southern Africa, departing from its northern breeding grounds in the period from May-August, eventually arriving in southern Africa at the onset of the rainy season in the period from October-December. It is nomadic in southern Africa, moving in response to food availability. It gathers in large flocks then departs in February, March and early April. It mainly eats large insects, doing most of its foraging on pastures, irrigated land and recently ploughed fields, usually in groups which split up to cover more ground (BirdLife International, 2023).

Ciconia nigra (Black Stork) is native to South Africa, and inhabits old, undisturbed, open forests (BirdLife International, 2023). They are known to forage in shallow streams, pools, marshes swampy patches, damp meadows, flood-plains, pools in dry riverbeds and occasionally grasslands, especially where there are stands of reeds or long grass (BirdLife International, 2023).

Circus macrourus (Pallid Harrier) is listed as NT on a regional and global scale, and overwinters in semi-desert, scrub, savanna and wetlands. The species is migratory, with most birds wintering in sub-Saharan Africa or south-east Asia (BirdLife International, 2023). The species is most likely only to use the area as a migratory route or a temporary overwintering location from August to March (BirdLife International, 2023).

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa. This species has an extremely large distributional range in sub-equatorial Africa (BirdLife International, 2023). South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides. This species breeds in wetlands and forages primarily over reeds and lake margins (BirdLife International, 2023).

Coracias garrulous (European Roller) is a summer migrant with the population from South-central Europe and Asia occurring throughout sub-Saharan Africa (BirdLife International, 2023). The European Roller has a preference for bushy plains and dry savannah areas. It is globally listed as LC but NT on a regional scale. Threats include persecution on migration in some Mediterranean countries and numerous individuals are killed for food in Oman and India. The loss of suitable breeding habitat due to changing agricultural practices, conversion to monoculture, loss of nest sites, and use of pesticides (reducing food availability) are the main threats to the species in Europe. It is sensitive to loss of hedgerows and riparian forest in Europe which provide essential habitats for perching and nesting (BirdLife International, 2023).

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (BirdLife International, 2023). They may occur in groups up to 20 individuals, but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins (BirdLife International, 2023).

Glareola nordmanni (Black-winged Pratincole) is a migratory species which is listed as NT both globally and regionally. This species has a very large range, breeding mostly in Europe and Russia, before migrating to southern Africa (BirdLife International, 2023). Overall population declines of approximately 20% for this species are suspected. This species generally occurs near water and damp meadows, or marshes overgrown with dense grass. Due to its migratory nature, this species will only be present in South Africa for a few months during the year and will not breed locally (BirdLife International, 2023).

Grus paradiseus (Blue Crane) is listed as NT on a regional scale and as VU on a global scale. Populations of all three of these species have declined, largely owing to direct poisoning, power-line collisions and loss of their grassland breeding habitats owing to afforestation, mining, agriculture and development (BirdLife International, 2023). These species breed in natural grass and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short (BirdLife International, 2023).

Gyps africanus (White-backed Vulture) is listed as CR on a global scale (BirdLife International, 2023). This species is the most widespread vulture in Africa and occurs from Senegal, Gambia and Mali in the west, throughout the Sahel region to Ethiopia and Somalia in the east, through East Africa into Mozambique, Zimbabwe, Botswana, Namibia and South Africa in the south. *Gyps africanus* is primarily a lowland species of open wooded savanna, particularly areas of thornveld. It requires tall trees for nesting but has also been recorded nesting on electricity pylons in South Africa. It is a gregarious species congregating at carcasses, in thermals and at roost sites and nests in loose colonies. The species' global population was estimated at 270 000 individuals in 1992, but it is likely considerably lower than this due to rapid population declines in recent years. The median estimate of the rate of decline, 4.1% annually (2.5-5.4%), is equivalent to a three-generation reduction of 81% (63-89%) (BirdLife International, 2023). The species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution and poisoning. In southern Africa, vultures are caught and consumed for perceived medicinal and psychological benefits, and the decline and possible extirpation in Nigeria has been attributed to the trade in vulture parts for traditional juju practices.

Gyps coprotheres (Cape Vulture) is listed as EN on both a regional and global scale. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (BirdLife International, 2023). They are resident and partially nomadic; adults may travel up to about 750 km from their colony in the non-breeding season.

Hydroprogne caspia (Caspian Tern) is native to South Africa and are known to occur in inland freshwater systems such as large rivers, creeks, floodlands, reservoirs and sewage ponds (BirdLife International, 2023).

Leptoptilos crumenifer (Marabou Stork) is a sedentary or locally nomadic species that disperse based on water availability, prey abundance and breeding (BirdLife International 2023). This species breeds in colonies of up to several thousand birds and may nest with other species. When not breeding, this species tends to feed in groups and roost in large groups of up to 1000 birds. Habitat for this species is open dry savanna, grassland, swampy areas, the banks of rivers, and shores of lakes and dams. Diet includes prey such as fish, termites, locusts, frogs, lizards, snakes, rats, mice and birds, as well as carrion. This species has a very large range and is very large in size globally (BirdLife International 2023).

Mycteria ibis (Yellow-billed Stork) is listed as EN on a regional scale and LC on a global scale. This species is migratory and has a large distributional range which includes much of sub-Saharan Africa (BirdLife International, 2023). It is typically associated with freshwater ecosystems, especially wetlands and the margins of lakes and dams (BirdLife International, 2023).

Pelecanus rufescens (Pink-backed Pelican) is listed as vulnerable on a regional scale. This species is threatened by habitat loss in KwaZulu-Natal, as many suitable pans and flood-plains are being altered through drainage and cultivation, and the natural flooding regime of pans in the Pongolo system has been altered by the Jozini Dam (BirdLife International 2023).

Phoeniconaias minor (Lesser Flamingo) is widely distributed throughout sub-Saharan Africa but mainly breeds in the Rift Valley Lakes in East Africa, with smaller breeding congregations in West Africa and southern Africa (BirdLife International, 2023). This species is nomadic and makes extensive movements in response to environmental conditions and southern African populations are partially migratory, with many making regular movements from their breeding sites inland to coastal wetlands when not breeding. The species is an obligate filter feeder and feeds during the night and early morning when the surface of the water is calm, primarily by swimming and filtering the algae near the surface. The global population has been estimated at between 2 220 000-3 240 000 individuals, with a declining population trend. The main threat is breeding habitat loss due to mining and hydro-electric power. Further threats include effluents mining, pollution from sewage and heavy metal effluents from industries and collisions with powerlines (BirdLife International, 2023).

Phoenicopterus roseus (Greater Flamingo) is widely distributed throughout sub-Saharan Africa and inhabits shallow eutrophic waterbodies such as saline lagoons, saltpans and large saline or alkaline lakes (BirdLife International, 2023). Juveniles, and to a lesser extent adults undertake irregular nomadic or partially migratory movements throughout the species' range in response to water-level changes. In sub-Saharan Africa, the species may also join large flocks of non-breeding *Phoeniconaias minor* (Lesser Flamingo). The sub-Saharan African populations between 100 000 and 120 000 mature individuals. The species suffers from low reproductive success if exposed to disturbance at breeding colonies, or if water-levels surrounding nest-sites lower resulting in increased predation from ground predators. Further threats include effluents mining, pollution from sewage and heavy metal effluents from industries and collisions with powerlines (BirdLife International, 2023).

Podica senegalensis **(**African Finfoot) occurs in forest and wooded savanna along permanent streams with thick growths of *Syzygium guineense*, along secluded reaches of thickly wooded rivers and on the edges of pools, lakes and dams with well-vegetated banks on the edges of dense papyrus beds far from the shore (BirdLife International, 2023). It is rarely found away from shoreline vegetation and generally avoids stagnant or fast-flowing water (BirdLife International, 2023).

Polemaetus bellicosus (Martial Eagle) is listed as EN on a regional scale and EN on a global scale. This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (BirdLife International, 2023). It inhabits open woodland, wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even sub-desert (BirdLife International, 2023).

Pterocles gutturalis (Yellow-throated Sand Grouse) is listed as LC on a global scale and NT on a regional scale. This species has a large range with a decline in the population (BirdLife International 2023). Habitats in which this species is found include arable land, desert and grassland as well as rivers and streams (Birdlife International 2023).

Rostratula benghalensis (Greater Painted-snipe) shows a preference for recently flooded areas in shallow lowland freshwater temporary or permanent wetland, it has a wide range of these freshwater habitats which they occur in, which may include, sewage pools, reservoirs, and mudflats overgrown with marsh grass (BirdLife International, 2023).

Sagittarius serpentarius (Secretarybird) is listed as EN on a global scale (BirdLife International, 2023). The species has a wide distribution across sub-Saharan Africa but surveyed densities suggest that the total population size does not exceed a five-figure number. Ad-hoc records, localised surveys and anecdotal observations indicate apparent declines in many parts of the species' range, especially in South Africa where reporting rates decreased by at least 60% of quarter degree grid cells used in Southern African Bird Atlas Projects. Threats include excessive burning of grasslands that may suppress populations of prey species, whilst the intensive grazing of livestock is also probably degrading otherwise suitable habitat. Disturbance by humans is likely to negatively affect breeding. The species is captured and traded; however, it is unknown how many deaths occur in captivity and transit. Direct hunting and nest-raiding for other uses and indiscriminate poisoning at waterholes are also further threats. A proposed conservation action is that landowners of suitable properties should join biodiversity stewardship initiatives and to manage their properties in a sustainable way for the species populations (BirdLife International, 2023).

Terathopius ecaudatus (Bateleur) is listed as EN both regionally and globally and has undergone very rapid declines in population due to poisoning, pesticides and disturbance of nests (BirdLife International 2023). This species occurs throughout southern Africa as well as is south-west Arabia and habitat includes grasslands, savanna and thorny shrubland. It is usually resident but may be nomadic. Food includes mammals and birds, as well as reptiles, carrion, insects and even bird eggs and crabs. Nesting occurs in large trees in December – August in southern Africa (BirdLife International 2023).

Torgos tracheliotus (Lappet-faced Vulture) is listed as EN, both on a regional and global level. Only a small, very rapidly declining population remains, owing primarily to poisoning and persecution, as well as ecosystem alterations (BirdLife International, 2023). The species inhabits dry savanna, arid plains, deserts and open mountain. It ranges widely when foraging and is mainly a scavenger, feeding predominantly on any large carcasses or their remains (BirdLife International, 2023).

Tyto capensis (African Grass-owl) is rated as Vulnerable (VU) on a regional basis. The distribution of the species includes the eastern parts of South Africa. The species is generally solitary, but it does also occur in pairs, in moist grasslands where it roosts (BirdLife International, 2023). The species prefers thick grasses around wetlands and rivers which are not present in the project area. Furthermore, this species specifically has a preference for nesting in dense stands of the grass species *Imperata cylindrica* (BirdLife International, 2023).

4.2 Field Assessment

4.2.1 First Field Survey

4.2.1.1 Species List of First Field Survey

During the first assessment performed in the summer (5th to the 8th of January 2023) 119 species were recorded during the point counts (Appendix B) and 39 during the incidental counts (Appendix C). Some species were observed both as incidental records and during the point counts. The total number of individual species accounts for approximately 30% of the total number of expected species. Avifauna communities within arid and semi-arid regions exhibit temporal movements in response to shifts in resource availability resulting in changes in species numbers.

One of the expected SCC as mentioned in section 4.1.2 of this report was recorded within the PAOI during the survey period either within point counts or an incidental sightings i.e., *Sagittarius serpentarius* (Secretarybird) (Figure 4-11). Table 4-3 lists the species recorded, Figure 4-11 shows a photograph of the species while Figure 4-12 shows the location of the observed species.

Table 4-3 Summary of the avifauna species of conservation concern recorded within the proposed Rustenburg PV PAOI during the field survey

Scientific Name	Common Name	Conservation Status	
		Red List (Regional)*	Red List (Global)+
Sagittarius serpentarius	Secretarybird	VU	EN

*(Taylor *et al.* 2015), + (IUCN 2021)

Figure 4-11 Photograph illustrating the SCC recorded from the project area – Sagittarius serpentarius (Secretarybird)

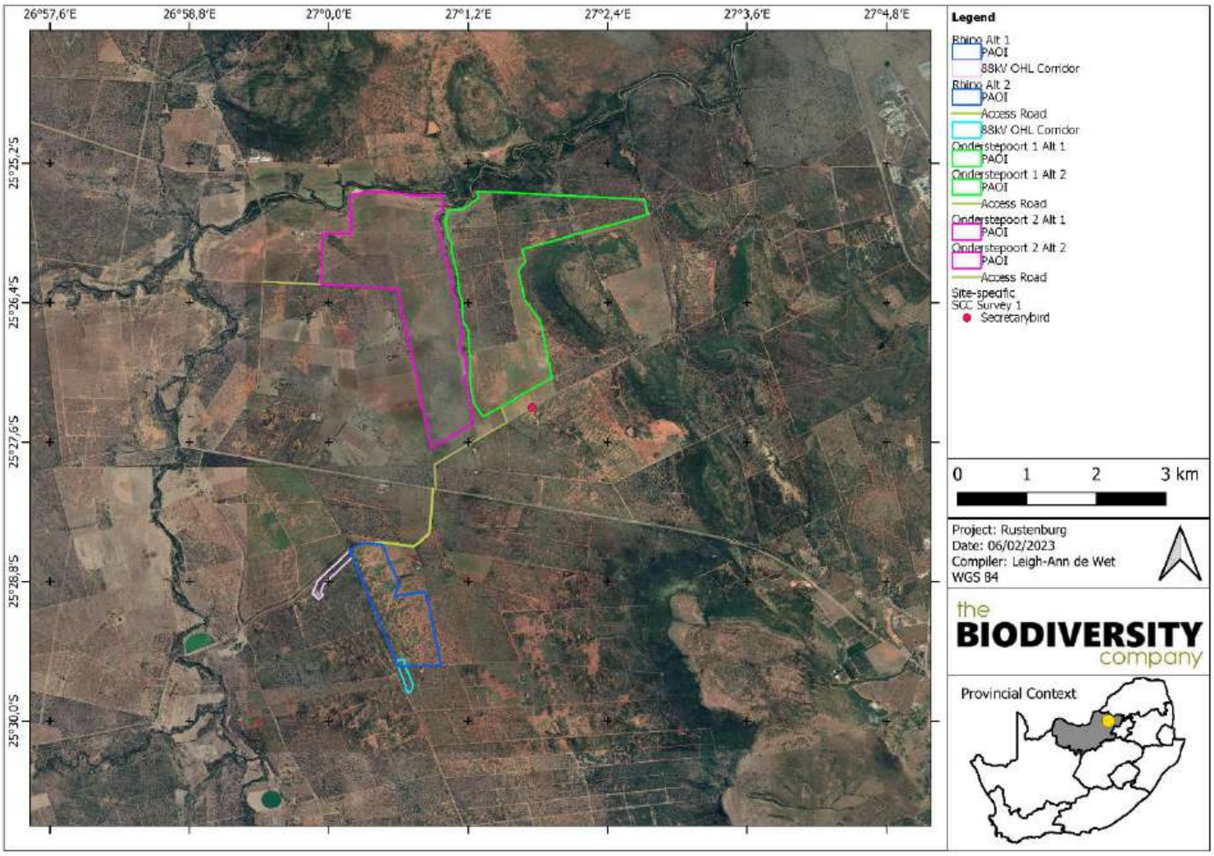


Figure 4-12 ***Map illustrating location of the recorded Sagittarius serpentarius (Secretarybird) within the PAOI during the first field survey***

4.2.1.2 Risk Species

As aforementioned, Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date) which together include all species, common or red-listed that may be at risk of collision, electrocution or habitat loss as a result of the proposed activity. Seventeen (17) of the species observed within the PAOI are regarded as priority species (Table 4-4).

Table 4-4 ***Summary of Priority Species recorded within and around the proposed Rustenburg Rhino Solar PV***

Scientific Name	Common Name	Collision	Electrocution	Habitat Loss
Accipiter melanoleucus	Black Sparrowhawk	X		
Afrotis afraoides	Northern Black Korhaan	X	X	
Alopochen aegyptiaca	Egyptian Goose	X	X	
Aquila spilogaster	African Hawk Eagle	X		
Ardea melanocephala	Black-headed Heron	X	X	
Buteo rufofuscus	Jackal Buzzard	X	X	
Circaetus cinereus	Brown Snake Eagle	X	X	
Circaetus pectoralis	Black-chested Snake Eagle	X	X	
Elanus caeruleus	Black-winged Kite	X		
Falco naumanni	Lesser Kestrel	X		
Falco rupicoloides	Greater Kestrel	X		

Scientific Name	Common Name	Collision	Electrocution	Habitat Loss
Haliaeetus vocifer	African Fish Eagle	X	X	
Lophotis ruficrista	Red-crested Korhaan	X	X	
Micronisus gabar	Gabar Goshawk	X		
Mirafra cheniana	Melodious Lark	X		
Plectropterus gambensis	Spur-winged Goose	X	X	
Sagittarius serpentarius	Secretarybird	X	X	

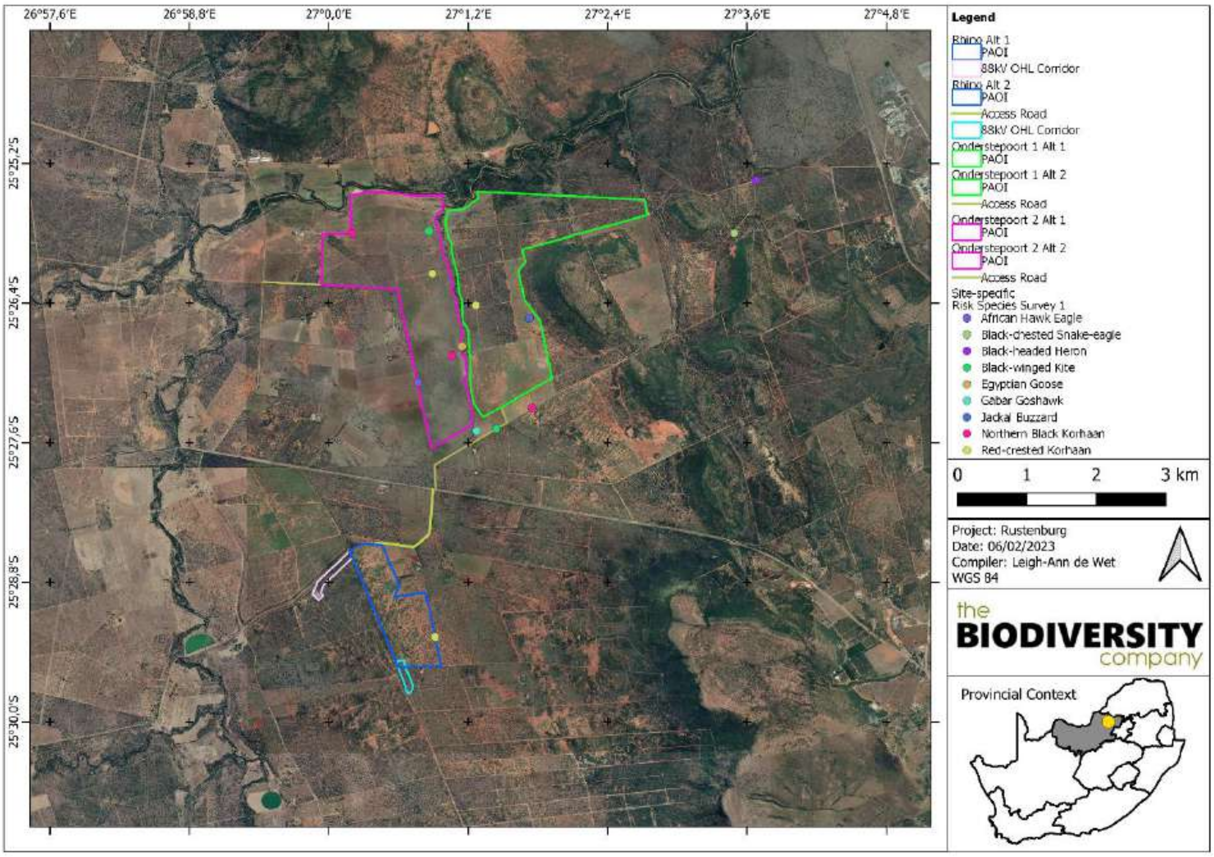


Figure 4-13 ***Map illustrating the location of some of the priority avifauna species within the proposed Rustenburg PV PAOI***

4.2.1.3 Dominant Species

Table 4-5 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. Thirty of the recorded species accounted for more than 75% of the total number of individuals recorded (Only data from Standardised Point Counts was considered). The most abundant species was the *Quelea quelea* (Red-billed Quelea) with a relative abundance of 0.168 and a frequency of occurrence of 3.797% (Table 4-5). Additional ubiquitous species comprised of *Merops apiaster* (Eropean Bee-eater) and *Apus affinis* (Little Swift) with a frequency of occurrence of 10.127% and 2.532%, respectively.

Table 4-5 ***Relative abundance and frequency of occurrence of dominant avifauna species recorded within the Rustenburg Rhino PV PAOI and surrounds during the field survey. Dominant species cumulatively account for more than 75% of the overall abundance. Only data from the standardized point counts were considered.***

Scientific Name	Common name	Conservation Status		Relative Abundance	Frequency (%)
		Red List (Regional)*	Red List (Global)+		
Quelea quelea	Quelea, Red-billed	LC	LC	0,168	3,797
Merops apiaster	Bee-eater, European	LC	LC	0,116	10,127
Apus affinis	Swift, Little	LC	LC	0,051	2,532
Cisticola chiniana	Cisticola, Rattling	LC	LC	0,044	49,367
Hirundo rustica	Swallow, Barn	LC	LC	0,041	10,127
Cisticola juncidis	Cisticola, Zitting	LC	LC	0,029	34,177
Streptopelia capicola	Dove, Ring-necked	LC	LC	0,026	27,848
Ploceus velatus	Weaver, Southern Masked	LC	LC	0,026	8,861
Ploceus intermedius	Weaver, Lesser Masked	LC	LC	0,025	2,532
Urocolius indicus	Mousebird, Red-faced	LC	LC	0,024	15,190
Uraeginthus angolensis	Waxbill, Blue	LC	LC	0,016	12,658
Pycnonotus tricolor	Bulbul, Dark-capped	LC	LC	0,015	17,722
Mirafra africana	Lark, Rufous-naped	LC	LC	0,015	17,722
Cisticola ayresii	Cisticola, Wing-snapping	LC	LC	0,014	15,190
Plocepasser mahali	Sparrow-weaver, White-browed	LC	LC	0,013	10,127
Corythaixoides concolor	Go-away-bird, Grey	LC	LC	0,011	12,658
Dendroperdix sephaena	Francolin, Crested	LC	LC	0,011	10,127
Pternistis swainsonii	Spurfowl, Swainson’s	LC	LC	0,011	12,658
Passer diffusus	Sparrow, Southern Grey-headed	LC	LC	0,010	11,392
Amadina erythrocephala	Finch, Red-headed	LC	LC	0,010	1,266
Alopochen aegyptiaca	Goose, Egyptian	LC	LC	0,009	3,797
Sporopipes squamifrons	Weaver, Scaly-feathered	LC	LC	0,009	2,532
Tockus leucomelas	Hornbill, Southern Yellow-billed	LC	LC	0,009	11,392
Lophoceros nasutus	Hornbill, African Grey	LC	LC	0,009	10,127
Pogoniulus chrysoconus	Tinkerbird, Yellow-fronted	LC	LC	0,009	11,392
Urolestes melanoleucus	Shrike, Magpie	LC	LC	0,009	7,595
Vanellus coronatus	Lapwing, Crowned	LC	LC	0,008	2,532
Prinia flavicans	Prinia, Black-chested	LC	LC	0,008	8,861
Tricholaema leucomelas	Barbet, Acacia Pied	LC	LC	0,007	8,861
Curruca subcoerulea	Warbler, Chestnut-vented	LC	LC	0,007	8,861

*(Taylor *et al*. 2015), + (IUCN 2021)

4.2.1.4 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. Although species to tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivorous birds that feed on the ground during the day (IGD). Followed by Omnivores (OMD) and Granivores (GGD) (Figure 4-14). The species composition is spread throughout the various groups.

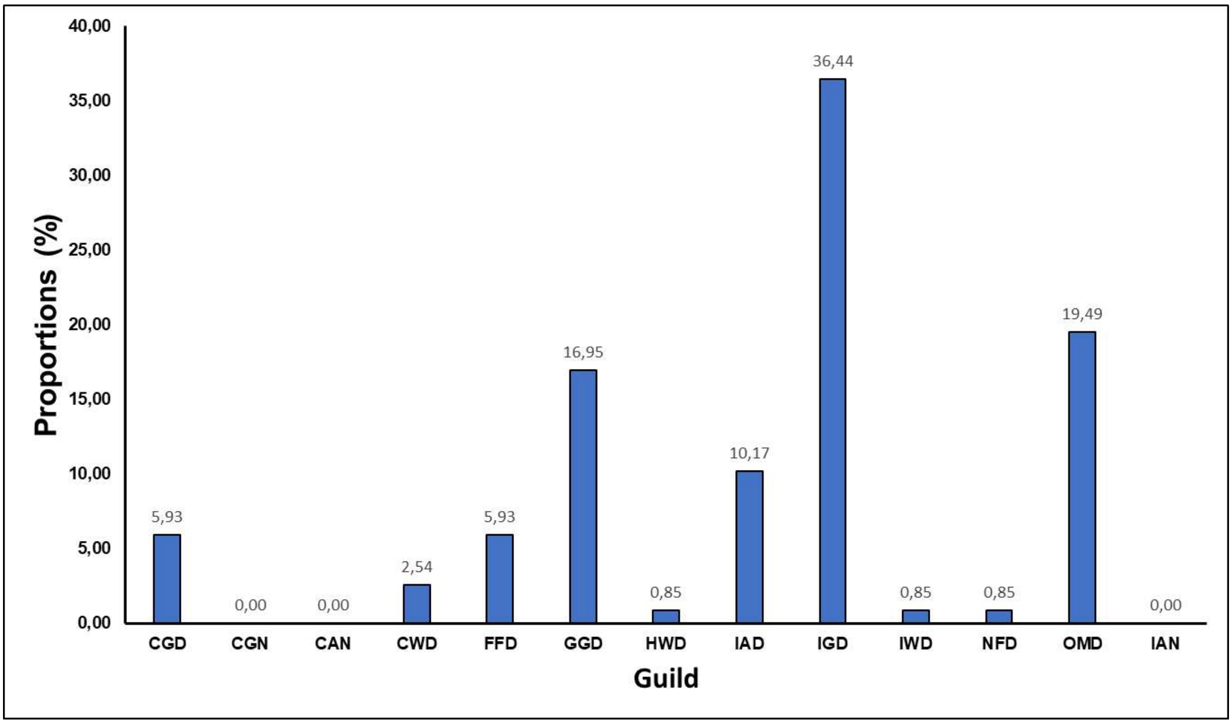


Figure 4-14 ***Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance. Avifaunal trophic guilds – CGD, Carnivore Ground Diurnal; CGN, Carnivore Ground Nocturnal, CAN, Carnivore Air Nocturnal, CWD, Carnivore Water Diurnal; FFD, Frugivore Foliage Diurnal; GGD, Granivore Ground Diurnal; HWD, Herbivore Water Diurnal; IAD, Insectivore Air Diurnal; IGD, Insectivore Ground Diurnal; IWD, Insectivore Water Diurnal; NFD, Nectivore Foliage Diurnal; OMD, Omnivore Multiple Diurnal; IAN, Insectivore Air Nocturnal.***

4.2.1.5 Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site. This section needs to be interpreted with caution based on the limited time spend on this component.

No specific flight paths were noted.

No confirmed nest sites were recorded during the first assessment, this is mainly attributed to the point count analysis protocol which allows for accurate sampling of the avifauna but does not exhaustively cover the site locating nests.

4.2.2 Second Field Survey

4.2.2.1 Species List of Second Field Survey

During the second assessment performed in the summer (13th to the 16th of March 2023) 110 species were recorded during the point counts (Appendix B) and 40 during the incidental counts (Appendix C), with an overall list of 128 species recorded during the survey. Some species were observed both as incidental records and during the point counts. The total number of individual species accounts for approximately 35% of the total number of expected species.

One of the expected SCC as mentioned in section 4.1.2 of this report was recorded within the PAOI during the survey period either within point counts or an incidental sightings i.e., *Sagittarius serpentarius* (Secretarybird), and an unconfirmed sighting of *Tyto capensis* (Grass Owl) (Figure 4-15). Table 4-6 lists the species recorded, Figure 4-15 shows a photograph of the species while Figure 4-16 shows the location of the observed species.

Table 4-6 Summary of the avifauna species of conservation concern recorded within the proposed Rustenburg PV PAOI during the field survey.

Scientific Name	Common Name	Conservation Status	
		RedList (Regional)*	RedList (Global)+
Sagittarius serpentarius	Secretarybird	VU	EN

*(Taylor *et al*. 2015), + (IUCN 2021)

Figure 4-15 Photograph illustrating a portion of the avifauna recorded within the proposed Rustenburg PAOI during the field survey – Sagittarius serpentarius (Secretarybird)

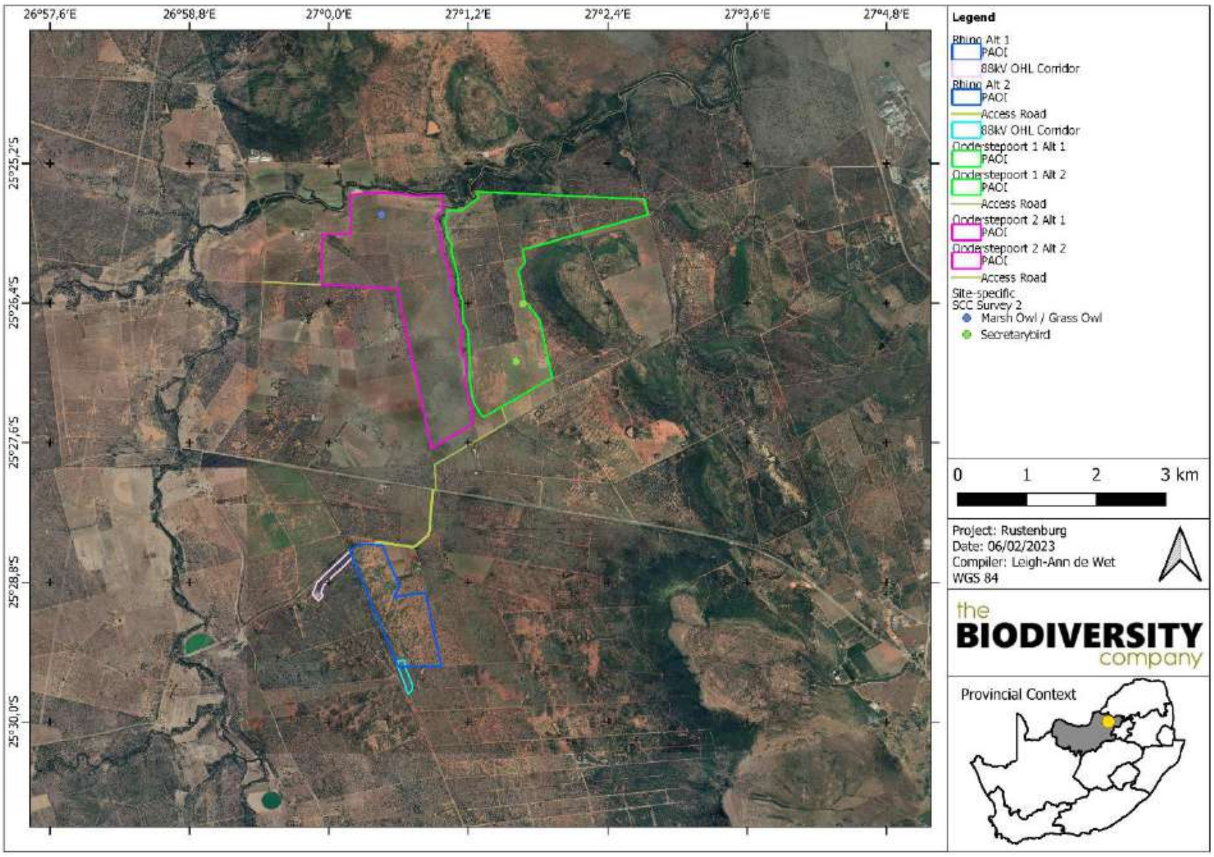


Figure 4-16 Map illustrating location of the recorded Sagittarius serpentarius (Secretarybird) within the PAOI during the second field survey

4.2.2.2 Risk Species

As aforementioned, Priority species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date) which together include all species, common or red-listed that may be at risk of collision, electrocution or habitat loss as a result of the proposed activity. Sixteen (16) of the species observed within the PAOI are regarded as Risk species (Table 4-7). The location of some of these species within the PAOI are provided in Figure 4-17.

Table 4-7 Summary of Priority Species recorded within and around the proposed Rhino PV

Scientific Name	Common Name	Collisions	Electrocutions	Habitat Loss
Accipiter minullus	Little Sparrowhawk	X		
Afrotis afraoides	Northern Black Korhaan	X	X	
Alopochen aegyptiaca	Egyptian Goose	X	X	
Ardea melanocephala	Black-headed Heron	X	X	
Bubulcus ibis	Western Cattle Egret	X		
Circaetus pectoralis	Black-chested Snake Eagle	X	X	
Elanus caeruleus	Black-winged Kite	X		
Falco amurensis	Amur Falcon	X		
Falco naumanni	Lesser Kestrel	X		
Hieraaetus wahlbergi	Wahlberg's Eagle	X	X	
Lophotis ruficrista	Red-crested Korhaan	X	X	
Melierax canorus	Pale Chanting Goshawk	X		

Scientific Name	Common Name	Collisions	Electrocutions	Habitat Loss
Micronisus gabar	Gabar Goshawk	X		
Sagittarius serpentarius	Secretarybird			X
Tachybaptus ruficollis	Little Grebe	X		

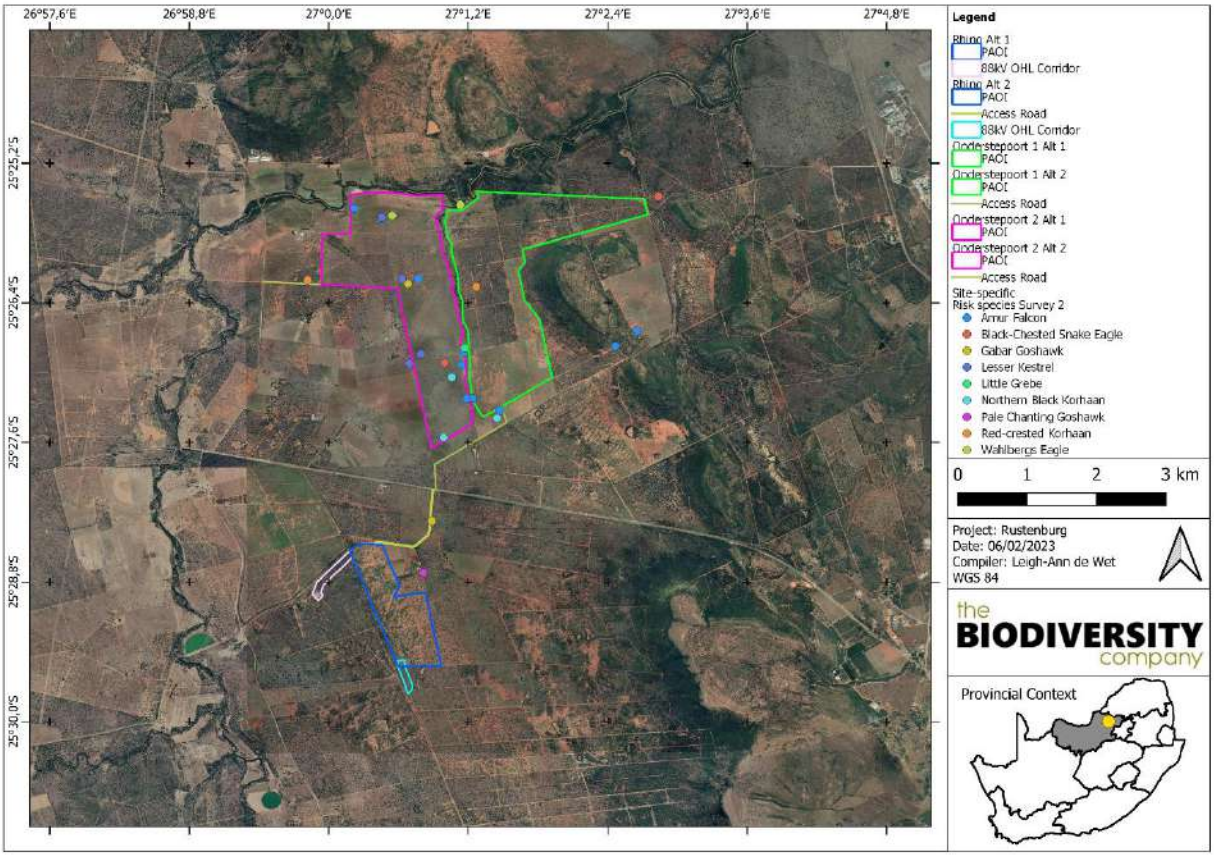


Figure 4-17 Map illustrating the location of some of the priority avifauna species within the proposed PV PAOI

4.2.2.3 Dominant Species

Table 4-5 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. Thirty of the recorded species accounted for more than 77% of the total number of individuals recorded (Only data from standardized point counts was considered). The most abundant species was *Hirundo rustica* (Barn Swallow) with a relative abundance of 0.12 and a frequency of occurrence of 39.96%. Additional ubiquitous species comprised of *Falco amurensis* (Amur Falcon) and *Merops apiaster* (European Bee-eater), with a frequency of occurrence of 0.08% and 0.08%, respectively. Some of the avifauna species recorded during the site visit can be seen in Figure 4-18.

Table 4-8 Relative abundance and frequency of occurrence of dominant avifauna species recorded within the Rustenburg Solar PV PAOI during the field survey. Dominant species cumulatively account for more than 77% of the overall abundance. Only data from the standardized point counts were considered.

Scientific Name	Common Name	Conservation status		relative abundance	frequency
		RedList (Regional)*	RedList (Global)⁺		
Hirundo rustica	Barn Swallow	LC	LC	0,12	36,96
Falco amurensis	Amur Falcon	LC	LC	0,08	15,22

Scientific Name	Common Name	Conservation status		relative abundance	frequency
		RedList (Regional)*	RedList (Global)+		
Merops apiaster	European Bee-eater	LC	LC	0,08	47,83
Apus affinis	Little Swift	LC	LC	0,06	15,22
Quelea quelea	Red-billed Quelea	LC	LC	0,05	8,70
Numida meleagris	Helmeted Guineafowl	LC	LC	0,04	6,52
Urocolius indicus	Red-faced Mousebird	LC	LC	0,03	30,43
Uraeginthus angolensis	Blue Waxbill	LC	LC	0,03	28,26
Cisticola chiniana	Rattling Cisticola	LC	LC	0,02	50,00
Lamprotornis nitens	Cape Glossy (Cape) Starling	LC	LC	0,02	26,09
Streptopelia capicola	Cape Turtle (Ring-necked) Dove	LC	LC	0,02	32,61
Crinifer concolor	Grey Go-Away-Bird	LC	LC	0,02	47,83
Bubulcus ibis	Western Cattle Egret	LC	LC	0,02	4,35
Apus caffer	White-rumped Swift	LC	LC	0,02	6,52
Urolestes melanoleucus	Magpie Shrike	LC	LC	0,02	19,57
Pycnonotus tricolor	Dark-capped Bulbul	LC	LC	0,02	32,61
Pternistis swainsonii	Swainson's Spurfowl	LC	LC	0,01	30,43
Laniarius atrococcineus	Crimson-breasted Shrike	LC	LC	0,01	32,61
Lanius minor	Lesser Grey Shrike	LC	LC	0,01	26,09
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	LC	LC	0,01	32,61
Prinia flavicans	Black-chested Prinia	LC	LC	0,01	26,09
Curruca subcoerulea	Chestnut-vented Tit-Babbler (Warbler)	LC	LC	0,01	30,43
Cercotrichas leucophrys	White-browed Scrub Robin	LC	LC	0,01	30,43
Batis molitor	Chinspot Batis	LC	LC	0,01	28,26
Phoeniculus purpureus	Green Wood-Hoopoe	LC	LC	0,01	8,70
Bostrychia hagedash	Hadeda (Hadada) Ibis	LC	LC	0,01	6,52
Buphagus erythrorynchus	Red-billed Oxpecker	LC	LC	0,01	13,04
Plocepasser mahali	White-browed Sparrow-Weaver	LC	LC	0,01	8,70
Ortygospiza atricollis	African Quail-Finch	LC	LC	0,01	10,87
Lophoceros nasutus	African Grey Hornbill	LC	LC	0,01	21,74

*(Taylor *et al*. 2015), + (IUCN 2021)

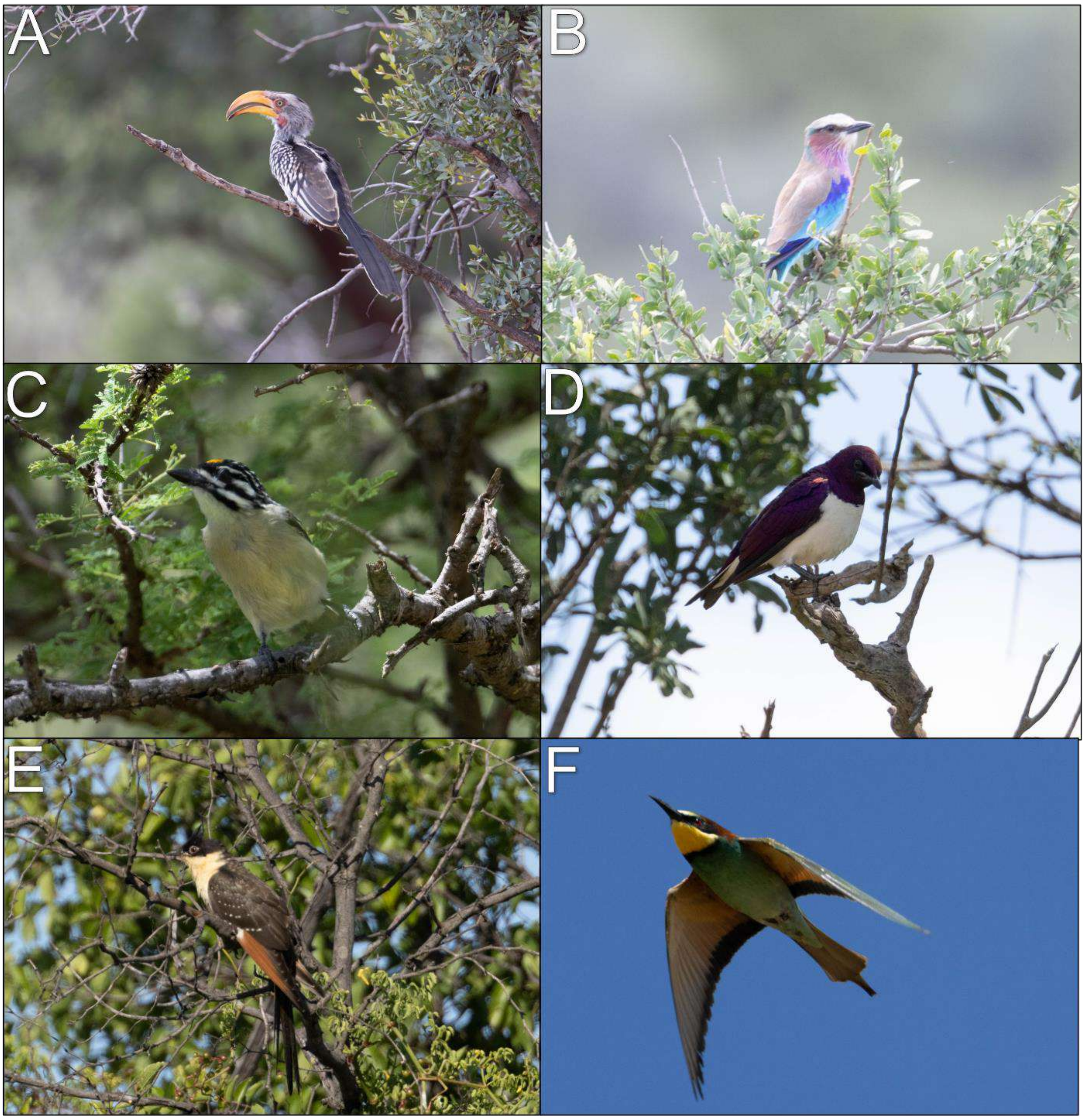


Figure 4-18 ***Some of the species recorded in the project area; A: Tockus leucomelas (Southern Yellow-billed Hornbill), B: Coracias caudatus (Lilac-breasted Roller), C: Pogoniulus chrysoconus (Yellow-fronted Tinkerbird), D: Cinnyricinclus leucogaster (Violet-backed Starling), E: Clamator glandarius*** **(Juvenile Great Spotted Cuckoo)** ***and F: Merops apiaster (European Bee-eater).***

4.2.2.4 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. Although species to tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivorous birds that feed on the ground during the day (IGD). Followed by Omnivores (OMD) and Insectivores (IAD) (Figure 4-14). The species composition is spread throughout the various groups.

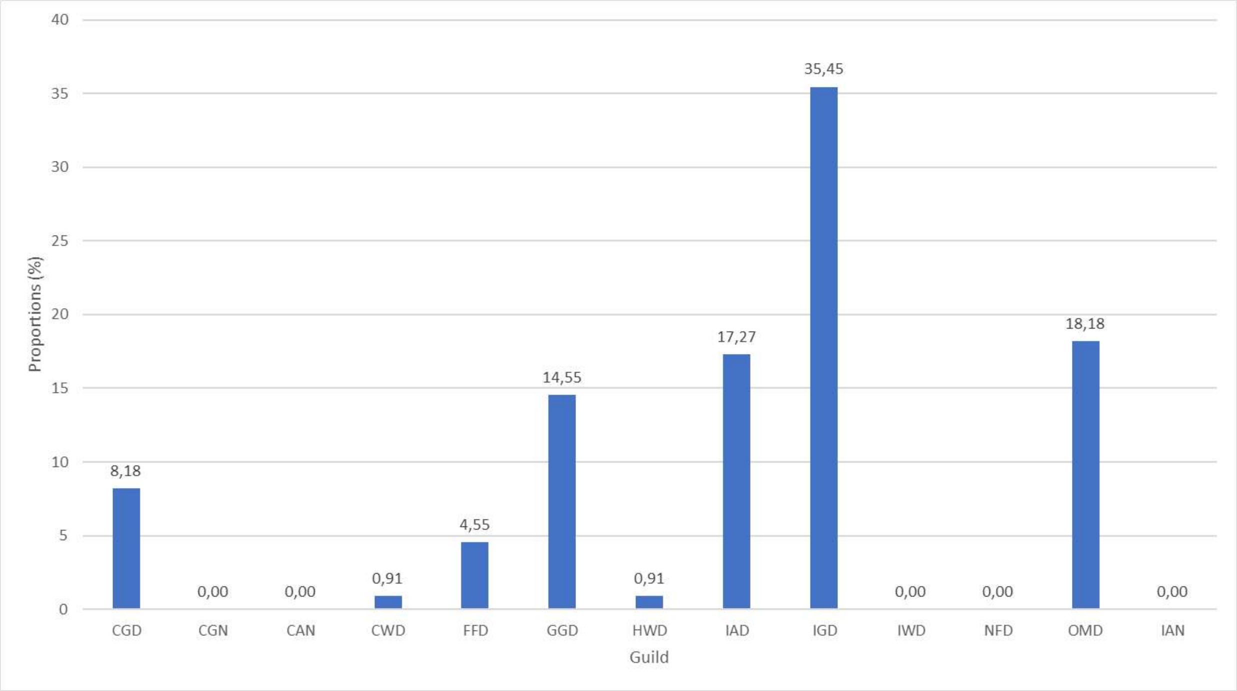


Figure 4-19 Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance (Avifaunal trophic guilds. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GGD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal.

4.2.3 Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site. This section needs to be interpreted with caution based on the limited time spend on this component.

No specific flight paths were noted during the field survey.

No confirmed nest sites were recorded during the second assessment, this is mainly attributed to the point count analysis protocol which allows for accurate sampling of the avifauna but does not exhaustively cover the site locating nests.

4.3 Fine-Scale Habitat Use

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities. Four different habitat types were delineated within the PAOI, comprising of Drainage Line, Thorny Bushveld, Old Fields and Modified Areas (Figure 4-24).

4.3.1 Drainage Line

The water resources considered in this assessment included a drainage line between Onderstepoort 1 and Onderstepoort 2 and do not form part of the Rhino PV facility nor the Integrated Grid (Figure 4-20). However, it is likely that avifauna making use of this habitat will be present at each of these sites. It is important to note the water source delineations were done from an avifauna perspective and is not representative of the wetlands delineated within the Wetland Assessment.

The standing and running water present in this drainage line does not create enough of a water body for the usual large waterbirds such as ducks and waders, however, it does form a water resource for several avifauna species. Species making use of this area include *Oriolus larvartus* (Black-headed Oriole), *Halcyon albiventris* (Brown-hooded Kingfisher), *Centropus burchellii* (Burchell's Coucal), *Batis molitor* (Chinspot Batis), *Muscicapa striata* (Spotted Flycatcher), and *Halcyon senegalensis* (Woodland Kingfisher).

Figure 4-20 Photograph illustrating the Drainage Line occurring within the broader assessment area

4.3.2 Thorny Bushveld

This habitat is thorny bushveld with a distinct woody component comprising of large trees. The habitat has not been disturbed much, except for the historic and current grazing (Figure 4-21). This habitat type is regarded as semi-natural, but slightly disturbed due to the grazing by livestock, mismanagement and also human infringement.

This habitat supported a large number of avifauna species that were recorded during the field survey. It also provided nesting sites, especially the thorn trees found in this area which were extensively utilised by the avifauna species. Some avifauna species observed in this habitat include *Tricholaema leucomelas* (Acacia Pied Barbet), *Ortygospiza atricollis* (African Quali-Finch), *Chloropicus namaquus* (Bearded Woodpecker), *Dryoscopus cubla* (Black-backed puffback), *Prinia flavicans* (Black-chested Prinia), *Zosterops virens* (Cape White-eye), *Curruca subcoerulea* (Chestnut-vented Tit-babbler), *Trachyphonus vaillantii* (Crested Barbet) amongst others.

Figure 4-21 Photograph illustrating an example of the Woody Thornveld habitat observed in the PAOI

4.3.3 Old Fields

Old fields comprised large areas of open grasslands with few scattered shrubs (Figure 4-22). This provides open areas for foraging for species that spend time in the open, as well as for seed eaters which feed on the grass seeds. These open areas are open due to past agricultural practices and the fields are now left fallow.

Avifauna species utilising this habitat type included, but not limited to, *Uraeginthus angolensis* (Blue waxbill), *Sagittarius serpentarius* (Secretarybird), *Vidua regia* (Shaft-tailed Whydah), *Bubulcus ibis* (Western Cattel Egret), *Euplectes albonotatus* (White-winged Widowbird), *Cisticola juncidis* (Zittign Cisticola), *Vanellus armatis* (Blacksmith Lapwing), *Numida melaegis* (Helmeted guineafowl), *Afrotis afraoides* (Northern Black Korhaan) and *Bubalornis niger* (Red-billed Buffalo Weaver).

Figure 4-22 Photograph illustrating an example of the Old Fields habitat observed in the PAOI

4.3.4 Modified Areas

The Modified Area consisted primarily of urban development and existing electricity infrastructure and roads (Figure 4-23). These areas were mostly void of avifauna species, with the species recorded here being those resilient to disturbance. Species occurring here included *Vanellus armatus* (Blacksmith Lapwing), *Lamprotornis nitens* (Cape Glossy Starling), *Passer melanurus* (Cape Sparrow), *Streptopelia capicola* (Cape Turtle Dive), *Acridotheres tristis* (Common Myna), and *Dicrurus adsimilis* (Fork-tailed Drongo).

Figure 4-23 Photograph illustrating an example of the modified habitats observed in the broader assessment area

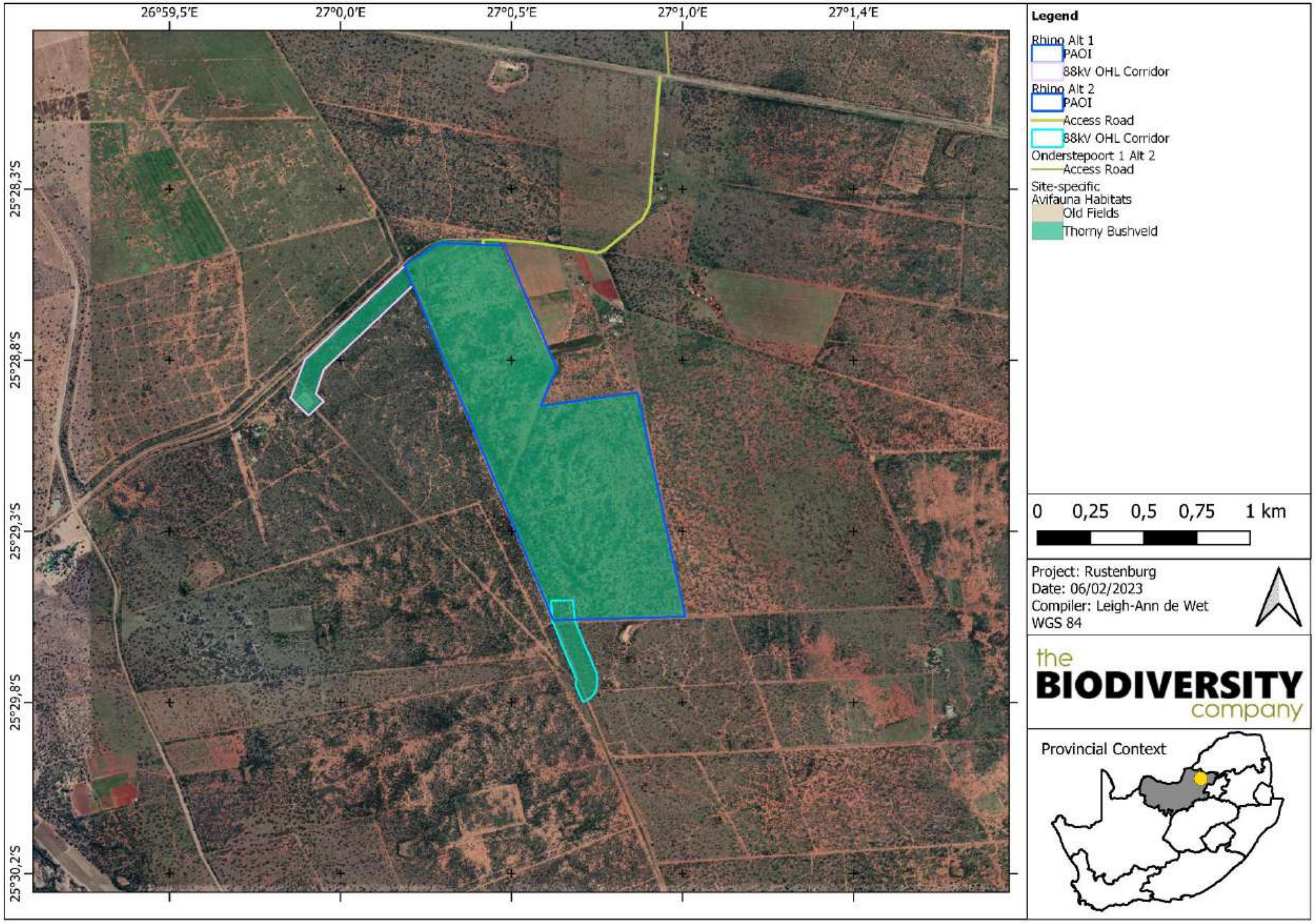


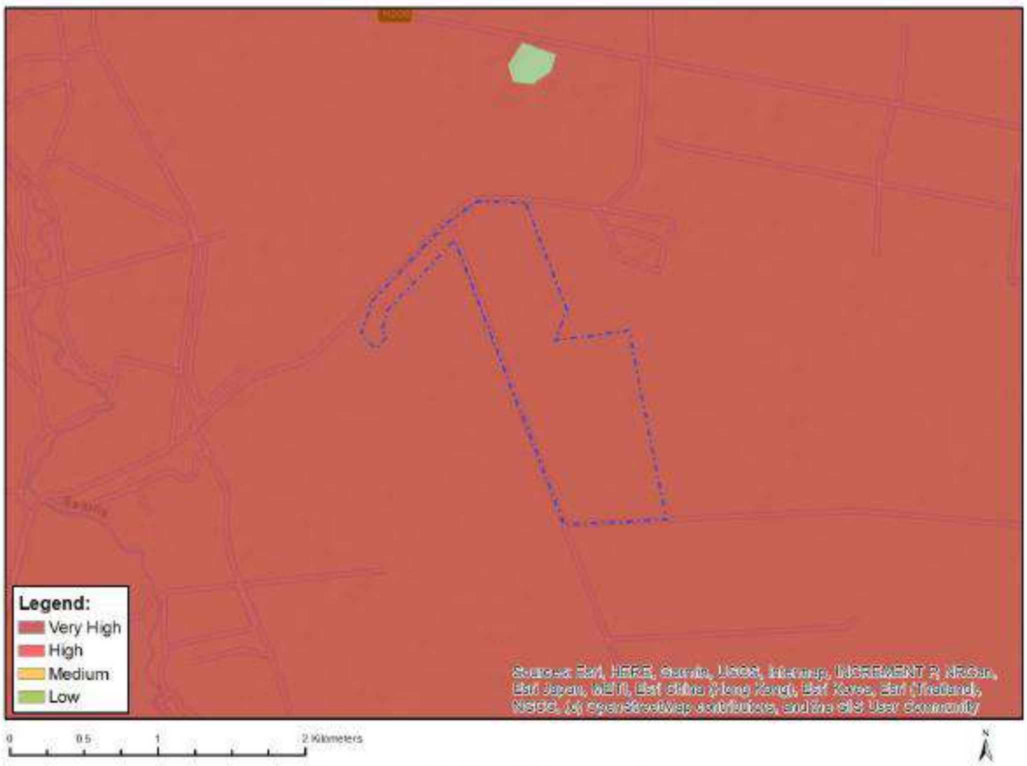
Figure 4-24 Map illustrating the habitat types delineated within the proposed Rustenburg Rhino Solar PV and associated infrastructure PAOI

5 Site Sensitivity Verification

5.1 Environmental Screening Tool

The terrestrial biodiversity theme sensitivity as indicated by the screening tool report for the project area of influence was derived to be 'Very High' for the entirety of the site due to its location within a CBA2, ESA1 and ESA2 as well as within a NPAES Focus Area (Figure 5-1).

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

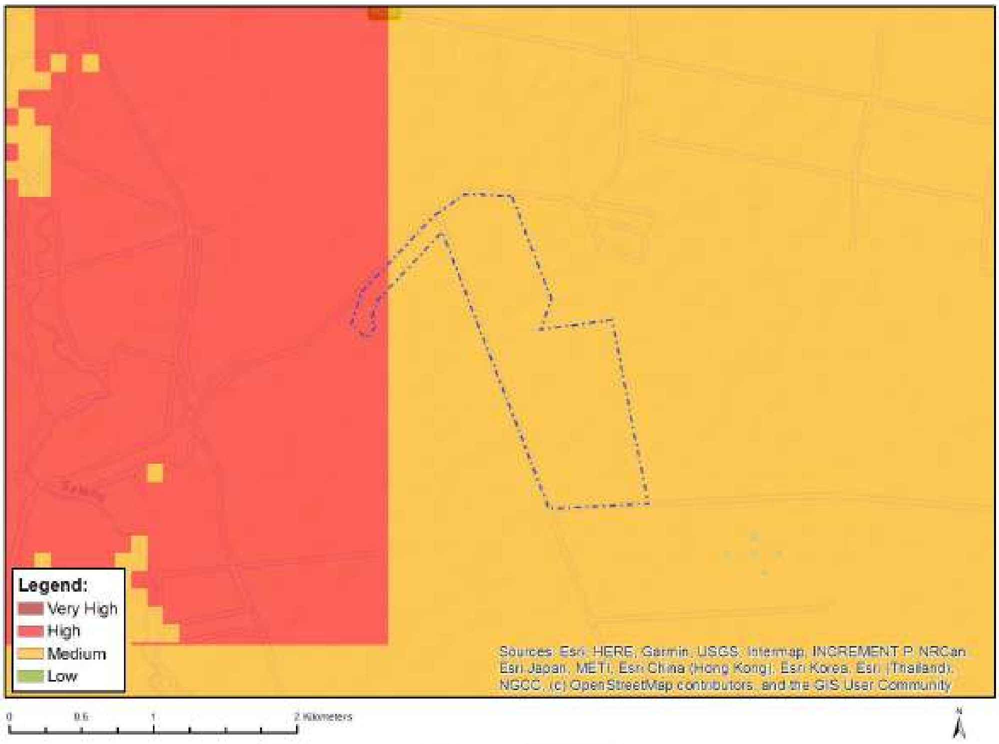
Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 2
Very High	Ecological support area 1
Very High	Ecological support area 2
Very High	Protected Areas Expansion Strategy

Figure 5-1 Terrestrial Biodiversity Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool

The Animal Species Theme sensitivity, as indicated in the screening report, was derived to be 'High' for the PAOI (Figure 5-2). The High sensitivity for a portion of the project area was due to the likely presence of *Torgos tracheliotos* (Lappet-faced Vulture) and a 'Medium' sensitivity for the remainder of the site due to the probable presence of *Aquilas rapax* (Tawny Eagle).

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Torgos tracheliotos
Medium	Aves-Aquila rapax
Medium	Sensitive species 5
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Lycaon pictus

Figure 5-2 Fauna Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool

5.2 Site Ecological Importance (SEI)

Based on the criteria provided in Section 3.4 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity or SEI category (Table 5-1).The SEI of the PAOI within an avifauna context was based on both the field results and desktop information. The SEI of the habitat types delineated are illustrated in Figure 5-3. The drainage line was given a high rating based on high likelihood of the water sources supporting SCCs. Only one SCC was recorded from the site but a high diversity of species in the thorny bushveld so the thorny bushveld was assigned a medium SEI and the old fields a low SEI. This habitat does however still have a high potential of supporting other SCCs.

Table 5-1 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Drainage Line	Medium	High	**Medium**	Low	**High**
	> 50% of receptor contains natural habitat with potential to support SCC.	Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.		Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor	
Woody Thornveld	Medium	Medium	**Medium**	Medium	**Medium**
	> 50% of receptor contains natural habitat with potential to support SCC.	Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.		Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	
Old Fields	High	Low	**Medium**	High	**Low**
	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2.	Several minor and major current negative ecological impacts.		Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor	
Modified	Very Low	Very Low	**Very Low**	Very High	**Very Low**
	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.	Several major current negative ecological impacts.		Habitat that can recover rapidly	

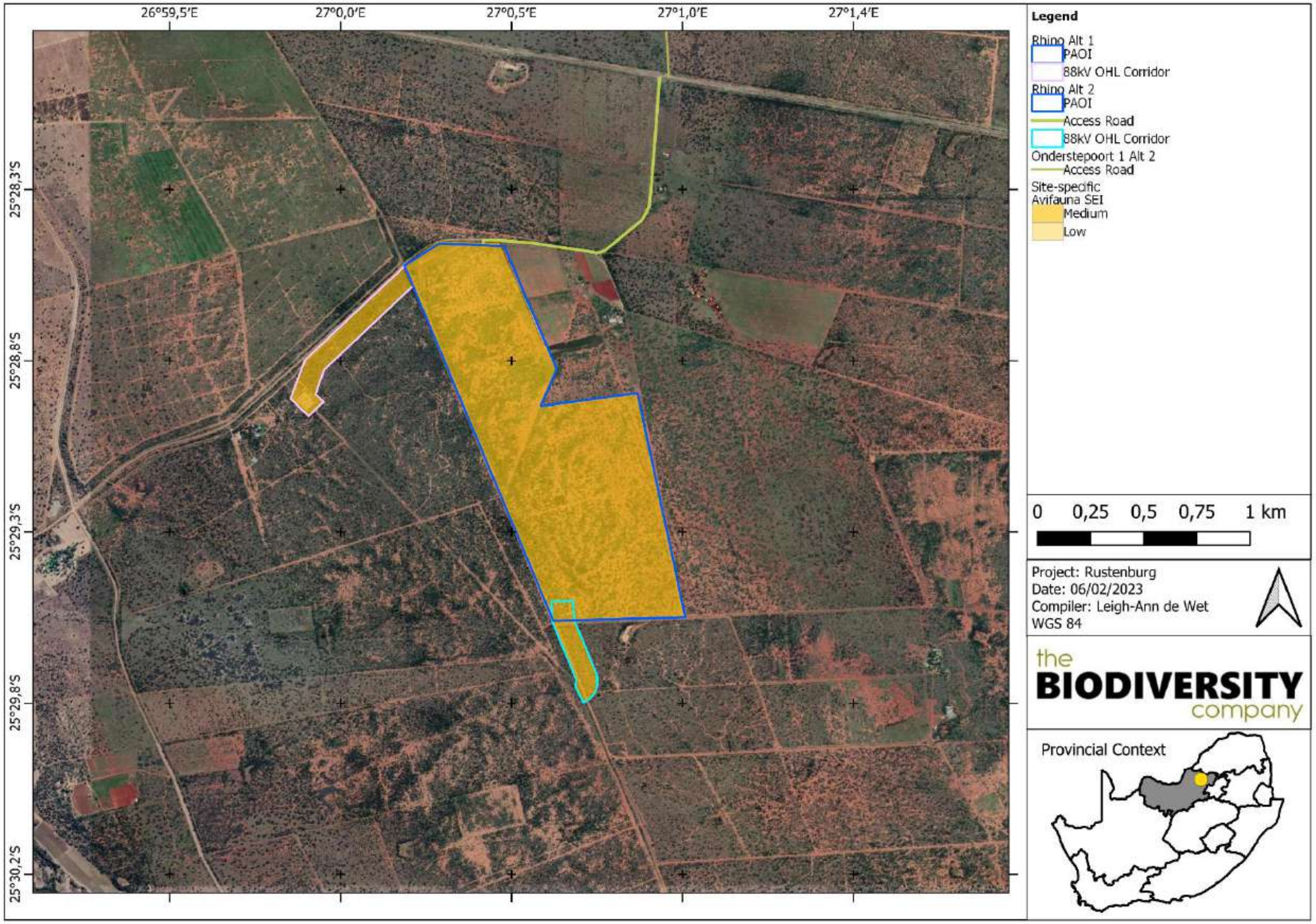


Figure 5-3 ***Map illustrating the Site Ecological Importance of the proposed Rustenburg Rhino PV PAOI and surrounds within an avifauna context***

Interpretation of the SEI in the context of the proposed project is provided in Table 5-2.

Table 5-2 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance (SEI)	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

6 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project site, specifically the proposed development footprint area. The assessment of the significance of direct, indirect and cumulative impacts was undertaken. Bennun *et al* (2021) describes three broad types of impacts associated with solar energy development:

- Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat frag- mentation as a result of project infrastructure and species disturbance or mortality as a result of project operations;

- Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence; and

- Cumulative impacts – Impacts that result from the successive, incremental and/or combined effects of existing, planned and/or reasonably anticipated future human activities in combination with project development impacts.

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. Three phases were considered for the impact assessment:

- Construction Phase;
- Operational Phase; and
- Closure/Rehabilitation Phase.

6.1 Present Impacts to Avifauna

In consideration that there are anthropogenic activities and influences are present within the landscape, there are several negative impacts to biodiversity, including avifauna (Figure 6-1). These include:

- Existing energy infrastructure;
- Noise pollution;
- Minor and major gravel roads and associated vehicle traffic;
- Invasive Alien Plants;
- Livestock agriculture; and
- Fences and associated infrastructure.

Figure 6-1 ***Photographs illustrating examples of impacts observed within the Rustenburg Rhino PV PAOI. A) agriculture, B) fences and C) roads and associated infrastructure.***

6.2 Anticipated Impacts

This section describes the potential impacts on avifauna associated with the construction and operational phases of the proposed development and is only relevant to the PV site and associated infrastructure.

During the construction phase vegetation clearing for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise pollution. Increased human presence can lead to poaching and the increase in vehicle traffic and heavy machinery will potentially lead to roadkill.

The principal impacts of the operational phase are electrocution, collisions, fencing, chemical pollution due to chemical cleaning of the PV panels and habitat loss. Solar panels have been implicated as a potential risk for bird collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the “lake effect” (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This “lake-effect” hypothesis has not been substantiated or refuted to date (Visser *et al,* 2019). It can however be said that the combination of powerlines, fencing and large infrastructure will influence avifauna species. Visser *et al* (2019) performed a study at a utility-scale PV SEF in the Northern Cape and found that most of the species affected by the facility were passerine species. This is due to collisions with solar panels from underneath. During a predator attack while foraging under the panels, individuals may alight and then collide with the panel. Larger species were said to be more influenced by the facilities when they were found foraging close by and were disturbed by predators which resulted in collisions with infrastructure.

Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires or earthed devices simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties.

Fencing of the PV site can influence birds in six ways (BirdLife South Africa, 2015):

- Snagging – occurs when a body part is impaled on one or more barbs or razor points of a fence;
- Snaring – when a bird’s foot/leg becomes trapped between two overlapping wires;
- Impact injuries – birds flying into a fence, the impact may kill or injure the bird;
- Snarling – when birds try and push through a mesh or wire stands, ultimately becoming trapped (uncommon);
- Electrocution – electrified fence can kill or severely injure birds; and
- Barrier effect – fences may limit flightless birds including moulting waterfowl from resources.

Chemical pollution from PV cleaning, if not environmentally friendly will result in either acute or chronic affects. Should this chemical penetrate into the surrounding environment, it would impact populations on a larger scale and not just species found in and around the PV footprint.

6.3 Alternatives considered

Two alternatives were considered for this project, both of which have very similar footprints in the same habitat with the same SEI designations. As such, this impact assessment is identical for both alternatives.

6.1 Loss of Irreplaceable Resources

The proposed development will lead to the loss of the following irreplaceable resources:

- Habitat and possible nesting sites for avifauna SCC.

6.2 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. Although different species and groups will react differently to the development, the risk assessment was undertaken bearing in mind the potential impacts to the priority species listed in this report.

6.2.1 Construction Phase

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat destruction within the project footprint	5	3	4	3	5		4	2	4	3	4	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Definite	**Moderately High**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Destruction, degradation and fragmentation of surrounding habitats	4	3	3	3	4		3	2	2	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**
Displacement/emigration of avifauna community (including SCC) due to noise pollution	4	3	3	3	4		3	2	2	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**
Direct mortality from persecution or poaching of	4	3	3	3	4		2	2	2	3	3	
						Moderate					Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
avifauna species and collection of eggs	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely		One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important		
	4	3	3	3	4		2	2	2	3	1	
Direct mortality from increased vehicle and heavy machinery traffic	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Highly unlikely	**Absent**
	4	4	4	3	4		2	2	2	3	1	
Chemical pollution associated with dust suppressants	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Highly unlikely	**Absent**

6.2.2 Operational Phase

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Collisions with infrastructure associated with the PV Facility	5	2	4	3	4		4	2	3	3	4	
	Permanent	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Electrocution due to infrastructure associated with the PV Facility	5	2	3	3	4		4	2	3	3	2	
	Permanent	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Possible	**Low**
Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs	4	3	3	3	3		4	2	2	3	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Direct mortalities and hinderance of movement from fencing infrastructure	5	3	3	3	3		4	2	2	3	3	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**
Pollution due to chemicals used to keep the PV panels clean	4	3	3	3	3		4	2	2	3	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Likely	**Low**

6.2.3 Decommissioning Phase

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Direct mortality due to earthworks, vehicle collisions and persecution	5	3	3	3	3		2	2	3	3	2	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Possible	**Low**
Direct mortality due to infrastructure including collisions with PV infrastructure, fences etc	5	3	3	3	4		2	2	3	3	1	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly unlikely	**Low**
Continued habitat degradation due to Invasive Alien Plant encroachment and erosion	5	3	3	3	4		2	2	2	3	2	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology moderately sensitive/ /important	Possible	**Low**

6.3 Unplanned Events

The planned activities will have anticipated impacts as discussed above; however, unplanned events may occur on any project, and these could lead to potential impacts which will require appropriate management.

Table 6-1 is a summary of the findings of an unplanned event assessment conducted from a terrestrial ecology perspective. Note that not all potential unplanned events may be captured herein, and this process must therefore be managed throughout all phases and according to events that take place or have a high likelihood of taking place.

Table 6-1 Summary of unplanned events, potential impacts and mitigations

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be available at all times. The incident must be reported on, and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural savannah.	An appropriate fire management plan needs to be compiled and implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the roads and cleared areas.	A storm water management plan must be compiled and implemented.

6.4 Cumulative Impacts

Cumulative impacts are assessed within the context of the extent of the proposed PAOI other developments and activities in the area (existing and proposed) and general habitat loss and disturbance resulting from any other anthropogenic activities in the area. The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project’s impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on the local and regional avifauna community.

Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, other solar PV facilities, and power infrastructure). Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

The total area within the 30 km buffer around the project area amounts to 376 845.686 ha, but when considering the transformation (94 457.686 ha) that has taken place within this radius, 278 388 ha of intact habitat remains according to the 2018 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 26.13% loss in natural habitat. Considering this context, the project footprint for the Rhino PV facility (according to the provided layout), and similar projects that exist in the 30 km region (Including the others of the same Rustenburg proposed development) measuring a maximum of 1 121.37 ha (as per the latest South African Renewable Energy EIA Application Database). This means that the total amount of remaining habitat lost as a result of solar projects in the region amounts to 0.4% (the sum of all related developments as a percentage of the total remaining habitat). Table 6-2 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 6-2 Loss of habitat within a 30 km radius of the project

	Total Habitat (ha)	Total Loss (ha)	Tot. Remaining Habitat (ha) (Remnants)	Total Historical Loss (%)	Cumulative Projects (ha)	Tot. Remaining Habitat (ha)	Cumulative Habitat Lost (%)
Approximate Solar development cumulative effects (Spatial)	376,845.686	98,457.686	278,388	**26.13**	1121.37	**279,388**	**0.4**

The overall cumulative impact assessment is presented in Table 6-3 and Figure 6-2 below. Approximately 26.13% of the habitat has already been lost, and as discussed above the proposed solar developments will result in a cumulative loss of approximately 0.4% from only similar developments (Solar, approved and in process) in the area, as such the cumulative impact from the proposed development is rated as Moderately high (Figure 6-2). This means that the careful spatial management and planning of the entire region must be a priority, and existing large infrastructure projects must be carefully monitored over the long term.

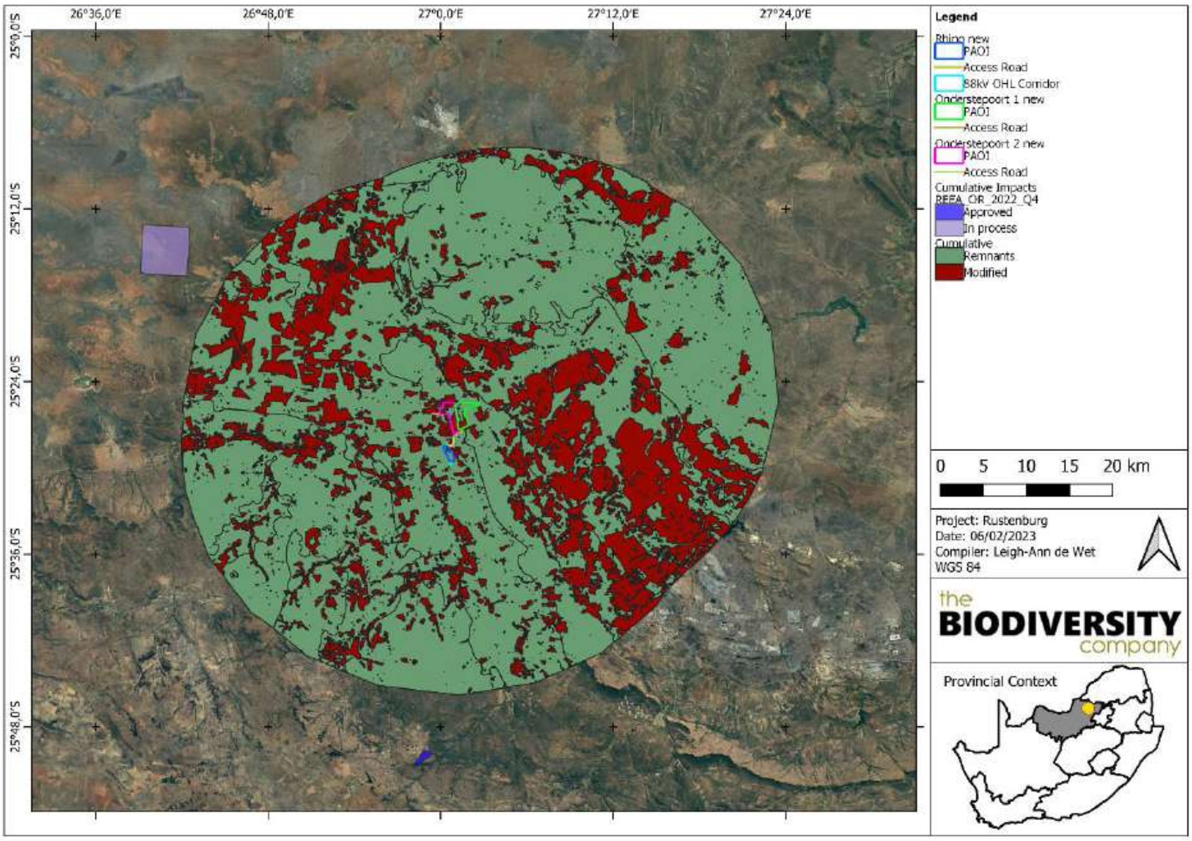


Figure 6-2 ***Map illustrating the additional renewable energy developments within the landscape overlaid onto the remnant vegetation types***

Table 6-3 ***Cumulative Impacts to avifauna associated with the proposed project***

Impact	Project in Isolation						Cumulative Effect					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Loss of habitat, and disruption of surrounding ecological corridors.	4	3	3	3	3		5	4	3	3	4	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**

7 Avifauna Impact Management Actions

The purpose of the Biodiversity Impact Management Actions of is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines.

Table 7-1 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators pertaining to the avifaunal component.

Table 7-1 Summary of management outcomes pertaining to impacts to avifauna and their habitats

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Habitats				
The areas to be developed must be specifically demarcated to prevent movement into surrounding environments.	Life of operation	Project Manager Environmental Officer	Development footprint	Ongoing
High sensitivity areas must be declared No-go areas, they must be demarcated to ensure no vehicles or people move int these areas.	Life of operation	Project Manager Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager Environmental Officer	Areas of indigenous vegetation	Ongoing
Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity.	Life of operation	Project Manager	Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity	Life of operation
Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018).	Life of operation	Project Manager	Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018).	Life of operation
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed	Decommissioning /Rehabilitation	Project Manager	Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the	Decommissioning /Rehabilitation

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.			likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Life of operation	Environmental Officer Contractor	Spill events, Vehicles dripping.	Ongoing
Cement mixing may occur on site if restricted to bunded areas at least 50 m away from any water resources. Waster used in the mixing process must not be allowed to permeate into the ground or create runoff, it must be evaporated or disposed of appropriately.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Water pollution and restricted rehabilitation	During phase
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.	Life of operation	Environmental Officer Contractor	Leaks and spills	Ongoing
A fire management plan needs to be complied to restrict the impact of fire.	Life of operation	Environmental Officer Contractor	Fire Management	During Phase

Management outcome: Avifauna

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species, and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The duration of the construction should be kept to a minimum to avoid disturbing avifauna.	Construction/Operational Phase	Project Manager Environmental Officer	Construction/Closure Phase	Ongoing
Outside lighting should be designed and limited to minimize impacts on avifauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) lights should be used wherever possible.	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (20 km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of Operation	Health and Safety Officer	Compliance to the training.	Ongoing
All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region	Construction/Operational Phase	Project Manager Environmental Officer	Noise	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern be found and not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction	Environmental Officer	Presence of avifauna species and nests	During Phase
The design of the proposed PV and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al.*, 2015).	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of bird collisions	During phase
The loop in loop out lines must join in at the closest point to the existing line as possible.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of bird collisions	During phase
All the parts of the infrastructure must be nest-proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and Construction	Environmental Officer Contractor Engineer	Presence of electrocuted birds	During phase
Use environmentally friendly cleaning and dust suppressant products	Construction and Operation	Environmental Officer Contractor	Chemicals used	During phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
		Engineer		
Fencing mitigations for ClearVu or similar fencing: • If needed, any **top** strands must be smooth wire, barbed wire must be avoided; • Routinely monitor all fencing for any collisions and mortality, as well as trapped fauna. • Place markers/diverters on fences, especially towards the top • A specialist must be consulted if any collisions or mortalities are observed. Conventional fencing mitigations: • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 300 mm between wires • Place markers on fences	Life of Operation	Project Manager Environmental Officer Contractor Design Engineer	Presence of birds stuck /dead in fences Monitor fences for collisions or mortalities every second day for the first 6 months.	During phase
As far as possible power cables within the project site should be thoroughly insulated and preferably buried.	Construction and Operation	Project Manager Environmental Officer Design Engineer	Exposed cables	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
The BESS must be enclosed in a structure with a non-reflective surface	Construction and Operation	Project Manager Environmental Officer Design Engineer	Reflective surfaces on BESS	During phase
Non-polarising white strips must be fitted along the edges of the panels to reduce reflection and therefore similarity to water and deter birds and insects (Horvath *et al,* 2010).	Operational	Project Manager Environmental Officer Design Engineer	Presence of dead birds in the project site. Monitoring must be undertaken in accordance with the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). The precise location of any dead birds found should be recorded and mapped (using GPS). All carcasses should be photographed as found then placed in a plastic bag, labelled as to the location and date, and preserved (refrigerated or frozen) until identified. Feather spots (e.g., a	During phase. The monitoring frequency is based on the collision rate.

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
			group of feathers attached to skin) and body parts should also be collected.	
Overhead cables/lines must be fitted with bird diverters or flappers (Shaw *et al.* 2021, Prinson *et al* 2012), .	Operational	Project Manager Environmental Officer Design Engineer	Collisions. Monitoring must be undertaken in accordance with the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017).	During phase. The monitoring frequency is based on the collision rate.
There is little to no information on the recovery of the avifauna community subsequent to the closure of Solar PV facilities within South Africa. A post-closure monitoring regime is recommended for the proposed project to document any impacts and this data must be used for improving rehabilitation measures	Closure/Rehabilitation	Project Manager Environmental Officer	Avifauna community	Wet-season and dry-season survey for the initial 3-5 years after closure.
All infrastructure including powerlines must be removed if the facility is decommissioned	Closure/Rehabilitation	Project Manager Environmental Officer	Infrastructure removal	During Process

8 Conclusion and Impact Statement

8.1 Conclusion

The aim of this Avifauna Impact Assessment was to provide information to guide the risk of the proposed Rustenburg Rhino Solar PV project to the avifauna community likely affected by its development.

During the first assessment performed in the wet season (5th – 8th of January 2023) 119 species were recorded during the point counts. One of the species recorded were SCC i.e., *Sagittarius serpentarius* (Secretarybird). During the second assessment performed in the summer (13th to the 16th of March 2023) 110 species were recorded during the point counts. One of the species recorded during incidental sightings were SCC i.e., *Sagittarius serpentarius* (Secretarybird) Seventeen (17) risk species were recorded in the first survey, and sixteen (16) in the second survey. These are species at risk for collisions, electrocutions or sensitive to habitat loss.

The SEI of the Rhino PAOI of both alternatives were found to be medium, with current impacts identified as roads and fences and associated infrastructure as well as cattle grazing and agriculture. Impacts were identified as being Moderately High to Moderate in the Construction Phase, most of which could be reduced to Moderate to Low, and even Absent with the application of mitigation measures. Impacts in the operational phase are expected to be Moderately High to Moderate and can be reduced to Moderate to Low with mitigation measures. Decommissioning phase impacts are expected to be Moderately High to Moderate and can be reduced to Low with mitigation measures. Cumulative impacts are Moderate for the project in isolation but Moderately High for the project in consideration of the entire cluster.

Management measures include ensuring the construction footprint is kept small and industry-standard mitigations are put into place for solar panels, fencing and electrical infrastructure among other measures.

8.2 Impact Statement

The main expected impacts of the proposed PV and associated infrastructure will include the following:

- Habitat loss and fragmentation;
- Electrocutions; and
- Collisions.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable residual risk level. Considering the above-mentioned information, it is the opinion of the specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented. As impacts for both alternatives are identical, the preferred Alternative: Alternative 2 is considered suitable.

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10 Appendix Items

10.1 Appendix A: Expected species

Scientific Name	Common Name	Conservation Status	
		RedList (Regional)*	RedList (Global)+
Accipiter minullus	Little Sparrowhawk	LC	LC
Acridotheres tristis	Common Myna	LC	LC
Afrotis afraoides	Northern Black Korhaan	LC	LC
Alopochen aegyptiaca	Egyptian Goose	LC	LC
Anthus cinnamomeus	African Pipit	LC	LC
Anthus nicholsoni	Nicholson's Pipit	LC	LC
Anthus vaalensis	Buffy Pipit	LC	LC
Apus affinis	Little Swift	LC	LC
Apus barbatus	African Black Swift	LC	LC
Apus caffer	White-rumped Swift	LC	LC
Ardea melanocephala	Black-headed Heron	LC	LC
Batis molitor	Chinspot Batis	LC	LC
Bostrychia hagedash	Hadeda (Hadada) Ibis	LC	LC
Brunhilda erythronotos	Black-faced Waxbill	LC	LC
Bubalornis niger	Red-billed Buffalo Weaver	LC	LC
Bubulcus ibis	Western Cattle Egret	LC	LC
Buphagus erythrorynchus	Red-billed Oxpecker	LC	LC
Calendulauda africanoides	Fawn-coloured Lark	LC	LC
Calendulauda sabota	Sabota Lark	LC	LC
Camaroptera brachyura	Green-backed Camaroptera	LC	LC
Camaroptera brevicaudata	Grey-backed Camaroptera	LC	LC
Campethera abingoni	Golden-tailed Woodpecker	LC	LC
Campocolinus coqui	Coqui Francolin	LC	LC
Cecropis abyssinica	Lesser Striped Swallow	LC	LC
Cecropis cucullata	Greater Striped Swallow	LC	LC
Cecropis semirufa	Red-breasted Swallow	LC	LC
Centropus burchellii	Burchell's Coucal	LC	LC
Cercotrichas leucophrys	White-browed Scrub Robin	LC	LC
Cercotrichas paena	Kalahari Scrub Robin	LC	LC
Chloropicus namaquus	Bearded Woodpecker	LC	LC
Chrysococcyx caprius	Diederik Cuckoo	LC	LC
Cinnyricinclus leucogaster	Violet-backed Starling	LC	LC
Circaetus pectoralis	Black-chested Snake Eagle	LC	LC
Cisticola aridulus	Desert Cisticola	LC	LC
Cisticola chiniana	Rattling Cisticola	LC	LC
Cisticola juncidis	Zitting Cisticola	LC	LC
Clamator glandarius	Great Spotted Cuckoo	LC	LC
Colius colius	White-backed Mousebird	LC	LC

Columba guinea	Speckled Pigeon	LC	LC
Coracias caudatus	Lilac-breasted Roller	LC	LC
Corvus albus	Pied Crow	LC	LC
Coturnix coturnix	Common Quail	LC	LC
Crinifer concolor	Grey Go-Away-Bird	LC	LC
Crithagra atrogularis	Black-throated Canary	LC	LC
Crithagra flaviventris	Yellow Canary	LC	LC
Curruca subcoerulea	Chestnut-vented Tit-Babbler (Warbler)	LC	LC
Dendropicos fuscescens	Cardinal Woodpecker	LC	LC
Dicrurus adsimilis	Fork-tailed Drongo	LC	LC
Dryoscopus cubla	Black-backed Puffback	LC	LC
Elanus caeruleus	Black-winged Kite	LC	LC
Emberiza flaviventris	Golden-breasted Bunting	LC	LC
Eremomela icteropygialis	Yellow-bellied Eremomela	LC	LC
Eremomela usticollis	Burnt-necked Eremomela	LC	LC
Estrilda astrild	Common Waxbill	LC	LC
Euplectes albonotatus	White-winged Widowbird	LC	LC
Falco amurensis	Amur Falcon	LC	LC
Falco naumanni	Lesser Kestrel	LC	LC
Glaucidium perlatum	Pearl-spotted Owlet	LC	LC
Granatina granatina	Violet-eared Waxbill	LC	LC
Halcyon albiventris	Brown-hooded Kingfisher	LC	LC
Halcyon senegalensis	Woodland Kingfisher	LC	LC
Hieraaetus wahlbergi	Wahlberg's Eagle	LC	LC
Hirundo dimidiata	Pearl-breasted Swallow	LC	LC
Hirundo rustica	Barn Swallow	LC	LC
Indicator indicator	Greater Honeyguide	LC	LC
Lagonosticta rhodopareia	Jameson's Firefinch	LC	LC
Lagonosticta senegala	Red-billed Firefinch	LC	LC
Lamprotornis nitens	Cape Glossy (Cape) Starling	LC	LC
Laniarius atrococcineus	Crimson-breasted Shrike	LC	LC
Laniarius ferrugineus	Southern Boubou	LC	LC
Lanius collaris	Southern (Common) Fiscal	LC	LC
Lanius collurio	Red-backed Shrike	LC	LC
Lanius minor	Lesser Grey Shrike	LC	LC
Lophoceros nasutus	African Grey Hornbill	LC	LC
Lophotis ruficrista	Red-crested Korhaan	LC	LC
Lybius torquatus	Black-collared Barbet	LC	LC
Melaenornis mariquensis	Marico Flycatcher	LC	LC
Melierax canorus	Pale Chanting Goshawk	LC	LC
Merops apiaster	European Bee-eater	LC	LC
Merops bullockoides	White-fronted Bee-eater	LC	LC
Micronisus gabar	Gabar Goshawk	LC	LC
Mirafra africana	Rufous-naped Lark	LC	LC

Muscicapa striata	Spotted Flycatcher	LC	LC
Numida meleagris	Helmeted Guineafowl	LC	LC
Oena capensis	Namaqua Dove	LC	LC
Oriolus larvatus	Black-headed Oriole	LC	LC
Ortygornis sephaena	Crested Francolin	LC	LC
Ortygospiza atricollis	African Quail-Finch	LC	LC
Passer diffusus	Southern Grey-headed Sparrow	LC	LC
Passer melanurus	Cape Sparrow	LC	LC
Petrochelidon spilodera	South African Cliff Swallow	LC	LC
Phoeniculus purpureus	Green Wood-Hoopoe	LC	LC
Plocepasser mahali	White-browed Sparrow-Weaver	LC	LC
Ploceus velatus	Southern Masked Weaver	LC	LC
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	LC	LC
Prinia flavicans	Black-chested Prinia	LC	LC
Pternistis natalensis	Natal Spurfowl	LC	LC
Pternistis swainsonii	Swainson's Spurfowl	LC	LC
Pycnonotus tricolor	Dark-capped Bulbul	LC	LC
Pytilia melba	Green-winged Pytilia	LC	LC
Quelea quelea	Red-billed Quelea	LC	LC
Rhinopomastus cyanomelas	Common Scimitarbill	LC	LC
Sagittarius serpentarius	Secretarybird	VU	EN
Spilopelia senegalensis	Laughing Dove	LC	LC
Sporopipes squamifrons	Scaly-feathered Finch (Weaver)	LC	LC
Streptopelia capicola	Cape Turtle (Ring-necked) Dove	LC	LC
Streptopelia semitorquata	Red-eyed Dove	LC	LC
Sylvietta rufescens	Long-billed Crombec	LC	LC
Tachybaptus ruficollis	Little Grebe	LC	LC
Tchagra australis	Brown-crowned Tchagra	LC	LC
Terpsiphone viridis	African Paradise Flycatcher	LC	LC
Tockus leucomelas	Southern Yellow-billed Hornbill	LC	LC
Tockus rufirostris	Southern Red-billed Hornbill	LC	LC
Trachyphonus vaillantii	Crested Barbet	LC	LC
Tricholaema leucomelas	Acacia Pied Barbet	LC	LC
Turdoides bicolor	Southern Pied Babbler	LC	LC
Turdoides jardineii	Arrow-marked Babbler	LC	LC
Turdus litsitsirupa	Groundscraper Thrush	LC	LC
Turdus smithi	Karoo Thrush	LC	LC
Uraeginthus angolensis	Blue Waxbill	LC	LC
Urocolius indicus	Red-faced Mousebird	LC	LC
Urolestes melanoleucus	Magpie Shrike	LC	LC
Vanellus armatus	Blacksmith Lapwing	LC	LC
Vanellus coronatus	Crowned Lapwing	LC	LC
Vidua paradisaea	Long-tailed Paradise Whydah	LC	LC
Vidua regia	Shaft-tailed Whydah	LC	LC

Zosterops virens	Cape White-eye	LC	LC

*(Taylor *et al*. 2015), + (IUCN 2021)

10.2 Appendix B

10.2.1 Point count data of survey 1

Scientific Name	Common name	Conservation Status		Guild	relative abundance	frequency
		RedList (Regional)*	RedList (Global)+			
Accipiter melanoleucus	Sparrowhawk, Black	LC	LC	CGD	0,001	1,27
Acridotheres tristis	Myna, Common	LC	LC	OMD	0,004	2,53
Afrotis afraoides	Korhaan, Northern Black	LC	LC	IGD	0,004	5,06
Alopochen aegyptiaca	Goose, Egyptian	LC	LC	HWD	0,009	3,80
Amadina erythrocephala	Finch, Red-headed	LC	LC	GGD	0,010	1,27
Anthus cinnamomeus	Pipit, African	LC	LC	IGD	0,004	5,06
Apalis thoracica	Apalis, Bar-throated	LC	LC	IGD	0,002	2,53
Apus affinis	Swift, Little	LC	LC	IAD	0,051	2,53
Apus caffer	Swift, White-rumped	LC	LC	IAD	0,001	1,27
Aquila spilogaster	Eagle, African Hawk	LC	LC	CGD	0,003	2,53
Ardea melanocephala	Heron, Black-headed	LC	LC	CGD	0,001	1,27
Batis molitor	Batis, Chinspot	LC	LC	IGD	0,007	7,59
Bostrychia hagedash	Ibis, Hadada	LC	LC	OMD	0,003	3,80
Brunhilda erythronotos	Waxbill, Black-faced	LC	LC	GGD	0,001	1,27
Bubulcus ibis	Egret, Western Cattle	LC	LC	IGD	0,007	2,53
Buphagus erythrorynchus	Oxpecker, Red-billed	LC	LC	IGD	0,006	2,53
Burhinus capensis	Thick-knee, Spotted	LC	LC	OMD	0,001	1,27
Buteo rufofuscus	Buzzard, Jackal	LC	LC	CGD	0,002	2,53
Camaroptera brevicaudata	Camaroptera, Grey-backed	LC	LC	IGD	0,002	2,53
Campephaga flava	Cuckooshrike, Black	LC	LC	IGD	0,002	2,53
Cecropis cucullata	Swallow, Greater Striped	LC	LC	IAD	0,001	1,27
Cecropis semirufa	Swallow, Red-breasted	LC	LC	IAD	0,005	3,80
Centropus burchellii	Coucal, Burchell's	LC	LC	OMD	0,002	2,53
Cercotrichas paena	Robin, Kalahari Scrub	LC	LC	IGD	0,001	1,27
Chlorophoneus sulfureopectus	Bush-shrike, Orange-breasted	LC	LC	OMD	0,001	1,27
Chrysococcyx caprius	Cuckoo, Diederik	LC	LC	IGD	0,007	7,59
Cinnyricinclus leucogaster	Starling, Violet-backed	LC	LC	OMD	0,001	1,27
Cinnyris talatala	Sunbird, White-bellied	LC	LC	NFD	0,001	1,27
Cisticola aridulus	Cisticola, Desert	LC	LC	IGD	0,005	6,33
Cisticola ayresii	Cisticola, Wing-snapping	LC	LC	IGD	0,014	15,19
Cisticola chiniana	Cisticola, Rattling	LC	LC	IGD	0,044	49,37
Cisticola fulvicapilla	Neddicky	LC	LC	IGD	0,001	1,27
Cisticola juncidis	Cisticola, Zitting	LC	LC	IGD	0,029	34,18
Clamator jacobinus	Cuckoo, Jacobin	LC	LC	IGD	0,005	6,33
Colius colius	Mousebird, White-backed	LC	LC	FFD	0,005	1,27

Colius striatus	Mousebird, Speckled	LC	LC	FFD	0,001	1,27
Corvus albus	Crow, Pied	LC	LC	OMD	0,001	1,27
Corythaixoides concolor	Go-away-bird, Grey	LC	LC	FFD	0,011	12,66
Cossypha caffra	Robin-chat, Cape	LC	LC	IGD	0,002	2,53
Cossypha humeralis	Robin-chat, White-throated	LC	LC	IGD	0,002	1,27
Crithagra atrogularis	Canary, Black-throated	LC	LC	OMD	0,001	1,27
Crithagra mozambica	Canary, Yellow-fronted	LC	LC	GGD	0,001	1,27
Cuculus clamosus	Cuckoo, Black	LC	LC	IGD	0,004	5,06
Cuculus solitarius	Cuckoo, Red-chested	LC	LC	IGD	0,006	7,59
Curruca subcoerulea	Warbler, Chestnut-vented	LC	LC	IGD	0,007	8,86
Dendroperdix sephaena	Francolin, Crested	LC	LC	OMD	0,011	10,13
Dicrurus adsimilis	Drongo, Fork-tailed	LC	LC	IAD	0,004	5,06
Dryoscopus cubla	Puffback, Black-backed	LC	LC	OMD	0,002	2,53
Elanus caeruleus	Kite, Black-winged	LC	LC	CGD	0,003	3,80
Emberiza flaviventris	Bunting, Golden-breasted	LC	LC	OMD	0,004	3,80
Emberiza tahapisi	Bunting, Cinnamon-breasted	LC	LC	GGD	0,002	2,53
Eremomela usticollis	Eremomela, Burnt-necked	LC	LC	IGD	0,004	5,06
Estrilda astrild	Waxbill, Common	LC	LC	GGD	0,001	1,27
Euplectes afer	Bishop, Yellow-crowned	LC	LC	GGD	0,001	1,27
Euplectes albonotatus	Widowbird, White-winged	LC	LC	GGD	0,006	6,33
Halcyon albiventris	Kingfisher, Brown-hooded	LC	LC	CWD	0,001	1,27
Halcyon senegalensis	Kingfisher, Woodland	LC	LC	CWD	0,002	2,53
Haliaeetus vocifer	Eagle, African Fish	LC	LC	CGD	0,001	1,27
Hirundo rustica	Swallow, Barn	LC	LC	IAD	0,041	10,13
Lagonosticta senegala	Firefinch, Red-billed	LC	LC	GGD	0,001	1,27
Lamprotornis nitens	Starling, Cape Glossy (Cape)	LC	LC	IGD	0,005	5,06
Laniarius atrococcineus	Shrike, Crimson-breasted	LC	LC	IGD	0,006	7,59
Laniarius ferrugineus	Boubou, Southern	LC	LC	IAD	0,004	5,06
Lanius collurio	Shrike, Red-backed	LC	LC	IGD	0,004	5,06
Lanius minor	Shrike, Lesser Grey	LC	LC	IGD	0,006	7,59
Lophoceros nasutus	Hornbill, African Grey	LC	LC	IGD	0,009	10,13
Lophotis ruficrista	Korhaan, Red-crested	LC	LC	IGD	0,003	3,80
Lybius torquatus	Barbet, Black-collared	LC	LC	FFD	0,005	3,80
Melaenornis mariquensis	Flycatcher, Marico	LC	LC	IAD	0,001	1,27
Melaenornis silens	Flycatcher, Fiscal	LC	LC	IGD	0,001	1,27
Merops apiaster	Bee-eater, European	LC	LC	IAD	0,116	10,13
Micronisus gabar	Goshawk, Gabar	LC	LC	CGD	0,001	1,27
Mirafra africana	Lark, Rufous-naped	LC	LC	IGD	0,015	17,72
Mirafra fasciolata	Lark, Eastern Clapper	LC	LC	IGD	0,001	1,27

Muscicapa caerulescens	Flycatcher, Ashy	LC	LC	IGD	0,001	1,27
Muscicapa striata	Flycatcher, Spotted	LC	LC	IAD	0,001	1,27
Nilaus afer	Brubru	LC	LC	IGD	0,001	1,27
Numida meleagris	Guineafowl, Helmeted	LC	LC	OMD	0,003	3,80
Oriolus larvatus	Oriole, Black-headed	LC	LC	OMD	0,007	7,59
Passer diffusus	Sparrow, Southern Grey-headed	LC	LC	GGD	0,010	11,39
Phoeniculus purpureus	Wood Hoopoe, Green	LC	LC	IGD	0,002	2,53
Plectropterus gambensis	Goose, Spur-winged	LC	LC	OMD	0,003	2,53
Plocepasser mahali	Sparrow-weaver, White-browed	LC	LC	OMD	0,013	10,13
Ploceus intermedius	Weaver, Lesser Masked	LC	LC	OMD	0,025	2,53
Ploceus velatus	Weaver, Southern Masked	LC	LC	GGD	0,026	8,86
Pogoniulus chrysoconus	Tinkerbird, Yellow-fronted	LC	LC	FFD	0,009	11,39
Prinia flavicans	Prinia, Black-chested	LC	LC	IGD	0,008	8,86
Prinia subflava	Prinia, Tawny-flanked	LC	LC	IGD	0,005	3,80
Pternistis swainsonii	Spurfowl, Swainson's	LC	LC	OMD	0,011	12,66
Pycnonotus tricolor	Bulbul, Dark-capped	LC	LC	OMD	0,015	17,72
Pytilia melba	Pytilia, Green-winged	LC	LC	GGD	0,003	2,53
Quelea quelea	Quelea, Red-billed	LC	LC	GGD	0,168	3,80
Spilopelia senegalensis	Dove, Laughing	LC	LC	GGD	0,004	5,06
Sporopipes squamifrons	Weaver, Scaly-feathered	LC	LC	GGD	0,009	2,53
Streptopelia capicola	Dove, Ring-necked	LC	LC	GGD	0,026	27,85
Streptopelia semitorquata	Dove, Red-eyed	LC	LC	GGD	0,001	1,27
Struthio camelus	Ostrich, Common	LC	LC	OMD	0,001	1,27
Sylvietta rufescens	Crombec, Long-billed	LC	LC	IGD	0,005	6,33
Tachybaptus ruficollis	Grebe, Little	LC	LC	CWD	0,002	1,27
Tchagra australis	Tchagra, Brown-crowned	LC	LC	OMD	0,007	8,86
Terpsiphone viridis	Flycatcher, African Paradise	LC	LC	IAD	0,003	2,53
Tockus leucomelas	Hornbill, Southern Yellow-billed	LC	LC	IGD	0,009	11,39
Trachyphonus vaillantii	Barbet, Crested	LC	LC	FFD	0,007	7,59
Tricholaema leucomelas	Barbet, Acacia Pied	LC	LC	OMD	0,007	8,86
Tringa glareola	Sandpiper, Wood	LC	LC	IWD	0,001	1,27
Turdoides jardineii	Babbler, Arrow-marked	LC	LC	IGD	0,007	5,06
Turdus litsitsirupa	Thrush, Groundscraper	LC	LC	IGD	0,001	1,27
Turtur chalcospilos	Dove, Emerald-spotted Wood	LC	LC	OMD	0,002	2,53
Uraeginthus angolensis	Waxbill, Blue	LC	LC	GGD	0,016	12,66
Urocolius indicus	Mousebird, Red-faced	LC	LC	FFD	0,024	15,19
Urolestes melanoleucus	Shrike, Magpie	LC	LC	IAD	0,009	7,59

Vanellus armatus	Lapwing, Blacksmith	LC	LC	IGD	0,002	1,27
Vanellus coronatus	Lapwing, Crowned	LC	LC	IGD	0,008	2,53
Vanellus senegallus	Lapwing, African Wattled	LC	LC	IGD	0,001	1,27
Vidua macroura	Whydah, Pin-tailed	LC	LC	GGD	0,001	1,27
Vidua paradisaea	Whydah, Long-tailed Paradise	LC	LC	GGD	0,001	1,27
Vidua regia	Whydah, Shaft-tailed	LC	LC	GGD	0,003	3,80
Zosterops virens	White-eye, Cape	LC	LC	OMD	0,002	2,53

*(Taylor *et al*. 2015) ⁺ (IUCN 2021)

10.2.2 Point Couint Data of Survey 2

Scientific Name	Common Name	Conservation Status RedList (Regional)*	RedList (Global)⁺	Guild code	Relative abundance	Frequency
Accipiter minullus	Little Sparrowhawk	LC	LC	CGD	0,001	2,174
Afrotis afraoides	Northern Black Korhaan	LC	LC	IGD	0,002	6,522
Alopochen aegyptiaca	Egyptian Goose	LC	LC	HWD	0,003	4,348
Anthus cinnamomeus	African Pipit	LC	LC	IGD	0,001	2,174
Apus affinis	Little Swift	LC	LC	IAD	0,055	15,217
Apus barbatus	African Black Swift	LC	LC	IAD	0,002	4,348
Apus caffer	White-rumped Swift	LC	LC	IAD	0,018	6,522
Ardea melanocephala	Black-headed Heron	LC	LC	CGD	0,001	2,174
Batis molitor	Chinspot Batis	LC	LC	IGD	0,011	28,261
Bostrychia hagedash	Hadeda (Hadada) Ibis	LC	LC	OMD	0,010	6,522
Brunhilda erythronotos	Black-faced Waxbill	LC	LC	OMD	0,002	2,174
Bubulcus ibis	Western Cattle Egret	LC	LC	IGD	0,018	4,348
Buphagus erythrorynchus	Red-billed Oxpecker	LC	LC	IGD	0,010	13,043
Calendulauda africanoides	Fawn-coloured Lark	LC	LC	GGD	0,001	2,174
Calendulauda sabota	Sabota Lark	LC	LC	OMD	0,001	2,174
Camaroptera brachyura	Green-backed Camaroptera	LC	LC	IGD	0,002	4,348
Camaroptera brevicaudata	Grey-backed Camaroptera	LC	LC	IGD	0,003	6,522
Campethera abingoni	Golden-tailed Woodpecker	LC	LC	IGD	0,001	2,174
Cecropis abyssinica	Lesser Striped Swallow	LC	LC	IAD	0,003	6,522
Cecropis cucullata	Greater Striped Swallow	LC	LC	IAD	0,003	4,348
Cecropis semirufa	Red-breasted Swallow	LC	LC	IAD	0,005	6,522
Centropus burchellii	Burchell's Coucal	LC	LC	OMD	0,002	4,348
Cercotrichas leucophrys	White-browed Scrub Robin	LC	LC	IGD	0,011	30,435
Cercotrichas paena	Kalahari Scrub Robin	LC	LC	IGD	0,004	10,870
Chloropicus namaquus	Bearded Woodpecker	LC	LC	IGD	0,001	2,174
Chrysococcyx caprius	Diederik Cuckoo	LC	LC	IGD	0,001	2,174
Cinnyricinclus leucogaster	Violet-backed Starling	LC	LC	OMD	0,001	2,174
Circaetus pectoralis	Black-chested Snake Eagle	LC	LC	CGD	0,001	2,174
Cisticola aridulus	Desert Cisticola	LC	LC	IGD	0,004	10,870

Scientific Name	Common Name	Conservation Status		Guild code	Relative abundance	Frequency
		RedList (Regional)*	RedList (Global)⁺			
Cisticola chiniana	Rattling Cisticola	LC	LC	IGD	0,024	50,000
Cisticola juncidis	Zitting Cisticola	LC	LC	IGD	0,005	10,870
Clamator glandarius	Great Spotted Cuckoo	LC	LC	IGD	0,001	2,174
Coracias caudatus	Lilac-breasted Roller	LC	LC	IAD	0,004	10,870
Corvus albus	Pied Crow	LC	LC	OMD	0,003	6,522
Coturnix coturnix	Common Quail	LC	LC	OMD	0,001	2,174
Crinifer concolor	Grey Go-Away-Bird	LC	LC	FFD	0,018	47,826
Crithagra atrogularis	Black-throated Canary	LC	LC	OMD	0,006	6,522
Crithagra flaviventris	Yellow Canary	LC	LC	GGD	0,001	2,174
Curruca subcoerulea	Chestnut-vented Tit-Babbler (Warbler)	LC	LC	IGD	0,011	30,435
Dendropicos fuscescens	Cardinal Woodpecker	LC	LC	IGD	0,001	2,174
Dicrurus adsimilis	Fork-tailed Drongo	LC	LC	IAD	0,007	13,043
Dryoscopus cubla	Black-backed Puffback	LC	LC	OMD	0,002	6,522
Elanus caeruleus	Black-winged Kite	LC	LC	CGD	0,003	8,696
Emberiza flaviventris	Golden-breasted Bunting	LC	LC	OMD	0,001	2,174
Eremomela icteropygialis	Yellow-bellied Eremomela	LC	LC	IGD	0,001	2,174
Eremomela usticollis	Burnt-necked Eremomela	LC	LC	IGD	0,005	10,870
Estrilda astrild	Common Waxbill	LC	LC	GGD	0,007	4,348
Euplectes albonotatus	White-winged Widowbird	LC	LC	GGD	0,001	2,174
Falco amurensis	Amur Falcon	LC	LC	CGD	0,078	15,217
Falco naumanni	Lesser Kestrel	LC	LC	CGD	0,005	2,174
Granatina granatina	Violet-eared Waxbill	LC	LC	IGD	0,001	2,174
Halcyon albiventris	Brown-hooded Kingfisher	LC	LC	CWD	0,002	4,348
Hieraaetus wahlbergi	Wahlberg's Eagle	LC	LC	CGD	0,002	4,348
Hirundo dimidiata	Pearl-breasted Swallow	LC	LC	IAD	0,003	4,348
Hirundo rustica	Barn Swallow	LC	LC	IAD	0,121	36,957
Indicator indicator	Greater Honeyguide	LC	LC	IGD	0,001	2,174
Lagonosticta rhodopareia	Jameson's Firefinch	LC	LC	GGD	0,003	4,348
Lamprotornis nitens	Cape Glossy (Cape) Starling	LC	LC	IGD	0,020	26,087
Laniarius atrococcineus	Crimson-breasted Shrike	LC	LC	IGD	0,013	32,609
Laniarius ferrugineus	Southern Boubou	LC	LC	IAD	0,006	10,870
Lanius collaris	Southern (Common) Fiscal	LC	LC	IAD	0,002	4,348
Lanius collurio	Red-backed Shrike	LC	LC	IGD	0,005	15,217
Lanius minor	Lesser Grey Shrike	LC	LC	IGD	0,012	26,087
Lophoceros nasutus	African Grey Hornbill	LC	LC	IGD	0,008	21,739
Lophotis ruficrista	Red-crested Korhaan	LC	LC	IGD	0,002	4,348
Lybius torquatus	Black-collared Barbet	LC	LC	FFD	0,003	6,522
Melaenornis mariquensis	Marico Flycatcher	LC	LC	IAD	0,005	10,870
Merops apiaster	European Bee-eater	LC	LC	IAD	0,077	47,826

Scientific Name	Common Name	Conservation Status		Guild code	Relative abundance	Frequency
		RedList (Regional)*	RedList (Global)⁺			
Merops bullockoides	White-fronted Bee-eater	LC	LC	IAD	0,002	2,174
Micronisus gabar	Gabar Goshawk	LC	LC	CGD	0,001	2,174
Muscicapa striata	Spotted Flycatcher	LC	LC	IAD	0,002	6,522
Numida meleagris	Helmeted Guineafowl	LC	LC	OMD	0,039	6,522
Oena capensis	Namaqua Dove	LC	LC	GGD	0,002	4,348
Oriolus larvatus	Black-headed Oriole	LC	LC	OMD	0,002	4,348
Ortygornis sephaena	Crested Francolin	LC	LC	OMD	0,008	17,391
Ortygospiza atricollis	African Quail-Finch	LC	LC	GGD	0,009	10,870
Passer melanurus	Cape Sparrow	LC	LC	GGD	0,002	2,174
Petrochelidon spilodera	South African Cliff Swallow	LC	LC	IAD	0,002	2,174
Phoeniculus purpureus	Green Wood-Hoopoe	LC	LC	IGD	0,010	8,696
Plocepasser mahali	White-browed Sparrow-Weaver	LC	LC	OMD	0,010	8,696
Ploceus velatus	Southern Masked Weaver	LC	LC	GGD	0,002	4,348
Pogoniulus chrysoconus	Yellow-fronted Tinkerbird	LC	LC	FFD	0,012	32,609
Prinia flavicans	Black-chested Prinia	LC	LC	IGD	0,011	26,087
Pternistis natalensis	Natal Spurfowl	LC	LC	OMD	0,002	4,348
Pternistis swainsonii	Swainson's Spurfowl	LC	LC	OMD	0,014	30,435
Pycnonotus tricolor	Dark-capped Bulbul	LC	LC	OMD	0,016	32,609
Quelea quelea	Red-billed Quelea	LC	LC	GGD	0,050	8,696
Rhinopomastus cyanomelas	Common Scimitarbill	LC	LC	IGD	0,002	4,348
Sagittarius serpentarius	Secretarybird	VU	EN	CGD	0,002	2,174
Spilopelia senegalensis	Laughing Dove	LC	LC	GGD	0,003	8,696
Sporopipes squamifrons	Scaly-feathered Finch (Weaver)	LC	LC	GGD	0,005	4,348
Streptopelia capicola	Cape Turtle (Ring-necked) Dove	LC	LC	GGD	0,018	32,609
Streptopelia semitorquata	Red-eyed Dove	LC	LC	GGD	0,002	4,348
Sylvietta rufescens	Long-billed Crombec	LC	LC	IGD	0,001	2,174
Tchagra australis	Brown-crowned Tchagra	LC	LC	OMD	0,002	4,348
Terpsiphone viridis	African Paradise Flycatcher	LC	LC	IAD	0,002	6,522
Tockus leucomelas	Southern Yellow-billed Hornbill	LC	LC	IGD	0,008	17,391
Tockus rufirostris	Southern Red-billed Hornbill	LC	LC	IGD	0,006	15,217
Trachyphonus vaillantii	Crested Barbet	LC	LC	FFD	0,001	2,174
Tricholaema leucomelas	Acacia Pied Barbet	LC	LC	OMD	0,008	19,565
Turdoides bicolor	Southern Pied Babbler	LC	LC	IGD	0,003	4,348
Turdoides jardineii	Arrow-marked Babbler	LC	LC	IGD	0,004	4,348
Turdus litsitsirupa	Groundscraper Thrush	LC	LC	IGD	0,002	2,174
Uraeginthus angolensis	Blue Waxbill	LC	LC	GGD	0,029	28,261
Urocolius indicus	Red-faced Mousebird	LC	LC	FFD	0,030	30,435
Urolestes melanoleucus	Magpie Shrike	LC	LC	IAD	0,017	19,565

Scientific Name	Common Name	Conservation Status		Guild code	Relative abundance	Frequency
		RedList (Regional)*	RedList (Global)+			
Vanellus armatus	Blacksmith Lapwing	LC	LC	IGD	0,002	2,174
Vanellus coronatus	Crowned Lapwing	LC	LC	IGD	0,006	6,522
Vidua regia	Shaft-tailed Whydah	LC	LC	GGD	0,007	6,522
Zosterops virens	Cape White-eye	LC	LC	OMD	0,005	4,348

*(Taylor *et al*. 2015) + (IUCN 2021)

10.3 Appendix C:

10.3.1 Incidental records during survey 1

Scientific Name	Common Name	Conservation Status	
		RedList (Regional)*	RedList (Global)+
Afrotis afraoides	Northern Black Korhaan	LC	LC
Apalis thoracica	Bar-throated Apalis	LC	LC
Buteo rufofuscus	Jackal Buzzard	LC	LC
Calendulauda sabota	Sabota Lark	LC	LC
Caprimulgus pectoralis	Fiery-necked Nightjar	LC	LC
Caprimulgus tristigma	Freckled Nightjar	LC	LC
Cecropis abyssinica	Lesser Striped Swallow	LC	LC
Circaetus cinereus	Brown Snake Eagle	LC	LC
Circaetus pectoralis	Black-chested Snake Eagle	LC	LC
Coracias caudatus	Lilac-breasted Roller	LC	LC
Dicrurus adsimilis	Fork-tailed Drongo	LC	LC
Elanus caeruleus	Black-winged Kite	LC	LC
Emberiza tahapisi	Cinnamon-breasted Bunting	LC	LC
Euplectes albonotatus	White-winged Widowbird	LC	LC
Falco naumanni	Lesser Kestrel	LC	LC
Falco rupicoloides	Greater Kestrel	LC	LC
Halcyon senegalensis	Woodland Kingfisher	LC	LC
Lamprotornis nitens	Cape Starling	LC	LC
Lophotis ruficrista	Red-crested Korhaan	LC	LC
Malaconotus blanchoti	Grey-headed Bush-Shrike	LC	LC
Melaenornis pammelaina	Southern Black Flycatcher	LC	LC
Merops apiaster	European Bee-eater	LC	LC
Mirafra cheniana	Melodious Lark	LC	LC
Numida meleagris	Helmeted Guineafowl	LC	LC
Oena capensis	Namaqua Dove	LC	LC
Plectropterus gambensis	Spur-winged Goose	LC	LC
Plocepasser mahali	White-browed Sparrow-Weaver	LC	LC
Sagittarius serpentarius	Secretarybird	LC	LC
Streptopelia capicola	Ring-necked Dove	LC	LC
Struthio camelus	Common Ostrich	LC	LC
Tockus rufirostris	Southern Red-billed Hornbill	LC	LC
Trachyphonus vaillantii	Crested Barbet	LC	LC
Turdoides bicolor	Southern Pied Babbler	LC	LC
Turnix sylvaticus	Kurrichane Buttonquail	LC	LC
Upupa africana	African Hoopoe	LC	LC
Urolestes melanoleucus	Magpie Shrike	LC	LC
Vanellus coronatus	Crowned Lapwing	LC	LC
Vanellus senegallus	African Wattled Lapwing	LC	LC
Vidua chalybeata	Village Indigobird	LC	LC

*(Taylor *et al.* 2015) + (IUCN 2021)

10.3.2 Incidental records during survey 2

Scientific Name	Common Name	Conservation Status	
		Red List (Regional)*	Redlist (Global)+
Acridotheres tristis	Common Myna	LC	LC
Anthus nicholsoni	Nicholson's Pipit	LC	LC
Anthus vaalensis	Buffy Pipit	LC	LC
Bubalornis niger	Red-billed Buffalo Weaver	LC	LC
Calendulauda africanoides	Fawn-coloured Lark	LC	LC
Calendulauda sabota	Sabota Lark	LC	LC
Camaroptera brevicaudata	Grey-backed Camaroptera	LC	LC
Campocolinus coqui	Coqui Francolin	LC	LC
Cecropis semirufa	Red-breasted Swallow	LC	LC
Cinnyricinclus leucogaster	Violet-backed Starling	LC	LC
Colius colius	White-backed Mousebird	LC	LC
Columba guinea	Speckled Pigeon	LC	LC
Coracias caudatus	Lilac-breasted Roller	LC	LC
Crithagra flaviventris	Yellow Canary	LC	LC
Dendropicos fuscescens	Cardinal Woodpecker	LC	LC
Dicrurus adsimilis	Fork-tailed Drongo	LC	LC
Dryoscopus cubla	Black-backed Puffback	LC	LC
Glaucidium perlatum	Pearl-spotted Owlet	LC	LC
Granatina granatina	Violet-eared Waxbill	LC	LC
Halcyon senegalensis	Woodland Kingfisher	LC	LC
Lagonosticta senegala	Red-billed Firefinch	LC	LC
Laniarius ferrugineus	Southern Boubou	LC	LC
Lophoceros nasutus	African Grey Hornbill	LC	LC
Mirafra africana	Rufous-naped Lark	LC	LC
Muscicapa striata	Spotted Flycatcher	LC	LC
Ortygospiza atricollis	African Quail-Finch	LC	LC
Passer diffusus	Southern Grey-headed Sparrow	LC	LC
Pternistis swainsonii	Swainson's Spurfowl	LC	LC
Pycnonotus tricolor	Dark-capped Bulbul	LC	LC
Pytilia melba	Green-winged Pytilia	LC	LC
Rhinopomastus cyanomelas	Common Scimitarbill	LC	LC
Streptopelia capicola	Cape Turtle (Ring-necked) Dove	LC	LC
Streptopelia semitorquata	Red-eyed Dove	LC	LC
Sylvietta rufescens	Long-billed Crombec	LC	LC
Tockus leucomelas	Southern Yellow-billed Hornbill	LC	LC
Turdoides bicolor	Southern Pied Babbler	LC	LC
Turdus smithi	Karoo Thrush	LC	LC
Urocolius indicus	Red-faced Mousebird	LC	LC
Vidua paradisaea	Long-tailed Paradise Whydah	LC	LC
Vidua regia	Shaft-tailed Whydah	LC	LC

*(Taylor *et al*. 2015) + (IUCN 2021)

10.4 Appendix F: Specialist Declaration of Independence

I, Leigh-Ann de Wet, declare that:

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

Leigh-Ann de Wet

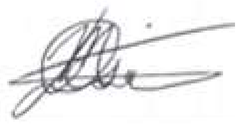
Biodiversity Specialist

The Biodiversity Company

April 2023

I, Mahomed Desai, declare that:

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



Mahomed Desai

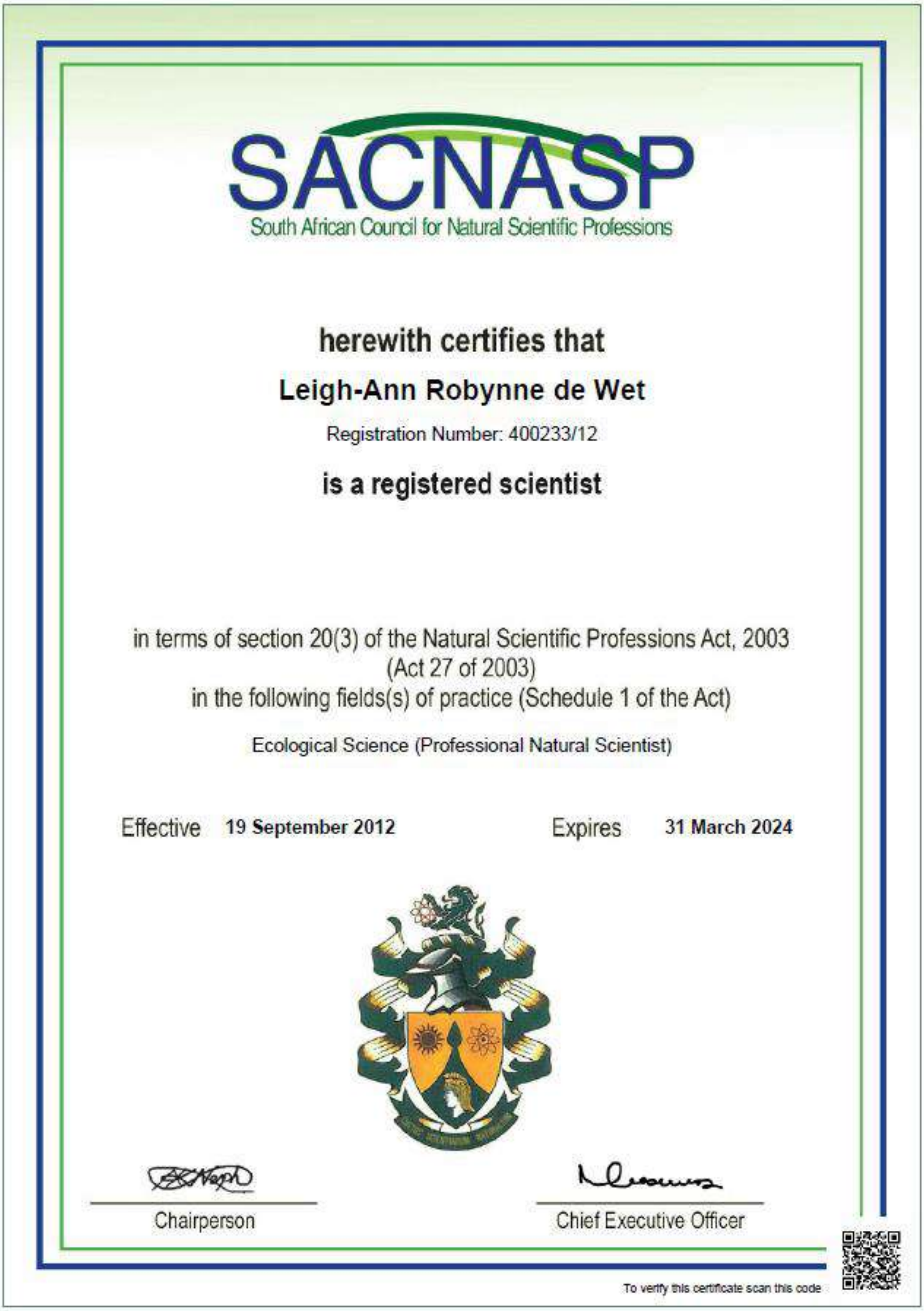
Avifauna Specialist

The Biodiversity Company

April 2023

10.5 Appendix G: Specialist Qualifications

10.5.1 Leigh-Ann de Wet



SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Leigh-Ann Robynne de Wet

Registration Number: 400233/12

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

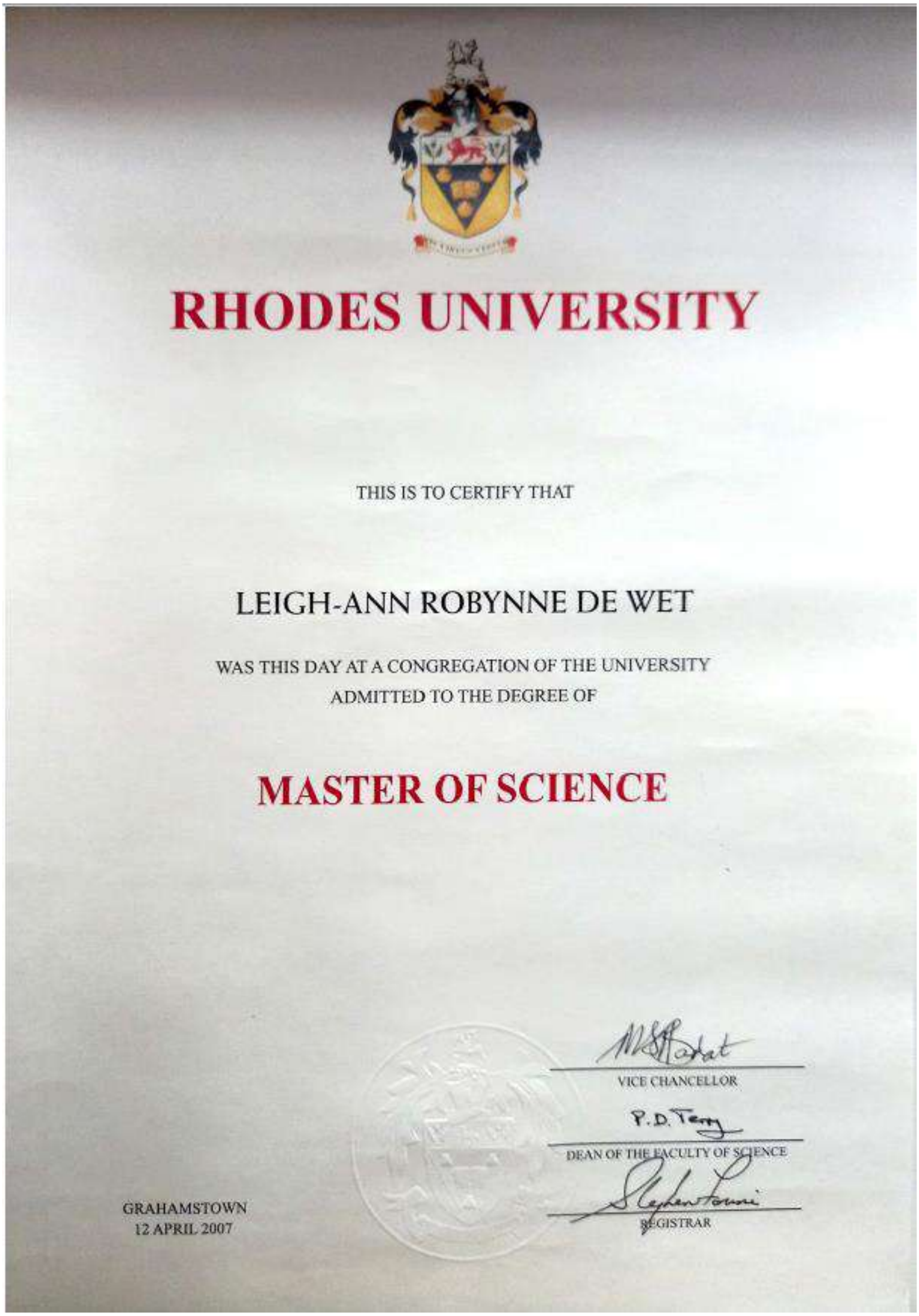
Ecological Science (Professional Natural Scientist)

Effective **19 September 2012** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code



RHODES UNIVERSITY

THIS IS TO CERTIFY THAT

LEIGH-ANN ROBYNNE DE WET

WAS THIS DAY AT A CONGREGATION OF THE UNIVERSITY
ADMITTED TO THE DEGREE OF

MASTER OF SCIENCE

VICE CHANCELLOR

P.D. Terry

DEAN OF THE FACULTY OF SCIENCE

REGISTRAR

GRAHAMSTOWN
12 APRIL 2007

10.5.2 Mahomed Desai

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Mahomed Desai

Registration Number: 134678

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

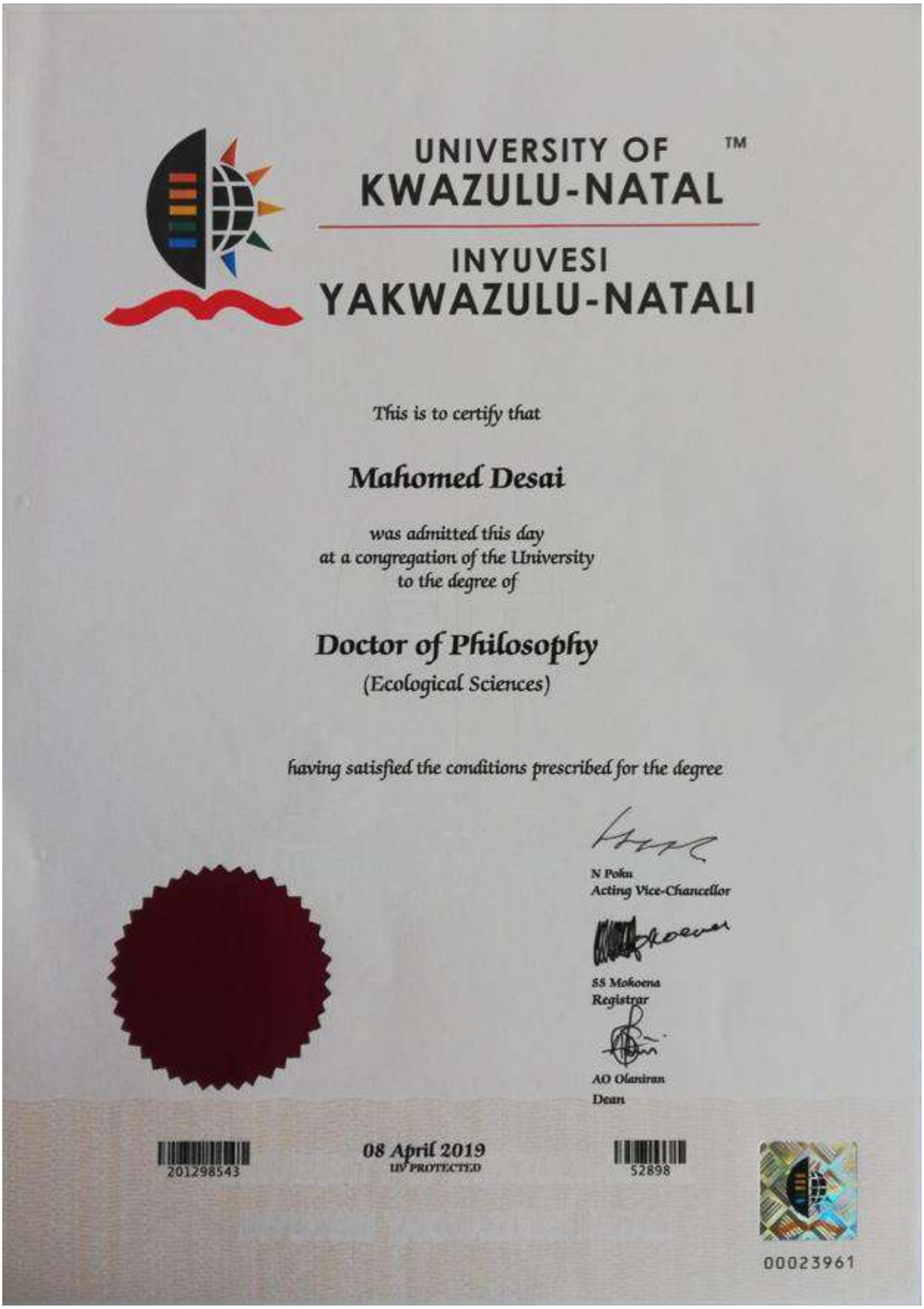
Ecological Science (Professional Natural Scientist)

Effective **27 January 2021** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code



UNIVERSITY OF KWAZULU-NATAL ™

INYUVESI YAKWAZULU-NATALI

This is to certify that

Mahomed Desai

was admitted this day
at a congregation of the University
to the degree of

Doctor of Philosophy

(Ecological Sciences)

having satisfied the conditions prescribed for the degree

N Poku
Acting Vice-Chancellor

SS Mokoena
Registrar

AO Olaniran
Dean

201298543

08 April 2019
UV PROTECTED

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10.6 Specialist CV

10.6.1 Leigh-Ann de Wet

Leigh-Ann de Wet

M.Sc Botany (*Pr Sci Nat*)

Cell: +27 83 352 1936

Email: leigh-ann@thebiodiversitycompany.com

Identity Number: 8209010127081

Date of birth: 1 September 1982

Profile Summary

Working experience throughout South Africa, Southern Africa West and Central Africa and also Madagascar.

Specialist experience in exploration, mining, engineering, hydropower, private sector and renewable energy.

Experience with project management for national and international biodiversity projects.

Experience with IFC Performance Standards, Critical Habitat and High Conservation Value Assessments. Experience in numerous vegetation and habitat types throughout Africa,

Specialist expertise includes botany, forest ecology, avifauna and terrestrial fauna. Methodology development, conservation management and terrestrial monitoring.

Areas of Interest

Forest ecology and ecosystem functionality.

Ecology and plant identification.

Field methodology.

Publication of scientific journals and articles.

Key Experience

- Familiar with World Bank, Equator Principles and the International Finance Corporation requirements.
- Familiar with High Conservation Value assessments as per ProForest guidelines.
- Conservation Management Plans.
- Flora assessments.
- Avifauna assessments.
- Terrestrial fauna assessments.
- Monitoring.
- Ecosystem services
- Rehabilitation Plans.
- Alien Invasive Plant Management Plans.
- Permitting.

Country Experience

Mozambique,

Malawi,

Zambia,

Madagascar,

Liberia,

Guinea'

Democratic Republic of the Congo,

South Africa

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Zulu - Basic

Qualifications

- MSc (Rhodes University) – Botany.
- BSc Honours (Rhodes University) – Botany
- BSc Natural Science (Botany and Entomology)
- Pr Sci Nat (400233/12)
- Certificate of Competence: UFS Introduction to wetland delineation.
- Certificate of Competence: UFS Introduction to wetland law
- Certificate of competence: Africa Land Use Training Grass Identification (long and short course)
- Certificate of Competence: ASI Snake Awareness, first aid for snake bite and venomous snake handling.

CURRICULUM VITAE: Leigh-Ann de Wet

OVERVIEW

An overview of the specialist technical expertise includes the following:

- Terrestrial Ecological baseline assessments and categorization of the current condition of the environment.
- Specialist flora assessments.
- Specialist Avifauna Assessments.
- IFC Performance Standard 6 studies and reporting.
- Ecosystem services for biodiversity, and the ecological and social interactions.
- Integration of specialist reports into IFC standard or HCV reporting.
- Design and adaptation of field methodology for assessment.
- Terrestrial Biodiversity offset strategy designs.
- Terrestrial rehabilitation, search and rescue, alien invasive plant species control plans.
- Monitoring plans for terrestrial systems.
- Faunal surveys which include mammals, birds, amphibians and reptiles.
- The design, compilation and implementation of Biodiversity and Land Management Plans and strategies.

TRAINING

Some of the more pertinent training undergone includes the following:

- Introduction to EIA – Rhodes University 2009
- Land Degradation – Rhodes University 2012
- Introduction to Wetland Delineation – University of the Free State – 2015
- Introduction to Wetland Law – University of the Free State – 2015
- Grass Identification – Africa Land Use Training – 2020
- Grass Identification – Africa Land Use Training and SANBI – 2021
- ASI Snake Awareness, first aid for snake bite and venomous snake handling - 2021
- Mountain Flowers Identification – Elsa Pooley – 2022

EMPLOYMENT EXPERIENCE

The Biodiversity Company (March 2022 – Present)

Terrestrial Ecologist.

LD Biodiversity (August 2014 – March 2022)

Director/ Terrestrial Ecologist

Digby Wells Environmental (July 2012 – September 2014)

Terrestrial Ecologist

Coastal and Environmental Services (March 2009 – June 2012)

Terrestrial Ecologist

PREVIOUS EMPLOYMENT: Rhodes University Department of Botany

Research Assistant

ACADEMIC QUALIFICATIONS

Rhodes University, Grahamstown, South Africa (2007): MAGISTER SCIENTIAE (MSc) - Botany:

Title: *Pollinator mediated selection in Pelargonium reniforme Curtis (Geraniaceae): Patterns and Process*.

R Rhodes University, Grahamstown, South Africa (2004): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Botany

Rhodes University, Grahamstown, South Africa (2001 - 2004): BACCALAUREUS SCIENTIAE IN SCIENCE. Majors: Entomology and Botany.

PUBLICATIONS

Taylor, S, Ripley, B, Martin, T, de Wet, L, Woodward, I and Osborne, C (2014.) Physiological advantages of C4 grasses in the field: a comparative experiment demonstrating the importance of drought. Global Change Biology – in Press.

Ripley BS, de Wet, L and Hill MP (2008). Herbivory-induced reduction in photosynthetic productivity of water hyacinth, *Eichhornia crassipes* (Martius) Solms-Laubach (Pontederiaceae), is not directly related to reduction in photosynthetic leaf area. African Entomology 16(1): 140-142.

de Wet LR, Barker NP and Peter CI (2008). The long and the short of gene flow and reproductive isolation: Inter-Simple Sequence Repeat (ISSR) markers support the recognition of two floral forms in *Pelargonium reniforme* (Geraniaceae). Biochemical Systematics and Ecology 36: 684-690.

de Wet L, NP Barker and CI Peter (2006). Beetles and Bobartia: an interesting herbivore-plant relationship. Veld & flora. September: 150 – 151.

de Wet LR and Botha CEJ (2007). Resistance or tolerance: An examination of aphid (*Sitobion yakini*) phloem feeding on Betta and Betta-Dn wheat (*Triticum aestivum* L.). South African Journal of Botany 73(1): 35-39.

de Wet L (2005). Is *Pelargonium reniforme* in danger? The effects of harvesting on *Pelargonium reniforme*. Veld & Flora. December: 182-184.

10.6.2 Mahomed Desai

Mahomed Desai *(Pr. Nat. Sci.)*

PhD Ecological Sciences

Cell: +27 78 595 2962

Email: mahomed@thebiodiversitycompany.com

Identity Number: 8303095065082

Date of birth: 09 March 1983

Profile Summary

Experience with the renewable energy, industrial, agricultural, mining and civil engineering sector in South Africa, providing specialist input into Basic Assessments and Environmental Impact Assessments.

Providing terrestrial and aquatic ecological expertise for the assessment and management of ecosystems via mitigation and/or offsetting actions.

The implementation of routine biomonitoring programmes in accordance with licensing.

Areas of Interest

Ecosystem processes

Functional diversity of ecosystems

Rehabilitation of degraded and/or transformed landscapes

Phytoremediation of wastewater

Key Experience

- Terrestrial and Aquatic Ecological Assessments
- Invertebrate Assessments
- Herpetofauna Assessments
- Ichthyofauna Assessments
- Species Rescue and Relocation Programmes
- Monitoring Programmes

Countries worked in

Mozambique

South Africa

Lesotho

Sudan

Zimbabwe

Nigeria

Democratic Republic of Congo

Namibia

Zambia

Eswatini

Botswana

The Gambia

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

Zulu – Basic

Qualifications

- PhD (University of KwaZulu-Natal) – Ecological Sciences
- MSc (University of KwaZulu-Natal) – Environmental Engineering
- BSc Honours (University of KwaZulu-Natal) – Estuarine Ecology
- SASS 5 Accredited – Department of Water Affairs and Forestry for the River Health Programme
- SACNASP Registered (Registration Number 134678)

CURRICULUM VITAE: Mahomed Desai

OVERVIEW

An overview of the specialist technical expertise includes the following:

- Ecological Assessments to identify critical habitats for fauna pertaining to International Finance Corporation (IFC) financed projects;
- Ecological Impact Assessments;
- Biodiversity Offset Plans;
- Plant Rescue Management Plans;
- Alien Invasive Plant Management Plans;
- Rehabilitation and Monitoring; and
- GIS spatial analysis and digital cartography.

TRAINING

Some of the training undergone include the following:

- South African Scoring System Version 5.
- River Ecostatus Monitoring Programme.
- Bioaccumulation assessment of fish communities.
- Stable Isotope analysis.
- Micro-PIXE analysis.
- Microplastics sample collection from fish guts.

EMPLOYMENT EXPERIENCE

CURRENT EMPLOYMENT: The Biodiversity Company (September 2019 – Present)

Ecological Consultant at The Biodiversity Company and have undertaken specialist assessments wherein practical offset and/or mitigation strategies for the management of biodiversity, taking into account all the relevant stakeholders. Moreover, relevant and measurable methods to impede the risk of negative impacts to the environment. I have been with numerous sectors, such as mining, agriculture, construction and renewable energy developments.

EMPLOYMENT: GroundTruth Consulting (April 2013 – November 2015 & February 2019 - August 2019)

Ecological consultant undertaking specialist terrestrial and aquatic ecological assessments. Further duties include GIS and database management.

EMPLOYMENT: Aquatic Ecosystem Research Programme (December 2015 – January 2019)

Senior researcher focussing on evaluating the dynamics of ichthyofauna communities on a species and functional group level in relation to environmental influences. In addition, was the leader for the ecosystem biomonitoring and fisheries theme within the programme.

EMPLOYMENT: DeTect Inc. (September 2008 – April 2009)

Ornithological Consultant to evaluate flight dynamics, spatially and temporally, of the *Hirundo rustica* (Barn Swallow) population in close proximity to the King Shaka International Airport (KISA), Durban, South Africa. This project utilised cinematographic and radar techniques to assess the dynamics of the swallow's diel flight paths to inform on aircraft flight paths and chronology.

ADDITIONAL EXPERIENCE

Locum Teacher	January 2010 – December 2010
	Duties included teaching Natural Science to pupils from grades 7 – 9 (a total of 7 classes).
Member	Custodian of Rare and Endangered Wildflowers (CREW)

CURRICULUM VITAE: Mahomed Desai

	Zoological Society of Southern Africa
Committee Member	Botanical Society of South Africa (BotSoc)
Volunteer	Islamic Relief

ACADEMIC QUALIFICATIONS

University of KwaZulu-Natal, Pietermaritzburg, South Africa (2019): PHILOSOPHIAE DOCTOR (PhD) – Ecological Sciences:

Title: Evaluating the influence of environmental drivers of ichthyofauna communities within select east-draining rivers in southern Africa.

University of KwaZulu-Natal, Durban (Howard College), South Africa (2015): MAGISTER SCIENTIAE (MSc) – Environmental Engineering:

Title: The efficacy of *Chlorella* sp, in treating hazardous landfill leachate

University of KwaZulu-Natal, Durban (Howard College) South Africa (2005): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Estuarine Ecology

Title: The macrobenthos community of Lake St. Lucia during the 2005 drought

CONFERENCES

Southern African Society of Aquatic Sciences Congress 2016. Kruger National Park, South Africa. Environmental Water Requirements to Maintain the Wellbeing of Key Social and Ecological Endpoints in the Dinder River, Blue Nile Basin.

Nile Basin Development Forum. 2017. Nile Basin Ecological Flows Framework.

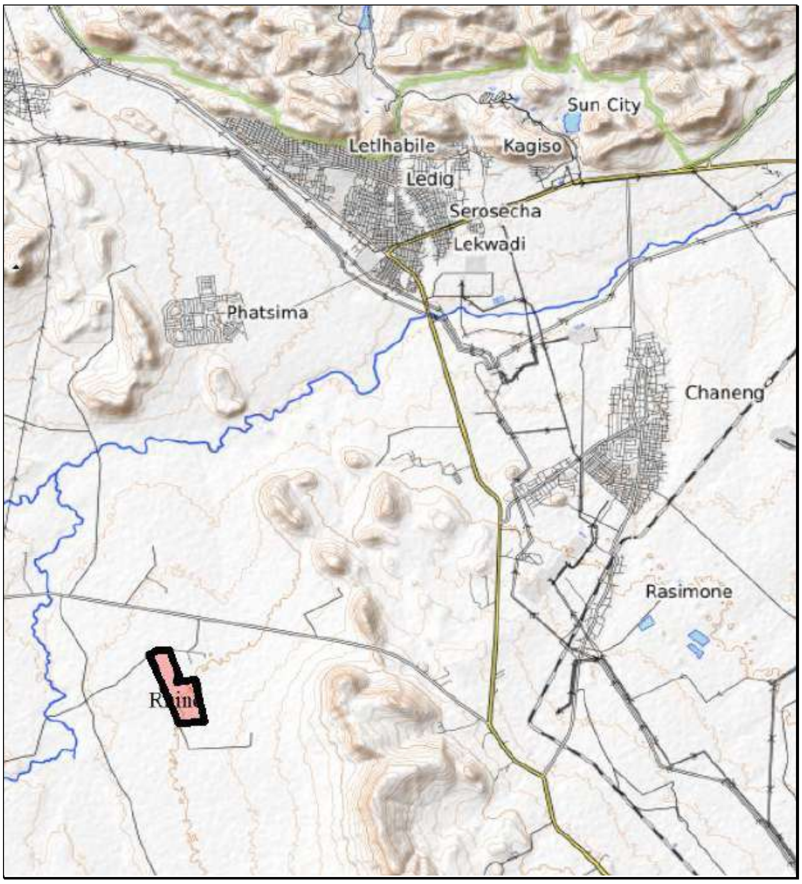
39th Zoological Society of Southern Africa 2019. Kruger National Park, South Africa. The response of the ichthyofauna community to multiple stressors within the river systems of the St. Lucia Basin.

PUBLICATIONS

Desai, M., Husted, A., Fry, C., Downs, C. T., & O'Brien, G. C. 2019. Spatial shifts and habitat partitioning of ichthyofauna within the middle–lower region of the Pungwe Basin, Mozambique. *Journal of Freshwater Ecology*, 34(1), 685–702. doi: 10.1080/02705060.2019.1673221

Desai, M., Hanzen, C., Downs, C.T. & O'Brien, G.C. 2021. Environmental drivers of ichthyofauna community composition of the river ecosystems draining the Lake St. Lucia basin, South Africa. *Hydrobiologia*, 848:3539–3554

APPENDIX E4: Agricultural Compliance Statement



AGRICULTURAL ASSESSMENT:

COMPLIANCE STATEMENT (Rev 2)

RHINO, NORTH WEST PROVINCE

Compiled for:
Nemai Consulting

Compiled by
Dr Andries Gouws Index

April 2023

DECLARATION

The observations, conclusions and recommendations made in this report are based on the best available data and on best scientific and professional knowledge of the directors of INDEX (Pty) Ltd. The report is based on GIS programming and utilises satellite tracking to map survey points. Survey points are normally accurate to within 3 metres; which must be considered in the use of the information.

The directors of INDEX (Pty) Ltd exercises due care and diligence in rendering services and preparing documents. However, the company accepts no liability, and the client, by receiving this document, indemnifies INDEX (Pty) Ltd and its directors and employees, by the use of the information contained in this document, against any action, claim, demand, loss, liability, cost, damage and expense arising from or in connection with services rendered.

The property and copyright of this report shall remain vested in INDEX (Pty) Ltd. The client that commissioned the report may use the information as it may think fit; but only for the land for which it was commissioned.

General declaration:

- INDEX acted as the independent specialist in this application;
- Performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- There were no circumstances that may compromise INDEX's objectivity in performing such work;
- INDEX have expertise in conducting the specialist report relevant to this application, including knowledge of NEMA and its regulations and any guidelines that have relevance to the proposed activity;
- Have not and will not engage in conflicting interests in the undertaking of the activity.
- The study was undertaken by Dr Andries Gouws. He is a registered member of SACNASP in the category of Agriculture.

May 2023

CONTENTS

SUMMARY

The site on Rhebokhoek 101JR is located south of Phatsima, which is close to Sun City in the Northwest Province.

A design alternative was suggested after the different specialist's evaluations were completed. Their recommendations were incorporated as Design 2 in this report.

The Department of Forestry, Fisheries and Environment published Notice 320 in 2020 that describes the minimum criteria when applying for environmental authorisation, which was followed for this investigation.

SENSITIVITY SCREENING TOOL

1) Field crop boundary: The sensitivity tool correctly indicates no cultivated land. This is correct. All cultivated areas are outside of the project area.
2) The sensitivity screening tool indicates that the majority of the land has a high sensitivity. In our professional view this grading is incorrect and that is is only moderately sensitive.

SITE INVESTIGATION

- Much of the land has moderately deep soils with a high soil potential. However, the erratic and low rainfall and high summer temperatures reduces the land use capability to medium/low.

  This is reflected by the low carrying capacity for livestock as well as the low projected crop yield. (This is discussed in detail in Section 7.5.) As stated in that section, the income generated from these is not viable and for that reason, in our opinion, the sensitivity is moderate.
- While the farm has some land that is irrigated, it was excluded from the project area.
- The result for the original investigation and the alternative design is the same.

The entire site is used for animal grazing and browsing. There is approximately 15ha that is planted to fodder.

The grazing land has many shrubs and trees that is used by browsing animals. The farmer raises goats that supplies meat to his butchery and restaurant. He, therefor, does not rely only on the farming income, but also on the value addition made possible by selling the meat from his butchery. The fodder crops that are produced under irrigation is an essential part of his farming operation.

There is no surface runoff on the property that can be used for irrigation. The farmer is totally reliant on groundwater. There is a field that is irrigated on the property, but it is not part of the development area.

LOSS OF HIGH POTENTIAL LAND

There will not be permanent loss of high potential land. According to the guidelines of various publications of DALRRD that deals with land capability and crop yield, the land is not high potential.

Maize is used as indicator crop for the site. The predicted average long-term yield is too low to cover the production costs for commercial maize production.

The irrigated land on the property has been excluded from development.

LOSS OF AGRICULTURAL PRODUCTION

The livestock carrying capacity at a stocking density of 10ha/LSU, is approximately 12 LSU (medium frame animals is a weaner production system). The projected enterprise income is R 84 636 or R7 503/month. This amount is not enough to cover any overhear costs or remuneration to general labour or the farmer.

The conclusion is that the property is too small to be viable and can only contribute towards the household income.

LOSS OF AGRICULTURAL INFRASTRUCTURE

The cattle handling facility is located on the land excluded for the development. In conclusion, no agricultural infrastructure will be lost.

LOSS OF SOIL DUE TO EROSION

The soil is well-drained with moderately developed structure. It is also on evenly sloped land where erosion is not expected. However, the panels create areas that are cleared of vegetation, and that could be subject to erosion.

Runoff from hard surfaces should be dealt with by a Stormwater Management Plan (SWMP).

RECOMMENDATION

The result for the original investigation and the alternative design is the same.

The conclusion is that there will be no permanent loss of high potential land and only limited loss of agricultural production from the livestock.

There were no gaps found in knowledge in the investigation. The recommendations made in this report is based on the findings during the investigation.

The PV site development takes place on low potential land that has a low sensitivity related to agriculture.

It is the author’s opinion that the no reason could be found to prevent the project from being implemented.

Further, any measure or project that can help to relieve the country’s electricity problems should be encouraged.

1 SPECIALIST DECLARATION

COMPLIANCE STATEMENT

Main findings of the study are as follows:

PV SITE

No high potential land was found on the site. According to the criteria of DALRRD the land is Class 7 or poorer and has a low or medium low sensitivity to agricultural development. There will be no impact regarding loss of sensitive land.

THE AUTHOR OF THE REPORT CONFIRMS THE FOLLOWING:

3.3.1. Details and relevant experience as well as the SACNASP registration number of the soil scientist/agricultural specialist/s preparing the assessment including a curriculum vita;	Dr Andries Gouws is a soil scientist and is registered with SACNASP. Refer to Section 10.
3.3.2. A signed statement of independence by the specialist;	Refer to the preamble of the report.
3.3.3. A map showing the proposed development footprint (including supporting infrastructure), overlaid on the agricultural sensitivity map generated by the national environmental screening tool;	The entire PV site will be developed. See Figure 2 for the development footprint. Although the screening tool indicate highly sensitive land, the detailed assessment found that the climatic conditions and crop yield are such that profitable crop farming is not possible. The result for the original investigation and the alternative design is the same.
3.3.4. Calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development including supporting infrastructure;	Total survey area was confined to the land of 124,4ha which will be under PV and support infrastructure. The total farms are 164,7ha.
3.3.5. Confirmation that the development footprint is in line with the allowable development limits contained in Table 1 above;	No detail at this stage.
3.3.6. confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities;	124ha will be developed. Irrigated land that is automatically judged as high potential was deliberately excluded from the development. The PV project will not disturb any adjacent farming activities. The site will be leased to the developer and will not be subdivided in terms of Act 70. It will, therefore not lead to fragmentation of farm land.

3.3.7. A substantiated statement from the soil scientist or agricultural specialist on the acceptability of the proposed development and a recommendation on the approval of the proposed development;	The PV site development takes place on low/medium potential land that has a medium sensitivity related to agriculture. It consists of moderately deep and shallow and rocky soils. However, the climate is not suitable for viable commercial crop production – see Section 6.2 and 7.5 for the motivation on why the land is only moderately sensitive. It is the author's opinion that there is no reason to prevent the project from being implemented. Further, any measure or project that can help to relieve the country's electricity problems should be encouraged.
3.3.8. Any conditions to which this statement is subjected	There are no conditions imposed on the approval of the project.
3.3.9. in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase.	The PV site is not a line activity. The 88kV OHL is, and while some land will be cleared from trees during installation, and will take time to recover. However, only the transmission line footprint will be disturbed and by planting locally occurring grass species, the grazing land will have no negative impact.
3.3.10. Where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; and	No particular management requirements are proposed. It is, however, recommended that a stormwater management plan be implemented.
3.3.11. A description of the assumptions made and any uncertainties or gaps in knowledge or data.	The observations are accepted as representative of the soil conditions. The author feels confident that this is the case. There were sufficient observations made that no gaps in knowledge or data is expected.
The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Assessment date: April 2023. The duration, date and season of the site inspection and the significance of the season to the outcome of the assessment is not relevant. The main criteria for farming potential are soils, climate and water availability. These are not bound to seasons.
A description of the methodology used to undertake the on-site assessment	Refer to Section 3.

2 BACKGROUND

Nemai Consulting has been appointed for a solar project at Rhino that is located north west of Rustenburg, North West Province. INDEX was then appointed to do the agricultural impact compliance statement in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.

This report will describe the findings of the initial site verification and then assess the agricultural potential of the site in terms of the guidelines of Notice 320.

The site is located directly south of Phatsima, which is close to Sun City in the Northwest Province.

The location is indicated in Figure 1.

A design alternative was suggested after the different specialist's evaluations were completed. Their recommendations were incorporated as Design 2 in this report. These alterations where minor as far as agricultural potential is concerned and does not affect the size of land affected.

The details of the site are as follows:

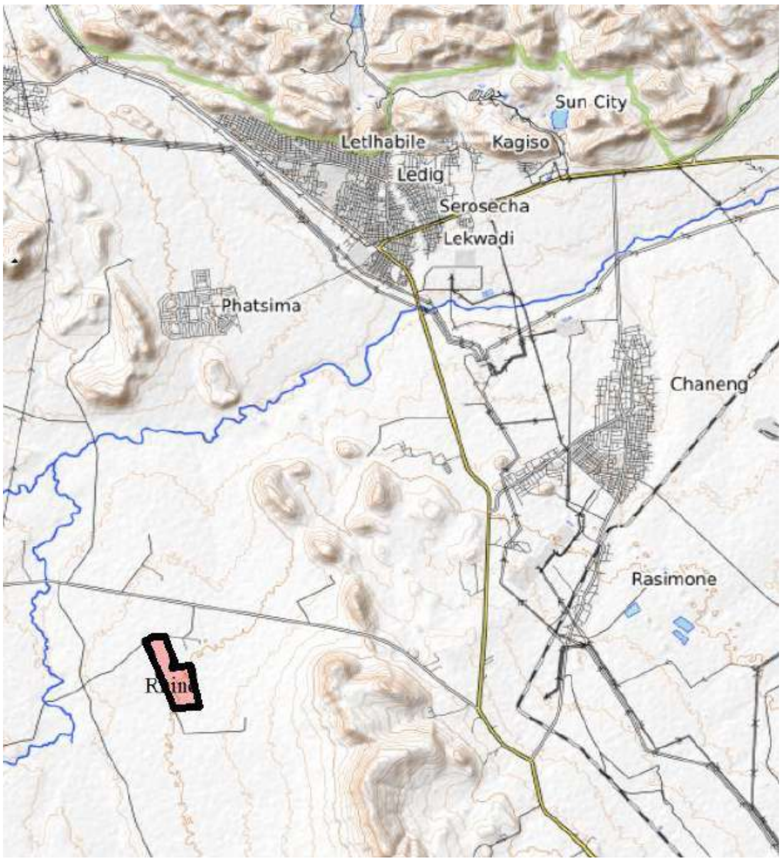


Figure 1. Locality of the project

SITE DESCRIPTION

Farm names	Rhebokhoek 101JR
Total farm size	164,7ha
Development footprint	124,4ha

3 TERMS OF REFERENCE

Nemai Consulting was appointed for this solar project located at Rhebokhoek. It consists of a solar PV plant, BESS and support infrastructure. In turn, they appointed Index to do a specialist assessment for agriculture.

APPROACH

- Determine agricultural potential in the Project's footprint.

- Determine impacts of the Project from an agricultural perspective.
- Suggest suitable mitigation measures to address the identified impacts.

The following were indicated by the client as particular outputs:

- Indicate Key Issues & Triggers Identified During Scoping.
- Indicate loss of agricultural land with high capability due to direct occupation by the development footprint.
- Indicate loss of fertile soil.
- Soil erosion due to inadequate stormwater management.

4 PROPOSED DEVELOPMENT

The project consists of a PV site and the associated infrastructure (refer to Figure 2).
The total farm size 164,7ha of which the development footprint of the PV section and support infrastructure is on 124,4ha. The overhead line runs across Stroomrivier 236 JP for the original design, but remails on Rhebokhoek 101JR for the alternative design.

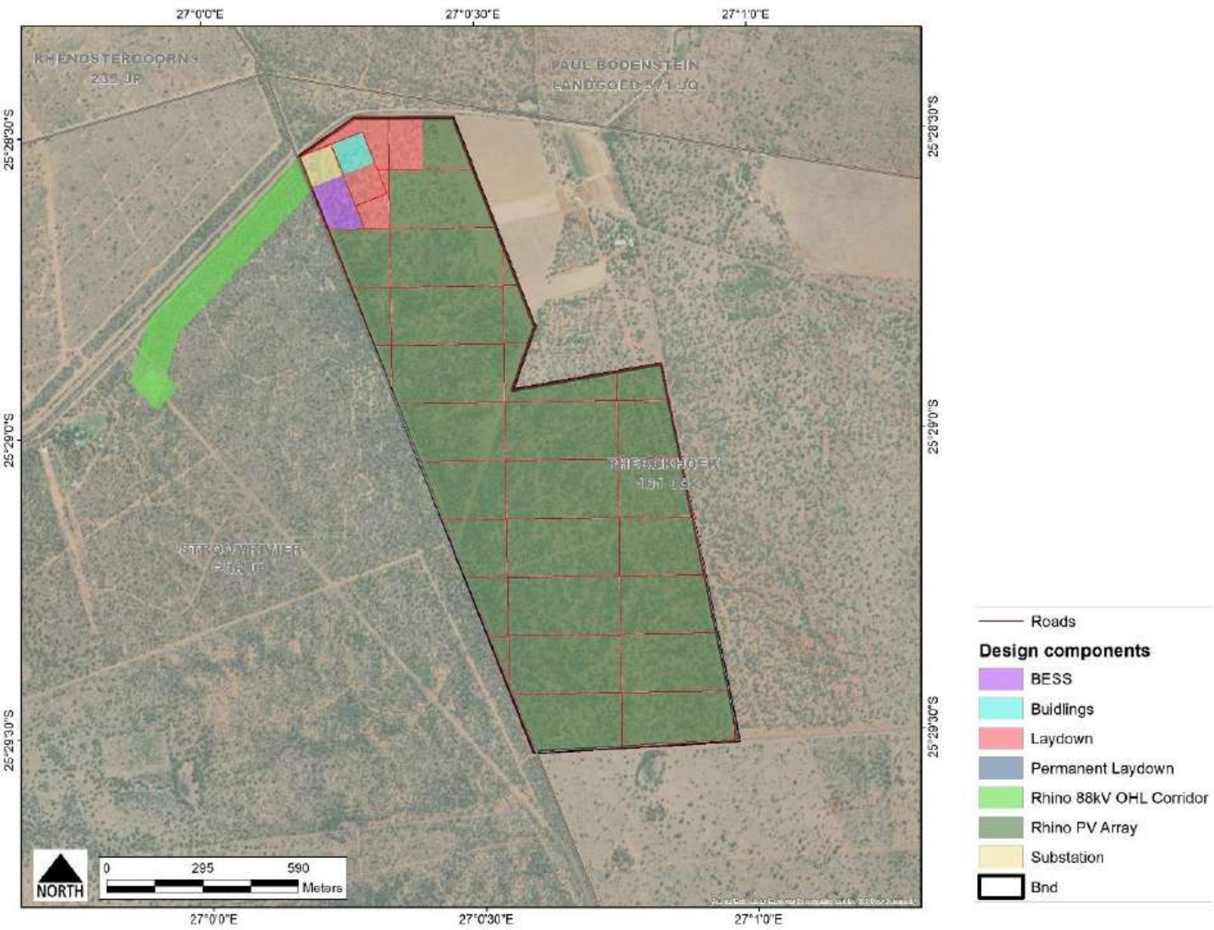


Figure 2. Main components of the development – Alternative 1

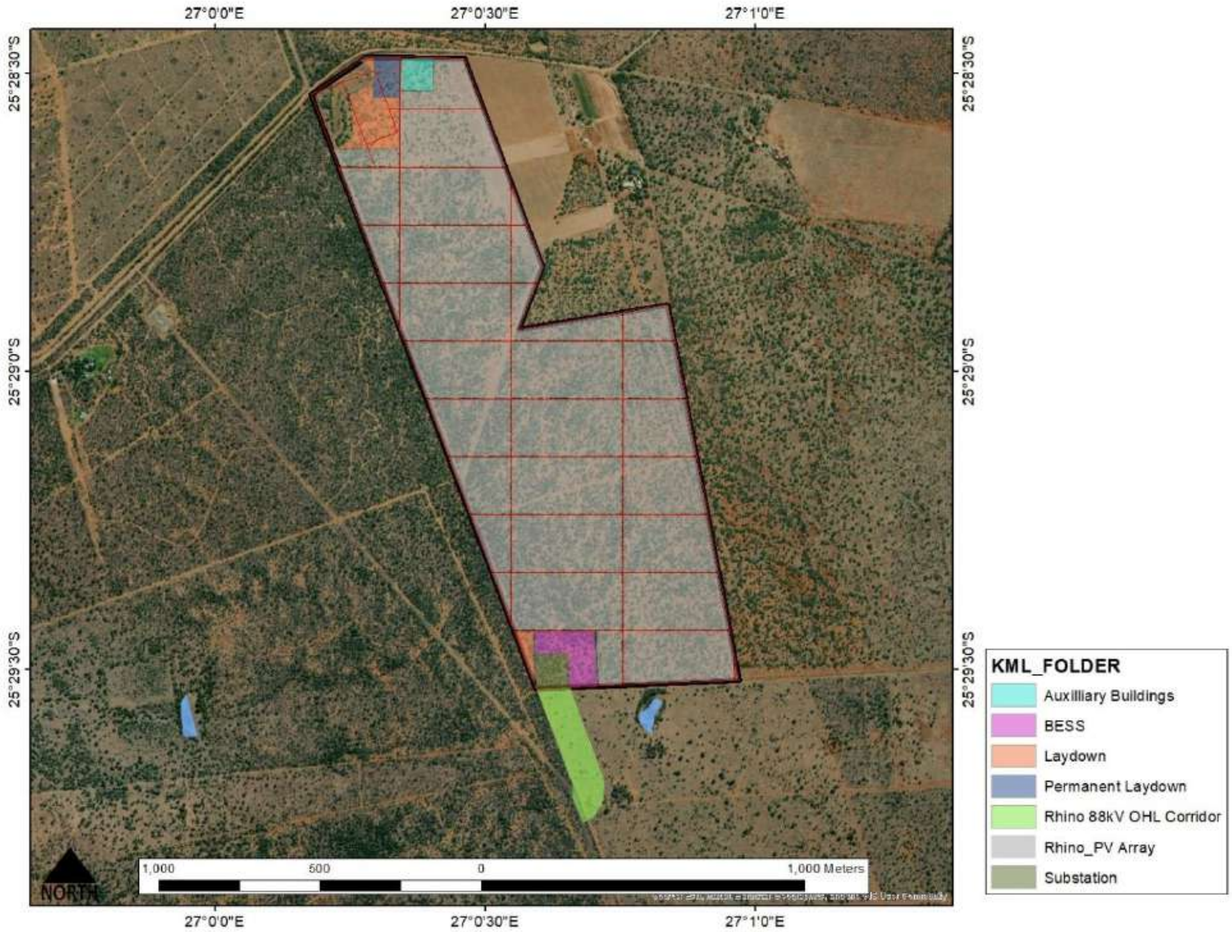


Figure 3. Main components of the development – Alternative 2

5 METHODS AND PROCEDURES

SITE SENSITIVITY VERIFICATION

The verification is a review of existing information on soils and topography on a desktop level to determine areas with high sensitivity in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.

The current use of the land and the environmental sensitivity of the site are available in the screening tool, and were used in assessing the site.

- The desktop verification was done through use of satellite imagery and a site visit took place on 4 April 2023.
- The aim of the site servery was to verify the findings of the interpretation done on the satellite images and of the data obtained from the Screening Tool.
- The outcome of the site verification is included in this report.

The report compared the current crop land and the environmental sensitivity as identified by the screening tool with the present situation.

The results are indicated in Section 5.

SITE EVALUATION PROCESS

Satellite images were used as backdrop and the present land uses digitised.

Soil profiles were augured to determine soil depth, clay content is land conditions.

Capability classification is according to the guidelines published on the AGIS website of the National Department of Agriculture (NDA) was used to determine the capability of soils and their agricultural potential (DALRRD, 2019).

6 ECOLOGICAL SENSITIVITY

BACKGROUND

The Department of Forestry, Fisheries and Environment published Notice 320 in 2020 that describes the minimum criteria when applying for environmental authorisation.

This protocol provides the criteria for the assessment and reporting of impacts on agricultural resources for activities requiring environmental authorisation. The assessments requirements of this protocol are according to the level of environmental sensitivity as indicated by the national web-based environmental screening tool for agricultural resources. It is based on the most recent land capability evaluation as provided by the DALRRD.

According to the protocol, an applicant intending to undertake an activity where it occurs on land with '*very high*' or '*high'* sensitivity for agricultural resources must submit an Agricultural Agro-Ecosystem Specialist Assessment. Alternatively, a Compliance Statement will suffice.

6.1 Sensitivity Screening Tool findings

A design alternative was suggested after the different specialist's evaluations were completed. Their recommendations were incorporated as Design 2 in this report. These alterations where minor as far as agricultural potential is concerned and does not affect the size of land affected.

- Field crop boundary

  The sensitivity tool indicates no cultivated land.

- Land sensitivity

  The tool indicates the sensitivity of the site as moderately high (Category 6 to 10).

  In the case of this project, the Screening Tool indicates that the site sensitivity is *high* in general and *moderate* on small portions scattered throughout. See Figure 4 for the results of the Sensitivity Screening Tool.

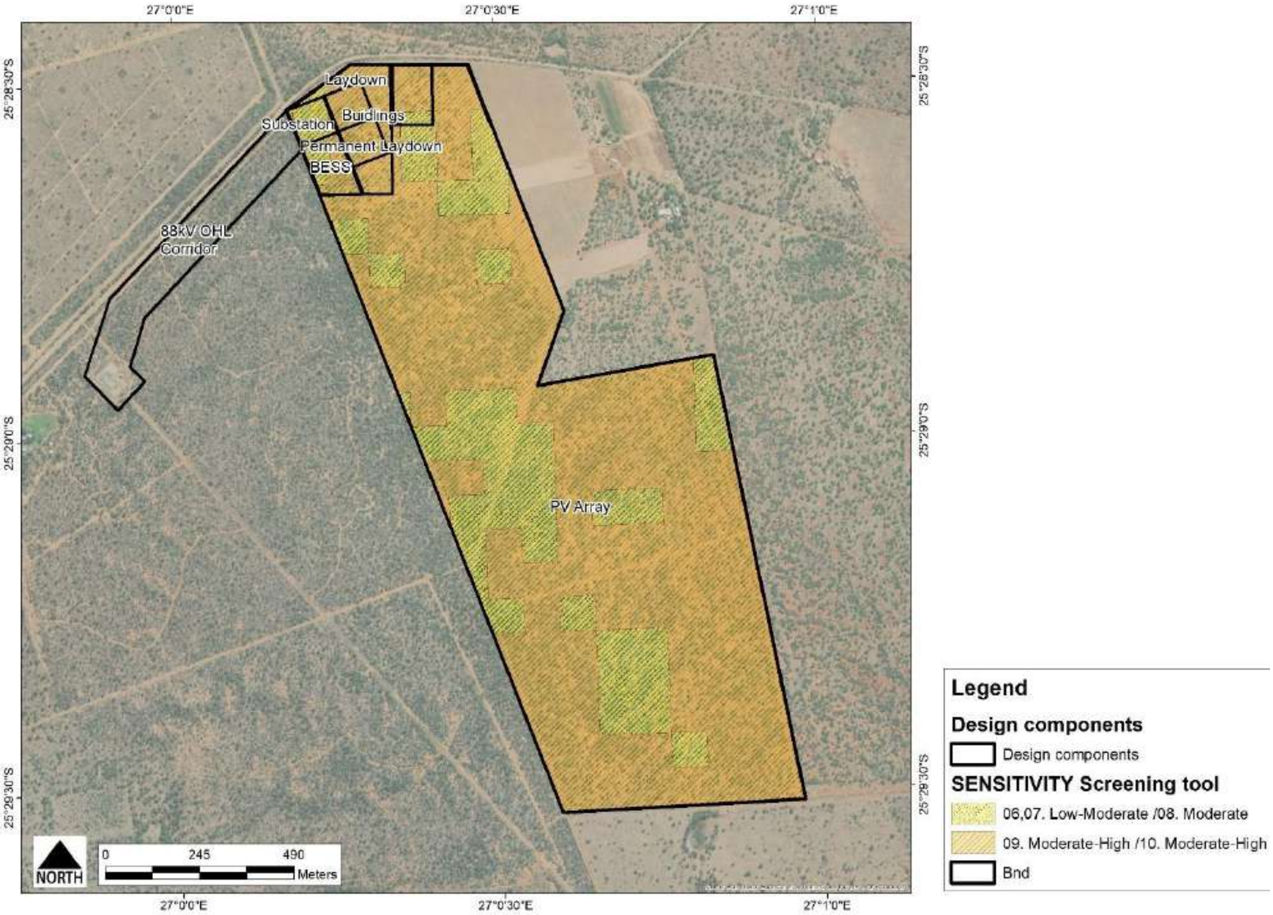


Figure 4. Sensitivity (screening tool)

6.2 FINDINGS OF THE SITE SENSITIVITY INVESTIGATION

The verification was done by desk top analysis, using satellite imagery and then a preliminary on-site inspection. The outcome of the site sensitivity verification found the following:

FIELD CROP BOUNDARY

- The survey agrees with the screening tool that there is no cultivated land.

LAND CAPABILITY

- The environmental sensitivity according to the tool is indicated as high and moderately sensitive. This is not the case; while much of the land has moderately deep soils with a high soil potential, the erratic and low rainfall and high summer temperatures reduces the land use capability to medium/low.

  This is reflected by the low carrying capacity for livestock as well as the low projected crop yield. (This is discussed in detail in Section 7.5.) As stated in that section, the income generated from these is not viable, and viability is one of the cornerstones of determining agricultural capability.
- The farm has some land that is irrigated, but that was excluded from the project area.
- Using the same guidelines as in AGIS (DALRRD), the land has low/moderate arable potential. This is because of the climatic conditions and its impact on potential crop yield (refer to Section 7). According to the criteria in AGIS the land is not arable and more suitable for livestock grazing.
- In line with the provisions of the Protocol, a compliance statement is required for the EIA scoping report.

VIABILITY OF THE LAND FOR COMMERCIAL CROP PRODUCTION

Regarding the arability of land, the Department contends that agricultural land is considered to have a 'high potential' if it can be cultivated in terms of Part I of the Regulations of the Conservation of Agricultural Resources Act, 43/83.

Cultivation in this context requires:

- That the soil can physically be tilled;
- That it is financially feasible to cultivate a piece of land.

The purpose of Act 70 of 1970 is to maintain viable farming units. Per implication, farming units and farming potential should be assessed for its economic viability. The Department should, therefore, have considered the site's economic feasibility.

The findings of the study related to site sensitivity are as follows:

- The crop yield is too low for commercial crop production if maize is used as indicator crop. Maize at a yield of 2,64 t/ha/year is produced at a loss of R254,11 per hectare (see Section 7.5 for crop yield and Section 10.2 for the gross margin calculations).
- Animal production

  The livestock carrying capacity at a stocking density of 10ha/LSU, is approximately 12 LSU (medium frame animals is a weaner production system). The projected enterprise income is R 84 636 or R7 503/month. This amount is not enough to cover any overhear costs or remuneration to general labour or the farmer.

  The conclusion is that the property is too small to be viable and can only contribute towards the household income.

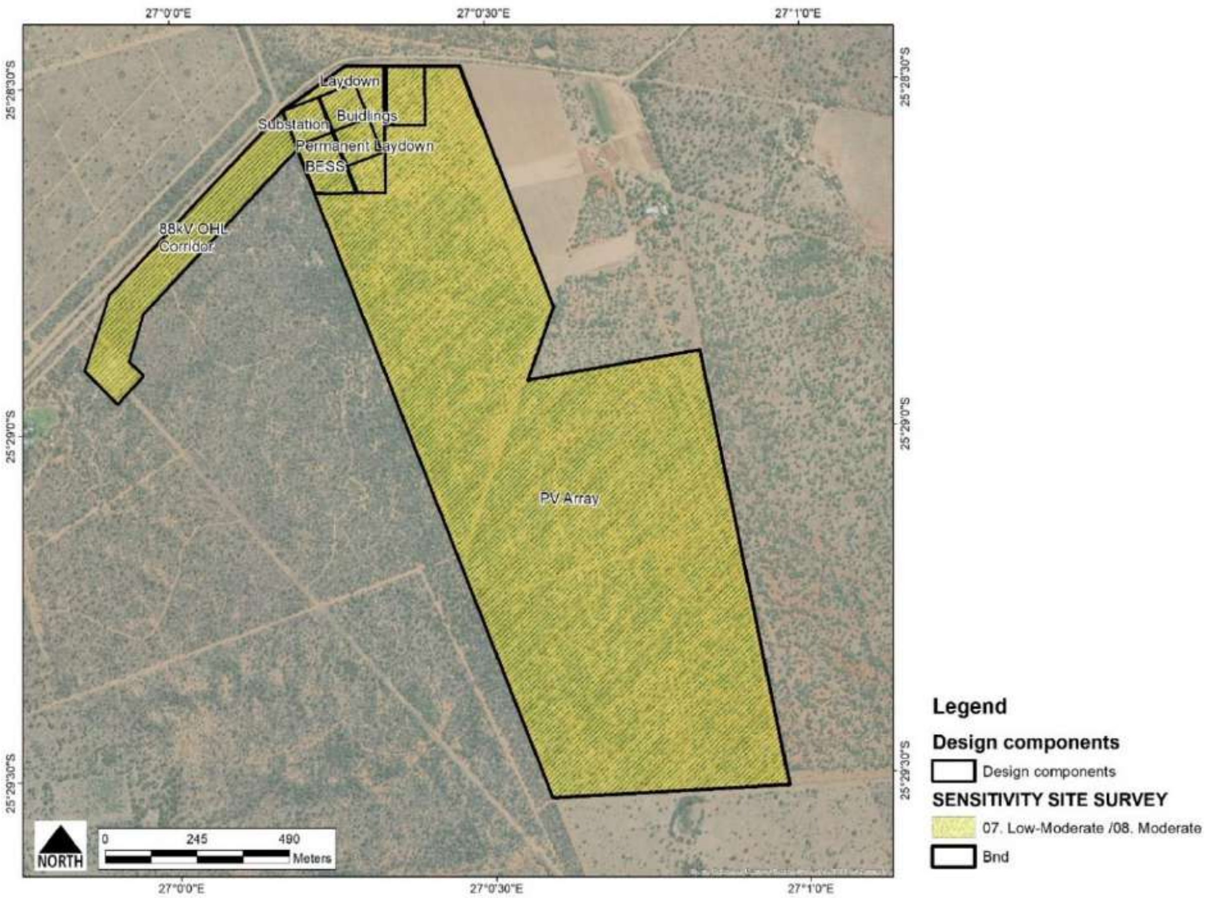


Figure 5. Site sensitivity following the site visit

The conclusion is that notwithstanding deep soil the criteria for agricultural sensitivity should include viability, and if that is done then it is clear that the land cannot be highly sensitive.

Figure 5 indicates the results of the site survey and interpretation of all factors that determine site sensitivity. The site is moderately sensitive.

7 SITE EVALUATION

7.1 PRESENT LAND USES

The entire site is used for animal grazing and browsing. There is approximately 15ha that is planted to fodder crops like sweet sorghum and haygrazer. A large portion is irrigated from boreholes (see Photos 1 and 2).

The grazing lands has many shrubs and trees that is used by browsing animals. Some of the land is becoming encroached by Sekelbos. There are also portions that are bare because of overgrazing.

Photo 1. Bushveld – browsing and grazing

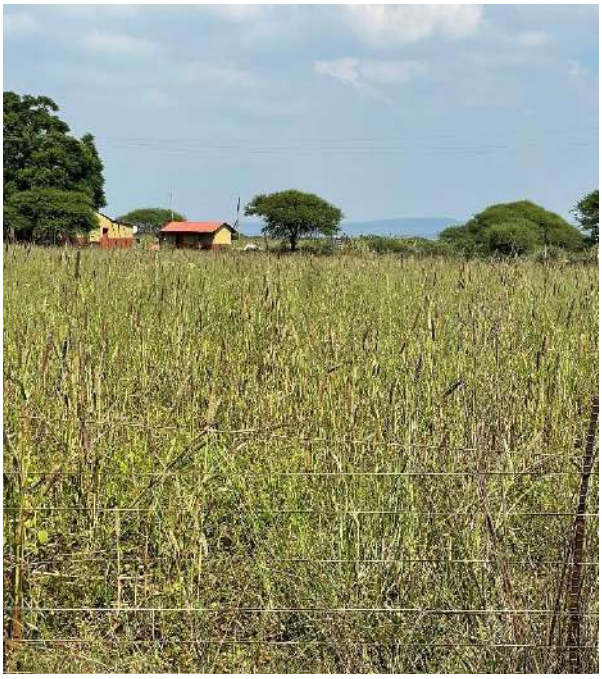


Photo 2. Cover crops planted for fodder

The farmer raises goats that supplies his butchery and restaurant. Therefore, he does not solely rely on the farming income, but also on the value addition made possible by the fodder crops that are produced under irrigation.

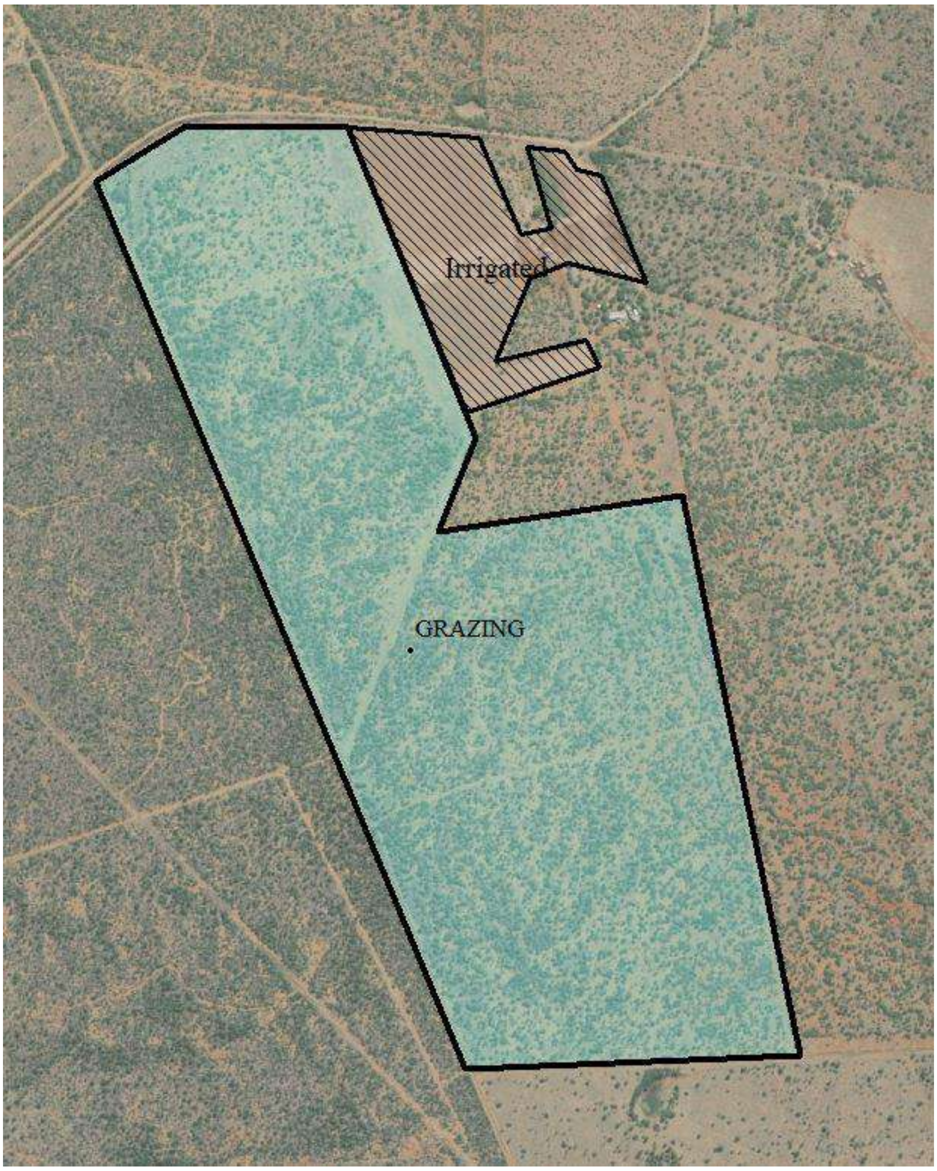


Figure 6. Present land uses (see irrigated land excluded from the development)

7.2 CLIMATE

On long term average rainfall is 574mm per year, measured at Waterval School, about 4km southwest of the site. This amount of rainfall, especially because the monthly and annual rainfall is highly variable, makes crop production risky. Because of this, there are no commercial production of summer crops. The only cropping that takes place is under irrigation or where there are clayey soils that can store sufficient moisture for the growing plant.

According to DALRRD criteria for the input to the Climate Capability, the site is within Category 5, which is medium capability. This implies that the reliability is low.

The climate is not suitable for crop production, which was also indicated by AGIS of DALRRD. This is the reason why the land use capability was downgraded from high (as indicated from the soil capability) to low if climate is incorporated.

7.3 WATER

There is no surface runoff on the property that can be used for irrigation. The farmer is totally reliant on groundwater.

There is a small field that is irrigated on the property, but it is not part of the development area.

7.4 VEGETATION

The land in its natural state is bushveld with highly palatable grass species.

The grazing capacity according to DALRRD is estimated at 10ha/large livestock unit (LSU). The carrying capacity for the PV site is approximately 12 LSU.

7.5 LAND CAPABILITY

SOIL TYPES

The PV site is located on shale in the western portion and sedimentary rock in the east. Shale gave rise to deep moderately structures reddish soils with a medium clay content. Soil types identified are Shortlands and Hutton with shallower Glenrosa in the western portion. Concretions of iron and manganese occurs at around 400mm, and rock outcrops, throughout this soil unit.

Sandy soils developed on the sedimentary rock. The soils are moderately deep and is where the irrigated land is found.

In general, because of the low variable rainfall, the land is not arable and only suitable for grazing. Irrigated land is automatically considered as high potential. Through micro placement, this land will not be developed but remain under cultivation.

LAND CAPABILITY DETERMINATION

In 2002 the Directorate: Land Use and Soil Management within DALRRD developed a national spatial land capability data set to indicate the spatial delineation of the then defined eight land capability classes. The approach followed was based on the approach of Klingebiel and Montgomery (1961) but adapted for South Africa. The aim was to develop a system for soil and land capability classification. It further aimed to incorporate the parameters within a Geographic Information System (GIS). The resulted spatial data set was derived at from a 1:250 000 land type data set being the main input data set for the derived land capability classes together with climatic and terrain parameters.

This dataset is used within the Sensitivity Screening tool.

While the new dataset is more complex than that of Klingebiel *et al*, the latter has clear guidelines and is generally still followed when assigning capability to land. A comparison between the two systems is provided below.

Table 1. Relationship between grading of the Sensitivity Screening tool and that of Klingebiel *et al*.

<table>
<tr><th>DALRRD (2016)</th><th>Klingebiel</th><th>Capability</th><th>Arability</th></tr>
<tr><td>1-2</td><td>viii</td><td>Very low</td><td rowspan="4">Not arable</td></tr>
<tr><td>3-4</td><td>vii</td><td>Very low to low</td></tr>
<tr><td>5-6</td><td>vi</td><td>Low</td></tr>
<tr><td>7</td><td>v</td><td>Low to moderate</td></tr>
<tr><td>8</td><td>iv</td><td>Moderate</td><td rowspan="5">Arable</td></tr>
<tr><td>9-10</td><td>iii</td><td>Moderate to high</td></tr>
<tr><td>11-12</td><td>ii</td><td>High</td></tr>
<tr><td>13-14</td><td>i</td><td>High to very high</td></tr>
<tr><td>15</td><td>i</td><td>very high</td></tr>
</table>

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability involves consideration of difficulties in land use owing to physical land characteristics, climate and the risks of land damage from erosion and other causes.

The classic eight-class land capability system (Klingebiel & Montgomery, 1961) was adapted for use by the

South African Department of Agriculture in their Agriculture Geographic Information System (AGIS).

According to the soil capability classification, the soils have medium capability (or sensitivity as related to the Sensitivity Screening Tool).

According to Klingebiel *et al*, the soil capability is Class v and lower, mainly because of climate that is not conducive to rainfed cropping, regardless of soil properties. The successfully cultivated land are mainly on deep clay and vertic soils where rain is stored during the season and then planted in the late summer.

These soil types are not found on the property.

Using the same criteria as AGIS, the farm is Class 7 (or Class v according to Montgomery *et al*) or poorer, which has *moderate/low* sensitivity.

FINANCIAL FEASIBILITY OF INPUT TO DETERMINE HIGH POTENTIAL LAND

Land use capability is but one aspect to determine high potential land. The DALRRD in a landmark case between Black Ridge Investments 11 (Pty) LTD and the Minister of Agriculture, Forestry and Fisheries (now DALRRD) confirmed that a change of land use and/or subdivision states that '…… *for a site to have high agricultural potential, is that it be cultivated and hence contribute to the production of food on a profitable and sustainable bases*.'

Change of land use thus assumes viable farming or food production. The viability is determined by enterprise composition.

- Crop yield

  Yield is an indicator of the potential viability of crop production of a piece of land. DALRRD published long term yield predictions based on climate in their AGIS website.

  The crop yield was calculated by ACRU Maize Yield Model (Domelo, 1990; Schulze, 1995). According to their model, the long term estimated yield for the region is around 2,64t/ha/year. This calculation assumes that the land is arable, with high potential soil.

- Animal grazing

  The grazing capacity according to DALRRD is estimated at 10ha/large livestock unit (LSU). The carrying capacity for the PV site is approximately 12 LSU.

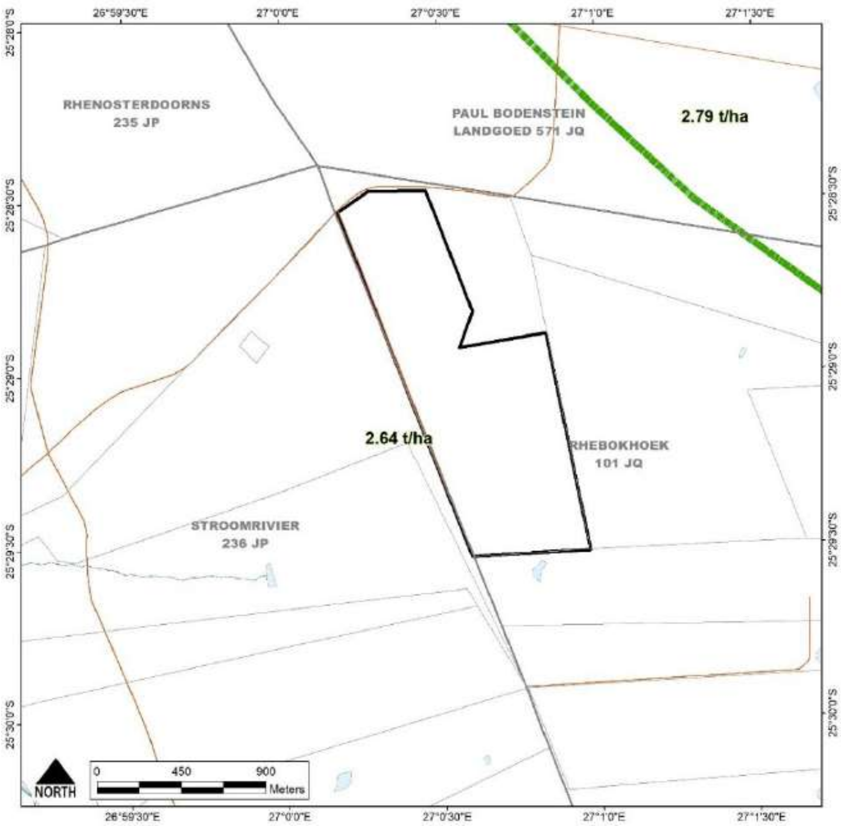


Figure 7. Predicted long-term yield of maize

The yield is too low to cover the production costs for commercial maize production (see next section for the financial impact).

8 IMPACT ASSESSMENT

8.1 LOSS OF HIGH POTENTIAL LAND

There will not be permanent loss of high potential land. According to the guidelines of various publications of DALRRD that deals with land capability and crop yield, the land is not high potential. The irrigated land on the property has been excluded from development.

Further, the PV infrastructure does not alter the soil properties or land conditions and once removed will be suitable for farming.

- The impact is low, temporary and totally reversable.

8.2 LOSS OF AGRICULTURAL PRODUCTION

The livestock carrying capacity at a stocking density of 10ha/LSU, is approximately 12 LSU (medium frame animals in a weaner production system). The projected enterprise income is R 84 636/ year or R7 503/month. This amount is not enough to cover any overhead costs or remuneration of the farmer and his staff.

The conclusion is that the property is too small to be viable and can only contribute towards the household income.

The grazing opportunity that the farm provides cannot be replaced or mitigated on a national level.

Our national electricity problems far outweigh the loss of income that the farm will sacrifice.

- The impact is low on a regional or national scale
- Is temporary and will be for the medium term.
- There will be no loss of labour opportunities. The labourer that tends the livestock can be employed elsewhere on the farm.

8.3 LOSS OF AGRICULTURAL INFRASTRUCTURE

The cattle handling facility is located on the land excluded for the development.

- In conclusion, no agricultural infrastructure will be lost.
- The impact is low, temporary and reversable.

8.4 LOSS OF SOIL DUE TO EROSION

The soil is well-drained with moderately developed structure. It is also on evenly sloped land where erosion is not expected.

Nevertheless, the PV projects creates areas that are cleared of vegetation, and that could be subject to erosion. Runoff from hard surfaces should be dealt with by a SWMP. This is an engineering function and is normally addressed as part of the project design.

- No impact is expected
- Mitigation is achieved by allowing grass to re-establish after construction and by guidelines in the SWMP.

9 CONCLUSIONS AND RECOMMENDATIONS

The impacts of the development are as follows:

- Loss of high potential land

There will not be permanent loss of high potential land. According to the guidelines of various publications of DALRRD that deals with land capability and crop yield, the land is not high potential. The irrigated land on the property has been excluded from development.

- Loss of agricultural production

The impact of the project on agricultural production is low. The loss in net farm income from livestock production is approximately R7 503 per month. The area is just too small to make any meaningful contribution to the farming income.

- Loss of Agricultural infrastructure

The cattle handling facility is located on the land excluded for the development. In conclusion, no agricultural infrastructure will be lost.

- Loss of soil due to erosion

The soil is well-drained with moderately developed structure. It is also on evenly sloped land where erosion is not expected. However, the panels create areas that are cleared of vegetation, and that could be subject to erosion. Runoff from hard surfaces should be dealt with by a SWMP.

RECOMMENDATIONS

The conclusion is that there will be no permanent loss of high potential land and only limited loss of agricultural production from the livestock. This applies to both the original and alternative design.

There were no gaps found in knowledge in the investigation. The recommendations made in this report is based on the findings during the investigation.

The PV site development takes place on low potential land that has a low sensitivity related to agriculture.

It is the author's opinion that there is no reason to prevent the project from being implemented.

Further, any measure or project that can help to relieve the country's electricity problems should be encouraged.

10 ADDENDA

10.1 SOURCES OF INFORMATION

a) Criteria for high potential agricultural land in South Africa, Department of Agriculture, Directorate Land Use and Soil Management, 2002.

b) Grondklassifikasie Werkgroep, 1991. Grondklassifikasie, 'n Taksonomiese sisteem vir Suid Afrika, Departement van Landbou-ontwikkeling, Pretoria.

c) Department of Agriculture. Grazing capacity. Development of Agricultural Land Framework Bill, 2016

d) WRC, 2003 South African Atlas of Agrohydrology and Climatology, Water Research Commission

e) CROPWAT 8.0 has been developed by Joss Swennenhuis for the Water Resources Development and Management Service of FAO.

10.2 GROSS MARGINS

MAIZE

MAIZE: Yield: t/ha	2.5	2.64	3.5
ALLOCATED COSTS	**R7 748.61**	**R8 146.40**	**R8 480.09**
Pre-plant	**R631.28**	**R631.28**	**R631.28**
Lime	R541.67	R541.67	R541.67
Lime spreading	R95.44	R95.44	R95.44
Disc	R116.94	R116.94	R116.94
Disc (mechanisation)	R120.14	R120.14	R120.14
Plough	R92.36	R92.36	R92.36
Plough (mechanisation)	R211.31	R211.31	R211.31
Plant:	**R3 742.22**	**R3 979.75**	**R4 217.28**
Seed BT	R1 267.49	R1 267.49	R1 267.49
Plant	R53.90	R53.90	R53.90
2.3.2 (30) + S	R1 781.49	R2 019.02	R2 256.55
Guardian S	R216.77	R216.77	R216.77
Terbuzine 600	R40.77	R40.77	R40.77
Mesoflex	R119.58	R119.58	R119.58
Tronic	R17.22	R17.22	R17.22
Flobor	R31.89	R31.89	R31.89
Sumi-Alpha	R25.25	R25.25	R25.25
Plant 0.9 m & Spuit	R187.86	R187.86	R187.86
Plant 0.9 m & Spuit (mechanisation)	R0.00	R0.00	R0.00
Pre-harvest	**R2 093.38**	**R2 253.64**	**R2 349.80**
LAN (28)	R641.05	R801.31	R897.47
Terbuzine 600	R81.53	R81.53	R81.53
Mesoflex	R119.58	R119.58	R119.58
Tronic	R17.22	R17.22	R17.22
Metalachlor 960	R84.18	R84.18	R84.18
Halo	R153.06	R153.06	R153.06
Custodia	R465.56	R465.56	R465.56
Hail insurance	R363.00	R363.00	R363.00
Topdressing	R51.81	R51.81	R51.81
Topdressing (mechanisation)	R65.00	R65.00	R65.00
Spaying	R28.56	R28.56	R28.56
Spaying (mechanisation)	R22.83	R22.83	R22.83
Harvesting	**R1 281.73**	**R1 281.73**	**R1 281.73**
Combine	R401.31	R401.31	R401.31
Combine	R228.31	R228.31	R228.31
Transport (50 Km)	R71.80	R71.80	R71.80
Transport (50 Km)	R228.31	R228.31	R228.31
Labour	R352.00	R352.00	R352.00
FIXED COST	**R555.71**	**R555.71**	**R555.71**
Labour	R555.71	R555.71	R555.71
TOTAL COST PER HECTARE	**R8 304.32**	**R8 702.11**	**R9 035.80**
SALES	**R8 000.00**	**R8 448.00**	**R11 200.00**
GROSS MARGIN	**-R304.32**	**-R254.11**	**R2 164.20**

CATTLE MARGINS	R/LSU
Income	**10 750**
Costs	**3 697**
Summer licks	217
Winter licks	652
Vet costs	127
Bull costs	200
Labour	1 046
Pastures	672
Repairs	320
VARIABLE COSTS	463
Marketing	438
Transport	25
Margin	**7 053**

10.3 SACNASP CERTIFICATE

THE SOUTH AFRICAN COUNCIL
FOR
NATURAL SCIENTIFIC PROFESSIONS

herewith certifies that

Johan Andries Gouws
Registration number: 400140/06

has been registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice
(Schedule I of the Act)

Agricultural Science

11 July 2006		
Pretoria	President	Chief Executive Officer

10.4 CURRICULUM VITAE (CV)

Position Title and No.	Agriculture, Land use planning and wetland specialist. INDEX
Name of Expert:	Andries Gouws
Date of Birth	12/04/1955
Country of Citizenship /Residence	South Africa

Education

Name of institution: College/University or other	Degree/diploma/certificate or other specialized education	Date completed
University of Pretoria, South Africa	BSc. Agriculture	1979
University of Bloemfontein	BSc. Honours, Agriculture	1987
Potchefstroom Collage for Agriculture	Diploma: Stereoscopic aerial photo interpretation of natural resources for farm planning	1981
University of South Africa	Diploma: Financial management	1992
University of Trinity	PhD: Integrated agricultural development	2007

Employment record relevant to the assignment:

Period	Employing organization and your title/position. Contact info for references	Country	Summary of activities performed relevant to the Assignment
1993 - current	INDEX - Director and co-owner: Responsibility: Agriculture and land use planning. Contact: Eugene Gouws - Director +27 82 55 33 787	RSA	Provided specialist assessment services in agriculture and land use planning for various development projects.

Membership in Professional Associations and Publications:

Soil Science society of South Africa.

South African Council for Natural Scientific Professions – Registered Professional Scientist (Reg no: 400140/06)

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks
Position: Agricultural Specialist	Agricultural Impact Assessment for the Proposed Mookodi-Mahikeng 400kv Line. 2018. Client: Nemai Consulting
	Agricultural Impact Assessment for the Proposed Foxwood Dam 2015 – 2016 Compiled the specialist report on Agricultural impact

	Client: Nemai Consulting, DWS
	Agricultural Impact Assessment for the Proposed Mokolo and Crocodile River (West) Water Augmentation Project (MCWAP) (2017 – 2019) Compiled the specialist report on Agricultural impact Client: Nemai Consulting, DWS
	MSOBO COAL – HARWAR; economic study for the farming enterprises Discussion of the natural resources that influences agricultural potential; Farming and the potential for different enterprises; Indicate the potential income from main enterprises and Indicate the financial impact of the development on the farmers. (2013/4) Client: Demacon
	Agricultural potential study of Portion 21 (Portion 1) of the farm Koppieskraal 1157-IR 2019. Client: Adv Johan du Plessis
	Agricultural Potential Assessment: Albany Wind Energy Facility & Grid Infrastructure Near Makhanda, Eastern Cape Province 2020 Client: CES Environmental and Social advisory Services
	Agricultural potential and impact assessment of Available Land At Mopeia, Mozambique 2016 Client: Barari Forest Management. Department: Research & Development Abu Dhabi

Expert’s contact information: E-mail: index@iafrica.com
Phone: +27 (0) 82 807 6717

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes my qualifications, my experience and myself.

Andries Gouws		April 2023
Name of Expert	Signature	Date

10.5 OBSERVATIONS


APPENDIX E5: Heritage Impact Assessment

RHINO SOLAR PV (PTY) LTD

PROPOSED 65MW RHINO SOLAR PHOTOVOLTAIC PROJECT, NORTH WEST OF RUSTENBURG, NORTH-WEST PROVINCE

HERITAGE IMPACT ASSESMENT

8 June 2023

Submitted to : Nemai Consulting

Prepared by:

Jennifer Kitto

Nitai Consulting (PTY) Ltd

147 Bram Fischer Drive

Ferndale

2194

The heritage impact assessment report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIAs Regulations (2014, amended 2017)	**Relevant section in report**
1.(1) (a) (i) Details of the specialist who prepared the report	Section 1.1.3 of Report
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.1.3 and of Report and **Appendix 2**
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page iii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
(cA) An indication of the quality and age of base data used for the specialist report	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 6
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7
(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;	Section 5.2 and 5.4, Section 6
(g) An identification of any areas to be avoided, including buffers	Section 6, Section 12
(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;	**Appendix 1**
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3
(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	Sections 6, 8
(k) Any mitigation measures for inclusion in the EMPr	Sections 11, 12
(l) Any conditions for inclusion in the environmental authorisation	N/A
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	N/A
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 12
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(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, and where applicable, the closure plan	Section 11, 12
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process will be handled as part of the EIAs and EMPr process.

Requirements of Appendix 6 – GN R326 EIAs Regulations (2014, amended 2017)	Relevant section in report
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date no comments have been raised regarding heritage resources that require input from a specialist.
(q) Any other information requested by the competent authority.	Not applicable.
(2) Where a government notice 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.	Section 38(3) of the NHRA

Declaration of Independence

The report has been compiled by Nitai Consulting (Pty) Ltd, an appointed Heritage Specialist for Nemai Consulting for the Proposed 65MW Rhino Solar Photovoltaic Project, North West of Rustenburg, North West Province. The views contained in this report are purely objective and no other interests are displayed during the Heritage Impact Assessment Process.

I, Jennifer Kitto, declare that –

General declaration:

- *I act as the independent heritage specialist*
- *I will perform the work in an objective manner, even if this results in views and findings that are not favourable to the project;*
- *I declare that there are no circumstances that may compromise my objectivity in performing such work;*
- *I have expertise in conducting heritage impact assessments, including knowledge of the National Heritage Resources Act, No 25 of 1999 (NHRA), associated Regulations and any guidelines that have relevance to the proposed activity;*
- *I will comply with the NHRA, associated Regulations and all other applicable legislation, specifically the National Environmental Management Act, No 107 of 1998 (NEMA);*
- *I will take into account, to the extent possible, the matters listed in section 38 of the NHRA;*
- *I have no, and will not engage in, conflicting interests in the undertaking of the activity;*
- *I undertake to disclose to the project proponent and the competent authority all material information in my possession that reasonably has or may have the potential of influencing -any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;*
- *I will ensure that information containing all relevant facts in respect of the project is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;*
- *I will provide the competent authority with access to all information at my disposal regarding the project, whether such information is favourable to the project or not*
- *All the particulars furnished by me in this form are true and correct;*
- *I will perform all other obligations as expected of a heritage specialist in terms of the NHRA and NEMA, associated Regulations, the constitutions of my affiliated professional bodies; and*
- *I realise that a false declaration is an offence in terms of regulation 71 of the NEMA Regulations and is punishable in terms of section 24F of the NEMA.*

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

HERITAGE CONSULTANT - Nitai Consulting (Pty) Ltd

PRINCIPAL HERITAGE PRACTITIONER – Jennifer Kitto

CONTACT PERSON - Jennifer Kitto

Tel - +27 (0) 633316606

Email – jenniferK@nitaiconsulting.co.za

SIGNATURE - ______________________________

Executive Summary

Rhino Solar PV (Pty) Ltd (the “Applicant”) has proposed the development of the 65 MW Rhino Solar Photovoltaic (PV) Project near Rustenburg, in the North West Province (the “Project”). The electricity generated by the Project will be transferred via 88 kV LILO powerlines from the on-site substation to the existing Eskom 88kV powerlines. A 100 m corridor will be assessed. The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

The Project is located approximately 10 km to the west of Rasimone central business district (CBD) and falls within Ward 6 of the Kgetlengrivier Local Municipality in the North West Province. The project footprint covers a combined area of approximately 125 ha. The site can be accessed off the Lindleyspoort road, which runs north of the site.

Methodology/ Significance Assessment

Although the desktop assessment /literature review process confirmed the presence of archaeological and historical cultural heritage resources within the surrounding region, the Site Survey fieldwork did not identify any heritage resources occurring within or close to the solar PV project area footprint (for either the Alternative 1 or Alternative 2 layouts).

Identification of Activities, Aspect and Impacts

The project area that will be impacted by the proposed grid connection project contains some areas that are currently disturbed by grazing activities.

The impact significance of the project on graves and cemeteries is low as no definite grave sites were identified. However, there is a possibility that unidentified graves could be uncovered.

The impact significance of the proposed project on protected historical structures is low as no historical structures or structure remains were identified.

The impact significance of the project on archaeological sites and materials is low as no archaeological resources were identified. However, there is a possibility that archaeological material could exist sub-surface.

Mitigation Measures

The proposed Rhino Solar PV project should have a low impact on archaeological or historical heritage resources as no archaeological or historical heritage resources (including graves) were identified within or adjacent to the project footprint area (for either the Alternative 1 or Alternative 2 layouts). However, there is a possibility that unidentified graves or archaeological material could exist sub-surface.

As both the DFFE Environmental Screening Tool and the SAHRIS Palaeontological Sensitivity Map identified the region of the project footprint as being of High Sensitivity for fossils, a separate palaeontological desktop assessment has been undertaken by a professional palaeontologist. The assessment will indicate if significant/sensitive fossils will be impacted by the proposed project and provide mitigation measures and the way forward.

Conclusion

No fatal flaws were identified during this study, therefore, it is the considered opinion if the heritage specialist that the construction of the proposed Rhino Solar PV project can proceed. There are no objections from a heritage perspective if the recommendations and mitigation measures recommended in this report are implemented. From a heritage perspective there is no difference between either of the two project layout alternatives and no preferred alternative.

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List of Abbreviations

APHP	Association of Professional Heritage Practitioners
ASAPA	Association of Southern African Professional Archaeologists
BGG	Burial Grounds and Graves
CRM	Cultural Resources Management
DALRRD	Department of Agriculture, Land Reform & Rural Development
DFFE	Department of Fisheries, Forestry and Environment
EAP	Environmental Assessment Practitioner
EIA	Early Iron Age
EMPr	Environmental Management Programme
ESA	Early Stone Age
ESIA	Environmental and Social Impact Assessment
GIS	Geographic Information System
ha	Hectare
HIA	Heritage Impact Assessment
IAIAsa	International Association for Impact Assessment South Africa
km	Kilometre (1 000m)
LIA	Late Iron Age
LSA	Later Stone Age
MSA	Middle Stone Age
NAMA	Nationally Appropriate Mitigation Actions
NEMA	National Environmental Management Act (No. 107 of 1998)
NHA	National Health Act, (No. 61 of 2003)
NHRA	National Heritage Resources Act (No 25 of 1999)
NW PHRA	North-West Provincial Heritage Resources Authority
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

1 INTRODUCTION

Rhino Solar PV (Pty) Ltd (the “Applicant”) has proposed the development of the 65 MW Rhino Solar Photovoltaic (PV) Project near Rustenburg, in the North West Province (the “Project”). The electricity generated by the Project will be transferred via 88 kV LILO powerlines from the on-site substation to the existing Eskom 88kV powerlines A 100 m corridor will be assessed. The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

The Project is located approximately 10 km to the west of Rasimone central business district (CBD) and falls within Ward 6 of the Kgetlengrivier Local Municipality in the North West Province. The project footprint is located on Portion 11 of the Farm Rhebokhoek 101, with an access road crossing Farm No. 571 and grid connection infrastructure on Portion 31 of the Farm No. 236, Portion 13 of the Farm No. 101 and the Remaining Extent of Portion 7 of the Farm No. 101, and covers a combined area of approximately 125 ha. The site can be accessed off the Lindleyspoort road which runs to the north of the site.

1.1 Scope & Terms of Reference for the HIA report

1.1.1 Summary of Key Issues & Triggers Identified During Scoping

In terms of the NHRA, the following proposed activities trigger the need for a Heritage Impact Assessment (HIA):

- Potential occurrence of heritage resources, graves and structures older than 60 years within the Project’s footprint.
- Proposed development that is more than 5000m^2
- Proposed linear development that is longer than 300m
- Proposed development where an impact assessment is triggered in terms of NEMA.

1.1.2 Approach

- Undertake a Heritage Impact Assessment in accordance with the NHRA.
- Identify and map all heritage resources in the area affected, as defined in Section 2 of the NHRA, including archaeological sites on or near (within 100m of) the proposed developments.
- Assess the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- Assess the impacts of the Project on such heritage resources.
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study.
- Identify heritage resources to be monitored.

- Comply with specific requirements and guidelines of FSHRA and SAHRA.

1.1.3 Nominated Specialist Details

Organisation:	Nitai Consulting
Name:	Jennifer Kitto
Qualifications:	BA Archaeology and Social Anthropology; BA (Hons) Social Anthropology
No. of years' experience:	24
Affiliation (if applicable):	Association of Southern African Professional Archaeologists (ASAPA) - Technical member No.444 International Association for Impact Assessment South Africa (IASAsa) – Member No. 7151

1.2 Project Description

Rhino Solar PV (Pty) Ltd (the "Applicant") has proposed the development of the 65 MW Rhino Solar Photovoltaic (PV) Project near Rustenburg, in the North West Province (the "Project"). The electricity generated by the Project will be transferred via 88 kV LILO powerlines from the on-site substation to the existing Eskom 88kV powerlines. A 100 m corridor will be assessed. The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

The Project is located approximately 10 km to the west of Rasimone central business district (CBD) and falls within Ward 6 of the Kgetlengrivier Local Municipality in the North West Province. The project footprint is located on Portion 11 of the Farm Rhebokhoek 101, with an access road crossing Farm No. 571 and grid connection infrastructure on Portion 31 of the Farm No. 236, Portion 13 of the Farm No. 101 and the Remaining Extent of Portion 7 of the Farm No. 101 and covers a combined area of approximately 125 ha. The site can be accessed off the Lindleyspoort road which runs to the north of the site.

2 LEGISLATION

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by various pieces of legislation, including the National Heritage Resources Act, 25 of 1999 (NHRA) and associated Regulations, National Environmental Management Act, Act 107 of 1998 (NEMA) and associated Regulations and, as well as the National Health Act, Act No. 61 of 2003 (NHA), specific Regulations governing human remains.

2.1 National Heritage Resources Act, No 25 of 1999 (NHRA)

The NHRA is the defines cultural heritage resources (section 3), provides protection to specific types of heritage resources (sections 34, 35, 36) and also requires an impact assessment of such resources for specific development activities (section 38(1)). Section 38(8) further allows for cooperation and integration of the management of such impact assessment between the national or provincial heritage authority (SAHRA or a PHRA) and the national environmental authority (DEFF).

In terms of section 38(1)(a) of the NHRA, the specific types of development activity that may require a Heritage Impact Assessment (HIA) include: the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length. As the proposed solar PV project footprint is larger than 5000m^2, this study falls under s38(8) and requires comment from the relevant heritage resources authority. (South African Heritage Resources Authority-SAHRA and/or the Free State Provincial Heritage Authority).

Sections 34-36 of the NHRA further stipulate the protections afforded to specific types of heritage resources, *i.e*. structures older than 60 years (s34); archaeological, palaeontological, meteorites (s35); graves and burial grounds (s36), as well as the mitigation process to be followed if these resources need to be disturbed. The construction of the solar PV project and powerline may result in impacts to any of these types of heritage resources.

2.2 National Environmental Management Act, Act 107 of 1998 (NEMA)

NEMA states that an integrated Environment Management Plan (EMP) should, (23 -2 (b)) "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". In addition, the NEMA and associated Regulations GNR 982 (Government Gazette 38282, 14 December 2014, amended 2017) state that, "the objective of an environmental impact assessment process is to, … identify the location of the development footprint within the preferred site … focussing on the geographical, physical, biological, social, economic, *cultural and heritage aspects* of the environment" (GNR 982, Appendix 3(2)(c), emphasis added).

The EIA Regulations, 2014 (as amended), published in GNR 982 of 2014 (Government Gazette 38282) promulgated under the (NEMA) contain specific requirements to be addressed in the different types or impact assessment repots (Regulations 19, 21 and 23) as well as requirements for Specialist Reports (Appendix 6).

2.3 The National Health Act, No. 61 of 2003 (NHA), Regulations 2013

In the case of graves and/or burial grounds that could be impacted by a proposed development, and which are identified through an impact assessment, specific Regulations relating to the Management of Human Remains (GNR 363 of 2013 in Government Gazette 36473) address the exhumation and reburial of human remains: Regulations 26, 27 and 28.

3 ASSUMPTIONS AND CONSTRAINTS

This assessment assumes that all the information provided by the Applicant and Environmental Assessment Practitioner (EAP) regarding the project footprint (Including the powerline) is correct and current.

The project area traverses various properties separated by fences, and access was sometimes restricted by locked gates .

The large area of the project footprint meant that it was not feasible to undertake a pedestrian survey of the whole area and the fieldwork therefore, comprised a combination of vehicle and pedestrian investigation. The extremely dense and long vegetation in several areas meant that archaeological and heritage visibility was low in those areas. Therefore, there is a possibility that some heritage resources were not identified, specifically, informal graves or burial sites and archaeological material that often occurs sub-surface.

4 PROJECT DESCRIPTION

4.1 Location

The Project is located approximately 10 km to the west of Rasimone central business district (CBD) and falls within Ward 6 of the Kgetlengrivier Local Municipality in the North West Province. The site can be accessed off the Lindleyspoort road which runs to the north of the site.

The Rhino Solar PV Project is located on Portion 11 of the Farm Rhebokhoek 101. There is also an access road crossing Farm No. 571 and grid connection infrastructure on Portion 31 of the Farm No. 236, Portion 13 of the Farm No. 101 and the Remaining Extent of Portion 7 of the Farm No. 101. The proposed project will cover up to approximately 125ha and is intended to generate up to 65MW.

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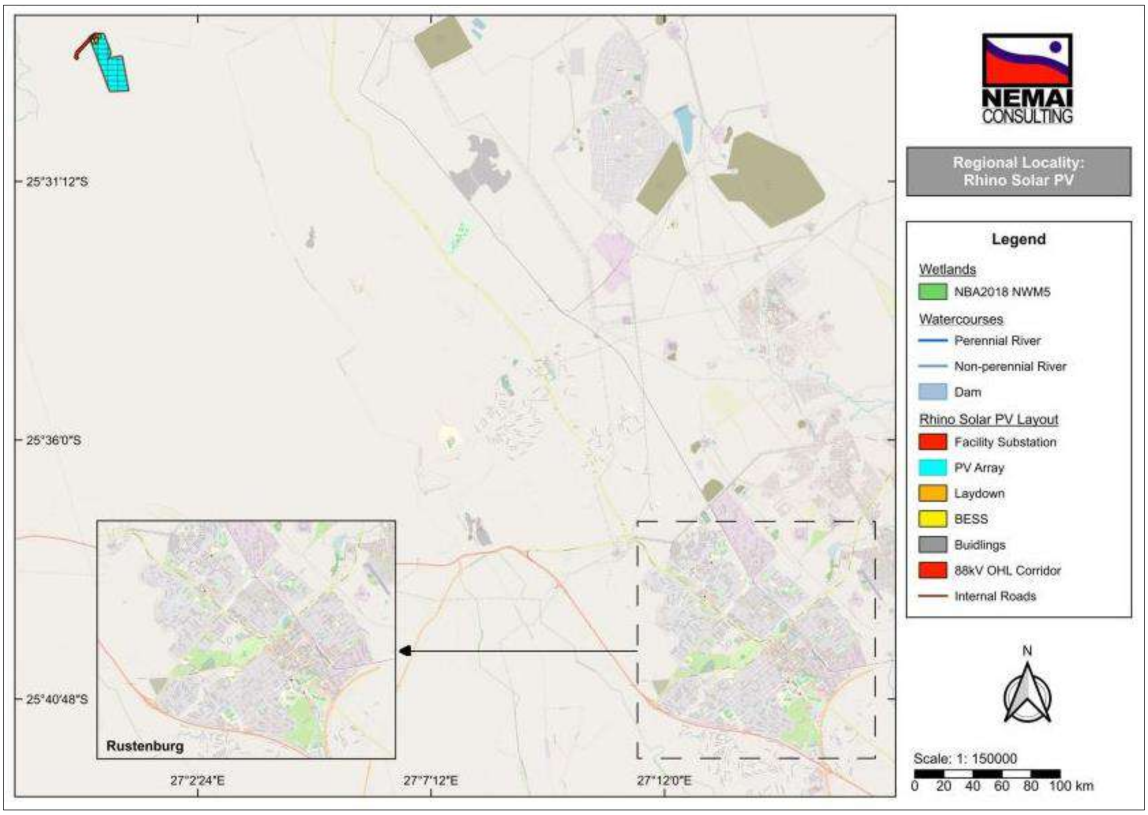

Figure 1: Rhino Solar PV project Locality near Rustenburg (blue polygon) with Powerline corridor (red)

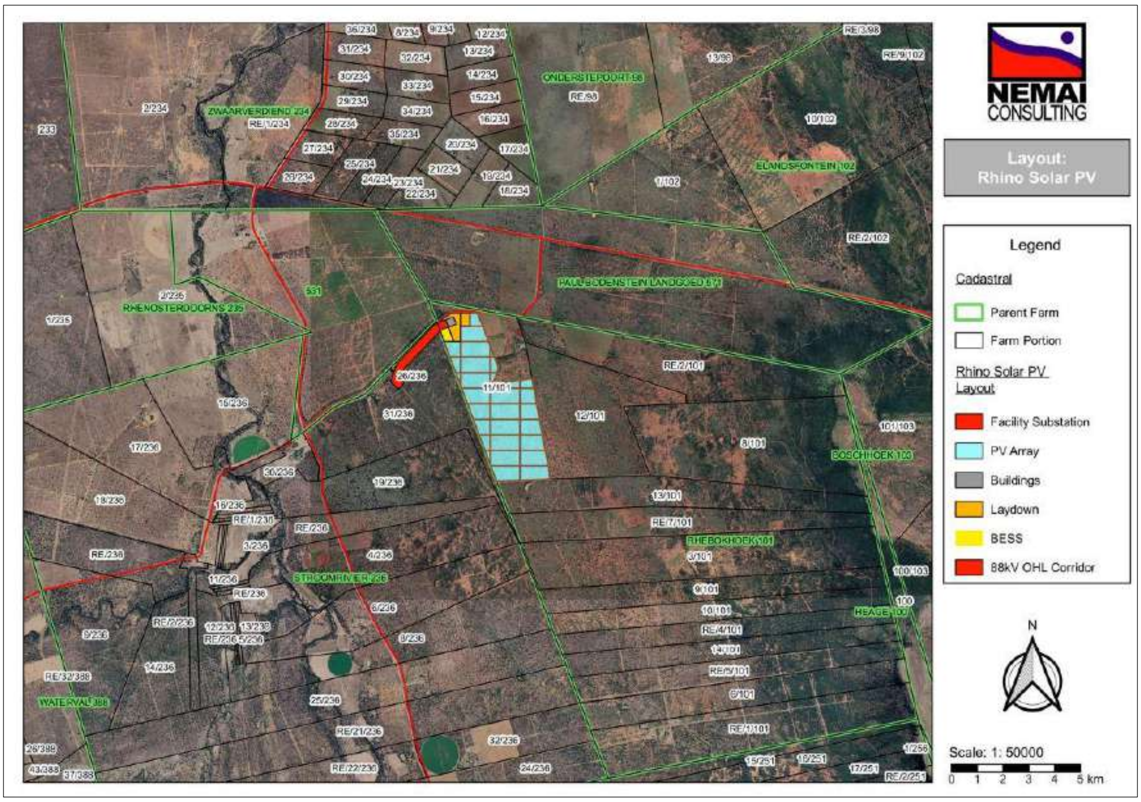

Figure 2: Rhino Solar PV Project Locality (blue polygon) with powerline corridor (red) -Alternative 1 Layout (Northern powerline)

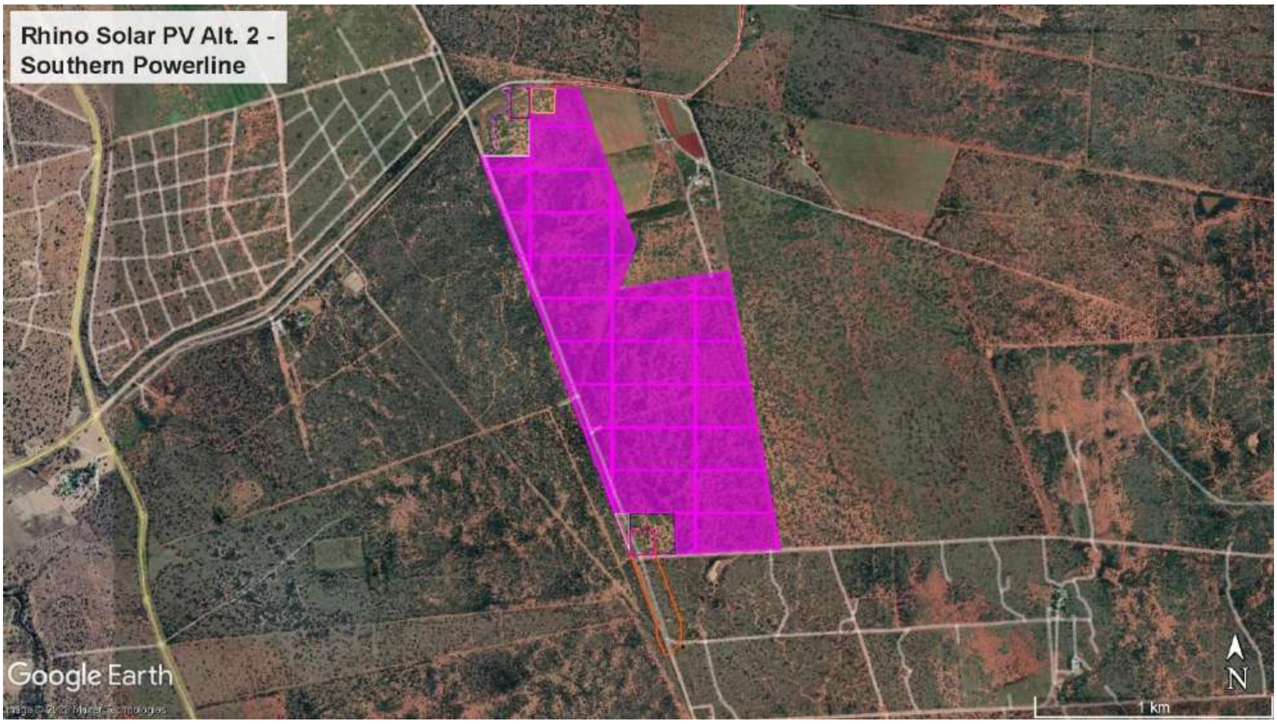

Figure 3: Rhino Solar PV Layout – Alternative 2 (southern powerline)

4.2 Project Technical Details

4.2.1 Solar Technology

Solar energy facilities operate by converting solar energy into a useful form (i.e., electricity). The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. Solar power produces an insignificant quantity of greenhouse gases over its lifecycle as compared to conventional coal-fired power stations. The operational phase of a solar facility does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution, as fossil fuel power generation technologies do.

4.2.2 PV Technology Overview

PV technology produces direct current (DC) which is then converted to alternating current (AC) via power electronic inverters. The main technology categories are crystalline modules (mono or poly), thin film, and concentrated photovoltaics (CPV). **Figure 4** below provides an overview of a typical Solar PV Power Plant.

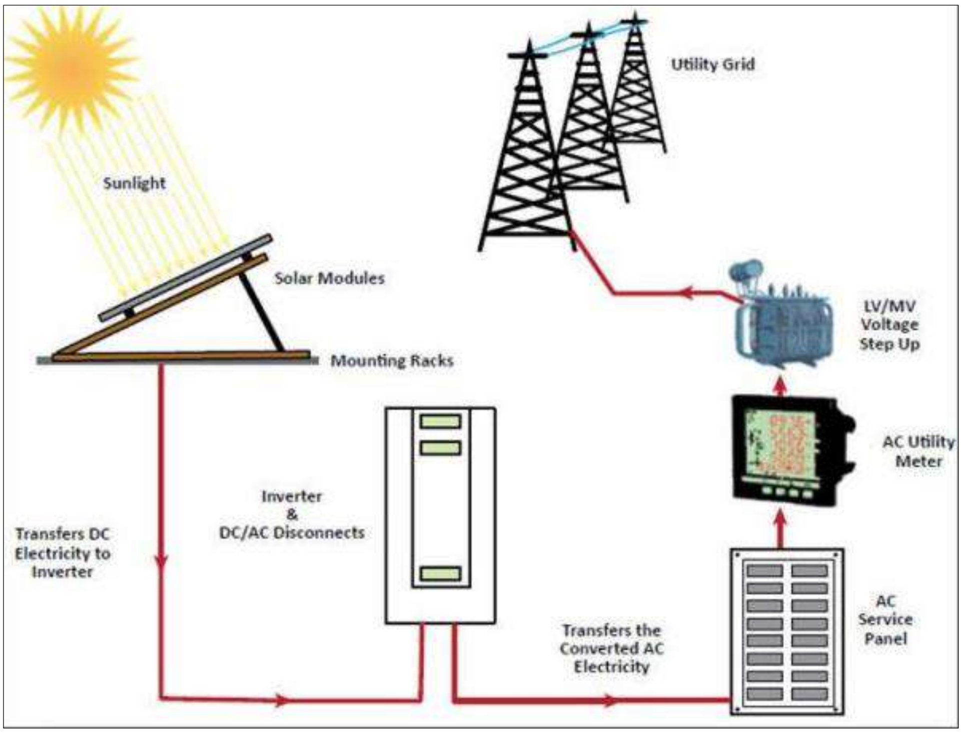

Figure 4: Overview of Solar PV Power Plant (International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plan.)

The proposed Solar PV Projects have a design life of a minimum of 25 years. The extension of the life of the plant will be considered when assessing the plant's economic viability to remain operational after its end of life.

4.2.3 Overview of Technical Details:

The technical details of the proposed Rhino Solar PV Plant are captured in Table 1 below.

Table 1: Technical details of the proposed PV Plant

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
1.	Height of PV panels	Up to 5 m	Up to 5.5 m
2.	Area of PV Array	Up to approximately 112 ha	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems. Area: Up to 115 ha
3.	Area occupied by substations	Up to 1 ha	It is estimated that the maximum size of the facility substation will not exceed 1 ha. Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling).

No.	Component	Alternative 1 - Description / Dimensions	Alternative 2 - Description / Dimensions
4.	Capacity of on-site substation	High voltage (up to 132 kV)	The facility substation will collect the power from the facility and transform it from medium voltage (up to 33 kV) to high voltage (88 or 132 kV).
5.	BESS	Area up to ± 4 ha	Area: up to ± 4 ha
6.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 5 ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary construction laydown area up to 5 ha. Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
7.	Area occupied by buildings	Up to 1 ha	Up to 1 ha
8.	Length of internal roads	Up to 10 km	Up to 10 km
9.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10.	Proximity to grid connection	Approximately 750m	Approximately 750m to the Eskom Rhino Substation
11.	Height of fencing	Up to 3.5 m	Up to 3.5m
12.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

4.2.4 Project Layout

The layout of the Solar PV Plant is shown in Error! Reference source not found. and **Figure 3** above. The desirability of the earmarked site for the development of the proposed Solar PV Plant is due to the following key characteristics:

- Solar Irradiation: The feasibility of a solar facility is dependent on the direct solar irradiation levels. The Project Area is considered to have favourable solar irradiation levels, which makes it ideal for the production of solar power via PV Panels.
- Topography: The suitability of the surface area is an important characteristic for the construction and operation of solar facilities. Most of the site has a low gradient slope and is suitable for this development.
- Grid connection: The electricity generated by the Solar PV Plant will be injected into the existing Eskom National Grid via 275kV powerlines (LILO) between the Eskom substation/switching station and the existing 275kV lines adjacent to the site.
- Extent of site: The overall extent of the site is sufficient for the installation of the PV facility

- Site access: The site can be accessed off the Lindleyspoort road which runs to the north of the site

The proposed Solar PV Projects include the following infrastructure:

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Facility grid connection, including:
  - Up to 132 kV powerline between the on-site substation and the existing Eskom grid infrastructure.
- Temporary construction laydown area up to 5 ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main access road is up to 8 m wide. The sites will be accessible via existing provincial roads, located adjacent to the development area.

5 STATUS QUO ANALYSIS

5.1 General Existing Condition of Receiving Environment

The Rhino Solar PV Project will be located on Portion 11 of the Farm Rhebokhoek 101. There is also an access road crossing Farm No. 571 and grid connection infrastructure on Portion 31 of the Farm No. 236, Portion 13 of the Farm No. 101 and the Remaining Extent of Portion 7 of the Farm No. 101 .

The areas affected by the proposed Project footprint are rural in nature. The Project's PV Site is used for grazing. The Project's power line connection to the Eskom grid is located approximately 750 m from the Project area.

The general area is covered mostly with acacia trees with large areas of bare earth and small patches of grass mixed with other vegetation. The terrain is extremely flat.

Figure 5: View looking north-east over the southern portion of the project footprint area, showing the acacia trees and bare earth

Figure 6: View of south-west section of the project footprint showing a small area with grass

Figure 7: View looking east over the central section of the project footprint

Figure 8: View of central section of the project footprint showing shorter grass with patches of grass and other vegetation

5.2 Cultural-Heritage Receiving Environment

5.2.1 DFFE Environmental Screening Tool

The DFFE Environmental Screening Tool was accessed for information on the cultural-heritage sensitivity of the general region. This tool indicated that the Archaeological and Cultural Heritage Sensitivity of the general region is Low for both Alternative 1 and Alternative 2 layouts (**Figure 9** and **Figure 10**). However, the Palaeontological Sensitivity of the general region is indicated as being mainly High with a small area of Medium sensitivity for both Alternative 1 and Alternative 2 layouts (**Figure 11** and **Figure 12**).

Figure 9: Archaeological Cultural Sensitivity map indicating that the project footprint is located within a region of low heritage sensitivity (DFFE Screening Tool).

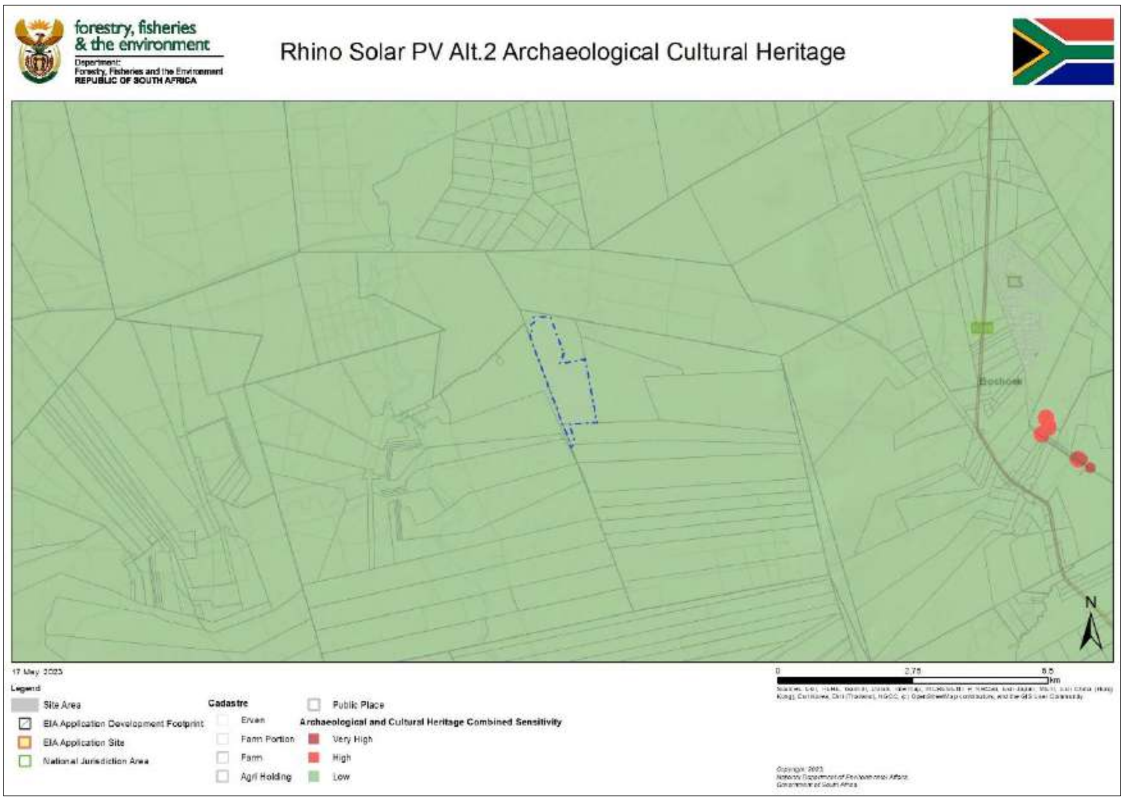

Figure 10: Archaeological Cultural Sensitivity map indicating that the project footprint is located within a region of low heritage sensitivity (DFFE Screening Tool).

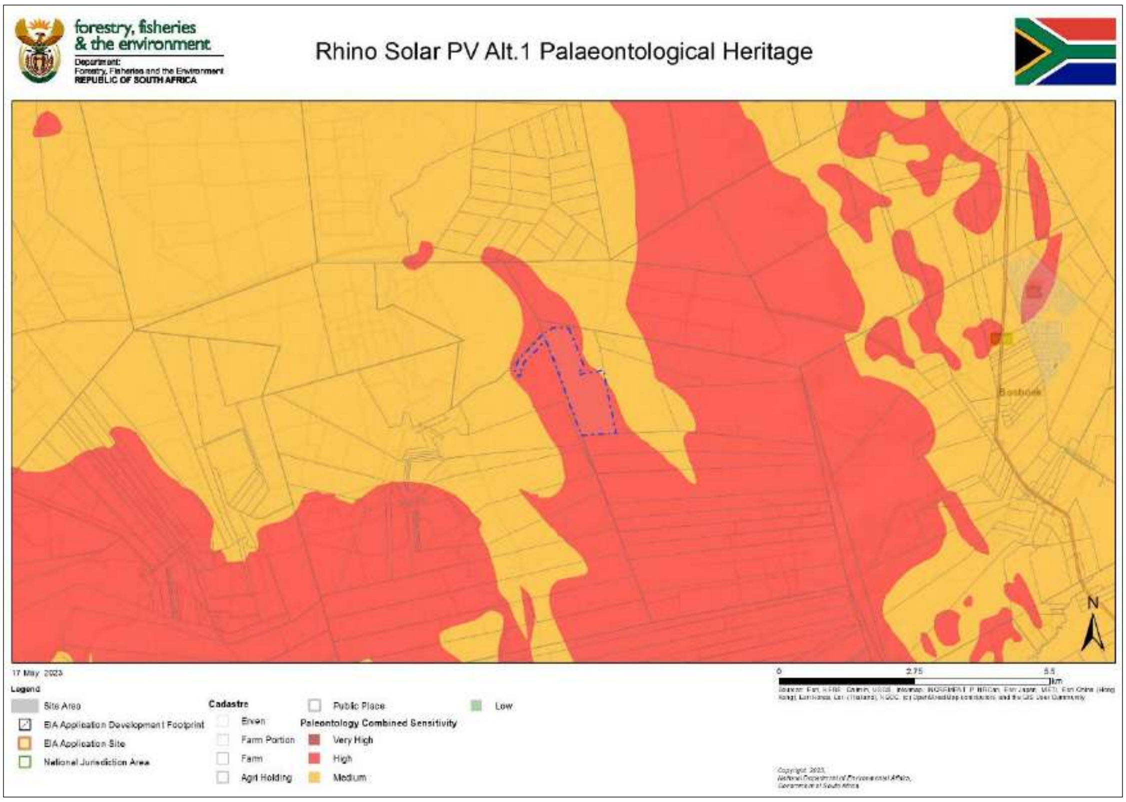

Figure 11: Palaeontological Sensitivity map indicating that the project footprint Alternative 1 is located within a region of High sensitivity for fossils (DFFE Screening Tool).

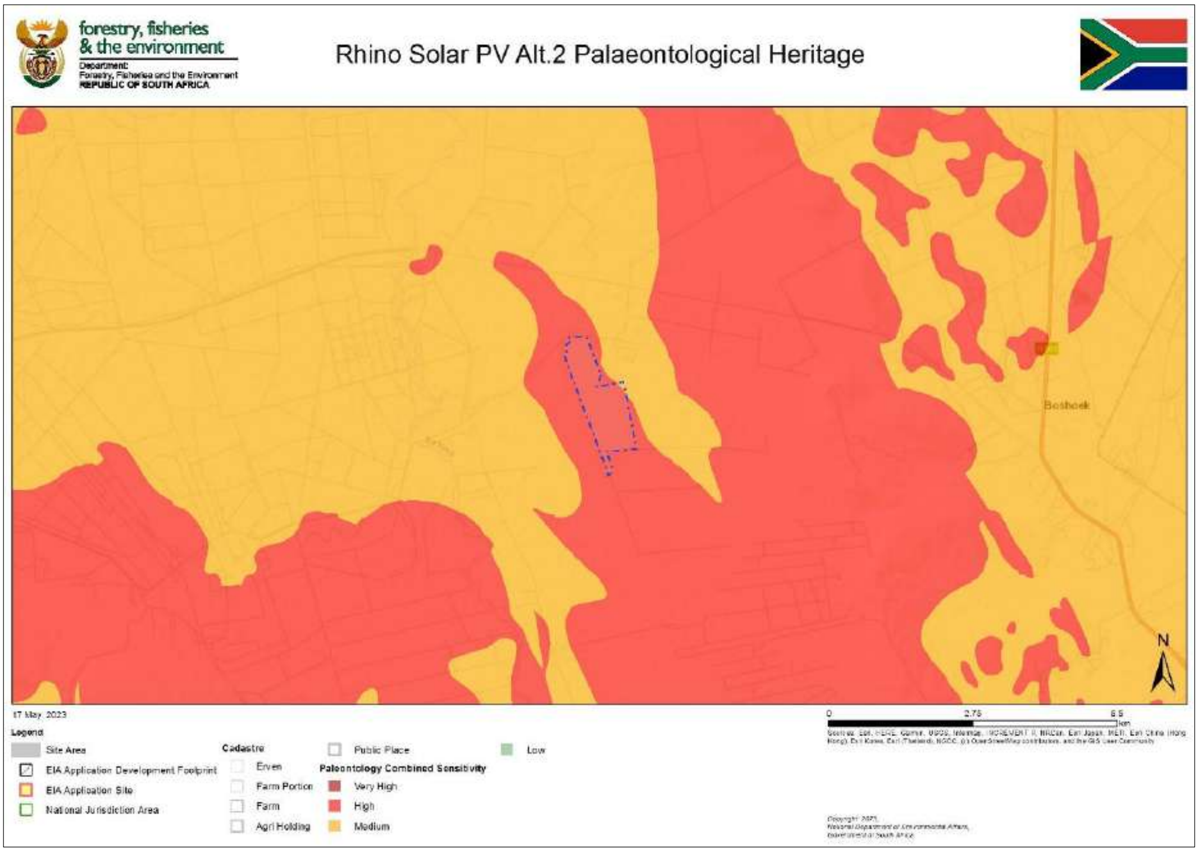

Figure 12: Palaeontological Sensitivity map indicating that the project footprint Alternative 1 is located within a region of High sensitivity for fossils (DFFE Screening Tool).

5.2.2 Historical Background of Surrounding Region (archaeological and historical literature survey)

The archaeological history of the area can be divided into a Stone Age, Iron Age and Historic or Colonial Period. An archaeological and historical overview of the general region is presented below.

The Stone Age

The Earlier Stone Age (ESA) is the oldest archaeological period found in Southern Africa. The ESA dates from about 2 million to 250 000 years ago and includes two technological phases or industries. The earliest industry is known as Oldowan, after the Olduvai Gorge in Tanzania where the stone tools were recognised in the 1960s (Esterhuysen and Smith, 2007). This industry is associated with basic flakes and hammer stones. It dates to approximately 2 million years ago. The second phase is known as Acheulian (named after a site in France where they were discovered in the 1800s), which includes stone artefacts that are more specialised, such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago. A number of ESA sites have been identified within the general vicinity of Rustenburg. One ESA quarry site that was identified by a previous HIA survey is located roughly 18km north-east of the current study area (Coetzee 2015).

The Middle Stone Age (MSA) period began around 250 000 years ago and is associated with flakes, points and blades produced more intentionally by what is called the "prepared core" technique. Many of these stone tools also show evidence of being attached to bone or wood shafts to produce spears, knives or axes (Esterhuysen and Smith, 2007). This phase is associated with modern humans and evidence of the development of complex cognition (Wadley, 2013). A few MSA tool scatters have been identified in previous surveys, mostly located to the east of Rustenburg, between 30-40km from the current study area (Huffman 2005).

The Later Stone Age (LSA) is the third archaeological phase, which occurred from about 20 000 years ago and is marked by increased technological complexity as well as social transformations. The technological changes include very small stone tools called microliths; innovations such as the bow and the link-shaft arrow; stones with holes bored through the middle (digging-stick weights); polished and decorated bone tools; ostrich eggshell beads. There is also evidence of ritual practices and complex societies (Deacon & Deacon 1999). This period is associated with hunter-gatherer populations (San) as well as early pastoralist groups (Khoekhoe) and continued until the arrival of Iron Age and European communities (including a considerable period of interaction) .

The LSA is also associated with the production of rock engravings and rock paintings. Rock engravings are known from the wider vicinity of the study area (Bergh, 1999). A rock engraving site was identified by Huffman (2005) roughly 44km south-east of the current study area.

The Iron Age

The Iron Age in South Africa (AD 1600 – AD 1840) is associated with pre-colonial farming communities and includes both agricultural and pastoralist farming activities, metal working, cultural customs such as lobola and stone-walled settlements described as the “Central Cattle Pattern” by Huffman (2007). Four main groups or periods (distinguished by ceramic styles) have been identified by Huffman (2007) as occurring in the general region.

The earliest Iron Age group or period known within the general region dates to AD 1450 – AD 1650 and is represented by the Ntsuanatsatsi sub-group (“facies”) of the Blackburn Branch of the Urewe Ceramic Tradition. The decoration on these ceramics is characterised by a broad band of stamping in the neck, stamped arcades on the shoulder and appliqué designs. Huffman has argued that the Ntsuanatsatsi facies is closely related to the oral histories of the early Fokeng people and represents the earliest known movement of Nguni people out of the area now known as Kwazulu-Natal into the interior of South Africa (Huffman, 2007).

The second Iron Age facies that has been identified around the study area is called the Olifantspoort facies of the Moloko Branch of the Urewe Ceramic Tradition and dates between AD 1500 - AD 1700. The main decorative features of these ceramics are multiple bands of fine stamping or narrow incisions separated by colour (Huffman, 2007). The type-site for this facies is located on the farm Olifantspoort 328 JQ, which is situated approx. 43km south-west of the present study area.

Several sites associated with the Olifantspoort ceramic style are known from the general vicinity of the study area. The closest sites were identified within the Anglo Platinum UG2 Expansion Project Area (Huffman, 2005), which is located roughly 30-40km south-east of the current study area.

The third Iron Age period to be identified within the general region is the Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition (AD 1650 – AD 1850). The decoration on these ceramics is in the form of stamped arcades, appliqué of parallel incisions, stamping and cord impressions and is described as combining the characteristics of both Ntsuanatsatsi (Nguni) and Olifantspoort (Sotho) ceramics (Huffman, 2007). This means that the Uitkomst pottery is viewed as a successor to the Ntsuanatsatsi facies and Huffman has argued that the Uitkomst ceramics are directly associated with the Bafokeng people who had gradually moved from Ntsuanatsatsi Hill in the present-day Free State Province to the north, coming into contact and interacting with Sotho-Tswana groups (Huffman 2007). It should be noted that not all researchers agree with this theory.

The type-site for this ceramic style is Uitkomst Cave, which is situated approximately 86km south-east of the study area. The site was one of five caves excavated in the Magaliesberg area by Professor Revil Mason. Uitkomst sites are well known from the surroundings of the study area. Huffman (2005) noted several examples of Uitkomst sites from the general vicinity, including one stone-walled site associated with a rock engraving (located roughly 37km to the south-east).

The subsequent phase of the Late Iron Age period identified in the general region is known as the Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition. It dates to between AD 1700 and AD 1840. The characteristic decoration on these ceramics includes rim notching, broadly incised chevrons and white bands, as well as the use of red ochre (Huffman, 2007). The Buispoort facies is associated with sites such as Boschhoek, Buffelshoek, Kaditshwene, Molokwane and Olifantspoort (Huffman, 2007). These sites are all situated within the broader Rustenburg/ North-West region.

During the Later Iron Age period, the region around present-day Rustenburg would have been occupied by the Bafokeng and the Tlokwa people (Birkholtz et al 2020). Birkholtz et al (2020) cite Mbenga and Mason's reference to an estimation by Prof. RD. Coertz that the Bafokeng had settled in this area by the end of the 17th century and that the capital of the Bafokeng had moved to the Boschpoort area. The farm Boschpoort 284JQ is situated roughly 38km south-east of the present study area.

Professor Huffman has identified a large number of Late Iron Age sites in the areas to the immediate east of Rustenburg, such as Photsaneng and Thekwane (Huffman, 2005). Photsaneng and Thekwane are located roughly 40-45km south-east of the current project area. Francois Coetzee has also identified large numbers of Late Iron Age sites across the Pilanesberg National Park which is located approximately 8 km north of the present study area.

Three major historical-archaeological sites are located in the immediate vicinity of the current project area: Molokwane, Boitsemagano and Marothodi. A short description of these sites follows below.

<u>Molokwane and Boitsemagano Mega-sites</u>

Molokwane and Boitsemagano are two extensive stone-walled archaeological sites near Rustenburg which were occupied from AD c.1600 by the Bakwena Bamodimosana group (Pistorius 1994). The archaeological site of Molokwane occurs on the farm Selonskraal (3 I7 JQ) in the Rustenburg district of the Transvaal. The site is located 15 km west of Rustenburg and 25km south of the current project area. Boitsemagano is the second mega-site which is located on the farm Shylock (256 JQ).This site is situated 18km south of the current project area.

Pistorius (1994) states that oral tradition, and information from spokesmen of the Bakwena Bamodimosana Bammatau, both confirm that the stone-walled complex on Selonskraal was the previous residence of the Bammatau group and was known as Molokwane. The oral histories further relate that the Bakwena Bamodimosana originated from Rathateng and initially settled at Mafatle in the Rustenburg district where the group divided into four sections. Two of these developed into the groups known as the Bakwena Bamodimosana Bammatau and the Baramanamela who occupied two separate villages, namely, Molokwane and Boitsemagano (Pistorius 1994). Pistorius states that the stone walls on the present-day Selonskraal (317 JQ) and the adjacent farm Moedwil (254 JQ) were built when the Bammatau settled in the area during the early eighteenth century.

Marothodi

During the 1980s, Eskom identified a Late Iron Age stonewalled megasite at Vlakfontein, to the west of the Pilanesberg. The site was assessed initially by Professor Revil Mason of the University of the Witwatersrand (Mason, 1986). More recently, the site was excavated by Dr Mark Anderson for his Doctoral Thesis at the University of Cape Town (Anderson, 2009). Anderson notes that according to oral history the site is associated with the Batlokwa ba ga Sedumedi group which settled at Marothodi from 1815 until c. 1823, when their capital was moved to present-day Botswana (Anderson, 2009). Anderson's excavation at Marothodi confirmed the association of the Tlokwa with the Uitkomst ceramic facies, which is part of the Fokeng cluster. Some elements of Buispoort pottery also appearing in the assemblage. Anderson's research also revealed a significant emphasis on metal production, especially copper, at Marothodi. He notes that copper could possibly have been valued high enough to be exchanged for cattle, and that the large cattle enclosures at the site may have been the result of trade with other communities (Anderson, 2009). This site is located approximately 16.5km northwest of the project area.

Historical/Colonial Period

During the late 1700s, there was apparently a period of conflict between the Bafokeng and their Batswana neighbours. During this time the Bafokeng established a settlement in the vicinity of present-day Rustenburg which was called Tlhabane (Birkholtz et al 2020). Around 1800, the Bafokeng then moved from Thlabane to Phokeng, which was situated a distance to the north-west (Birkholtz et al 2020).

Between 1827 to 1832 the Khumalo Ndebele of Mzilikazi moved into the area from the central Vaal River and settled along the Magaliesberg Mountains. Around 1832 the Khumalo Ndebele then moved northwest to the Marico River area (Bergh, 1999).

The first Voortrekker parties started crossing the Vaal River in 1836 (Bergh, 1999). Subsequently, the earliest farms in the region were established from the late 1830s to the early 1840s, around the vicinity of the present day town of Rustenburg (Bergh, 1999). The young Paul Kruger, (who later became President of the Zuid-Afrikaansche Republiek from 1883 to 1902) was one of these farmers. His family had been part of one of the early trek groups which settled in the area (Pretorius 1967). In 1851 both the district and town of Rustenburg were established (Bergh, 1999). The project area fell within the Rustenburg district.

Several mission stations were established in the general region from the mid-nineteenth century. In 1858 a Lutheran Mission Station was opened on the farm Kronendal, in the area of the present town of Kroondal (Erasmus, 2014). The town of Kroondal is situated approx. 38.66km south-east of the present study area. In 1867, a second mission station was established by a Hermannsburg missionary on the farm Tweedepoort 283 JQ (Bergh, 2005) which is located roughly 34km south east of the project area. In December 1869, this mission station (called Kana) was moved to the farm Reinkoyalskraal 278 JQ (Bergh, 2005). The new location of the Kana Mission Station is located roughly 32km south east of the study area.

Between the 1860s to 1870s, the Hermannsburg Missionary Society assisted Kgosi Mokgatle of the Bafokeng and his people to buy a number of farms in the area around Rustenburg (Bergh, 2005). Birkholtz et al (2020) cite Mbenga & Manson's statement that a total of 24 farms were acquired by the Bafokeng. Two of these farms are located relatively close to the present project area: Turffontein (located roughly 38km south east of the current project area) and a portion of the farm Klipfontein (the present farm Waterval 303 IQ was created from a portion of the original farm Klipfontein).

The First South African War (First Boer War) between the British Empire and the Boer Republics took place from 1880-1881. The most significant event of the war for the town of Rustenburg would have been a three month long siege by Boer forces of a company of 2nd Batallion Royal Scots Fusiliers in the town ((Birkholtz et al 2020).

During the Second South African War (1899-1902), the Rustenburg area was significant due to its strategic position halfway between Zeerust and Pretoria as well as near the two main passes over the Magaliesberg range of Olifants Nek and Magato's Nek. This resulted in the town suffering a series of occupations by both the British and the Boer forces. Between 15 June and 7 August 1900, the town was occupied by a British force under Major-General Baden-Powell until Lord Roberts' decision to evacuate all the smaller British positions in the Western Transvaal. After the British evacuation, the Boer forces occupied Rustenburg from 7 August until 16 August 1900, when a British force under Lord Methuen succeeded in reoccupying the town. However, the British evacuated the town again at the end of August 1900. On 26 September 1900 General Cunningham's column occupied the town and Rustenburg remained in British hands until the end of the war in 1902 (Birkholtz et al 2020).

Although several battles occurred in the general region around Rustenburg, an engagement that happened relatively close to the project area is the Battle of Moedwil. During September 1901, the Boer General de la Rey had moved closer to Rustenburg, with two British columns under Colonels Kekewich and Fetherstonhaugh actively searching for him and his men. On 22 September 1901, Colonel Kekewich had begun marching his column along the Elands River and by the afternoon of 29 September they had arrived at Moedwil Farm which was situated on the Selons River, about 25 km west of Rustenburg and made camp there overnight. The column had not encountered any Boers during the previous week and they believed there were no Boers in the area. In the meantime, de la Rey had made contact with General Kemp and they had planned to attack Kekewich's camp. Just before 5 am on the morning of 30 September Kemp began his attack on the camp. He sent two outflanking wings to surround the British camp, while the main centre thrust advanced from the Selons River. The attack surprised the British and many of the horses stampeded which left the camp-site in confusion. The British first moved towards the river to confront their attackers when they received reports that the Boers were attacking the rear of the camp as well. As the camp contained a large number of stores, which Kekewich was unwilling to abandon, he directed his forces to close in upon the river bank and fight at close quarters to drive the Boers out from their command of his camp. Wulfsohn's account of this battle states that the Boers began to withdraw at around 6am as they realised they were heavily outnumbered and running out of ammunition (Moedwil - Battle Tours ZA; Birkholtz et al 2020). The British losses were 61 killed or fatally wounded and 158 wounded, including Kekewich himself and a large number of horses and draught animals were lost. The Boer losses were 11 killed and 35 wounded (Birkholtz et al 2020; Moedwil - Battle Tours ZA). The Moedwil Battlefield and Anglo Boer War Gravesite is located approximately 19.60km south of the current project area, near the N4 highway.

The next significant development in the Rustenburg area was the discovery of platinum ore. In 1924, the geologist Hans Merensky was shown a sample of ore that had been found near Lydenburg by Mr. Andries Lombard. Merensky subsequently was able to trace a platinum reef all the way from Lydenburg to Rustenburg. This reef became known as the Merensky Reef (Carruthers, 2007). Following this discovery, several companies were floated between 1925-1927 to mine the platinum reef in the area around Rustenburg (Carruthers, 2007). These companies included the following: Potgietersrust Platinums was registered 27 August 1925, the Waterval (Rustenburg) Platinum Mining Company Limited was registered on 29 September 1926 and in 1927 the Potgietersrust Platinum Mines Limited applied for the re-proclamation of the farm Rustenburg Townlands (Birkholtz et al 2020). On 11 September 1931, the Rustenburg Platinum Mines Ltd was formed by the amalgamation of Potgietersrust Platinums and the Waterval (Rustenburg) Platinum Mining Company (Birkholtz et al 2020).

Recent/ Modern history

In 1966 the Apartheid government forcibly relocated the Bakubung ba Ratheo from Molotestad near Boons (roughly 69km south-east of the present study area) to the farms Wydhoek, Ledig and Koedoesfontein near Saulspoort in the Pilanesberg district. When Bophutatswana was established a decade later, these farms were handed over to the Bantustan (Oosthuizen and Molokoe 2000). These farms are located directly north of the study area. 6 December 1977 The South African government granted independence to Bophutatswana on 6 December 1977 (Oosthuizen and Molokoe 2000).

On 16 August 2012, the South African Police Service (SAPS) opened fire on a crowd of striking mineworkers at Marikana, in the North West Province. This action resulted in the deaths of 44 mineworkers with 78 being seriously injured. Subsequently, a large number (250) of the miners were arrested.

This event followed a series of incidents between 9-14 August associated with an unsupported strike called by a large section of the mineworkers at Lonmin platinum mine. Subsequent events became increasingly violent, resulting in the deaths of at least four miners, two police officers and two security guards between 12- 14 August. On 14 August Lonmin officially halted production at the Marikana platinum mine. The miners had congregated on a hill called Wonderkop near the Lonmin mine and a large number of police had been deployed, including military police vehicles and helicopters. Sources are unclear on what led to the police opening fire, as some accounts blame the police and others blame the mineworkers. The role of the two mineworker Unions and the reaction of Lonmin management in the situation has also been questioned. This terrible event resulted in the establishing of a judicial commission of inquiry to investigate the matters that resulted in the tragedy (Marikana Massacre 16 August 2012 | South African History Online (sahistory.org.za)).

5.2.3 Cartographic findings

An assessment of available historical topographical maps was undertaken to establish a historic layering for the study area. Overlays of the maps were made on Google Earth. These historic maps are valuable resources in identifying possible heritage sites and features located within the study area. It should be noted that the earliest edition of the map sheets for this area dates to the 1960s. As the first edition of this sheet dates to 1963, it was not considered necessary to examine the later edition map sheets. Any heritage resources that are 60 years or older would be depicted on the 1963 edition sheet.

The topographical maps were obtained from the Department of Agriculture, Land Reform and Rural Development (DALRRD) in Cape Town.

The following 1:50 000 map sheet was assessed for the Rhino Solar footprint: 2527AC Heystekrand Edition 1 1963. The map was surveyed in 1963 and drawn in 1964 by the Trigonometrical Survey Office of the Republic of South Africa from aerial photographs taken in 1961.

As can be seen in **Figure 13,** the 1963 edition map depicts no heritage features within the Rhino Solar PV footprint (Alternative 1). The only heritage features depicted in the vicinity are two groups of structures and one homestead which are located outside the footprint, east of the northern section. Note that **Figure 14** shows the Alternative 2 Layout.

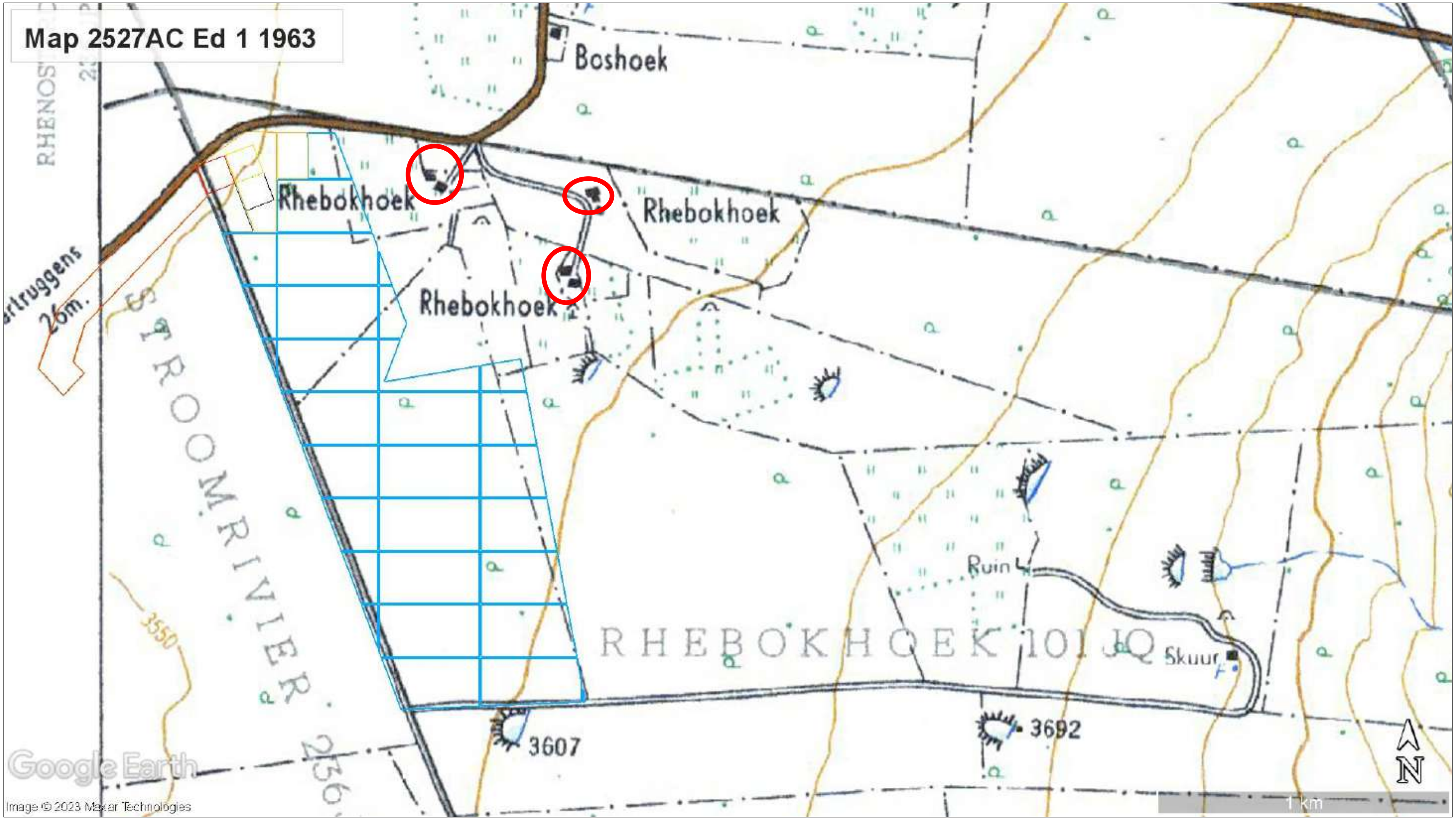

Figure 13: Enlarged view of topographic map 2527AC Ed 1 1963, with Rhino Solar PV footprint Alternate Layout 1 (Northern powerline) overlain. Two groups of structures and one homestead are depicted outside and east of the footprint, (red polygons. No heritage features are depicted inside the Alternative 1 layout

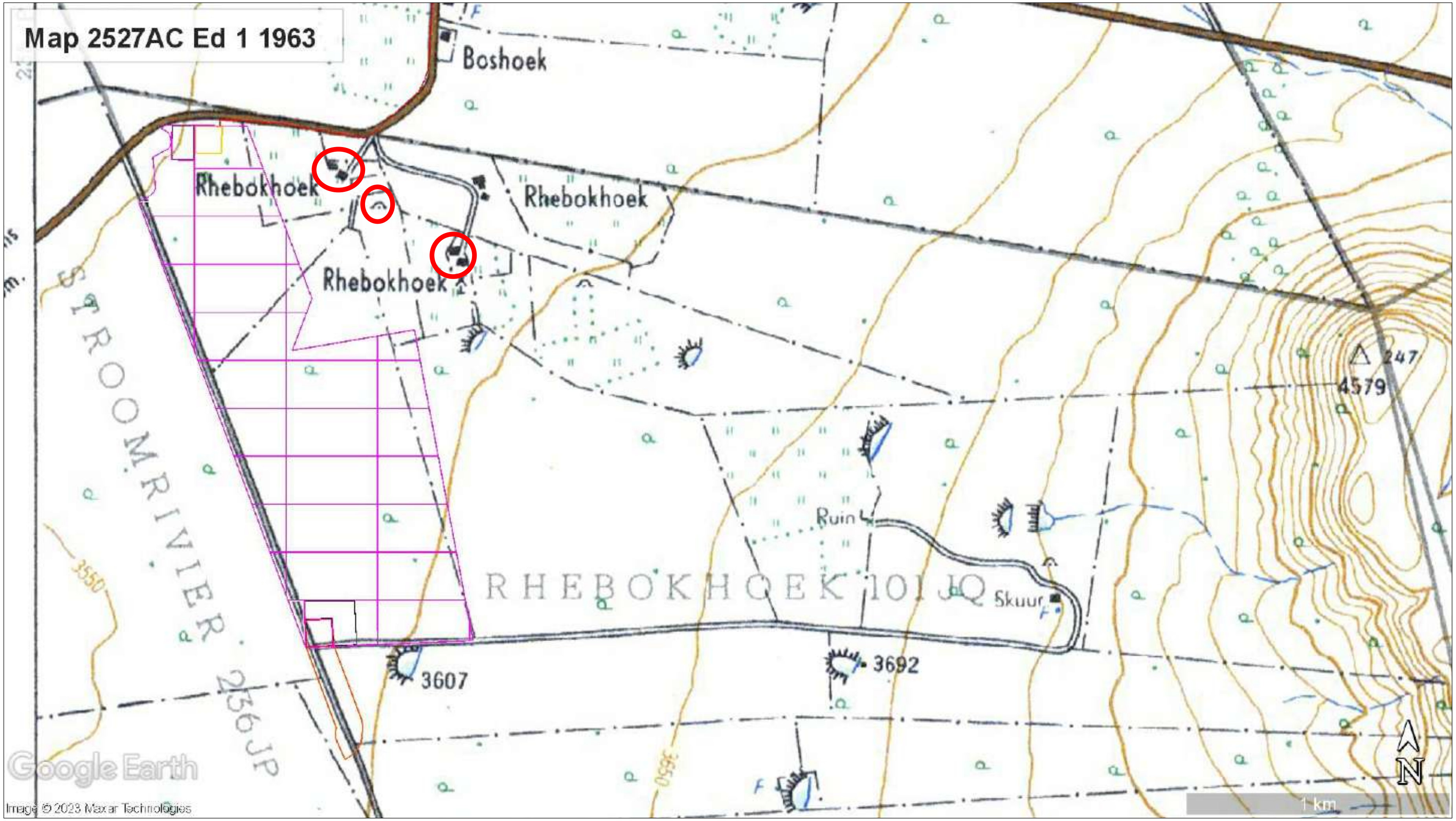

Figure 14: Enlarged view of topographic map 2527AC Ed 1 1963, with Rhino Solar PV footprint Alternate Layout 2 (Southern powerline) overlain. Two groups of structures and one homestead are depicted outside and east of the footprint, (red polygons. No heritage features are depicted inside the Alternative 2 layout

5.3 Previous HIA reports in the area

A search on the South African Heritage Resources Information System (SAHRIS) has identified several Heritage Impact Assessments conducted in and around the study area.

Pistorius, J. 2000. *An Archaeological Scoping Report Supplemented With a Phase I Archaeological Survey for SA Chrome's Proposed New Ferrochrome Smelter on the Farm Boschhoek 103JQ in the Rustenburg District of the Central Bankeveld in the North West Province*. Two historical structures, two recent graveyards and a third possible graveyard were identified in the study area.

Dreyer, C. 2006. *First Phase Archaeological and Cultural Heritage Assessment of the Proposed Development Site at the Farm Wildebeestfontein JQ274, Rustenburg, North West Province*. The site is part of the existing mining activities and no cultural or historical remains were found in the development area.

Fourie, W. 2009. *Isotium (Pty) Ltd (Isotium) – Royalty Fair Resort on Portion 35 of the farm Buffelspoort 343 JQ, District Rustenburg, North West Province.* Five sites of cultural significance were identified in this study area: two Iron age stone walling sites, two historical mine cuttings and one comprising possible homestead remains.

Pistorius J. 2011. *A Phase I Heritage Impact Assessment (HIA) Study for Lonmin Platinum's Proposed Exploration Activities on Vlakfontein 207JP and Diamand 206JP near the Pilanesberg in the North-West Province*. The HIA investigated Lonmin's proposed exploration activities of ten drill holes on the farms Vlakfontein 207JP and Diamand 206JP to the south-west of the Pilanesberg. The farm Vlakfontein contains the Late Iron Age/historical stone-walled town known as Marothodi which was the Tlokwa capital (*motse*), one of four mega-sized stone walled settlements in the North-West.

Magoma M. 2016. *Phase 1 Archaeological Impact Assessment Specialist Study Report for the Proposed Rustenburg Strengthening Project within Rustenburg Local Municipality of Bojanala Municipality. North West Province.* The project area for the AIA report is located on Farm Klipgat 281 JQ and Portion 2 of the Farm Elandsheuvel 282 JQ. Late Iron Age stone walled sites, Late Stone Age tools, historical terracing and undecorated potsherds were identified in the project area.

Coetzee, FP. 2017. *Phase 1 Investigation of the Proposed 1 ML Reservoir at Bakubung Lodge, Pilanesberg National Park, Bojanala District Municipality, Moses Kotane Local Municipality, North West Province*. The survey formed part of a Basic Assessment (BA) for the construction of a new 1ML (1000 m3) potable water reservoir to replace the three existing aging reservoirs for the Bakubung Lodge which is located on Portion 6 of the farm Ledig 909JQ. No cultural heritage remains were identified.

5.4 Palaeontological sensitivity

Note that this section was compiled by the author and not by a palaeontological specialist. A basic palaeontological sensitivity was determined using the SAHRIS database South African Palaeontological Sensitivity Map (http://www.sahra.org.za/sahris/map/palaeo). This map indicates that the project footprint for both Alternative 1 and Alternative 2 layouts, falls within an area where the underlying geology has High fossil sensitivity (orange) (see **Figure 15** and **Figure 16** below). The different palaeontological sensitivities that are defined on the SAHRIS Palaeontological Sensitivity Map, are outlined in the table below. Due to the underlying geology being of High sensitivity for fossils, a separate palaeontological assessment has been undertaken by a professional palaeontologist. This will provide recommendations and mitigation measures where necessary.

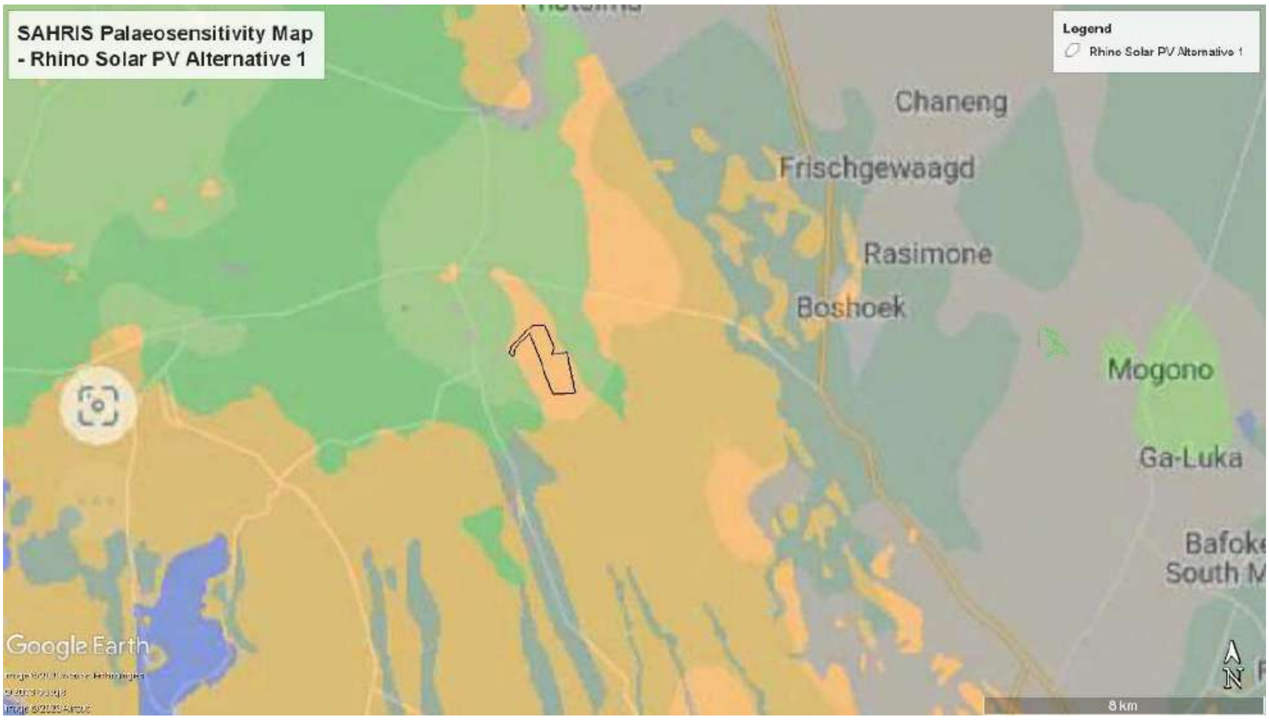

Figure 15: SAHRIS Palaeo sensitivity map overlain on the Rhino Solar PV project footprint- Alternative 1 (black polygon). The underlying geology is shown as having High fossil sensitivity (orange).

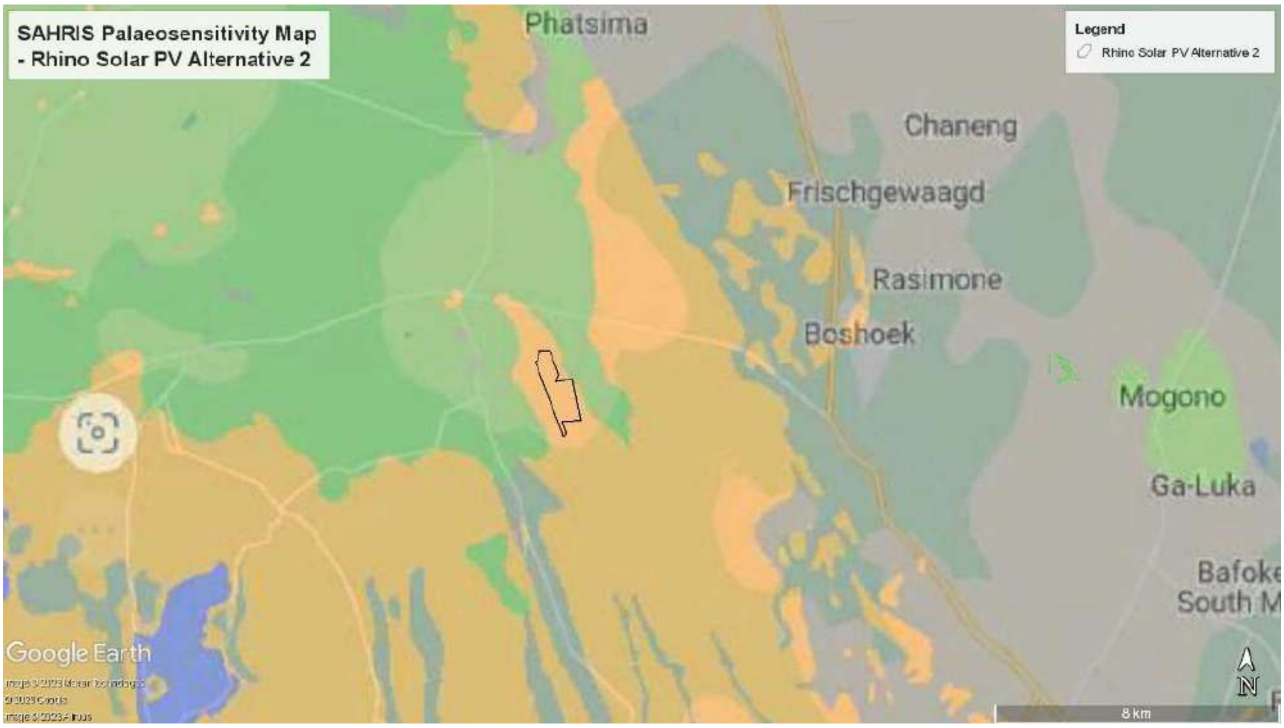

Figure 16: SAHRIS Palaeo sensitivity map overlain on the Rhino Solar PV project footprint- Alternative 1 (black polygon). The underlying geology is shown as having High fossil sensitivity (orange).

Table 2: SAHRIS Fossil Map Palaeontological Sensitivity Ratings and Required Actions

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required.
ORANGE/ YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely to be requested.
GREEN	MODERATE	Desktop study is required.
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required.
GREY	INSIGNIFICANT /ZERO	No palaeontological studies are required.
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information becomes known, SAHRA will continue to populate the map.

5.5 Findings of the Historical Desktop Study

The general overview from the historical desktop study has shown that various archaeological and historical resources can be expected to occur in the project area. However, the examination of the earliest edition (1963) of the 1:50 000 topographical maps produced by overlying the maps with satellite Imagery (Google

Earth) has shown that no heritage features are depicted within the Rhino Solar PV footprint, for either of the two alternative layouts.

The Site Survey fieldwork did not identify any heritage resources occurring within or close to the project area footprint.

6 SITE SURVEY/FIELDWORK RESULTS

The survey of the Rhino Solar PV project footprint took place over one day (15 January 2023) by the author (heritage specialist) as part of a specialist team. A vehicle was used to access the project footprint area and the survey was conducted by both vehicle and on foot (at selected areas). The survey covered as much of the project footprint area as was feasibly accessible.

The author used a Global Positioning System (GPS) application to navigate access roads in the study area and for recording the tracklog of the survey and waypoints of the identified heritage resources. A combination of Sony digital camera and Samsung smartphone camera was used for photographic recording of identified heritage resources and general images of the project study area.

The survey aimed to find and identify archaeological and other heritage resources such as burial grounds and graves (BGG), archaeological material or sites, historic built environment and landscape features of cultural heritage significance. The inspection of the area that was surveyed identified no visible heritage resources within or immediately adjacent to the project footprint (for both Alternative 1 and Alternative 2).

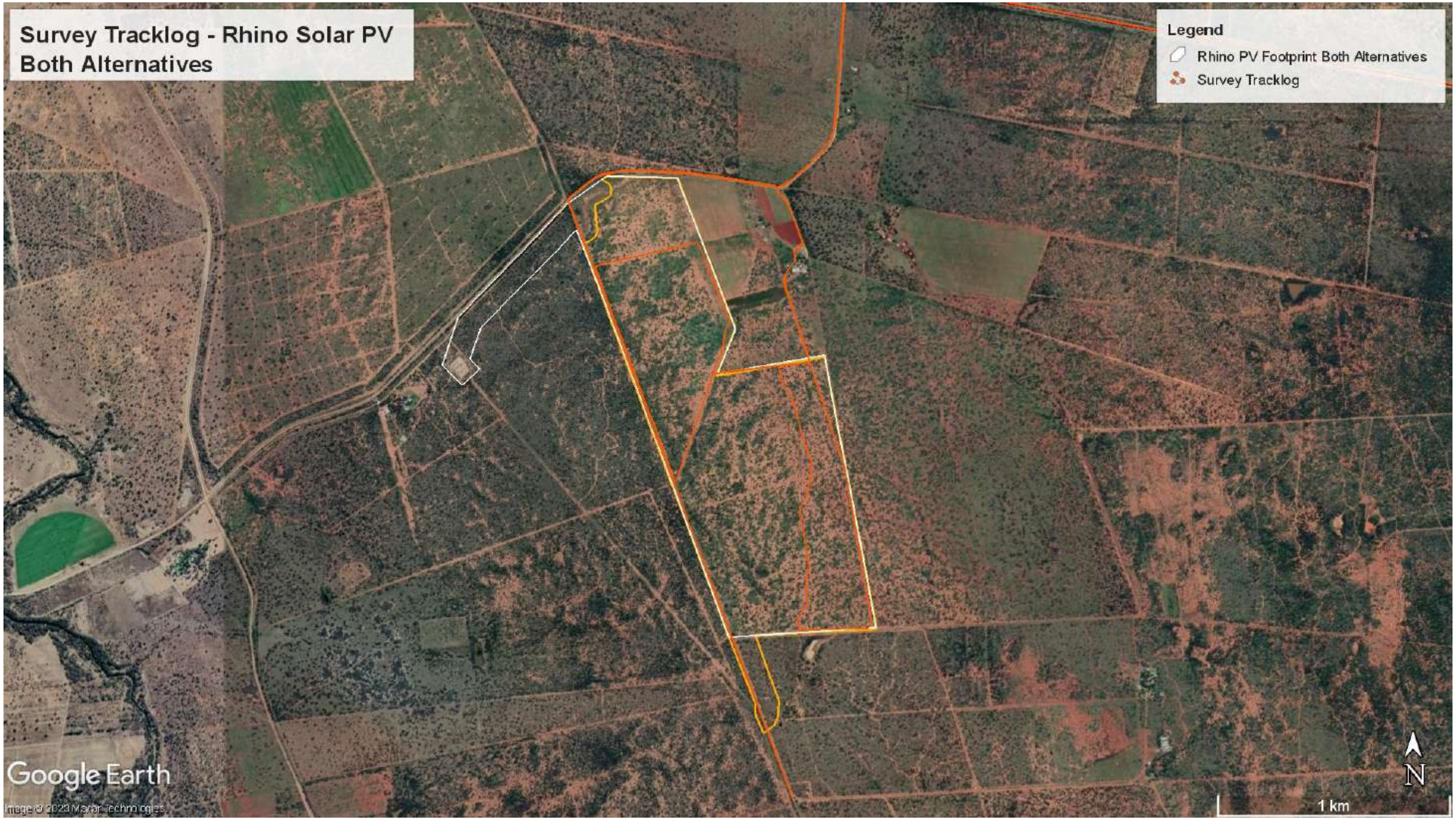

Figure 17: Site Survey Tracklog overlaid on the project layout (Alt. 1 = white footprint; Alt.2 =yellow footprint). No heritage resources were identified within the project footprint

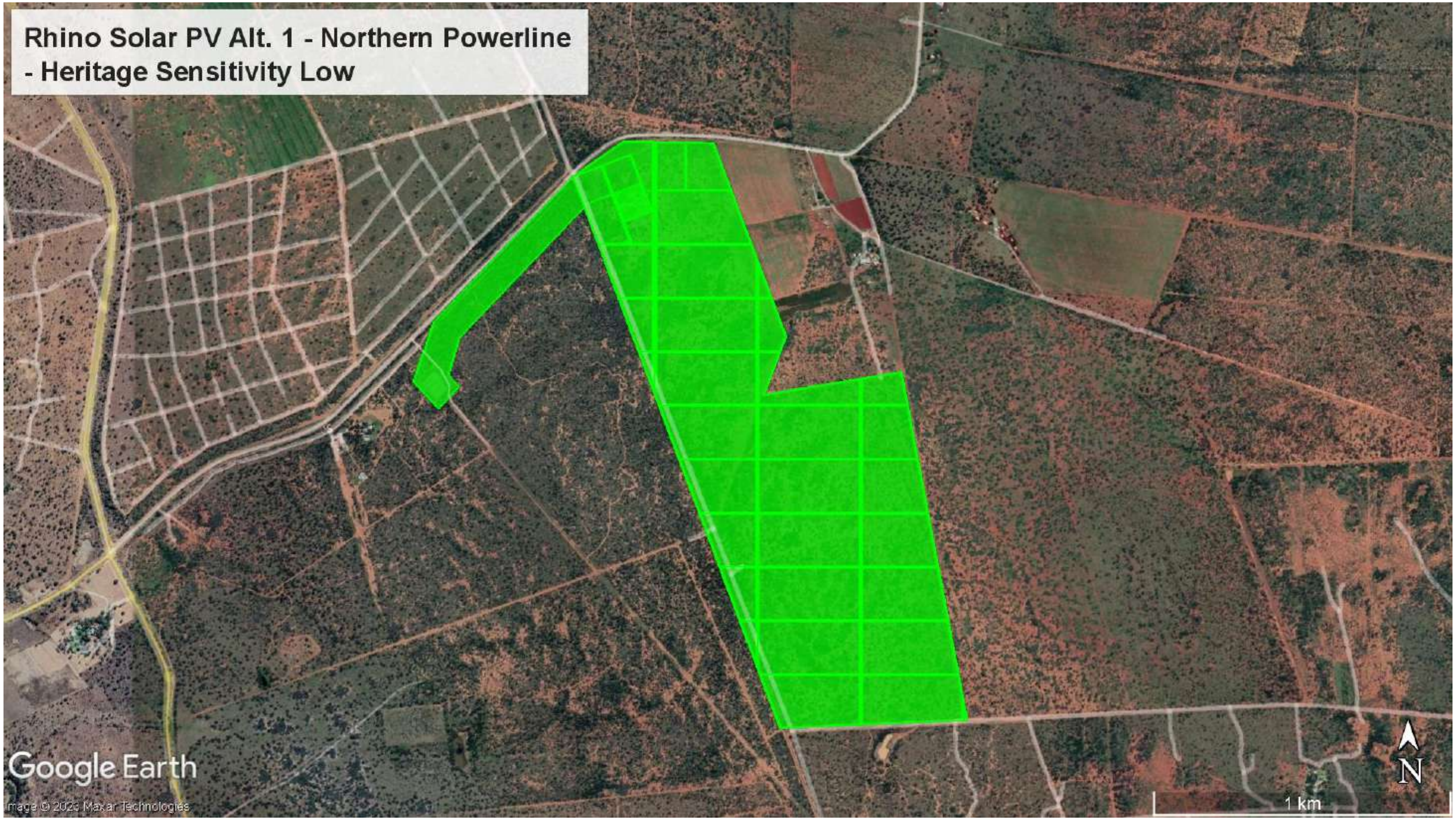

Figure 18: Heritage Sensitivity Map of the Rhino Solar PV footprint – Alternative 1 (with Northern powerline corridor). The green colour designates Low sensitivity.

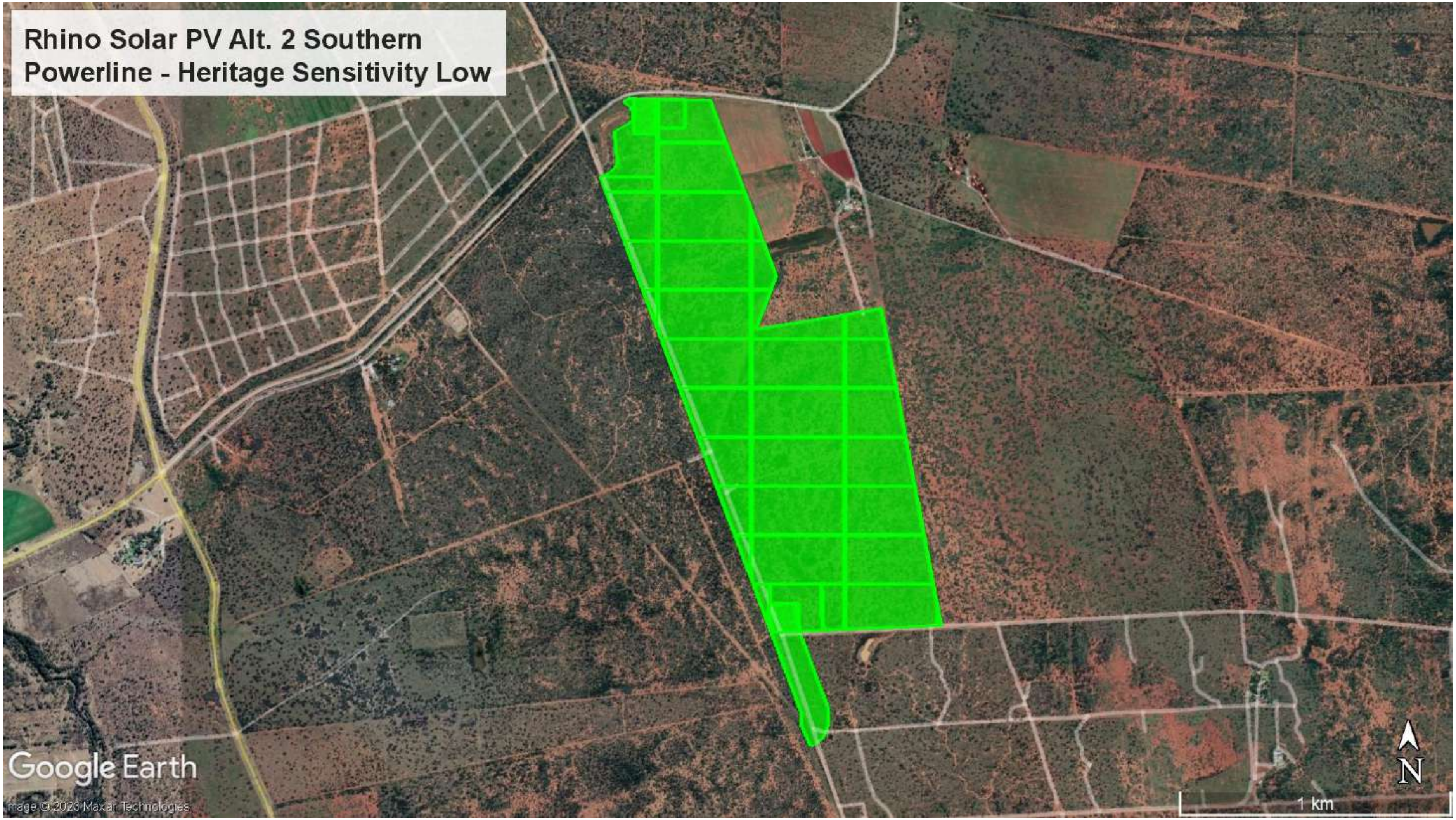

Figure 19: Heritage Sensitivity Map of the Rhino Solar PV footprint – Alternative 2 (with Southern powerline corridor). The green colour designates Low sensitivity.

7 Site Sensitivity Verification

The Historical Desktop study showed that that no specific heritage features were depicted on the historical topographic maps within the project footprint (for either Alternative 1 or Alternative 2). The only heritage features depicted in the vicinity are two groups of structures and one homestead which are located outside the footprint, east of the northern section.

The Site Survey fieldwork identified no heritage resources within or close to the project footprint. This confirmed the sensitivity from the initial PV Site screening results that the Archaeological Cultural Heritage sensitivity is low.

The palaeontological sensitivity verification will be discussed in the separate palaeontological report.

8 SIGNIFICANCE ASSESSMENT

Methodology for Assessing Heritage Site Significance

The applicable maps, tables and figures are included, as stipulated in NHRA and NEMA. The HIA process consists of three steps:

Literature Review

The desktop literature review provided information on the Heritage Background of the general region and project area. This included investigating published sources as well as past HIA studies conducted for the project area and surrounding region. An examination of historical 1:50 000 topographical maps and/or archival maps (if available) was also undertaken. The relevant early editions of the 2527AC topographical map sheets were obtained from the Department of Rural Development & Land Reform (DALRRD), Cape Town.

A number of internet sites were also accessed for information, specifically, the website of SA History Online (https://www.sahistory.org.za).

Literature resources accessed are listed in Table 3.

Table 3: Literature sources accessed

Source	Information
Background Information Document - Nemai	Project location and description details
Published and unpublished sources and Past HIAs	Historical and archaeological background on Rustenburg and surrounding region

Directorate: National Geo-spatial Information of the Department of Rural Development & Land Reform, Cape Town	Historical topographic maps, 1:50 000 2527AC Heystekrand Edition 1 1963

Field Survey

A physical Site Inspection or Field Survey was conducted, predominantly by vehicle and on foot through the project area by an experienced heritage specialist as part of a specialist team. This focussed on identifying and documenting heritage resources situated within and immediately adjacent to the proposed project area footprint, such as graves, historical structures or remains and archaeological sites or material.

HIA Report

The final step involved the recording and documentation of the identified heritage resources, the assessment of such resources in terms of heritage significance and impact assessment criteria, producing a heritage sensitivity map and compiling the heritage impact assessment report with constructive recommendations for mitigation, if required.

Impacts on these sites by the development will be evaluated as follows:

Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2021) is implemented in this report.

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (set out in **Table 4** and **Table 5,** below).

Table 4: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority. Specific mitigation and scientific investigation	Exceptionally High Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	can be permitted in certain circumstances with sufficient motivation.	
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 5: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a	This grading is applied to buildings and/or sites whose significance is contextual, i.e., in large part due to its contribution to the character or significance of the environs.	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	streetscape or direct neighbourhood.	These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by the PHRA for structures in this category if they are older than 60 years.	Not Conservation worthy – no research potential or other cultural significance

Table 6: Site significance classification standards as prescribed by SAHRA.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	Very High - of National Significance	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	Very High – of Provincial Significance	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)		High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)		Medium Significance	Recording before destruction
Generally Protected C (GP.A)		Low Significance	Destruction

9 IDENTIFICATION OF IMPACTS

9.1 Impacts and Mitigation Framework

All impacts are analysed in the section to follow with regard to their nature, extent, magnitude, duration, probability and significance.

ISO 14001-2004 defines impacts as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects".

When considering an assessment of the impacts and their mitigation, the following definitions as per Table 7 apply.

Table 7: Impact and Mitigation Quantification Framework

Nature	The project could have a positive, negative or neutral impact on the environment.
Extent	**Local** – extend to the site and its immediate surroundings. **Regional** – impact on the region but within the province. **National** – impact on an interprovincial scale. **International** – impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources: **Low** – natural and socio-economic functions and processes are not affected or minimally affected. **Medium** – affected environment is notably altered; natural and socio-economic functions and processes continue albeit in a modified way. **High** – natural or socio-economic functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	**Short term** – 0-5 years. **Medium term** – 5-11 years. **Long term** – impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. **Permanent** – mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability	**Almost certain** – the event is expected to occur in most circumstances. **Likely** – the event will probably occur in most circumstances. **Moderate** – the event should occur at some time. **Unlikely** – the event could occur at some time. **Rare/Remote** – the event may occur only in exceptional circumstances.
Significance	Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- **0** – Impact will not affect the environment. No mitigation necessary. **1** – No impact after mitigation. **2** – Residual impact after mitigation. **3** – Impact cannot be mitigated.

Mitigation	Information on the impacts together with literature from socio-economic science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased and positive benefits are enhanced.
Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

Table 8: Impact Methodology Table

Nature				
Negative	Neutral	Positive		
-1	0	+1		
Extent				
Local	Regional	National	International	
1	2	3	4	
Magnitude				
Low	Medium	High		
1	2	3		
Duration				
Short Term (0-5yrs)	Medium Term (5-11yrs)	Long Term	Permanent	
1	2	3	4	
Probability				
Rare/Remote	Unlikely	Moderate	Likely	Almost Certain
1	2	3	4	5
Significance				
No Impact/None	No Impact After Mitigation/Low	Residual Impact After Mitigation/Medium	Impact Cannot be Mitigated/High	
0	1	2	3	

9.2 Identification of Activities and Aspects

An “Activity” is defined as a distinct process or risks undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation (International Organization for Standardization, 2011).

An aspect is defined as elements of an organisation’s activities or products or services that can interact with the environment.

In order to capture the impacts associated with the proposed infrastructure, an activity – aspect – impact table was created refer to Table 9 below.

Table 9: Activity, Aspects and Impacts of the Project

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Site clearance/ construction camp	Heritage		Damage to existing historical structures or unidentified graves
Construction	Heritage	Positive - if historical structures are reused	Damage to existing historical structures
Operation	Heritage	Positive – if historical structures are reused	Damage to existing historical structures

9.3 Impact and Mitigation Assessment

The project area that will be impacted by the proposed Rhino Solar PV project contains some areas that are currently disturbed by grazing activities and other animal activity.

No archaeological material, historical structures or graves were identified within or close to the Rhino Solar PV project footprint area. Therefore, low impacts on heritage resources are anticipated for both the Alternative 1 and Alternative 2 layout. However, there is a low possibility that some archaeological material or unidentified graves could be uncovered sub-surface.

9.4 Impacts During the Planning and Construction Phases

Although a low impact on heritage resources is anticipated for this project, an impact/mitigation table has been generated for Chance Finds (**Table 10**, below), as there is a low probability that some archaeological material or unidentified graves could be uncovered sub-surface. The heritage management guidelines provided in **Section 12** also address this possibility.

Table 10: Impact on Heritage Resources - Chance Finds

Environmental Feature	Chance finds: Heritage resources - Unidentified graves or archaeological material
Project life-cycle	Planning, Construction
Potential Impact	Proposed Management Objectives / Mitigation Measures
Possible damage to or destruction of unidentified archaeological material	If any changes are made to the final design footprint prior to construction, monitoring of site clearance activities must be undertaken by a heritage specialist to identify any archaeological sites or material
Possible damage to or destruction of unidentified graves or burials	If any changes are made to the final design footprint prior to construction, monitoring of site clearance activities must be undertaken by a heritage specialist to identify any graves/burials

Alternative 1	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Remote	1
After Mitigation	Negative	Local	High	Long- term	Remote	1
Significance of Impact and Preferred Alternatives	No visible heritage resources were identified within the project area for Alternative 1. However, there is a remote possibility that unidentified graves/burials or archaeological material could be uncovered during site clearing or construction activities.					
Alternative 2	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	High	Permanent	Remote	1
After Mitigation	Negative	Local	High	Long- term	Remote	1
Significance of Impact and Preferred Alternatives	No visible heritage resources were identified within the project area for Alternative 2. However, there is a remote possibility that unidentified graves/burials or archaeological material could be uncovered during site clearing or construction activities.					

9.5 Cumulative impacts

The project area and surrounding region has been affected by impacts of activities occurring in the past, current activities and proposed future developments. These will be discussed below.

Past impacts: The past HIA reports recovered from the SAHRIS database indicated that the Rhino Solar PV project footprint and surrounding region has been affected by several development and other activities that would have disturbed the heritage resources which occur in the area. These include prospecting and mining related projects, powerline construction and recreation developments, in addition to historical farming and platinum mining activities in the general region around Rustenburg.

Current impacts: the immediate area of the Rhino Solar PV footprint is affected mainly by farming activities (cattle and game).

The baseline impacts are considered to be Very Low for Heritage resources, and additional project impacts (if no mitigation measures are implemented) will increase the significance of the existing baseline impacts, where the cumulative unmitigated impact will probably be of a low significance. The impact is going to happen and will be long-term in nature, however, the impact risk class will remain Low.

10 ANALYSIS OF ALTERNATIVES

Two alternative layouts have been provided for the Rhino Solar PV project footprint: Alternative 1, with a powerline/grid connection running North-west from the north-west corner; and Alternative 2, with a slightly reduced PV footprint and a powerline/grid connection running south from the south-west corner.

11 ALTERNATIVES

11.1 Introduction

Alternatives are the different ways in which the Project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for a project.

11.2 Site Alternatives

No site alternatives are proposed for the Rhino Solar PV Project. Favourable location factors for the PV Site include suitable solar irradiation levels, short distance to grid connection point, flat topography, suitable site access and availability of land.

11.3 Layout / Design Alternatives

It is anticipated that the space available at the PV Site will be adequate to position the facility and its associated infrastructure to avoid areas of sensitive environmental features, which will be determined in the EIA Phase through the specialist studies. The extent of the site allows for the identification of layout/design alternatives to manage impacts to environmental sensitivity.

Two alternative layouts have been provided for the Rhino Solar PV project footprint: Alternative 1, with a powerline/grid connection from the north-west corner; and Alternative 2, with a slightly reduced PV footprint and a powerline/grid connection from the south-west corner.

11.4 <u>No-Go Option</u>

As standard practice and to satisfy regulatory requirements, the option of not proceeding with the Project is included in the evaluation of the alternatives.

The no-go alternative can be regarded as the baseline scenario against which the impacts of the Project are evaluated. This implies that the current status and conditions associated with the proposed Project footprint will be used as the benchmark against which to assess the possible changes (impacts) associated with the Project.

In contrast, should the proposed Project not go ahead, any potentially significant environmental issues would be irrelevant, and the status quo of the local receiving environment would not be affected by the project-related activities. The objectives of the Project, including the benefits (such as the exploitation of SA’s renewable energy resources, potential economic development and related job creation, and increased security of electricity supply), will not materialise.

12 STATEMENT OF IMPACT SIGNIFICANCE

The project area that will be impacted by the proposed grid connection project contains some areas that are currently disturbed by cattle and game farming activities.

The impact significance of the project on graves and cemeteries is low as no grave sites were identified. However, there is a low possibility that unidentified graves could be uncovered sub-surface.

The impact significance of the proposed project on protected historical structures is low as no historical structures were identified.

The impact significance of the proposed project on archaeological resources is low as no archaeological sites or material were identified. However, there is a low possibility that some archaeological material could be uncovered sub-surface.

13 HERITAGE MANAGEMENT GUIDELINES

The following general heritage management guidelines should be followed:

1. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:
    a. Heritage;
    b. Graves;
    c. Archaeological finds; and
    d. Historical Structures.

This module must be tailor made to include all possible finds that could be expected in that area of construction. Possible finds include:

a. Unidentified graves or burials.
b. Remains of historical structures.
c. Palaeontological deposits such as bones and teeth and plant fossils

2. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.
3. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
4. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
5. After mitigation, an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
6. If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
7. In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made.
8. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

14 Recommendations and Conclusion

The proposed Rhino Solar PV project on archaeological or historical heritage resources is considered low as no archaeological cultural heritage resources were identified within and adjacent to the project footprint (for either the Alternative 1 or Alternative 2 layouts). However, there is a low possibility that some archaeological material or unidentified graves could be uncovered sub-surface.

As both the DFFE Environmental Screening Tool and the SAHRIS Palaeontological Sensitivity Map identified the region of the project footprint as being of High Sensitivity for fossils, a separate palaeontological assessment has been undertaken. The assessment will indicate if significant/sensitive fossils will be impacted by the proposed project and provide mitigation measures and the way forward.

No fatal flaws were identified during this study, therefore, it is the considered opinion if the heritage specialist that the construction of the proposed Rhino Solar PV project can proceed. There are no objections from a heritage perspective if the recommendations and mitigation measures recommended in this report, specifically regarding the desktop palaeontological assessment, are implemented. From a heritage perspective there is no difference between either of the two project layout alternatives and no preferred alternative.

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https://:www.battletoursza.com/moedwil Moedwil - Battle Tours ZA

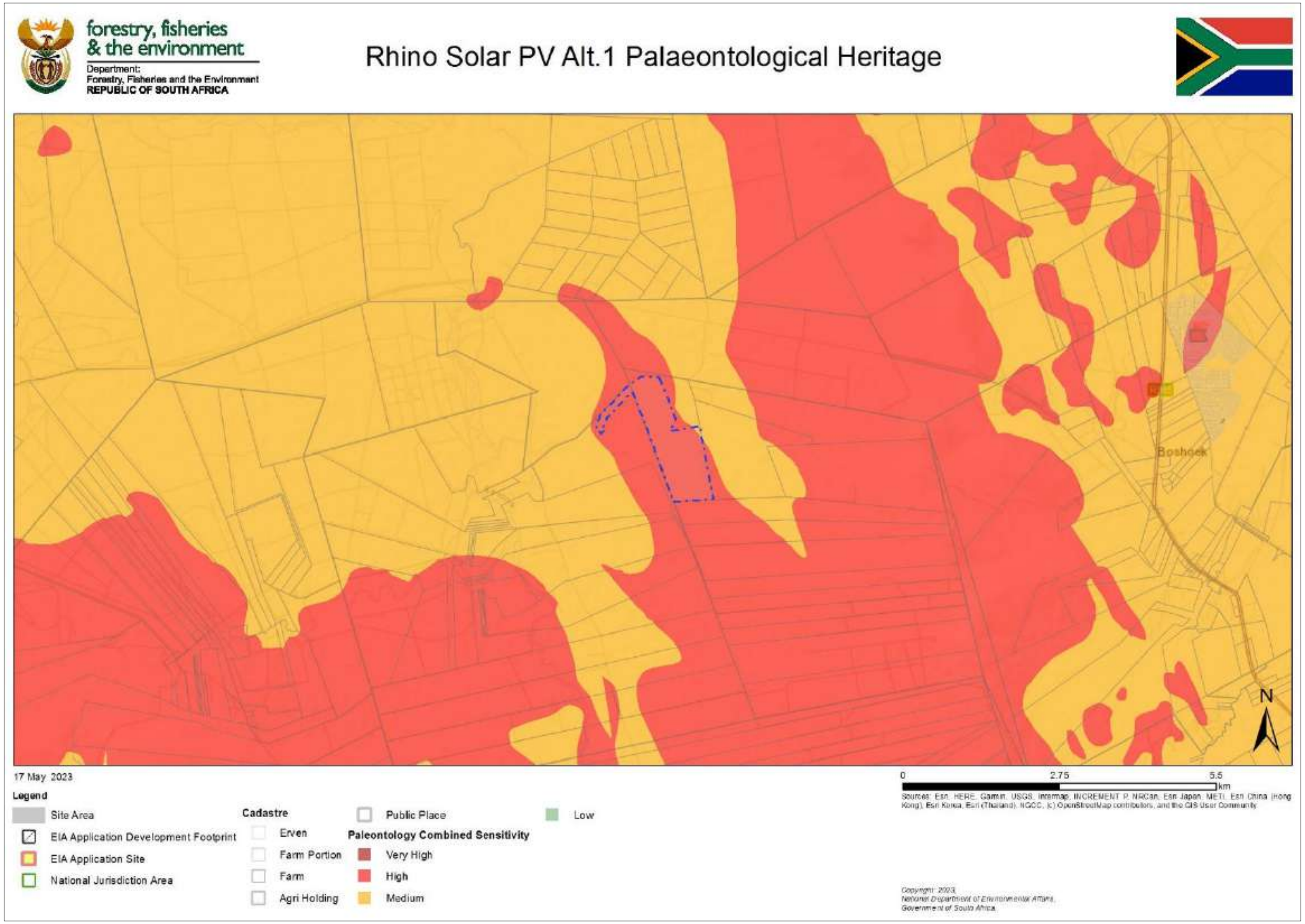
Marikana Massacre 16 August 2012 | South African History Online (sahistory.org.za).

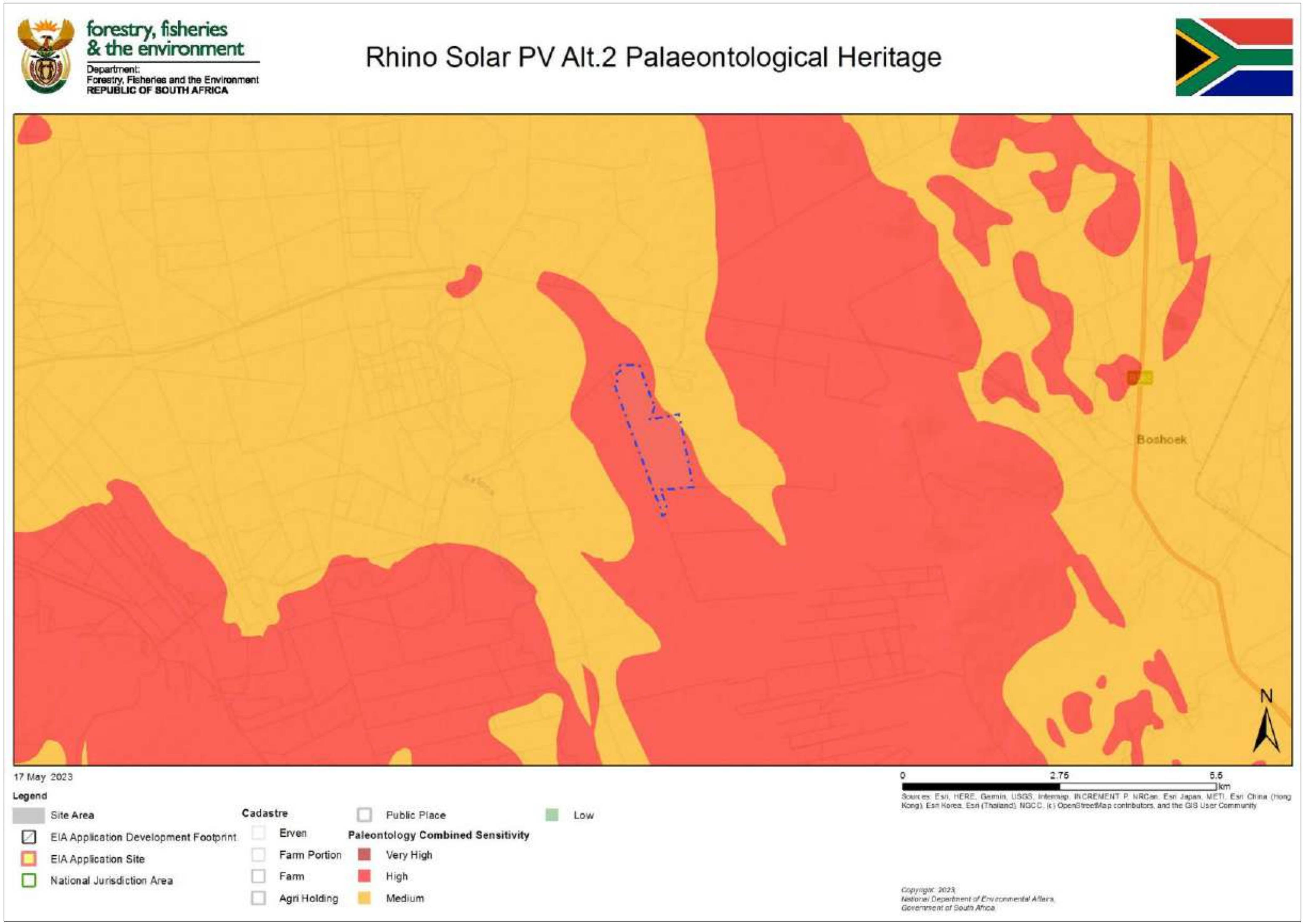
Appendix 1: Heritage Sensitivity Map/s

1. Cultural Heritage Sensitivity maps from DFFE screening tool


forestry, fisheries & the environment
Department: Forestry, Fisheries and the Environment REPUBLIC OF SOUTH AFRICA
Rhino Solar PV Alt.2 Archaeological Cultural Heritage
Boshoek
N
17 May 2023
0
2.75
5.5
km
Legend
Site Area
EIA Application Development Footprint
EIA Application Site
National Jurisdiction Area
Cadastre
Erven
Farm Portion
Farm
Agri Holding
Public Place
Archaeological and Cultural Heritage Combined Sensitivity
Very High
High
Low

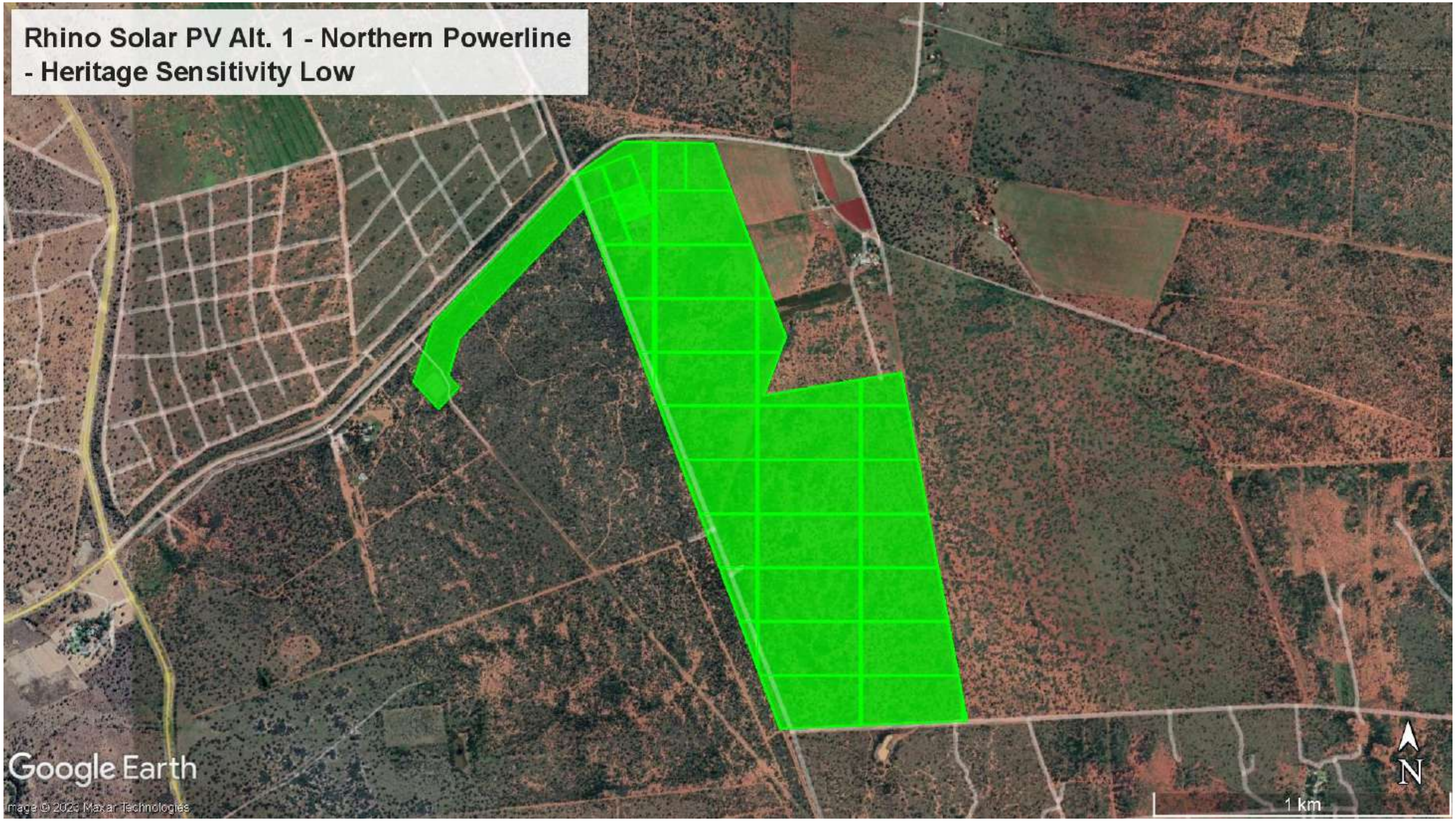
2. Palaeontological Sensitivity maps from DFFE screening tool

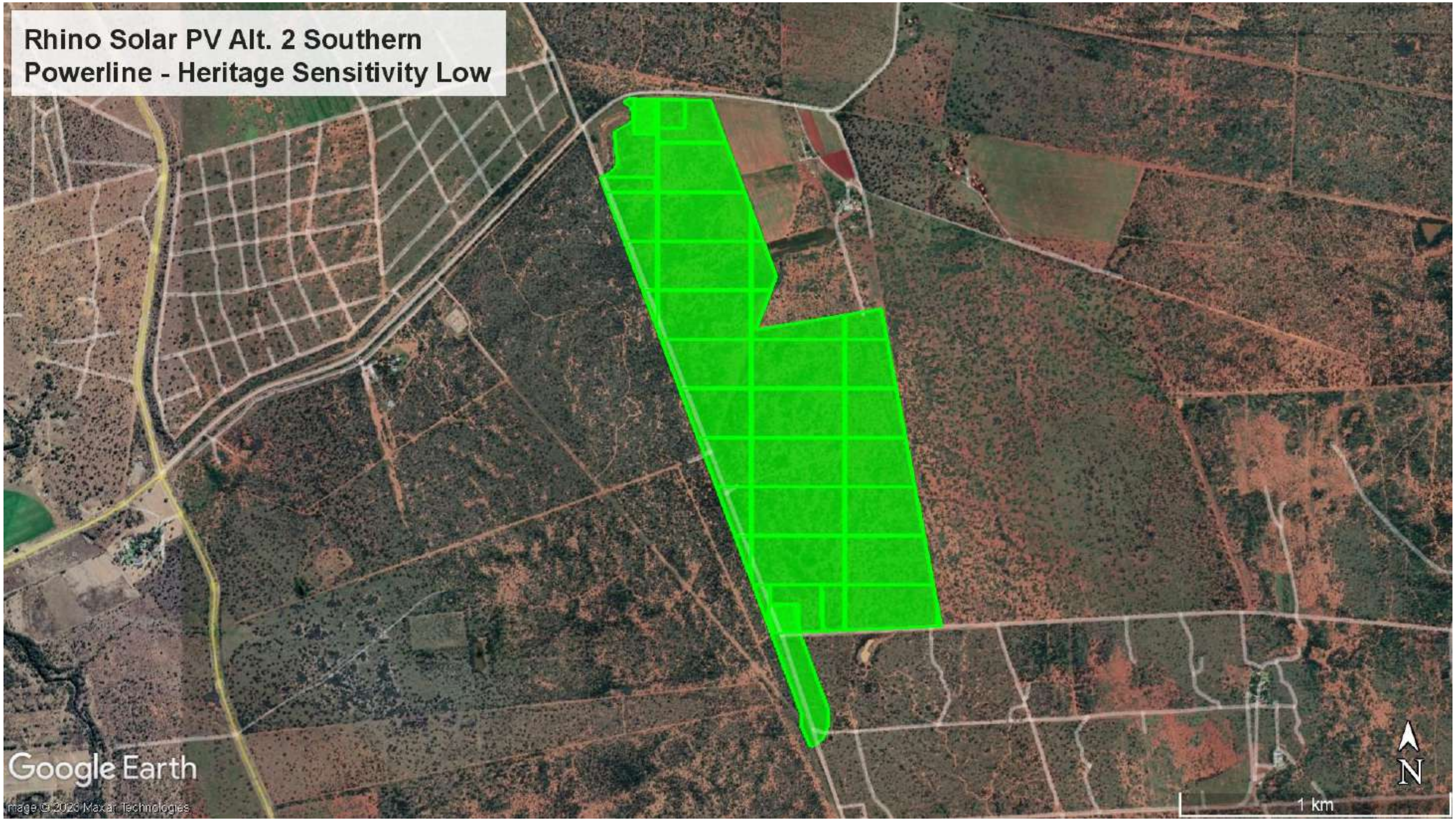




forestry, fisheries
& the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA
Rhino Solar PV Alt.2 Palaeontological Heritage
Boshoek
N
17 May 2023
Legend
Site Area
EIA Application Development Footprint
EIA Application Site
National Jurisdiction Area
Cadastre
Erven
Farm Portion
Farm
Agri Holding
Public Place
Paleontology Combined Sensitivity
Very High
High
Medium
Low
0
2.75
5.5
km
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Copyright: 2023,
National Department of Environmental Affairs,
Government of South Africa

3. Heritage Sensitivity Maps based on the Site Inspection / Field survey and topographical map sheet




Rhino Solar PV Alt. 2 Southern
Powerline - Heritage Sensitivity Low
Google Earth
1 km
N

APPENDIX 2: CURRICULUM VITAE OF HERITAGE SPECIALIST

1 Personal Particulars

Profession:	Heritage Specialist
Date of Birth:	11 September 1966
Name of Firm:	Nitai Consulting
Name of Staff:	Jennifer Kitto
Nationality:	RSA
Membership of Professional Societies	Association of Southern African Professional Archaeologists (444); International Association for Impact Assessment South Africa (7151)

2 Education:

BA Hons Social Anthropology, WITS, South Africa, 1994

BA. Archaeology and Social Anthropology, WITS, South Africa, 1993

Higher National Diploma, Practical Archaeology, Dorset Institute for Higher Education (now Bournemouth University), UK, 1989

3 Employment Record:

2022 – Present Heritage Specialist, Nitai Consulting

Conduct Heritage Impact Assessments;

2012 – 2021 Heritage Specialist, PGS Heritage (Pty) Ltd

Conduct Heritage Impact Assessments

Compile Desktop Historical Research

Compile Heritage Audit and Management Plans

Compile and submit permit applications to National and Provincial Heritage Authorities for Section 34 building alterations and demolitions (under National Heritage Resources Act, 25 of 1999)

Compile and submit permit applications to Provincial and Municipal Health Authorities for Section 36 relocations of graves and burial grounds (under National Heritage Resources Act, 25 of 1999 and National Health Act, No 61 of 2003)

2008 – 2011 Cultural Heritage Officer (National), Burial Grounds and Graves Unit: South African Heritage Resources Agency (SAHRA)

Review and assessing permit applications for relocation of historical graves and burial grounds.

1998 – 2008 Cultural Heritage Officer (Provincial), Provincial Office – Gauteng: SAHRA

Review and comment on heritage and archaeological impact reports

Research for the nomination and grading process for related to the declaration of specific heritage resources as National Heritage Sites

Monitoring of certain archaeological and built environment National Heritage Sites (e.g. The Cradle of Humankind World Heritage Site)

4 Selected Consultancies

4.1 GDID East Corridor, OHS Implementation, Tambo Memorial Regional Hospital (as sub-contractor to PGS Heritage (Pty) Ltd

2022 Independent Heritage Specialist. Compile Historical Archival Report of Tambo Hospital Boksburg, Gauteng for PGS Heritage (Pty) Ltd, Finalise HIA Report and submit HIA report to Gauteng Provincial Heritage Resources Authority

4.2 GDID East Corridor, OHS Implementation, Tembisa Regional Hospital (as sub-contractor to PGS Heritage (Pty) Ltd

2022 Independent Heritage Specialist. Compile Historical Archival Report of Tembisa Hospital, Ekurhuleni, Gauteng for PGS Heritage (Pty) Ltd, Finalise HIA Report and submit HIA report to Gauteng Provincial Heritage Resources Authority.

4.4 Kroonstad South Solar PV Facilities

2022/2023 Heritage Specialist, Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Undertake Heritage Impact Assessment of all heritage resources associated with the five solar PV facilities

4.5 Kroonstad Cluster Solar PV Facilities

2022/2023 Heritage Specialist, Development of three Solar PV facilities west of Kroonstad, Free State Province, South Africa, Undertake Heritage Impact Assessment of all heritage resources associated with the three solar PV facilities

4.6 Seelo Solar PV Cluster

2022/2023 Heritage Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Undertake Heritage Impact Assessment all heritage resources associated with the three solar PV facilities

4.7 Decommissioning of Komati Power Station

2023, Heritage Specialist, Proposed Decommissioning of the Komati Power Station, Middelburg, Mpumalanga, Undertake Heritage Impact Assessment of all heritage structures within the power station

4.8 Carbon Capture Utilisation & Storage Pilot Project

2023 Heritage Specialist, Proposed pilot project for the capture and storage of CO_2, in Mpumalanga, comprising a 3D seismic survey and test drilling for the purpose of geological characterisation of the project area. Undertake Heritage Impact Assessment all heritage resources associated with the CCUS Pilot Project.

5 Languages:

English - excellent speaking, reading, and writing

Afrikaans –fair speaking, reading and writing

APPENDIX E6: Palaeontological Desktop Assessment

PALAEONTOLOGICAL DESKTOP ASSESSMENT

PROPOSED 65MW RHINO SOLAR PHOTOVOLTAIC PROJECT NORTH WEST OF RUSTENBURG, NORTH WEST PROVINCE

2023

COMPILED for: Nemai Consulting CC

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and

- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

The Palaeontological impact assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)		
Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 – refer to Appendix A	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Methods and Terms of Reference	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8	-

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)		
Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment		Desktop Assessment
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 4 Approach and Methodology	-
(f) details of an assessment of the specifically 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;	Section 1; & 9	
(g) An identification of any areas to be avoided, including buffers	Section 1 & 9	
(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;	Section 5 – Geological and Palaeontological history	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4.1 – Assumptions and Limitation	-
(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	Section 1 and 9	
(k) Any mitigation measures for inclusion in the EMPr	Section 1 and 9	

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)		
Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
(l) Any conditions for inclusion in the environmental authorisation	Section 1 and 9	
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 1 and 9	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 9	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(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, and where applicable, the closure plan	Section 1 and 9	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment (EIA) and Environmental

Table 1: Checklist for Specialist studies conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)		
Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	The relevant section in the report	Comment where not applicable.
		Management Plan (EMP) process.
(p) A summary and copies of any comments that were received during any consultation process	N/A	Not applicable. To date, no comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice 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.	Section 3 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by Nemai Consulting CC to conduct the Palaeontological Desktop Assessment (PDA) to assess the 65MW Rhino Solar Photo Photovoltaic (PV) Renewable Energy Project north west of Rustenburg, North West Province. In accordance with the National Environmental Management Act 107 of 1998 (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the resources and to mitigate possible damage to fossil resources.

The study area is underlain by undifferentiated Quaternary surface deposits as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary deposits is Moderate while that of the Silverton Formation is High. The Palaeontological Sensitivity generated by the National Environmental Web-Based Screening indicates that the Sensitivity of the proposed development is High. Updated Geology (Council of Geosciences) indicates that the proposed development is underlain by the alluvium, colluvium, eluvium and gravel as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup) (Groenewald *et al.,* 2014). Two Layout alternatives have been proposed for the project. Layout Alternative One is the original layout and Alternative Two has been revised after specialist input. As the geology of the two layouts are the same there are no preference between the alternatives from a Palaeontological Perspective.

Based on the desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development is considered to be Low and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be alerted immediately. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

Impact Summary

Environmental parameter	Issues	Rating prior to mitigation	Average	Rating post mitigation	Average
Planning Phase Rhino Solar PV Facility Layout Alternative 1	No Impact	0	No Impact	0	No Impact
Construction Stage Rhino Solar PV Facility Loss of fossil heritage Layout Alternative 1	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	48	Negative Medium impact	16	Negative Low impact
Operational Phase Rhino Solar PV Facility Layout Alternative 1	No Impact	0	No Impact	0	No Impact
Decommissioning Phase	No Impact	0	No Impact	0	No Impact

Rhino Solar PV Facility Layout Alternative 1					
Planning Phase Rhino Solar PV Facility Layout Alternative 2	No Impact	0	No Impact	0	No Impact
Construction Stage Rhino Solar PV Facility Loss of fossil heritage Layout Alternative 2	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	48	Negative Medium impact	16	Negative Low impact
Operational Phase Rhino Solar PV Facility Layout Alternative 2	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Rhino Solar PV Facility Layout Alternative 2	No Impact	0	No Impact	0	No Impact

It is therefore considered that the proposed Rhino Solar PV Facility is deemed appropriate and will not lead to detrimental impacts on the palaeontological reserves of the area. Thus, the construction of the development may be authorised in its whole extent.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Nemai Consulting CC (Nemai) was appointed by Rhino Solar (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the proposed 65 MW Rhino Solar Photovoltaic (PV) Project near Rustenburg, in the North West Province (the "Project") (Figure 1-2).

The electricity generated by the Project will be transferred via up to 132 kV powerlines from the Eskom switching station, located adjacent to the facility substation, to the existing Eskom powerlines, which is approximately 750 meters (m) away. A 100 m corridor will be assessed. The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

The Project is not located within any REDZs (Renewable Energy Development Zones) or Strategic Transmission Corridors. According to GNR 114 of 16 February 2018, where an Application for Environmental Authorisation for large scale wind or solar PV facilities is being made and these facilities fall outside of the REDZs then these applications will be considered in terms of the requirements of the EIA Regulations.

1.1 Technical description

The Project consists of the following systems, sub-systems or components (amongst others):

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area up to 4ha.
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Facility grid connection infrastructure, including:
  - 33kV cabling between the project components and the facility substation
  - An up to 132kV facility substation
  - 88 kV LILO powerline between the facility substation and the exiting Eskom 88kV powerlines
- Temporary construction laydown area up to 5ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.

- Main access road is up to 8 m wide. The site is accessible via the R565.

Table 2: Property details

Farm Name
Portion 11 of the Farm Rhebokhoek No. 101
Access Road
No. 571
Grid Connection Infrastructure
Portion 31 of the Farm No. 236
Portion 13 of the Farm No. 101
Remaining Extent of Portion 7 of the Farm No. 101

Table 3: Technical details of the proposed PV Plant		
No.	**Component**	**Description / Dimensions**
1.	Height of PV panels	± Up to 5.5 m
2.	Area of PV Array	Up to approximately 115ha
3.	Area occupied by substations	Up to 1ha
4.	Capacity of on-site substation	High voltage (up to 132 kV)
5.	BESS	Area up to ± 4ha
6.	Area occupied by both permanent and construction laydown areas	Temporary: Up to 5ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)
7.	Area occupied by buildings	Up to 1 ha
8.	Length of internal roads	Up to 10km
9.	Width of internal roads	The internal roads will be up to 6 m wide. The access roads will be up to 8 m wide.
10.	Proximity to grid connection	Project site directly adjacent to 88kV overhead lines
11.	Height of fencing	Up to 3.5m
12.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing

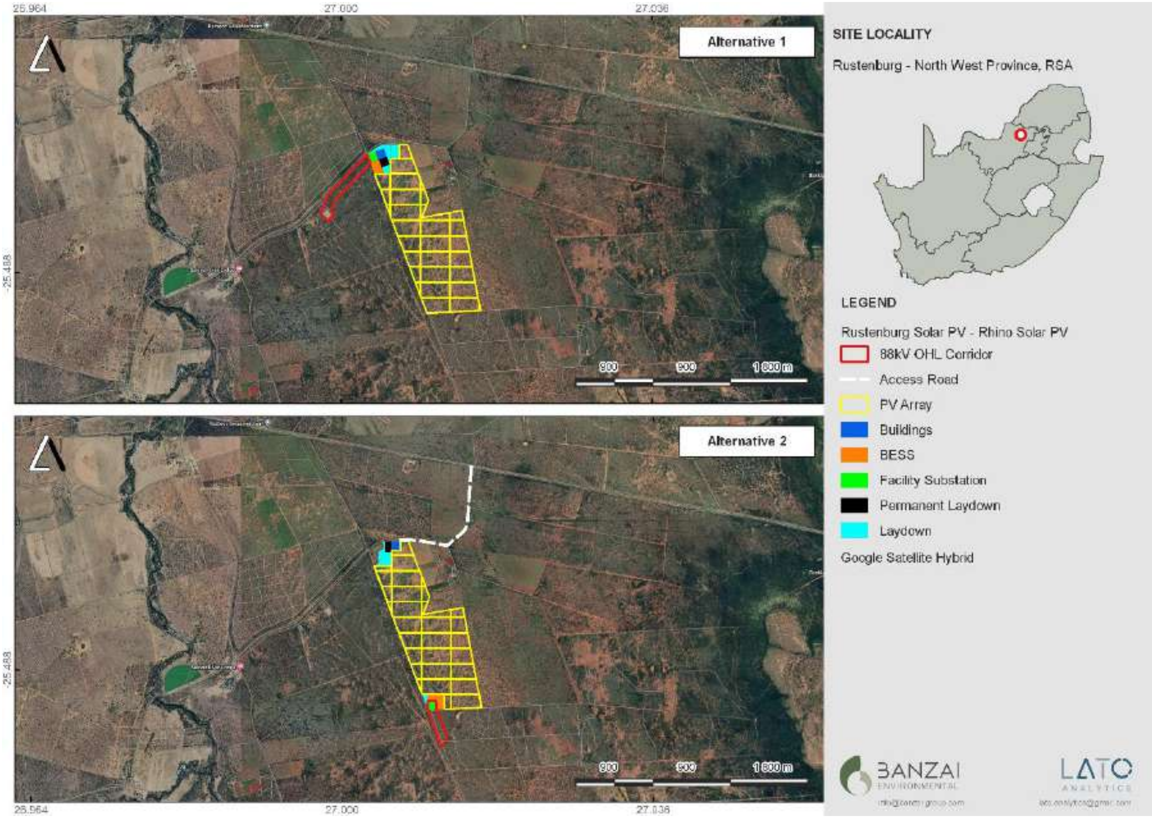


Figure 1: *Regional locality Map of the proposed Rhino Solar PV Project near Rustenburg, in the North West Province.*

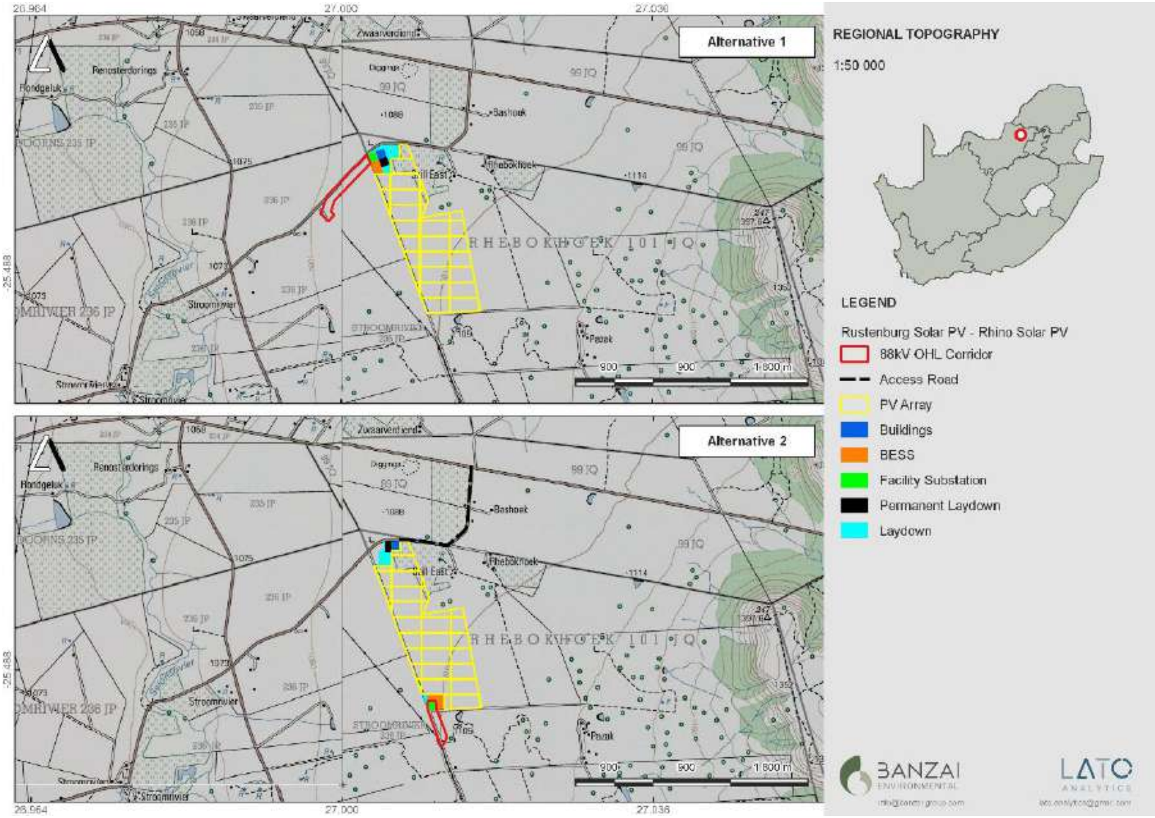


***Figure 2**: Locality map of the proposed Rhino Solar PV Project near Rustenburg, in the North West Province.*

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This study has been conducted by Mrs Elize Butler. She has conducted approximately 300 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-eight years. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

3. LEGISLATION

National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

MPRDA Regulations of 2014

Environmental reports to be compiled for application of mining right – Regulation 48

- Contents of scoping report – Regulation 49
- Contents of environmental impact assessment report – Regulation 50
- Environmental management programme – Regulation 51
- Environmental management plan – Regulation 52

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies the following comprehensive and legally compatible PIA report have been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to Section 38 (1), an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length.
- the construction of a bridge or similar structure exceeding 50 m in length.
- any development or other activity which will change the character of a site—
- (Exceeding 5 000 m^2 in extent; or
- involving three or more existing erven or subdivisions thereof; or
- involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority

- the re-zoning of a site exceeding 10 000 m² in extent.
- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4. METHODS AND TERMS OF REFERENCE

The present desktop Palaeontological Assessment assesses the potential impacts on Fossil Heritage on the development. This study forms part of the Heritage Impact Assessment Report. According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the formations; 3) to clarify the impact on fossil heritage; and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development and c) the quantity of bedrock removed.

All possible information is consulted to compile a scoping report, and this includes the following: Provisional DFFE Screening Tool, SAHRIS Palaeosensitivity map, all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical and geological maps as well as scientific articles of specimens from the development area and Assemblage Zones.

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps

- Provide palaeontological and geological history of the affected area.
- Identification of sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
    a. Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
    b. Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity.
    c. Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

4.1 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally assumed that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment.

5. GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The geology of the proposed Rhino Solar PV Project near Rustenburg, in the North West Province is depicted on the 1: 250 000 Rustenburg 2526 (1981) Geological Map (Council for Geosciences, Pretoria) (Figure 3, Table 4). This map indicates that the study area is underlain by undifferentiated Quaternary surface deposits (Q, yellow) as well as the Silverton Formation (Vsi, khaki, Pretoria Group, Transvaal Supergroup). The PalaeoMap (Figure 4, Table 5) of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary deposits is Moderate (green) while that of the Silverton Formation is High (orange). The Palaeontological Sensitivity generated by the National Environmental Web-Based Screening (depicted in Figure 5) indicates that the Sensitivity of the proposed development is High. Updated Geology (Council of Geosciences) indicates that the proposed development is underlain by the alluvium, colluvium, eluvium and gravel as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup) (Figure 6).

Two Layout alternatives have been proposed for the project. Layout Alternative One is the original layout proposed by the developer while Alternative Two has been revised after specialist input. As the geology of the two layouts are the same there are no preference between the alternatives from a Palaeontological Perspective.

Quaternary superficial deposits are the youngest geological deposits formed during the most recent period (approximately 2.6 million years ago to present). Most of the superficial deposits are unconsolidated sediments and consist of calcretes, sand, silt and clay, and they form relatively thin, often discontinuous patches of sediments. The Quaternary deposits reveal palaeoclimatic changes in the geological formations (Hunter et al., 2006). The climatic fluctuations in the Cenozoic Era were responsible for the formation of most geomorphologic features (Maud, 2012). Various warming and cooling events occurred in the Cenozoic but climatic changes during the Quaternary, specifically the last 1.8 Ma, were the most drastic climate changes relative to all climate variations in the past Barnosky (2005). Climate in the Quaternary Period were both drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth et al., 2004).

The fossil assemblages of this Group are generally very low in diversity, but locally high and occur over a wide range. Quaternary deposits are especially important when in fluvial environments along water courses. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include diatoms, gastropod shells, bivalves, ostracods and trace fossils as well as mammalian bones and teeth as well as coprolites, freshwater molluscs and plant microfossils). Various authors have described fossilized hyena burrows in Late Pleistocene alluvial sediments of the Modder River (Broom 1909 a, b; Cooke 1955; Churchill et al. 2000; Rossouw 2006). Fossilized hyena lairs are occasionally located outside the present river valleys along localized spring deposits and calcified pan dunes (Scott & Brink 1991). Fossiliferous sediments (local peat deposits) occur within calcified pan dunes in this region (Horowitz et al. 1978; Scott and Klein 1981; Butzer 1984). These types of pans formed when the prevailing winds blew aeolian sands (unconsolidated material) into newly formed lunettes on the lee side of the deflation hollows and sometimes provided a site for hyena burrows and prehistoric human habitation.

Pleistocene vertebrate fossils and plant microfossils are associated with spring and pan deposits (Brink 1987, 1988; Scott & Rossouw 2005)]. Fossils in these areas occur over large areas in erosion gullies. Stone artefacts from the earlier part of the Middle Stone Age and the Later Stone Age have also been uncovered and are sometimes associate with bones (Churchill et al. 2000). The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile remains have been uncovered where the depositional settings in the past were wetter.

The Transvaal Supergroup is preserved in three structural basins on the Kaapvaal Craton of South Africa namely the Griqualand West Basin, Transvaal Basin, as well as the Kanye Basin in Botswana. The Griqualand West Basin can be subdivided into the Ghaap Plateau and Prieska sub basins. The geometry of the three basins is mostly stratiform with the exclusion of the volcanic precursor of the Kanye Basin and parts of the Griqualand West Basin. Extensive deformation has taken place in the south-western portion of the Griqualand West Basin. Rocks of the Transvaal Supergroup in the Transvaal Basin were intruded by the Bushveld Complex approximately 2060 million years ago. The Transvaal Supergroup overlays the Archaean basement as well as the Witwatersrand and Ventersdorp Supergroups. In the far western and Kanye Basins rocks belonging to the Kanye Formation and Gaborone Granite Suite is also overlain by the Transvaal Supergroup.

The Precambrian Transvaal Supergroup is approximately 2550-2050 Ma years old (Bekker et al. 2008; Catuneanu et al 1999), (Late Archaean to Early Proterozoic) and is about 15 km thick. This Supergroup consists of sedimentary, volcanic and unmetamorphosed clastic rocks. The sandstone dominated Magaliesberg Formation overlies the mudrocks of the Silverton Formation, and in turn the Silverton Formation overlies the sandstone dominated Daspoort Formation.

The Daspoort Formation overlies the Strubenkop (Eriksson et al., 1993b). The Daspoort Formation is characterised by subordinate mudrocks and ironstones in the east of the basin (Button, 1973a), and mature quartz arenites. Erikson et al (1993b) also describes pebbly arenites, immature sandstones, conglomerates and mudrocks in this formation that reflects the beginning of a major marine transgression that deposited the Silverton and Magaliesberg Formations (Eriksson et al., 1995). Thin stromatolitic cherts and carbonates (top of formation) normally changes into a condensed, transgressive dolomite or chert and is finally covered by the Silverton Shales. The Silverton Formation is a lithologically varied, mudrock-dominated sequence that was deposited on an offshore shelf along the borders of the Kaapvaal Craton (Eriksson et al. 2002, 2009). Volcanic ash-rich intervals are common as well as minor beds of carbonate and chert. Sandstones become more regular in the upper part of the sequence and was deposited under shallower conditions. In the eastern part of the Pretoria Basin, the Machadodorp Member lies in the middle of the Silverton Formation and is represented by a conspicuous interval of volcanic rocks (including agglomerates basaltic lavas as well as tuffs). The presence the volcanic pillow lavas and water-lain tuffs indicates that they were formed beneath the sea. The deep-water Silverton mudrocks were deposited in high sea levels and was followed by shallowing fluvial and deltaic sandstones in low sea levels of the overlying Magaliesberg Formation. The Hekpoort formation consists of Basaltic andesite and pyroclastic rocks and is volcanic in origin. In the south the basaltic andesitic lavas are more than 1100m thick thinning to 800m in the west and is less than 50m thinning in the north.

Subaerial fissure eruptions are dominant, with local pyroclastic systems (Oberholzer, 1995). Small lacustrine shale deposits are present between recurrent hiatuses in volcanism. Button (1973a) suggested an uppermost, widespread palaeosol.

In the eastern part of the Transvaal Basin the Silverton Formation is approximately 1-3 km thick and consists of recessive weathering producing a topography of rolling hills and valleys (Visser 1989). Carbonate rocks are present at the top of the Silverton Formation. Research indicated that microbial activity under low oxygen conditions causes organic carbon within the shales (Eriksson et al. 1989). Organic-walled microfossils thus may be present in these carbon-rich mudrocks of the Silverton Formation while the chert horizons may contain other microbial assemblages.

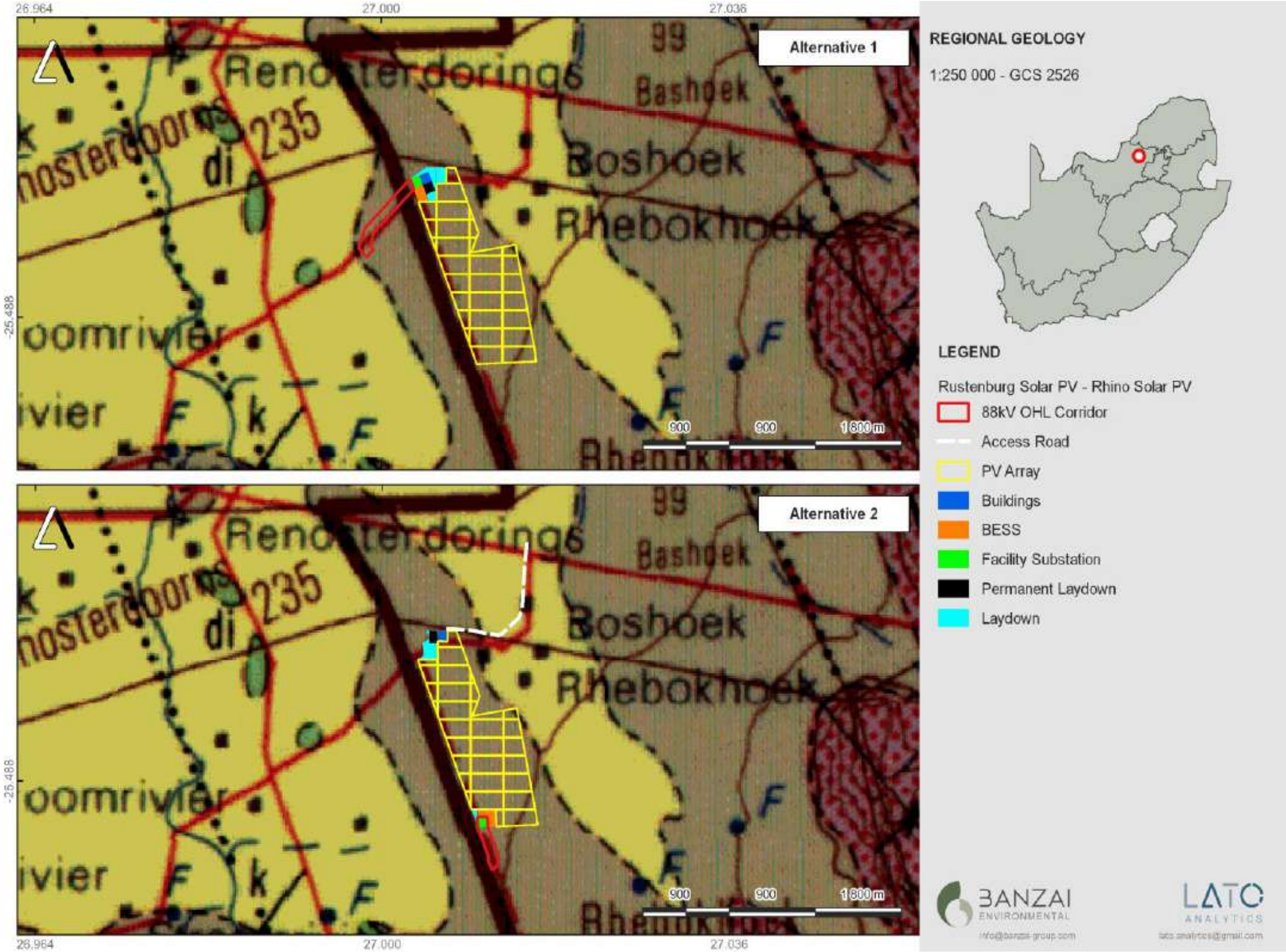
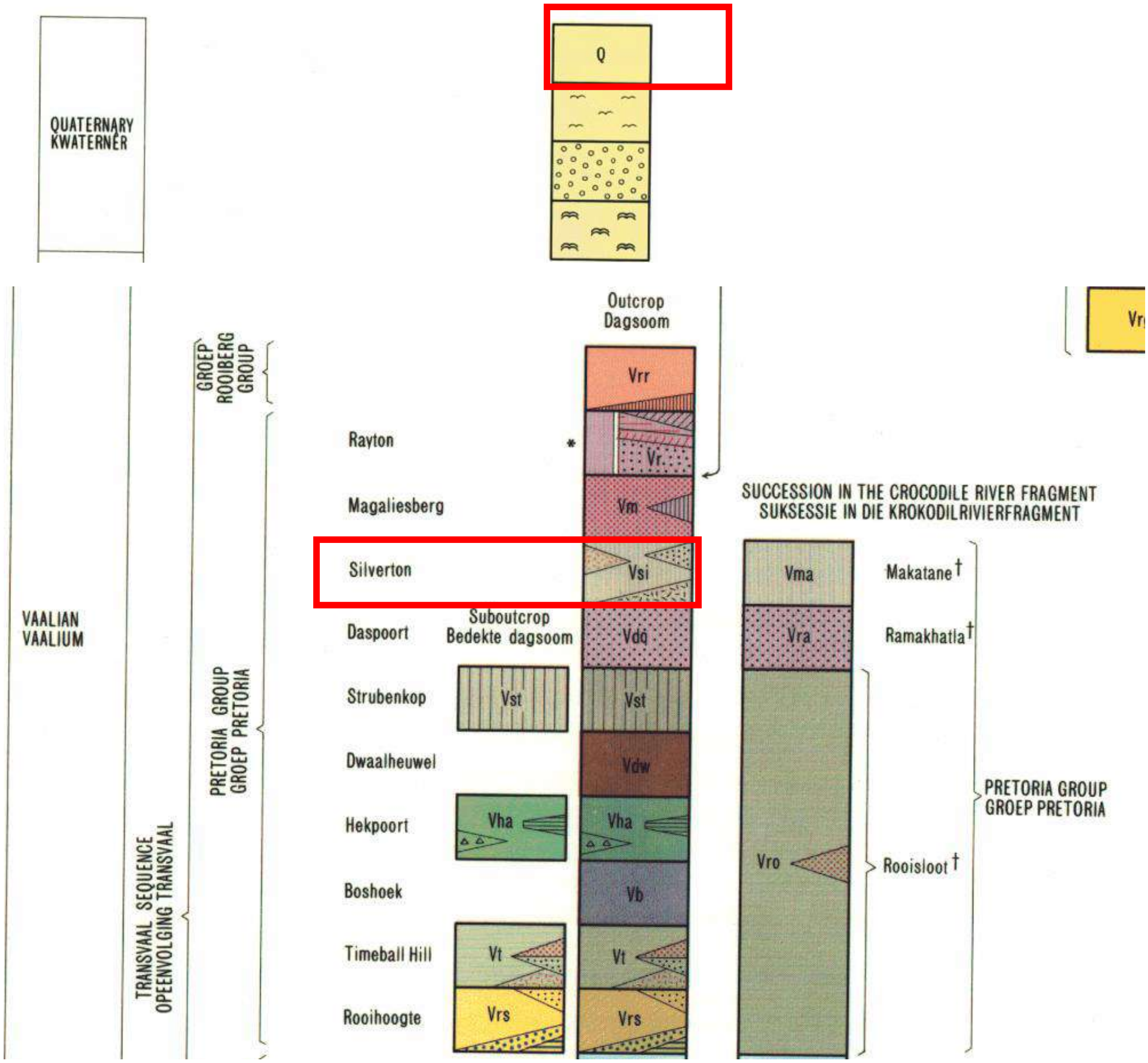


***Figure 3**: Extract of the 1:250 000* Rustenburg *2526 (1981) Geological Map (Council for Geosciences, Pretoria) indicating the proposed Rhino Solar PV Project near Rustenburg, in the North West Province. The proposed development is underlain by Quaternary aeolian sand (O, yellow), as well as the Silverton Formation (Vsi, khaki).*

Table 4: Legend of the Rustenburg 2526 (1981) Geological Map (Council for Geosciences, Pretoria). Relevant sediments are indicated in a red square



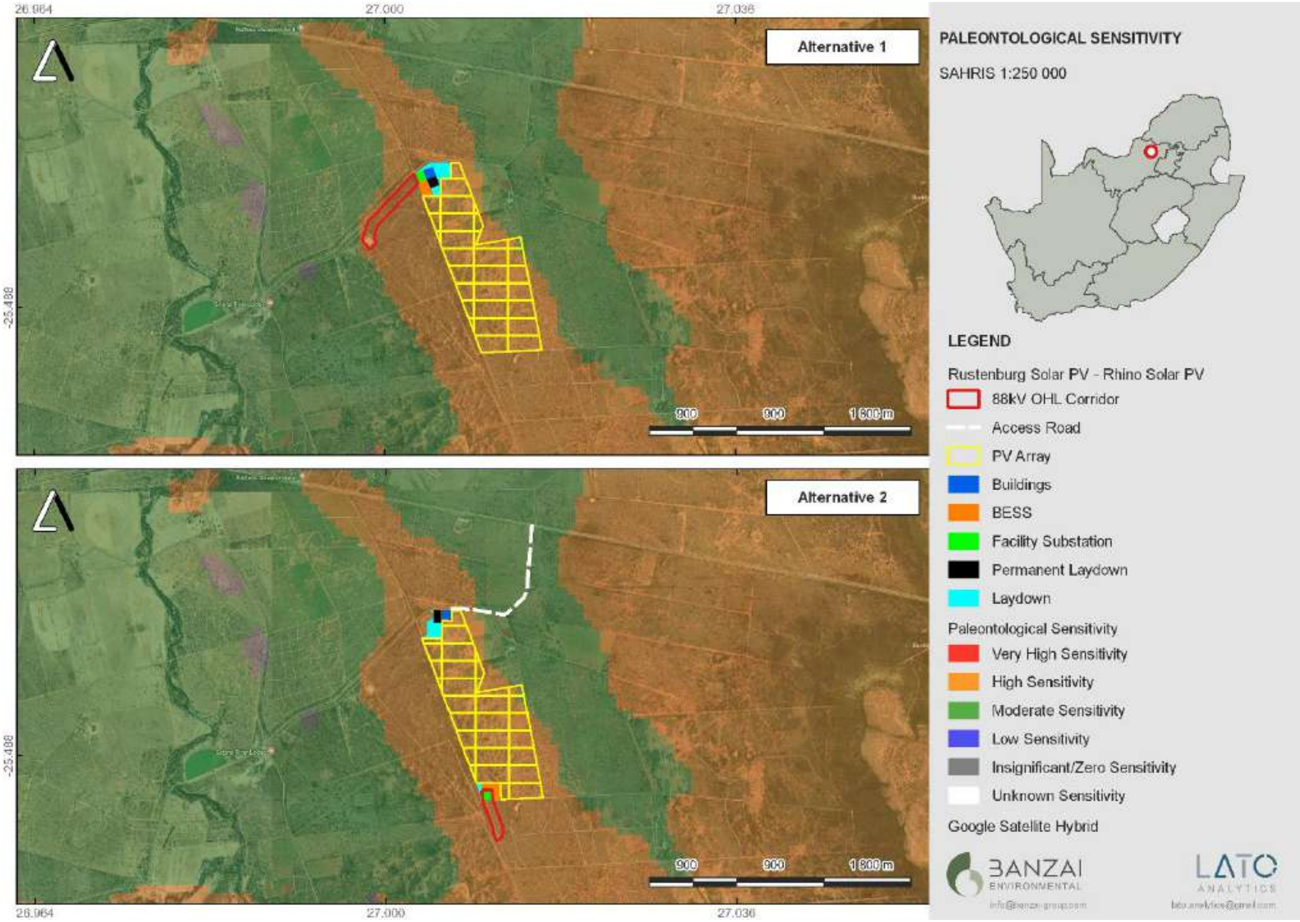


Figure 4*: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences) indicating the proposed Rhino Solar PV Project near Rustenburg, in the North West Province.*

Table 5:Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website		
Colour	**Sensitivity**	**Required Action**
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	**HIGH**	**Desktop study is required and based on the outcome of the desktop study; a field assessment is likely**
GREEN	**MODERATE**	**Desktop study is required**
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The SAHRIS Palaeosensitivity map (Figure 4) indicates that the proposed development is underlain by sediments with a High (orange) and Moderate (green) Palaeontological Sensitivity.

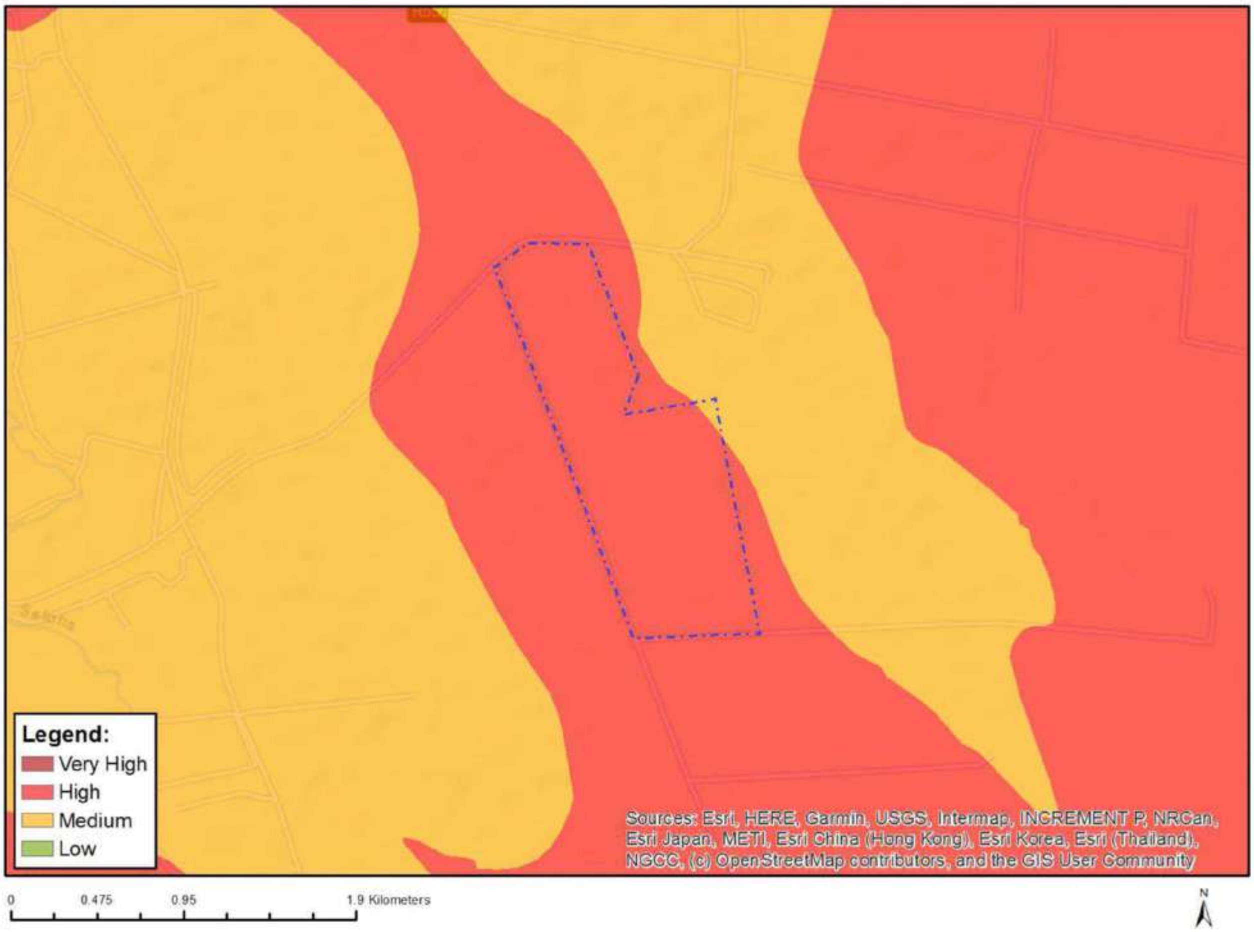


***Figure 5**: Palaeontological Sensitivity of the* Rhino Solar PV facility *by the National Environmental Web-bases Screening Tool.*

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is High (red) to Moderate (orange).

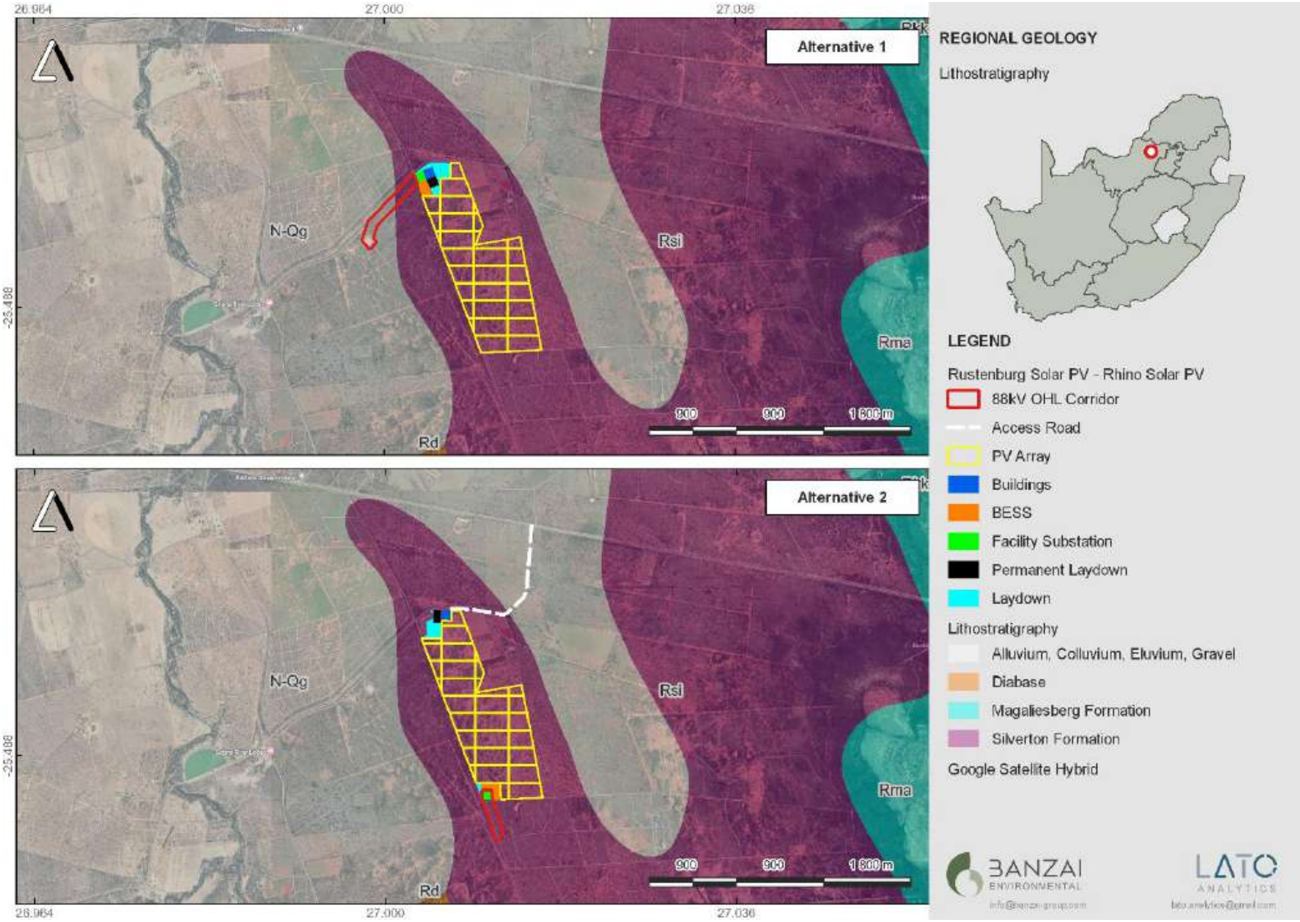


Figure 6: *Updated Geology (Council of Geosciences, Pretoria) of the proposed Rhino Solar PV development indicates that the development is underlain by Alluvium, Elluvium, Colluvium and Gravel, as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup).*

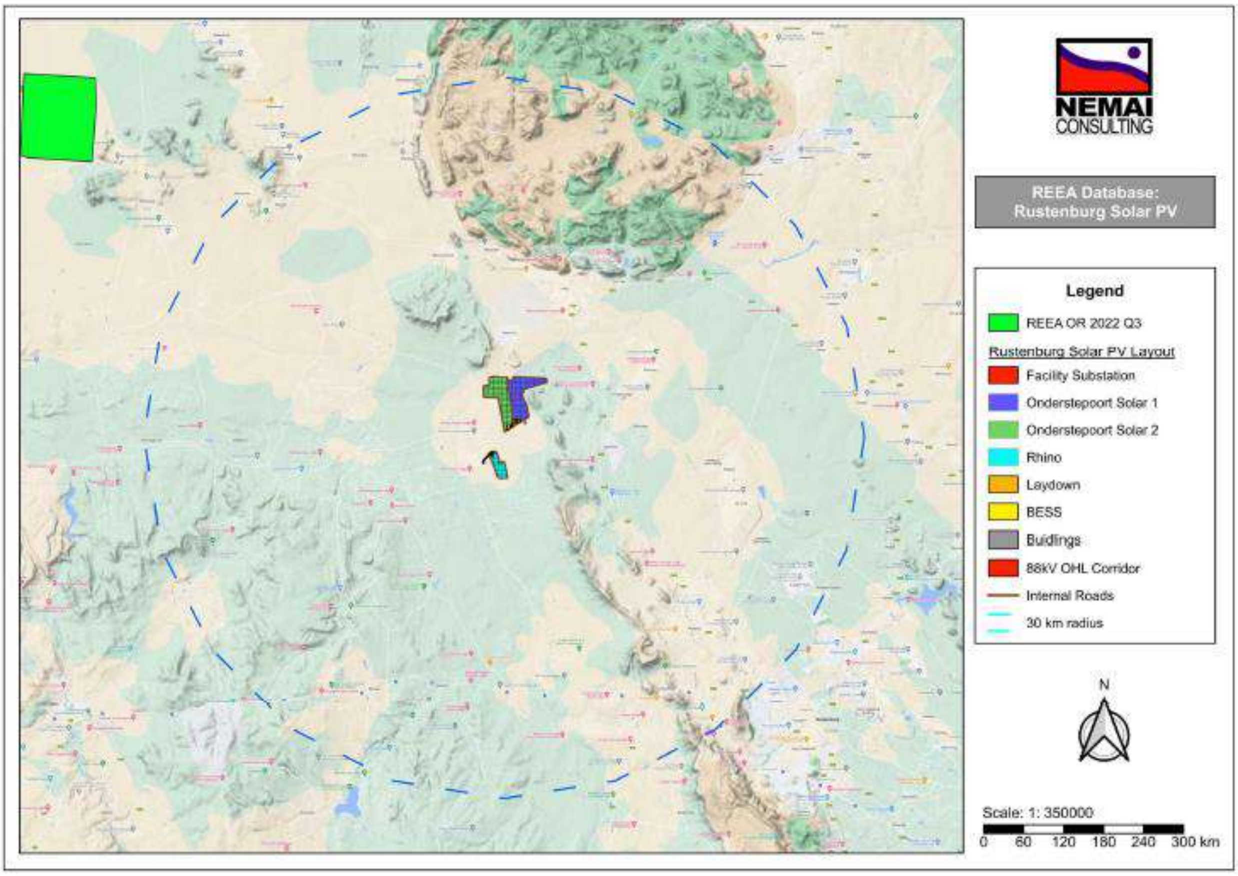


Figure 7: *Renewable energy applications in relation to the Project (within a 30km radius)*

Solar facilities have been identified in a 30 km radius of the proposed development (Figure 7). However, it is important to note that the quality of preservation of different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between Low and Medium.

6. GEOGRAPHICAL LOCATION OF THE SITE

The Project is located approximately 10 km to the west of Rasimone central business district (CBD) and falls within Ward 6 of the Kgetlengrivier Local Municipality in the North West Province. The project footprint covers a combined area of approximately 125 ha. The site can be accessed off the R565 (Figure 1-2).

7. ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)

- A Google Earth map with polygons of the proposed development was obtained from Nemai Environmental.
- 1:250 000 Rustenburg 2526 (1981) Geological Map (Council for Geosciences, Pretoria)
- Updated geological shape files (Council for Geosciences, Pretoria)
- National Environmental Web-based Screening Tool

8. ASSESSMENT METHODOLOGY

8.1 Method of Environmental Assessment

Impact assessment must take account of the nature, scale, and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the following project phases:

- 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 should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 6: The rating system

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
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		

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).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact 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 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 – 30 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 indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		

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. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact 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		
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.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
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. The calculation of the significance of an impact uses the following formula: **(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity = X.** 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
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.

29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	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".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

Table 7: Summary of Impacts								
Nature of Impacts	*Loss of Fossil Heritage in or above ground surface*							
Impacts	Extent	Probability	Duration	Magnitude	Reversibility	Irreplaceable loss	Cumulative effect	Impact Significance
Pre-mitigation	Site (1)	Possible (2)	Permanent (4)	High (2)	Irreversible 4	Significant loss of resources 2	Low (2)	Negative Medium (30)
Post mitigation	Site (1)	Possible (2)	Permanent (4)	Low (1)	Irreversible (4)	Significant loss of resources (1)	Low (2)	Negative Low (15)

9. CONCLUSION

The study area is underlain by undifferentiated Quaternary surface deposits as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of Quaternary deposits is Moderate while that of the Silverton Formation is High. The Palaeontological Sensitivity generated by the National Environmental Web-Based Screening indicates that the Sensitivity of the proposed development is High. Updated Geology (Council of Geosciences) indicates that the proposed development is underlain by the alluvium, colluvium, eluvium and gravel as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup) (Groenewald *et al.,* 2014). Two Layout alternatives have been proposed for the project. Layout Alternative One is the original layout and Alternative Two has been revised after specialist input. As the geology of the two layouts are the same there are no preference between the alternatives from a Palaeontological Perspective.

Based on the desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development is considered to be Low and falls within the acceptable limits for the project**. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the ECO/site manager in charge of these developments must be alerted immediately. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

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APPENDIX A

CURRICULUM VITAE

ELIZE BUTLER

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988 University of the Orange Free State B. Sc (Hons) Zoology, 1991 University of the Orange Free State Management Course, 1991 University of the Orange Free State M. Sc. *Cum laude* (Zoology), 2009 University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part-time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part-time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998–2022

TECHNICAL REPORTS

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Butler, E. 2018. Palaeontological Impact Assessment of the authorisation and amendment processes for Manangu mine near Delmas, Victor Khanye local municipality, Mpumalanga. Bloemfontein.
Butler, E. 2018. Palaeontological Desktop Assessment for the proposed Mashishing township establishment in Mashishing (Lydenburg), Mpumalanga Province. Bloemfontein.
Butler, E. 2018. Palaeontological Desktop Assessment for the Proposed Mlonzi Estate Development near Lusikisiki, Ngquza Hill Local Municipality, Eastern Cape. Bloemfontein.
Butler, E. 2018. Palaeontological Phase 1 Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.
Butler, E. 2018. Palaeontological Desktop Assessment for the proposed electricity expansion project and Sekgame Switching Station at the Sishen Mine, Northern Cape Province. Bloemfontein.

Butler, E. 2018. Palaeontological field assessment of the proposed construction of the Zonnebloem Switching Station (132/22kV) and two loop-in loop-out power lines (132kV) in the Mpumalanga Province. Bloemfontein.
Butler, E. 2018. Palaeontological Field Assessment for the proposed re-alignment and de-commissioning of the Firham-Platrand 88kv Powerline, near Standerton, Lekwa Local Municipality, Mpumalanga province. Bloemfontein.
Butler, E. 2018. Palaeontological Desktop Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.
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Butler, E. 2018. Palaeontological desktop assessment of the proposed Mookodi – Mahikeng 400kV line, North West Province. Bloemfontein.
Butler, E. 2018. Palaeontological Desktop Assessment for the proposed Thornhill Housing Project, Ndlambe Municipality, Port Alfred, Eastern Cape Province. Bloemfontein.
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APPENDIX B

PALAEONTOLOGICAL SITE VERIVICATION REPORT

Rhino Solar PV Project

(Part of the Rustenburg Solar PV Cluster)

CONTENTS

1. INTRODUCTION

Nemai Consulting CC (Nemai) was appointed by Rhino Solar (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the proposed 65 MW Rhino Solar Photovoltaic (PV) Project near Rustenburg, in the North West Province (the "Project") (Figure 1-2).

The electricity generated by the Project will be transferred via up to 132 kV powerlines from the Eskom switching station, located adjacent to the facility substation, to the existing Eskom powerlines, which are approximately 750 meters (m) away. A 100 m corridor will be assessed. The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

The Project is not located within any REDZs (Renewable Energy Development Zones) or Strategic Transmission Corridors. According to GNR 114 of 16 February 2018, where an Application for Environmental Authorisation for large scale wind or solar PV facilities is being made and these facilities fall outside of the REDZs then these applications will be considered in terms of the requirements of the EIA Regulations.

Table S1: Property details

Farm Name
Portion 11 of the Farm Rhebokhoek No. 101
Access Road
No. 571
Grid Connection Infrastructure
Portion 31 of the Farm No. 236
Portion 13 of the Farm No. 101
Remaining Extent of Portion 7 of the Farm No. 101

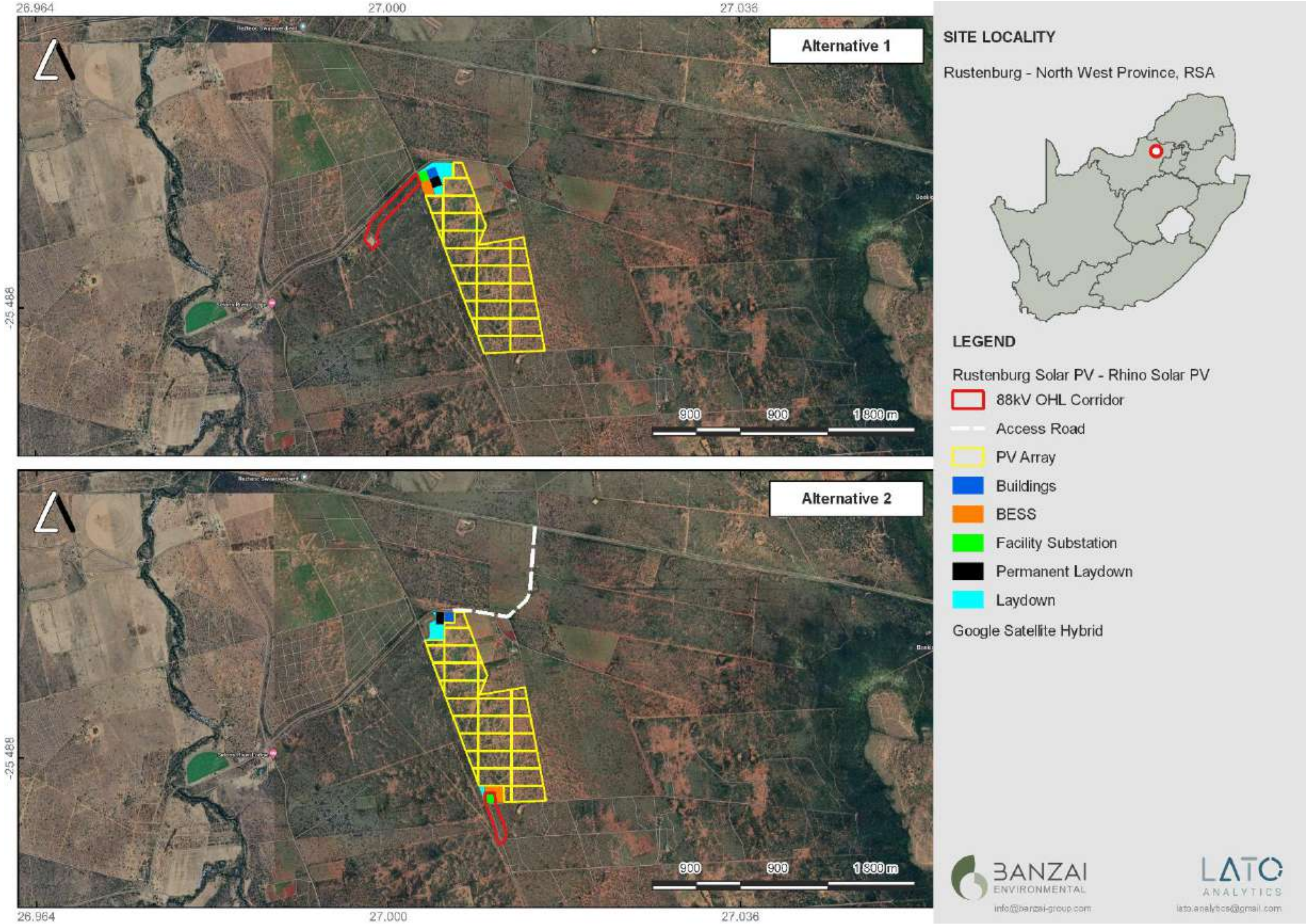


Figure S1: Regional locality Map of the proposed Rhino Solar PV Facility in the North West Province.

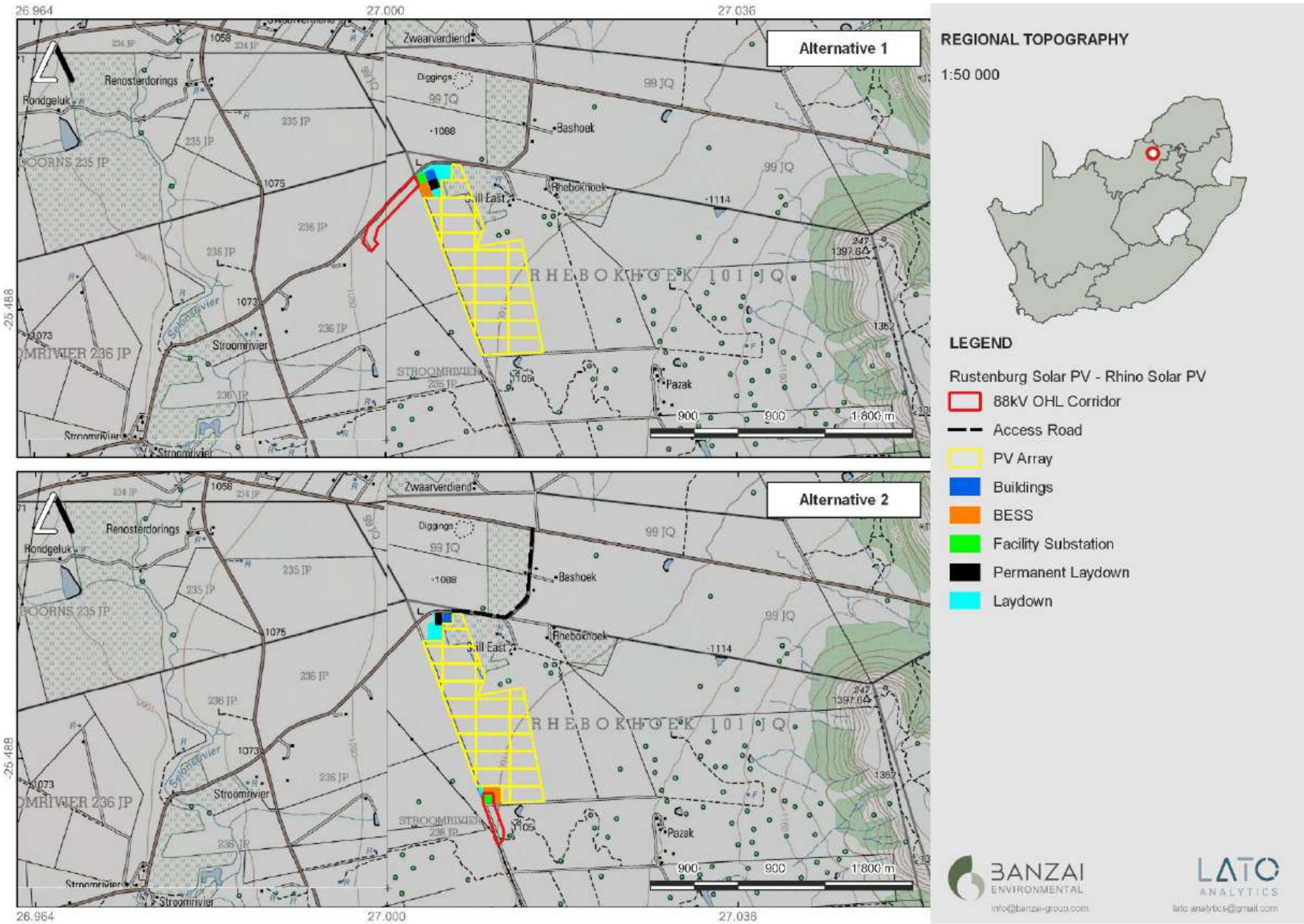


Figure S2: Locality map of the proposed Rhino Solar PV Facility in the North West Province.

2. TECHNICAL DETAILS FOR THE PROPOSED DEVELOPMENT

The Project consists of the following systems, sub-systems or components (amongst others):

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area up to 4ha.
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Facility grid connection infrastructure, including:
  - 33kV cabling between the project components and the facility substation
  - An up to 132kV facility substation
  - 88 kV LILO powerline between the facility substation and the exiting Eskom 88kV powerlines

- Temporary construction laydown area up to 5ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main access road is up to 8 m wide. The site is accessible via the R565.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R982, R983, R984 and R985, as amended), various aspects of the proposed development may have an impact on the environment and are considered to be listed activities. These activities require environmental authorisation (EA) from the Competent Authority (CA), namely the DFFE prior to the commencement thereof.

In accordance with GN 320 of 20 March 2020 and GN 1150 of 30 October 2020[1] (i.e., "the Protocols") of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Elize Butler as Palaeontology Specialist have been commissioned to verify the

[1] GN 320 (20 March 2020): Procedures for The Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation

sensitivity of the Rhino Solar PV development and associated infrastructure site under these specialist protocols.

3. SITE SENSITIVITY VERIFICATION METHODOLOGY

The Palaeontology Sensitivity Verification was undertaken by the following methodology:

- The site sensitivity is established through the National Environmental Web-Based Screening Tool
- The Site is mapped on the relevant Geological Map to determine the underlying geology of the development
- Then the site is mapped on the South African Heritage Resources Information System (SAHRIS) PalaeoMap, and the Sensitivity of the proposed development established.
- Other information is obtained by using satellite imagery and
- Palaeontological Impact Assessments and Desktop Assessments of projects in the same area are studied.
- Only a desktop assessment was conducted for this Project.

4. OUTCOME OF SITE SENSITIVITY VERIFICATION

The geology of the proposed Rhino Solar PV near Rustenburg in the North West Province is depicted on the 1: 250 000 Rustenburg 2526 (1981) Geological Map (Council for Geosciences, Pretoria) (Figure S3, Table S2). This map indicates that the study area is underlain by Quaternary sediments (Q, yellow) as well as the Silverton Formation (Pretoria Group, Karoo Supergroup)

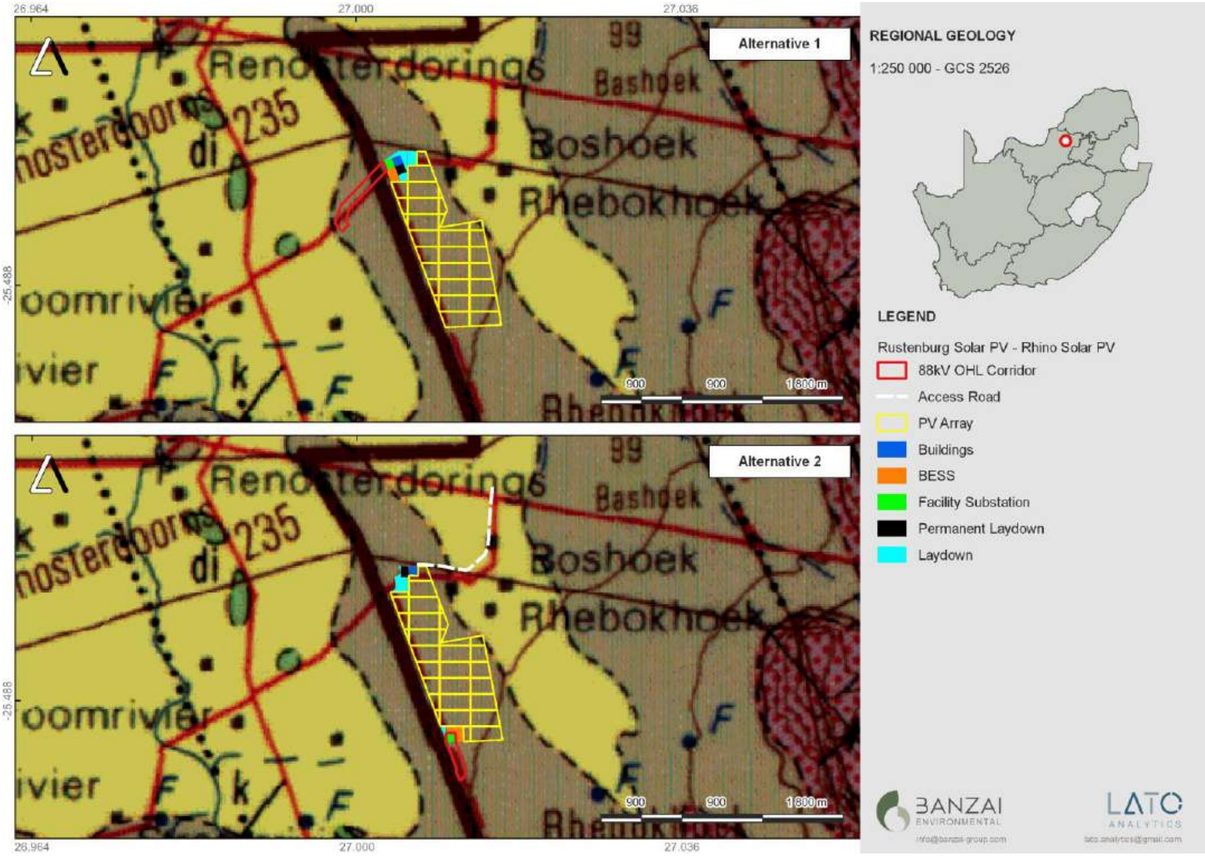
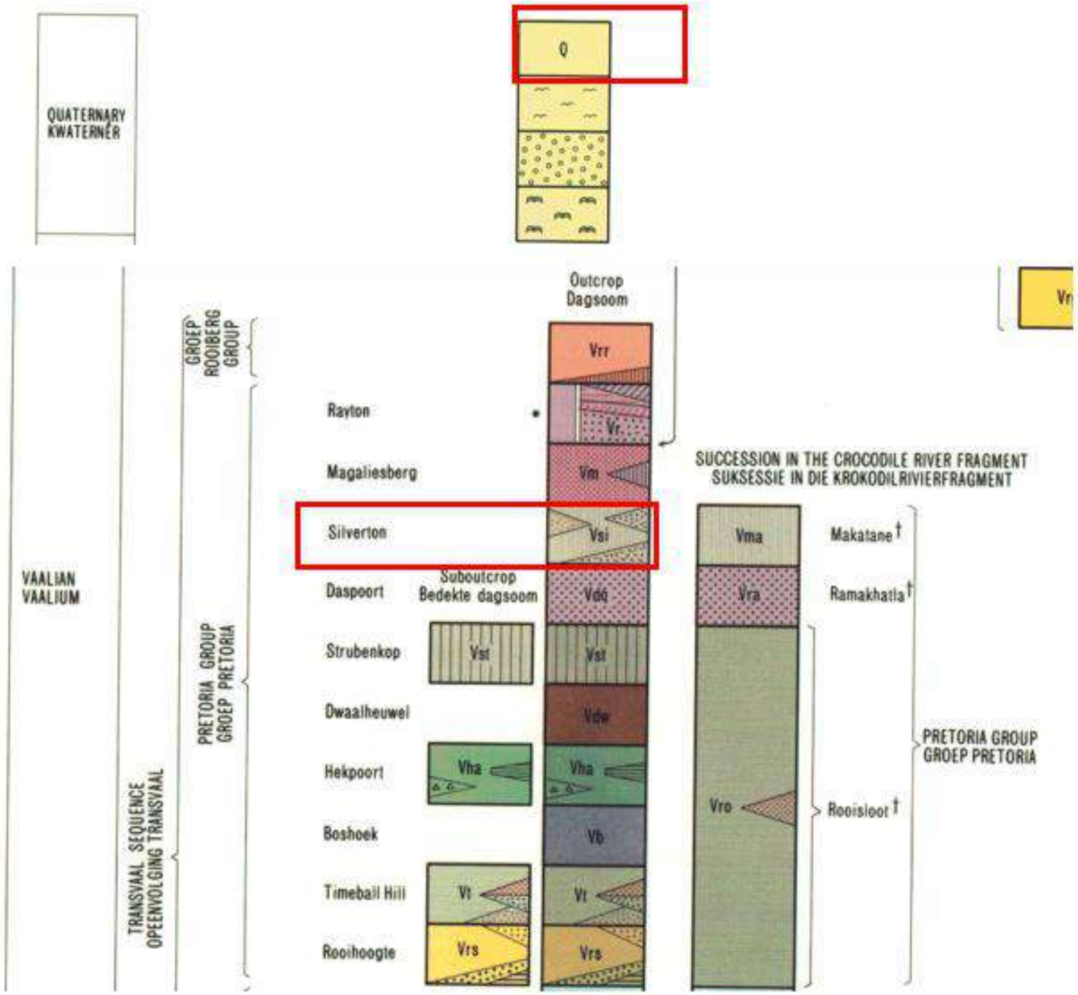


Figure S3: Extract of the 1: 250 000 Rustenburg 2726 (1981) Geological Map (Council of Geoscience, Pretoria) indicating that the study area is underlain by undifferentiated Quaternary sediments (Q, yellow) as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup).

Table S2: Legend to the *Rustenburg 2726 (1981)* Geological Map (Council for Geosciences, Pretoria).

Relevant sediments are indicated in a red square



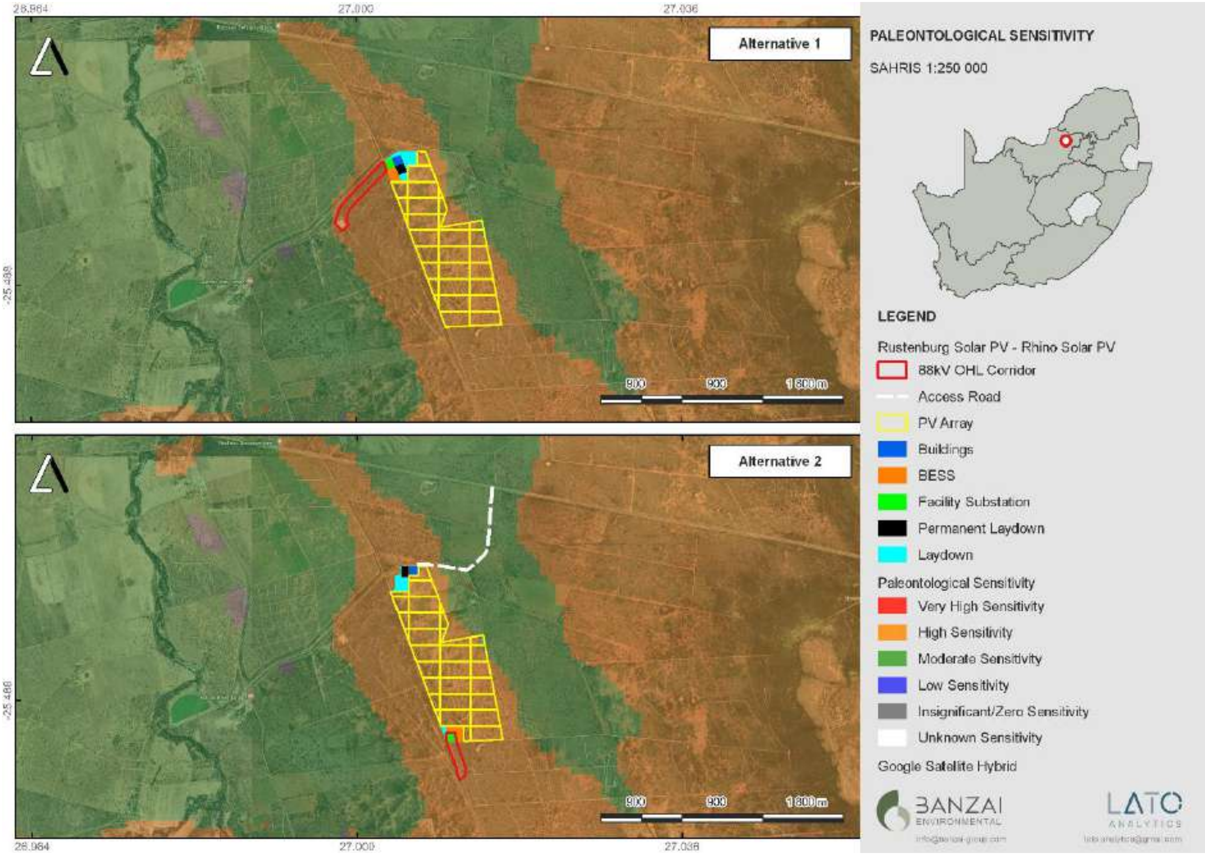


Figure S4: Extract of the 1: 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed study area.

Table S3: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	**HIGH**	**Desktop study is required and based on the outcome of the desktop study; a field assessment is likely**
GREEN	**MODERATE**	**Desktop study is required**
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	**INSIGNIFICANT/ZERO**	**No palaeontological studies are required**
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The PalaeoMap of the South African Heritage Resources Information System (Figure S4, Table S3) indicates that the Palaeontological Sensitivity of the Rhino Solar PV development is High (orange) and Moderate (green) (Almond and Pether, 2009; Almond *et al*., 2013).

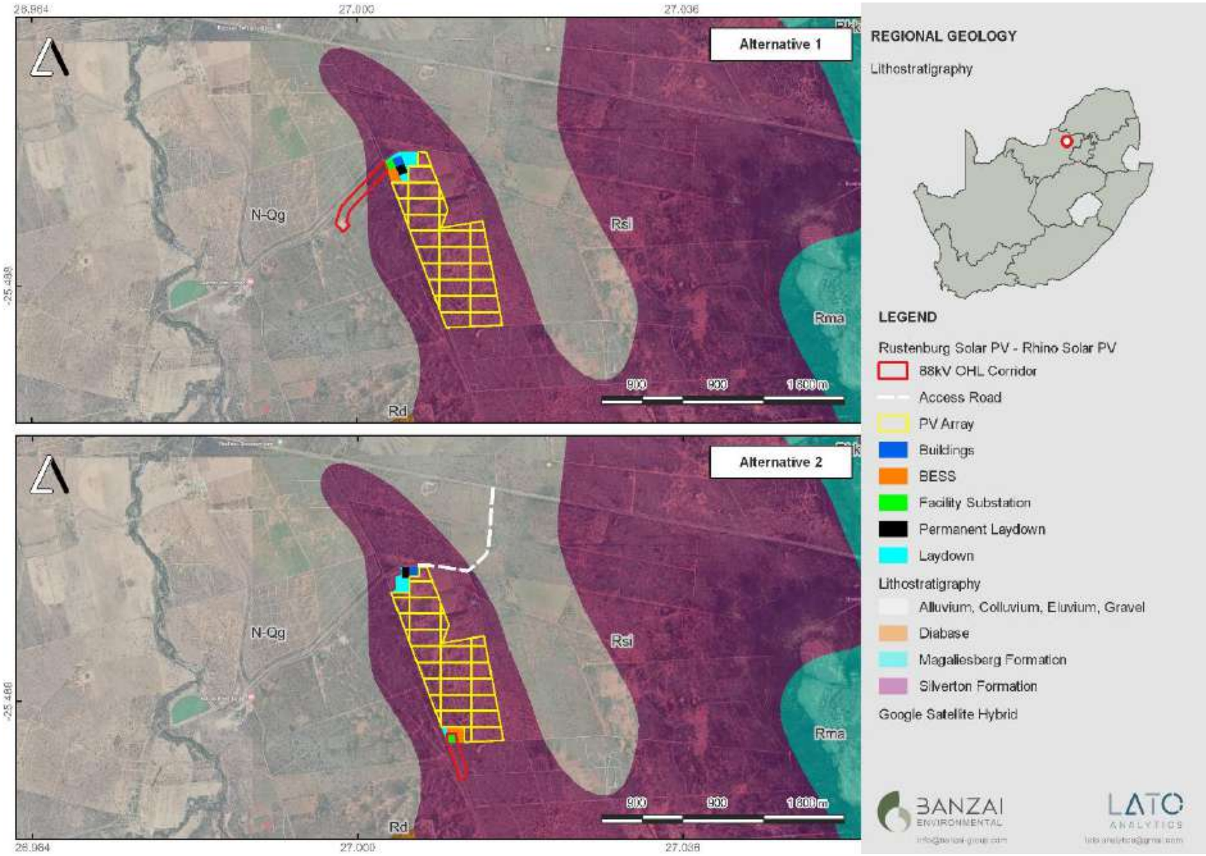


Figure S5: Updated Geology (Council of Geosciences, Pretoria) of the study area indicates that the development is underlain by alluvium, colluvium, eluvium and gravel as well as the Silverton Formation (Pretoria Group, Transvaal Supergroup).

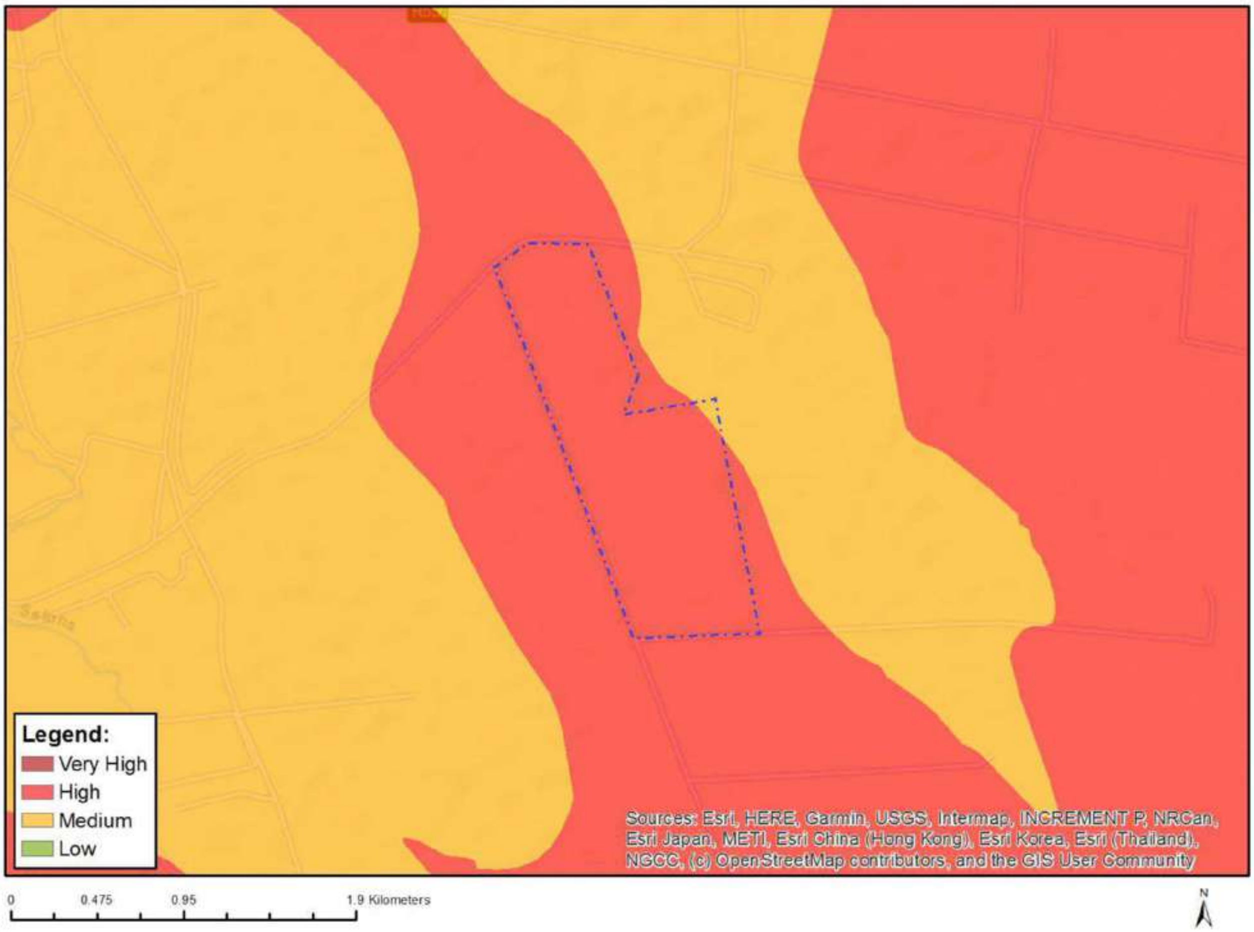


Figure S5: Palaeontological Sensitivity of the Rhino Solar PV facility *by the National Environmental Web-bases Screening Tool.*

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is High (red); and Medium (orange).

5. CONCLUSION

The Site Sensitivities of the proposed Rhino Solar PV has been verified and it was found that:

- The SAHRIS Palaeosensitivity map indicates that the Palaeontological Sensitivity of the development is High.

And

- The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is High.

These maps indicate that the proposed Rhino Solar PV development is Sensitive from a Palaeontological point of view. According to the SAHRHA minimum standards for palaeontological impact studies (2012) a" **Desktop study is required and based on the outcome of the desktop study; a field assessment is likely".** As the surrounding areas does not contain sediments with a Very High Palaeontological Sensitivity a desktop assessment was conducted.

APPENDIX E7: Social Impact Assessment

PROPOSED RHINO SOLAR PHOTOVOLTAIC PROJECT LOCATED WEST OF RASIMONE, NORTH WEST PROVINCE

Social Impact Assessment Report

May 2023

Prepared for: Rhino Solar (PTY) LTD

Title and Approval Page

Project Name:	Proposed Rhino Solar Photovoltaic Project, located West of Rasimone, Northwest Province
Report Title:	Social Impact Assessment Report
Report Status:	Draft for Public Review

Client	Rhino Solar (Pty) Ltd

Prepared By:	Nemai Consulting			
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Report Reference:				R-PRO-REP|20170216

Authorisation	Name	Signature	Date
Author:	Caroline Tanhuke		21 March 2023
Reviewer:	Ciaran Chidley		9 May 2023

Amendments Page

Date:	Nature of Amendment	Amendment Number:
9 May 2023	Draft for public review	0

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List of Abbreviations

AIDS	Acquired immunodeficiency syndrome
BESS	Battery Energy Storage System
BID	Background Information Document
BPDM	Bojanala Platinum District Municipality
CSR	Corporate Social Responsibility
DMRE	Department of Mineral Resources and Energy
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GDP	Gross Domestic Product
GIS	Geographic Information System
GVA	Gross Value Added
HIV	Human Immunodeficiency Virus
IAP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IFC	International Finance Corporation
ILO	International Labour Organisation
IRP	Integrated Resource Plan
ISO	International Organisation for Standardization
km	Kilometre (1 000m)
KLM	Kgetlengrivier Local Municipality
LM	Local Municipality
MTS	Main Transmission Substation
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
MW	Mega Watt (one million watts)
OHS	Occupational Health and Safety
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SA	South Africa
SIA	Social Impact Assessment
SMME	Small, Medium, and Micro Enterprises
SW/STN	Switching Substation

1 INTRODUCTION

The team of Caroline Tanhuke and Ciaran Chidley of Nemai Consulting have been appointed to undertake the Social Impact Assessment (SIA) as part of the environmental authorisation process for the proposed 65 MW Rhino Solar Solar Photovoltaic Project.

This solar PV generator aims to provide 65 MW of electricity to the electrical grid. The project is being prepared for submission to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within South Africa. The Project is located on sites near Rasimone, within the Rustenburg Local Municipality and Kgetlengrivier Local Municipality, in the Northwest Province

One of the specialist studies required by the Environmental Impact Assessment (EIA) is a Social Impact Assessment. This report fulfils the requirements of the Social Impact Assessment, and its recommendations will be included into the EIA.

1.1 Terms of Reference

The terms of reference for the study are as follows:

- Describe the social baseline conditions that may be affected by the project;
- Describe the approach proposed for assessing the potentially significant issues that should be addressed by the SIA during the EIA phase;
- Determine the specific local social impacts of the project;
- Identify the potential social issues associated with the project;
- Suggest suitable mitigation measures to address the identified impacts; and
- Make recommendations on preferred options from a social perspective.

1.2 Structure of the report

The remainder of the report is structured as follows:

Section 2: Project Description – This section provides an introduction and motivation to the project. It includes a description of the study area.

Section 3: Legislation – A description of the statutory and regulatory requirements that informed this report.

Section 4: Definition of the Study Area – Defines the studies areas for the SIA.

Section 5: Methodology – Outlines the methodology used to determine the social impacts of the proposed project.

Section 6: Status Quo Analysis – A desktop analysis of the baseline situation in the regional study area.

Section 7: Local Study Area Overview – Provides an analysis of the social aspects of the local study area. The section includes a discussion on the findings that resulted from community engagement, site visits and stakeholder participation.

Section 8: Identification of Impacts - Aspects and Impacts – The identification of the project activities and an investigation into what aspects of these activities will result in social impacts.

Section 9: Analysis of Alternatives – Decision making with regards the preferred project alternatives from a social perspective.

1.2 Specialists' Details

This report is written by Caroline Tanhuke and Ciaran Chidley. Ciaran Chidley obtained bachelor's degrees in civil engineering, economics and philosophy, and holds a Master of Business Administration. His experience over the past 26 years includes economic and social assessments for a wide variety of linear and site-based infrastructure and industrial projects. Caroline Tanhuke holds a B.A Environmental Management (Geography) Degree and has three years of experience. Her experience in assessing social impacts of infrastructure projects include renewable energy infrastructure, powerlines and pipelines. She has conducted social facilitation projects throughout South Africa.

1.3 Specialist Declaration

Nemai Consulting operates as an independent consultant conducting environmental impact assessments and associated specialists' studies. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget).

2 PROJECT DESCRIPTION

The South African Government ratified the Paris Agreement in 2016, and thereby showed the country's commitment to contribute to the global effort to address the challenge of climate change. Electricity generation sources need to be diversified to ensure security of supply and reduction in the carbon footprint created by the current heavy reliance of South Africa (SA) on coal to produce electricity. The electricity demand is increasing in SA, and to match that demand there is a need to supply a diversified power generation that includes renewable energy technologies. These technologies include solar, wind, small utility scale hydro, biomass, biogas and energy storage that the Department of Mineral Resources and Energy (DMRE) intends to develop and implement as identified in the approved Integrated Resource Plan (IRP) 2019.

To this end the proponent has proposed the subject of this report, a solar photovoltaic generation facility.

2.1 Project Components

A cluster of proposed Solar PV Projects are planned on sites near Rasimone, within the Rustenburg Local Municipality and the Kgetlengrivier Local Municipality, falling within the Bojanala Platinum District Municipality in the Northwest Province. Rhino Solar (Pty) Ltd intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within south Africa, in compliance with the National Energy Act was promulgated in 2008 (Act 34 of 2008).

The solar energy functions by the conversion of solar energy into electricity. The generation of electricity using solar energy is a non-consumptive use of a natural resource that requires no fuel for continued operation. In comparison to typical coal-fired power plants, solar energy creates a negligible amount of greenhouse gases during its existence. And in the operational phase of solar power, it does not emit carbon dioxide, Sulphur dioxide, or any other kind of air-pollution.

Photovoltaic technology produces direct current, which is then converted to alternating current via power electronic inverters. Figure 1 below provides an overview of a typical Solar PV Power Plant project.

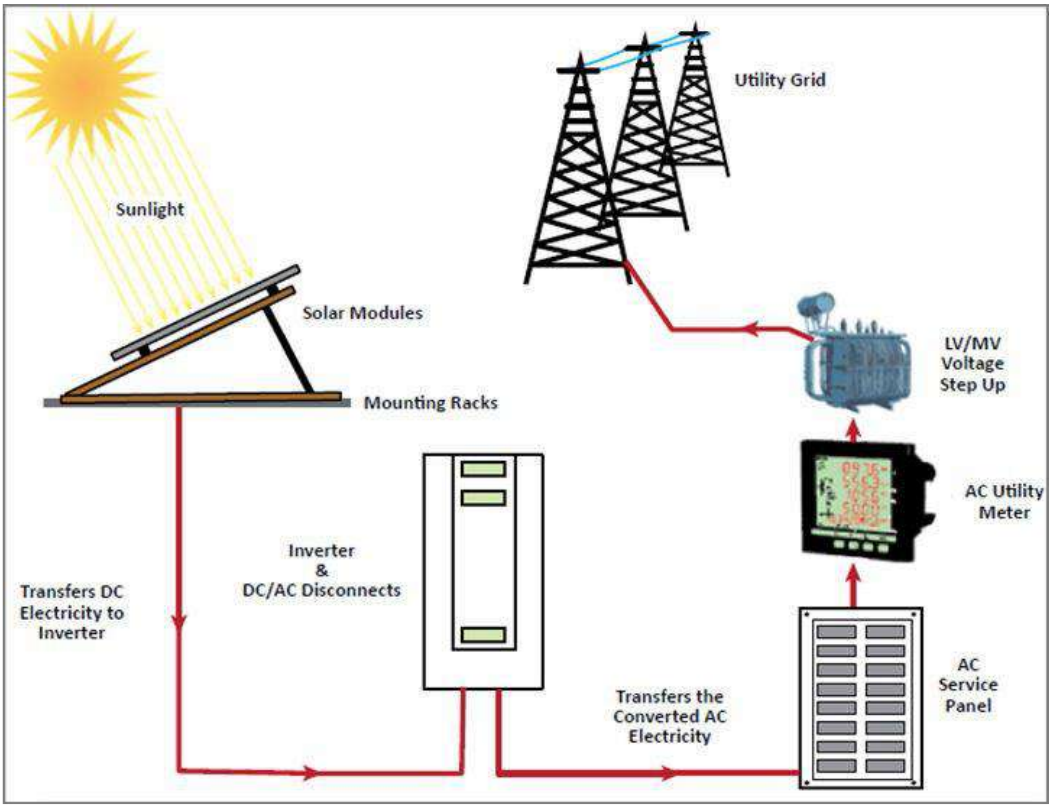


Figure 1:Overview of the solar power plant

(Source: International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plants)

Energy is harvested from the solar modules, which are angled toward the sun using mounting racks. The energy harvested is in the form of direct electrical current, which is processed through the inverters to convert this electrical power into alternating electrical current, which can be used by the national electrical system. The alternating current is transferred via the facility substation onto the national grid.

The project forms part of the cluster of three facilities, all located near one another and using the same electricity transmission infrastructure. The three projects in the cluster are shown in Figure 2 below.

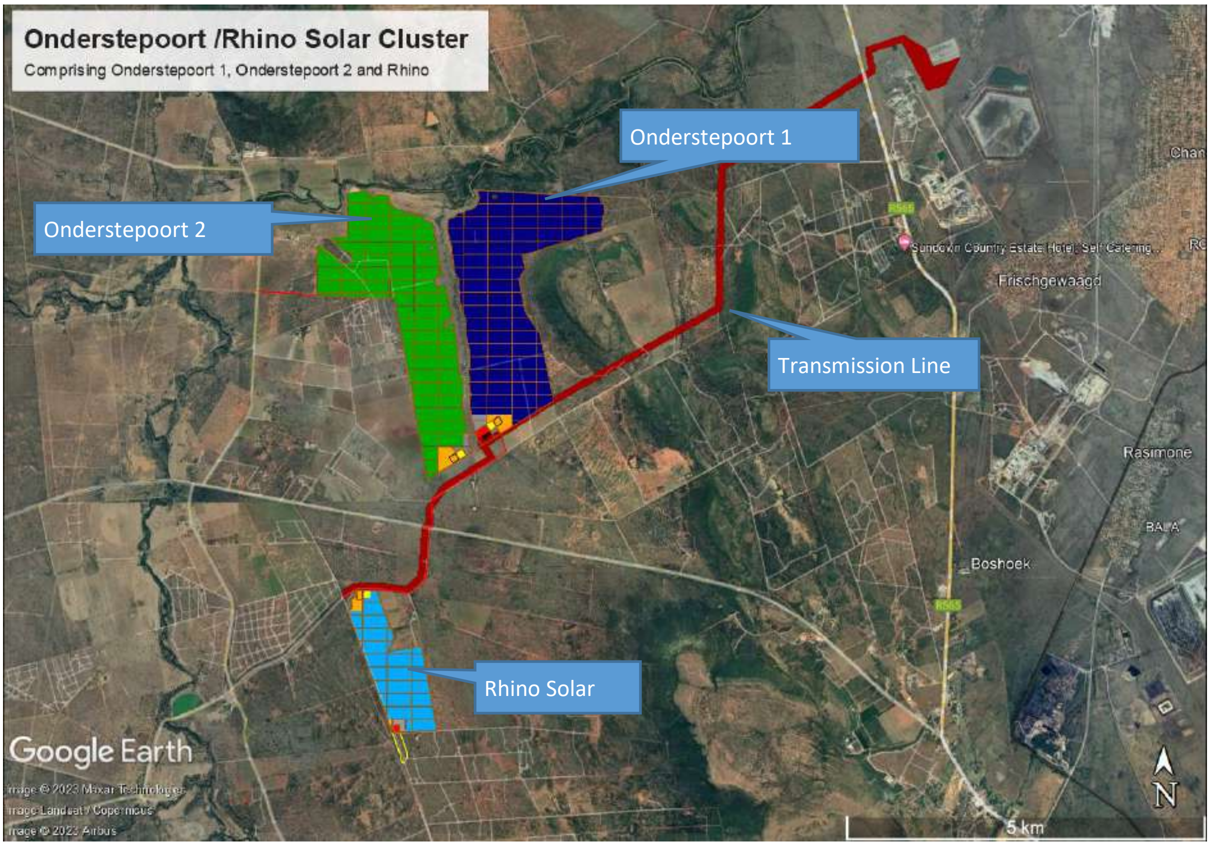


Figure 2: Onderstepoort / Rhino Solar Cluster

The proposed Rhino Solar will include the following components:

- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters, transformers, switchgear, and internal electrical reticulation.
- Battery Energy Storage System (BESS) area up to 4 ha.
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Grid connection infrastructure, including: 33kV cabling between the project components and the facility substation; A 132kV facility substation and collector switching station; 132kV

powerlines between the collector switching station and the Eskom Ngwedi Main Transmission Substation (MTS); 88 kV or 132 kV powerline between the Rhino Solar PV facility substation and the existing Eskom Rhino Substation or collector switching station.

- Temporary construction laydown area up to 5 ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main access road is up to 8 m wide. The sites will be accessible via existing provincial roads, located adjacent to the development area.
- The interconnection grid powerline is contemplated in a separate application.

The proposed Solar PV Projects have a design life of a minimum of 25 years. The extension of the life of the plant will be considered when assessing the plant’s economic viability to remain operational after its end of life.

2.2 Project Locality

The Project is located on sites near Rasimone; within the Rustenburg Local Municipality and Kgetlengrivier Local Municipality; in the Northwest Province. Figure 3 shows the project and the site locality.

The layout below shows the so-called EIR Layout, which is the layout submitted during the Environmental Impact Report stage of the Environment Impact Assessment.

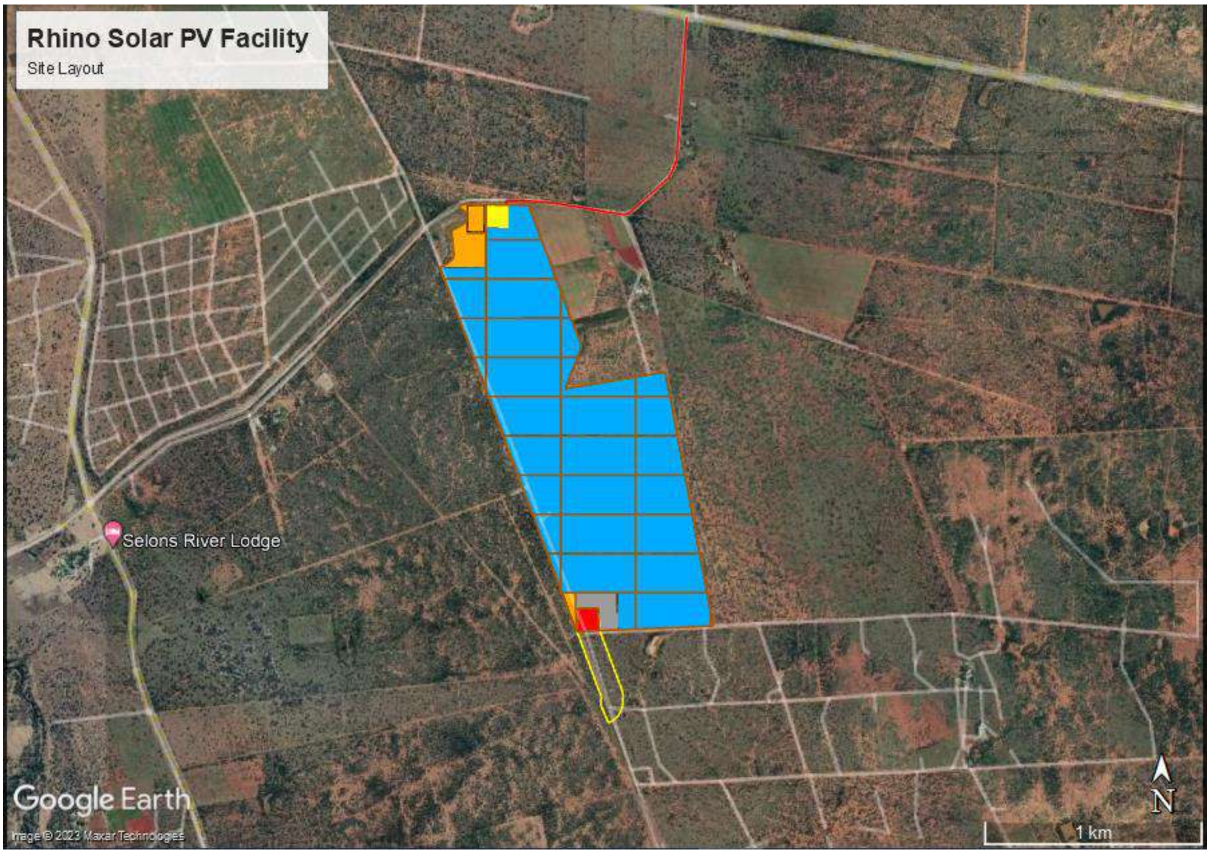


Figure 3: Rhino Solar Layout

No	Applicant	MW Output	Properties Affected
		Solar PV Project	
1.	Rhino Solar (Pty) Ltd	Up to 65MW	• Portion 11 of the Farm Rhebokhoek 101
		Grid Connection	
2.	The Grid connection infrastructure: • 88 kV powerline between the facility substation and the existing Eskom Rhino Substation; or alternatively - approximately 2.5 km 132 kV powerline between the facility substation and the proposed Collector Sw/Stn to the south	• Portion 31 of the Farm Stroomrivier 236 and Portion 26 of the Farm Stroomrivier 236 • Alternative: Farm Paul Bodenstein Landgoed 571, Portion 1 of Farm 102, and Remaining Extent of Portion 2 the Farm Onderstepoort 98.	
3.	2 x 132 kV powerlines between a proposed 132 kV collector Switching Station (Sw/Stn) and the Eskom Ngwedi Main Transmission Substation (MTS).	• Remaining Extent of Portion 2 the Farm Onderstepoort 98; • Portion 13 (a portion of Portion 2) of the Farm Onderstepoort 98; • Remaining Extent of Portion 3 of Farm Onderstepoort 98; • Portion 8 of the Farm Onderstepoort 98; • Remaining Extent of Portion 2 of the Farm Frischgewaagd 96;	

No	Applicant	MW Output	Properties Affected
			• Portion 19 of the Farm Frischgewaagd 96; • Portion 23 of the Farm Frischgewaagd 96; • Portion 24 of the Farm Frischgewaagd 96; • Portion 7 of the Farm Frischgewaagd 96; • Portion 10 of the Farm Frischgewaagd 96; and • Portion 14 of the Farm Frischgewaagd 96.

2.3 Social Stimulus

Solar PV creates several social impacts which are created at different stage of the value chain. The value chain can be conceptualised as being the following events (IRENA and CEM, 2014):

- Project planning – consulting work conducted by specialists;
- Manufacturing – raw material sourcing and component manufacture and assembly. Component manufacturing covers the solar modules, transformers, inverters, electrical cabling, combiner boxes and module support structures;
- Installation – a labour intensive process involving civil engineering contractors, module installation and electrical engineering contractors;
- Grid Connection – carried out by specialised electrical engineering contractors. This work allows the solar park to contribute to the national grid, thereby contributing to stabilising supply of electricity;
- Operations and Maintenance – a long-term activity requiring regular plant monitoring, equipment inspections and repair services; and
- De-commissioning – plant at the ned of their lifespan require activities such as recycling the modules and disposal or reselling of components.

The potential for creating value within the regional study area and into the broader Free State economy is depends on the level of development of the renewable energy sector. The major cost items for a solar park are the modules, the transformers, and the inverters – these will be imported items. The cabling and electrical systems can be manufactured in South Africa. The economic value created through installation and grid connection can be created within South Africa, with much of the labour and semi-skilled workers being available within the regional study area.

As South Africa's level of development in the renewable energy field increases, so the value captured within the country will increase all along the value chain.

2.3.1 Job Creation

The number of direct and indirect jobs created for the construction phase was estimated in 2007 as being 69.1 per MW installed, and 0.73 / MW installed during the operations and maintenance phase (IRENA and CEM, 2014). The definition of "jobs" in this case would be work opportunities of any duration above one month. For the proposed project, this yields total values of 9 218 during construction, and 96 during operations and maintenance. These jobs are not all created on the construction site, they are distributed throughout the value chains of these two phases, at different parts of the country where the value is being created. It must be pointed out that this data is based upon the state of solar photovoltaic technology in 2007. Technology changes since then have improved solar farm outputs, and this may not have increased the proportion of manhours required for the plant in a linear fashion.

The Independent Power Producers programme, managed by the Department of Energy has local content requirements and targets for the bid windows. Some of these targets are:

- Job creation for SA citizens – a minimum of 50% and a target of 80%; and
- Local content for SA manufactures – a minimum of 45% and a target of 65%, the minimum has been increased by 10% from bid window 2.

The proportion of employment from local communities for all renewable energy projects have been reported (Department of Energy, 2019). The Department of Energy reports that of the 33 019 job years created for the entire renewable energy procurement programme, 18 253 job years were attributable to people from the local community – this is a proportion of 55%. This proportion can be attributed to the proposed project. The Department of Energy also cites figures that 8% of employment was female and 41% was from the youth category (Department of Energy, 2019). These proportions can also be attributable to the project.

An estimate of the number of direct job years to be created by the proposed project can be derived from the Department of Energy Report using the figures to date for the Limpopo Province. A provincial breakdown is provided for 3 projects (all completed) which all use Solar PV technology. It was reported that 118MW of energy was generated, creating 1 240 job years to date (which included all of the construction jobs) and estimated at 2 917 job years over the 20-year life of the projects (Department of Energy, 2019). Applying these proportions to the proposed project yields the total job years of 4 650, made up of 3 263 job years for operations and maintenance and a construction phase job phase year estimate of 1 387. No estimate has been made for the Battery Energy Storage portion of the project since no data is available to make an estimate.

The table below summarises the job creation estimates for the proposed project. Readers should bear in mind the various sources for this information, the assumptions made and the dates of the data – together these factors combine to set the degree of accuracy for these estimates at 20%.

Table 1: Job Creation Estimate

Description	Total No.	Local No.
Total Jobs Created (durations above one month)	16 759	9 218
Planning and Construction Phase	16 584	9 121
Operation and Maintenance Phase, 20 years	175	96

Table 2: Estimated Job Years Created

Description	Total No.	Local No.
Total Job Years Created	8 455	4 650
Planning and Construction Phase	2 522	1 387
Operation and Maintenance Phase, 20 years	5 933	3 263

2.3.2 Economic Value Creation

The contribution of the project to South Africa's Gross Domestic Product (GDP) can be estimated from published literature. A Department of Energy report using the figures for renewable project delivery to date for the Limpopo Province provides an indication. A provincial breakdown is provided for 3 projects (all completed) which all use Solar PV technology. It was reported that 118MW of energy was generated, creating R3.6 billion in GDP contribution (Department of Energy, 2019). Applying this proportion to the proposed project yields a total GDP contribution of R9.8 billion. This captured the total impact of the project on the nation's economy, both through direct and indirect spending.

The local content for Solar PV projects has varied over the four bid windows. Bid window 1 achieved 50% local content, bid window 2 achieved 52%, bid window 3 achieved 55% and bid window 4 achieved 75% (Department of Energy, 2019). This increasing trend demonstrates the possible impact that the proposed project could have on the South African value chain. To date, the average local content spend for PV projects in South Africa has been R46.5 billion versus a comparable total project value of R90.3 billion – a percentage of 51%.

If this value is applied to the proposed project value of R7.3 billion, a local value chain addition of R3.7 billion can be estimated. The proportion of value attributable to the regional study could not be estimated and figures from the literature are not available.

3 RELEVANT LEGISLATION, STANDARDS AND GUIDELINES

Legislation, policy, plans, and strategy provide an important framework and governance of the SIA. This section provides a summary of the prevailing acts, policies, plans and strategy which were considered by this study.

3.1 The Constitution of South Africa (Act 7 of 1996)

The Constitution emphasizes human rights with the intention of establishing a society based on democratic values; social justice and fundamental human rights. Furthermore, The Constitution recognizes the general need to improve the quality of life of all citizens. These constitutional rights can be used to support reasonable environmental demands. Other fundamental rights in the Constitution which support environmental demands include:

- The right to life (Section 11).
- The right to human dignity (Section 10).
- The right to privacy (Section 14).
- Certain socio-economic rights.

Socio-economic rights relevant to environmental rights:

- The right of access to adequate housing (Section 26).
- The right of access to sufficient food and water (Section 27).
- The right of access to health care services (Section 27).
- The rights of children to basic nutrition and shelter, and to be protected from maltreatment; neglect; abuse or degradation (Section 28).

3.2 National Development Plan (2011)

The National Development Plan (NDP) of 2010 proposes to "invigorate and expand economic opportunity through infrastructure, more innovation, private investment, and entrepreneurialism.

The Plan aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality. The core elements of a decent standard of living identified in the Plan are:

- Housing, water, electricity and sanitation;
- Safe and reliable public transport;
- Quality education and skills development;
- Safety and security;
- Quality health care;
- Social protection;
- Employment;
- Recreation and leisure;
- Clean environment; and
- Adequate nutrition.

3.3 National Energy Act (Act 34 of 2008)

The National Energy Act was promulgated in 2008 (Act 34 of 2008); and one of the key objectives of the Act was to promote diversity in the supply of energy and its sources. The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998. In terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply constriction and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process; eight key objectives were identified; namely:

- Objective 1: Ensure security of supply;
- Objective 2: Minimize the cost of energy;
- Objective 3: Promote the creation of jobs and localization;
- Objective 4: Minimize negative environmental impacts from the energy sector;
- Objective 5: Promote the conservation of water;
- Objective 6: Diversify supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

3.4 National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (NEMA) and the principles contained therein have a significant influence on the need to identify and assess social impacts. The NEMA principles are based on the basic rights, as set out in Chapter 2 (Bill of Rights) of the Constitution referred to above.

According to Barber (2007:16) the following NEMA principles have an important impact on social issues:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- Development must be socially, environmentally and economically sustainable.
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must consider the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option;
- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons;
- Equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination;
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured;
- Decisions must consider the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge;

- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means;
- The social, economic, and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, and evaluated, and decisions must be appropriate in light of such consideration and assessment;
- The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;
- The environment is held in public trust for the people. The beneficial use of environmental resources must serve the public interest and the environment must be protected as the peoples' common heritage; and
- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

3.5 Guideline for Involving Social Assessment Specialists in EIA Processes (Barbour, 2007)

These guidelines direct the role of social assessment specialists in the Environmental Impact Assessment (EIA) process within the South African context.

3.6 Social Impact Assessment: Guidance document (2015) (Vanclay, Esteves, Aucamp, & Franks, 2015)

This document encapsulates the core values of the international SIA community providing a set of principles to guide SIA practitioners in incorporating the social element into environmental impact assessments.

3.7 International Labour Organisation

A guide on gender issues in employment and labour market policies: working towards women's economic empowerment and gender equality.

"The objective of this resource guide is to strengthen the capacities of International Labour Organisation (ILO) constituents and development policy makers in the formulation of employment policies. There is a well-known proclivity among many policymakers and practitioners to treat employment as a "residual" of economic growth" (Otobe, 2014).

3.8 International Organisation for Standardization, ISO 14001:2004

The International Organisation for Standardization (ISO) is used for identifying impacts. The ISO 14001: 2004 – Environmental Management Systems definitions for aspect, activity and impact are used in keeping with best practice.

ISO 14001:2004 specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives and information about significant environmental aspects. It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence.

4 DEFINITION OF THE STUDY AREA

A study area is defined by the International Finance Corporation (IFC) as "an area that is likely to experience impacts from, or exert influence over, the Project or activity being evaluated" (IFC World Bank, 2012). For the purposes of this study, a study area that conforms to existing administrative boundaries, has been identified.

Three study areas have been delineated for the purposes of analysing the project and its social impacts: a regional study area which comprises the affected local municipality; and a local study area which is the Ward in which the project is located, and a direct study area which is the site's close neighbours upon which the project will be located. It is for this reason that a radius of five kilometres from the site has been selected as the direct study area. The centre of the solar cluster is the centre of the impact circle.

4.1 Regional Study Area

The regional study area is composed of the Rustenburg Local Municipality (RLM) and the Kgetlengrivier Local Municipality (KLM), which falls within the Northwest Province. This regional study area is most likely to have both direct positive and negative impacts, including economic pull (job creation), in-migration of workers and multiplier effects in the local and regional economy, due to the proximity of the Project footprint.

Figure 4 below shows the regional study area.

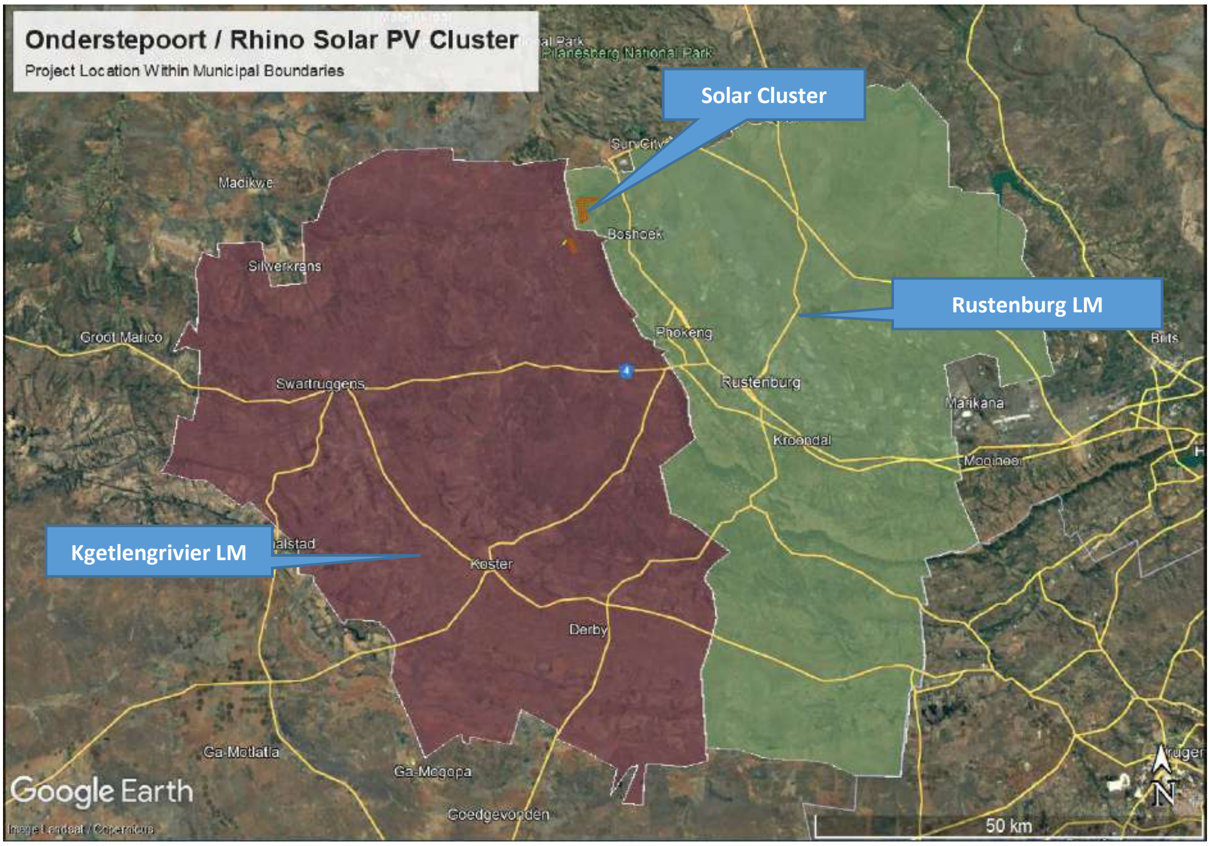


Figure 4: Onderstepoort / Rhino Cluster in Local Municipal Context

Local Municipality	Affected Wards
Rustenburg Local Municipality	Ward 1
Kgetlengrivier Local Municipality	Ward 6

4.2 Local Study Area

The local study area falls under Ward 6 of the Kgetlengrivier Local Municipality and is highlighted in blue. The ward context is shown in Figure 5 below.

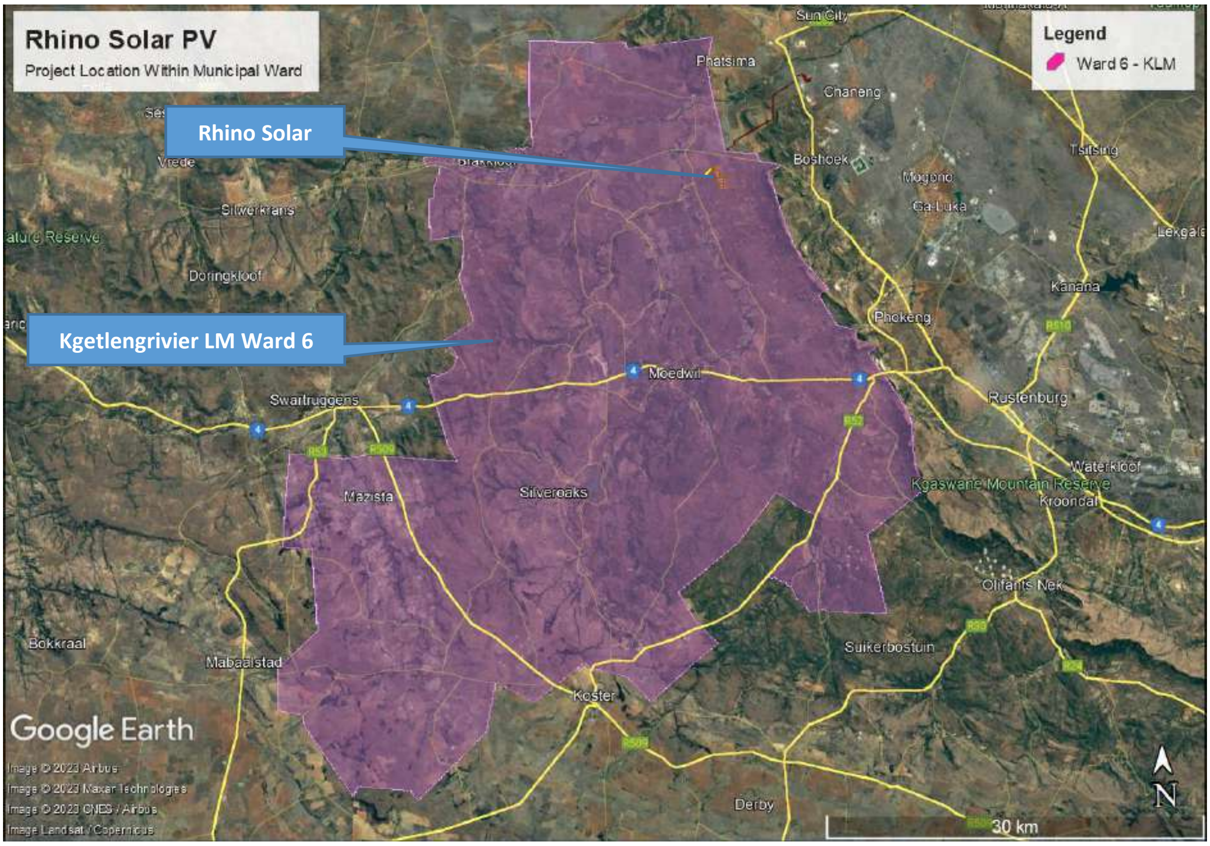


Figure 5: Rhino Solar PV in KLM Ward 6

4.3 Direct Study Area

The direct study area is that immediately adjacent to the project. They are captured in the Google Earth image in Figure 6 below.

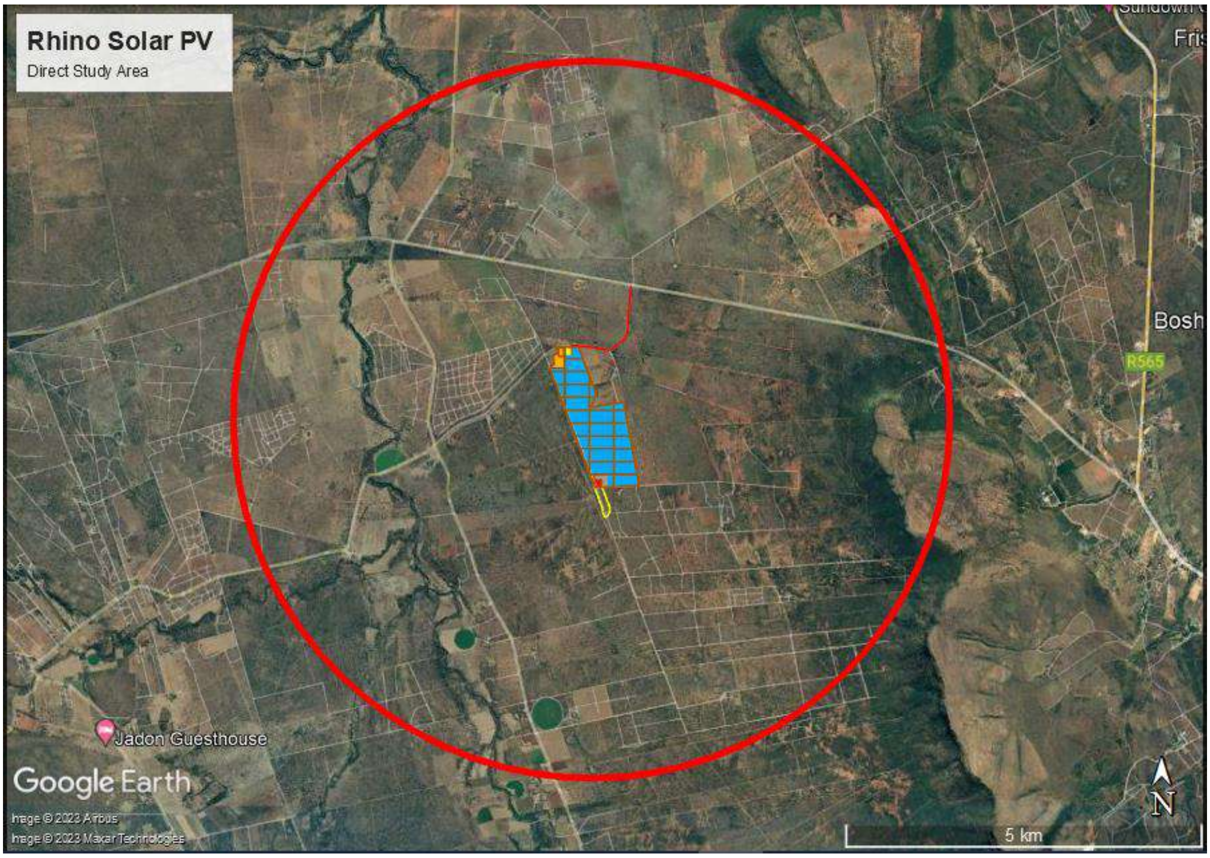


Figure 6: Rhino Solar Direct Study Area

The solar facility is in a populated area whose main economic nodes are: the Rasimone Mine, which is some ten kilometres from the site; and Sun City, a tourism hub, some fifteen kilometres from the site. Thus, the direct project area is influenced by large economic drivers and populations centres are supported to some degree by these drivers.

5 METHODOLOGY

The information presented in this report was obtained through the following data collection methods.

5.1 Sourcing of Information and Data Analysis

The Socio-Economic Impact Assessment sets out the socio-economic baseline of the study area; predicts social and economic impacts and makes recommendations for mitigation of negative social and economic impacts and measures which can be taken to enhance the positive social and economic impacts.

The baseline study is based on both primary and secondary data. Primary data was collected directly from engagements with community members, landowners and business owners. Secondary data was accessed through South African economic and social databases. Articles and internet searches were also used and are referenced in the text and in the reference sections of this report.

The profile of the baseline conditions includes describing the current status quo of the community; including information on a number of social and economic issues such as:

- Demographic data.
- Socio-economic factors such as income and population data.
- Access to services.
- Institutional environment.
- Social Organization (Institutional Context); and
- Statutory and Regulatory Environment.

5.2 Primary Data

5.2.1 Public Participation

The Public Participation Process granted Interested and Affected Persons an opportunity to comment on the project during the Scoping and EIA phase. Comments and responses used during this process have formed one of the bases of the analysis of the socio-economic impacts considered in this report.

Further primary data was collected for the purposes of the study; these were collected using the following approaches:

- Rapid Rural Assessment: A survey was conducted to capture visual observations on the social dynamics, community proceedings, community resources and infrastructure.
- Stakeholder Consultations: Consultations with the affected communities carried out by members of the project team along each project component to discuss the proposed project and to gather their concerns and feedback on the project; and
- Key Informant Interviews: Informal discussions with the IAP’s to help inform the baseline were conducted during site visits and as well as during the scoping phase. These included community members and authority members.

5.3 Secondary Data

An assessment of the EIA and Scoping phase was conducted to provide an understanding of the project detail, location and possible impacts.

The required information was collected using different sources, these included Statistics South Africa Census data as well as a review of relevant municipal, district and other literature. The discussion of the demographics and the development profile of the study area is carried out using Census 2011 data produced by Statistics South Africa. The Census 2011 data is the most comprehensive dataset available for the subject areas, and it is currently the best data at hand. Where possible, information from the Community Survey 2016 was included in the analysis. The ward and municipal data have been extracted using the project Geographic Information System, and the data for the affected areas will be presented in tables and figures throughout the report.

5.4 Geographic Information System

A Geographic Information System (GIS) was used to conduct an analysis of the area. The use of GIS brings together the demographic and socio-economic data to enable a thorough analysis of the project area.

5.5 Impact Assessment

The identification of the socio-economic impacts associated with the project is issues-based, with the main headings referring to a common theme addressing several related impacts. Under each of these issues, the specific impacts and potential mitigation strategies are discussed for pre-construction, construction, operation, and decommissioning phases.

5.6 Assumptions and Limitations

The following assumptions and limitations underlie this socio-economic impact assessment:

- The information obtained during the public participation phase provides a comprehensive account for the community structure and community concerns for the project.
- The study was done with the information and the time frames available to the specialist at the time of executing the study. The specialist took an evidence-based approach in the compilation of this report and did not intentionally exclude information which is relevant to the assessment; and
- No relocation of families will take place for this project.

6 STATUS QUO ANALYSIS

This section has been compiled from research of the Rustenburg Local Municipality; the Kgetlengrivier Local Municipality and the Northwest Province Integrated Development Plan (IDP) documents giving broad background information on the mining areas and surrounding municipalities. Statistics South Africa; the Community Survey and Wazi Map have also been used as resources for the statistical information. The following section presents the socio-economic profile of the study areas.

6.1 Project Locality Context

The Northwest Province, as the name implies, is situated in the north-west of South Africa. It came to existence in the year 1994 through the merger of Bophuthatswana and the Western boundaries of the Transvaal. It serves as the provincial capital and is divided into four district municipalities, which are subdivided into eighteen (18) local municipalities; the four districts are, namely, the Bojanala Platinum District; Dr Kenneth Kaunda District; Dr Ruth Segomotsi Mompati District, and Ngaka Modiri Molema District (Northwest IDP, 2021).

Northwest Province covers an area of 105 238 square kilometers and in the year 2016 was recorded as having a population size of 3 748 435 people. The biggest cities in the province are Klerksdorp and Potchefstroom, and towns that can be found in the vicinity are Brits, Lichtenburg, Rustenburg and Sun City. It is located south of Botswana and is locally bordered by Limpopo, Gauteng, the Free State, and the Northern Cape. The province includes two universities: the University of Northwest and Potchefstroom University. Furthermore, tourist attraction sites have been established in the province, with Sun City, situated next to the Pilanesburg National Park, being the most popular. Sun City has a variety of entertainment facilities, including a casino a golf course theatres and performance halls, hotels, and beaches, to name a few (Northwest IDP, 2021).

The Bojanala Platinum District Municipality forms part of the four district municipalities in the Northwest Province and consists of five local municipalities, namely Kgetlengrivier Local Municipality, Madibeng Local Municipality, Moses-Kotane Local Municipality, Moretele Local Municipality, and Rustenburg Local Municipality. The Bojanala Platinum District Municipality is classified as a Category C municipality and has municipal, executive, and legislative authority. However, the district is not responsible for the provision of basic services; it is solely responsible for coordinating and supporting its local municipalities, and further administers services related to disaster management and firefighting, as stipulated by section 88(2) of the Municipal Structures Act 117 of 1998.

The district is bordered by the Waterberg District Municipality to the north, Dr Kenneth Kaunda District Municipality to the south, the City of Tshwane Metro to the east, West Rand District Municipality to the southeast, and Ngaka Modiri Molema District Municipality to the west. The Cradle of Humankind, which is a popular World Heritage site in South Africa, can be found in Bojanala Platinum (BPDM IDP, 2020/21).

The Northwest Provincial Gazette No 5574, dated 29 September 2000, in terms of Section 12 of the Municipal Structures Act, Act 117 of 1998, gave rise to the Rustenburg Local Municipality when existing municipalities were disestablished. The Rustenburg Local Municipality is a Category B municipality and consists of an Executive Mayor and Ward Committees. There are two interrelated organizational streams within the municipality; one handles political leadership and governance, and the other oversees operational and administrative functions.

There are seventy-two Councilors responsible for governing Rustenburg Local Municipality. In total, 36 councilors are elected on ward representation, whilst thirty-six are from a system of proportional representation. The Ward Councilors plays a mediator role between the community and the Council and are responsible for communicating local concerns and grievances to the Council. (Rustenburg IDP, 2020/21).

The Kgetlengrivier Local Municipality is one of the five local municipalities found in the Bojanala Platinum District Municipality in the Northwest Province. It is located in the south-eastern parts of the province and is situated on the N4 national road that runs between Pretoria and Botswana, and towns that can be found in the municipality are Reagile, Borolelo and Koster (Municipal IDP; 2020/21).

6.2 Demographics

In this section, we will discuss the Rustenburg Local Municipality and the Kgetlengrivier Local Municipality, both in the Northwest Province. Rustenburg LM has the fastest growing population in the province, growing at 2.98% between 2011 and 2016. The total population size was 626 522 people in 2016, an increase from the 549 575 people recorded in 2011, making it the most populous municipality in the Bojanala Platinum District Municipality.

Kgetlengrivier LM has also experienced an increase in population size. In 2016 there were 59 561 people, compared with the 51 049 people recorded in 2011. Kgetlengrivier LM experienced an annual population growth of 3.51% over this period. This population growth is likely as a result of the migration of people from neighboring areas in pursuit of better economic and social opportunities. Table 3 provides an overview of the demographic data below.

Table 3: Municipality Demographic Data (2016)

	Population Size	Annual Population growth	Median Age
Rustenburg LM	626 522	2.98%	27
Kgetlengrivier LM	59 561	3.51%	25

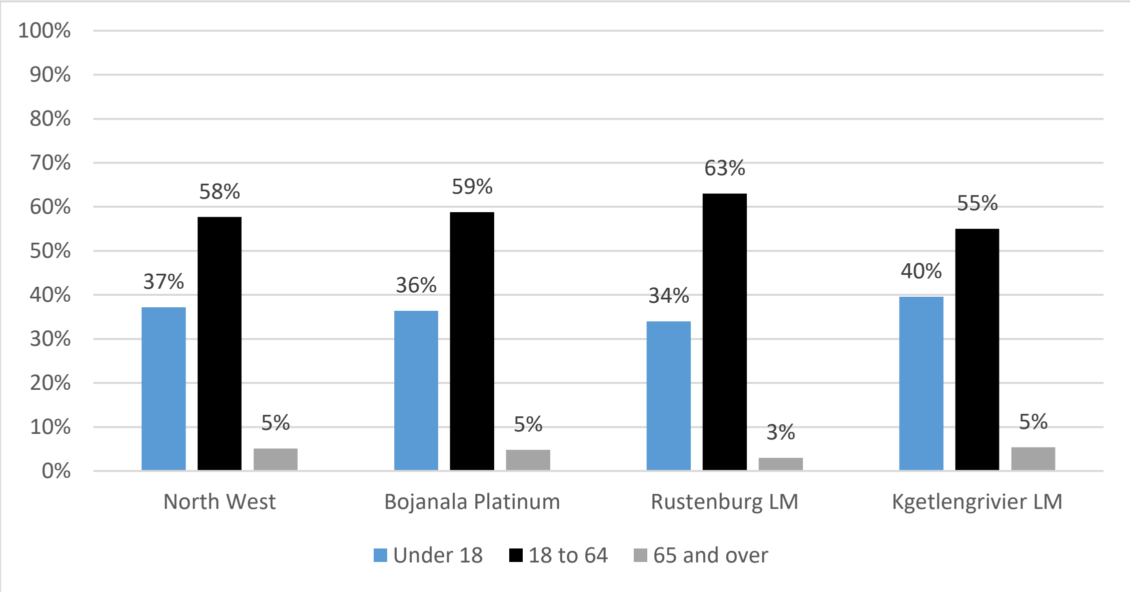
The median age is the age that divides a population into two numerically equal groups; which implies; half the people are younger than the specified age and half are older. The median age in Rustenburg LM is twenty-seven, which is slightly higher than the figure in the Bojanala Platinum District Municipality at twenty-six years of age. The median age in Kgetlengrivier LM, and for the Northwest Provincial level was twenty-five years of age.

6.3 Population

Individuals between the ages of eighteen and sixty-four fall within the economically active population. The population aged in this range in the Bojanala Platinum District Municipality is 973 982 people, 59% of the population. The equivalent figure for the Rustenburg Local Municipality is 394 737 people, 63% of the population. Kgetlengrivier Local Municipality, has the smallest proportion in this range at 32 739 people, 55% of the population.

The dependency ratio describes a total number of people who are either too young or too old to work (non-working dependents). The dependency ratio in Rustenburg LM was 45.2 in 2016, which is an increase from the 37.9 in 2011, whereas Kgetlengrivier LM experienced an increase from 52.5 in 2011 to 64.0 in 2016. From this can be concluded that there was an increased number of dependents across the study area by 2016 (StatsSA, 2016). Figure 3 displays the representation of population by age

Figure 7: Population by Age Group



6.4 Household Characteristics

In 2011, Rustenburg LM comprised 199 044 households and by 2016, the number had increased to 262 576, an increase of 63 532 households. Despite the increase, the average household size showed a decrease during the same period, dropping from 2.5 to 2.4. Kgetlengrivier LM had an increase of 4 114 households, going from 14 673 households in 2011 to 18 787 in 2016. The average household size in Kgetlengrivier LM has seen a slight increase from 3.1 in 2011 to 3.2 in 2016 (StatsSA, 2016).

The head of household refers to the primary person who provides practical support and maintenance for their family. The Community Survey 2016 indicated that households are headed by males throughout the provincial, district and municipal spheres. The Northwest province accounts for 809 219 (65%) male headed households, The Bojanala Platinum District Municipality accounts for 427 210 (70%), Rustenburg LM has 198 664 (76%), and Kgetlengrivier LM 13 152 (70%) male headed households. It can be concluded that the mining houses around the study area have created job opportunities that have enabled males to provide for their families (Community Survey, 2016).

It can be noted that there has been a significant decline in the number of people residing in informal dwellings/shacks. Rustenburg LM consists of 76 062 (29%) while Kgetlengrivier LM consists of 5 865 (31%) informal dwellings. This could be due to the distribution of RDP houses by government within these communities (Community Survey, 2016).

Table 4 indicates other household dynamics below.

Table 4: Household Characteristics

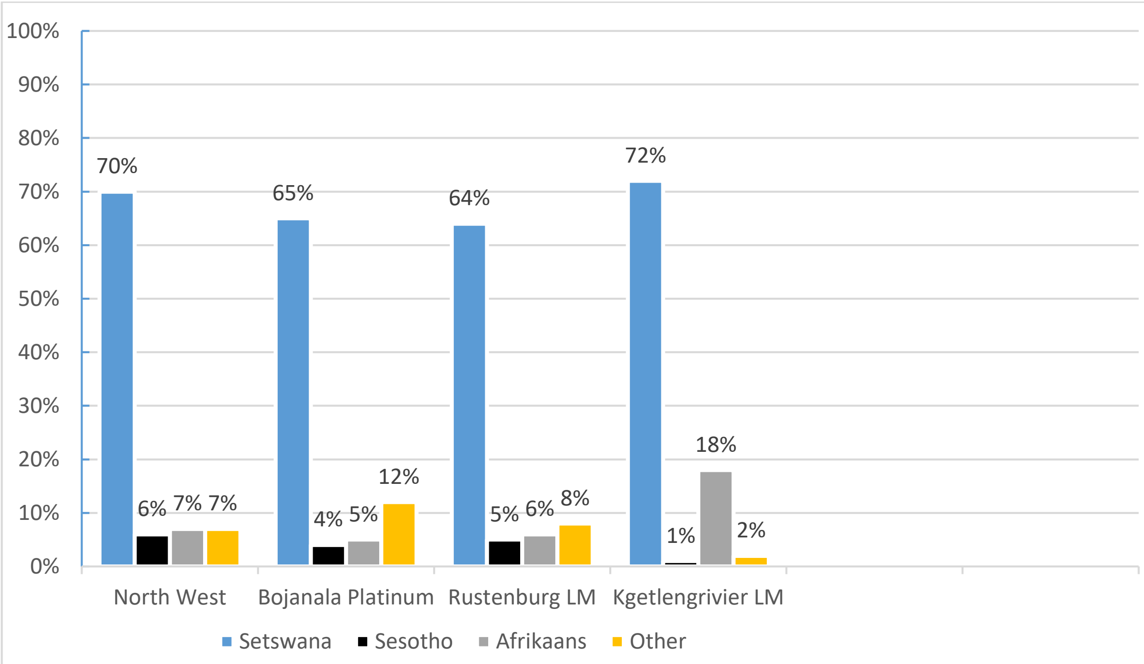
Indicator	Rustenburg LM	Kgetlengrivier LM
Households fully owned/being paid off	94 453 (36%)	12 302 (66%)
Individuals living in a house	134 397	12 364

Indicator	Rustenburg LM	Kgetlengrivier LM
	(51%)	(66%)
Households with heads under 18	777	83

6.5 Spoken Language

The Northwest borders Botswana to the province's north. The prevalence of Setswana in both these regions suggests a commonality most likely related to the free movement of Bantu-speaking peoples throughout the Southern African region. Figure 8 below displays spoken languages.

Figure 8: Spoken Language



In the study area, Setswana is the predominant home language, with approximately 400 487 (64%) of the population in Rustenburg LM, 1 071 678 (65%) in Bojanala Platinum, and 43 050 (72%) in Kgetlengrivier LM. Other spoken languages include Afrikaans, Sesotho, Isixhosa, and Xitsonga (Community Survey, 2016).

6.6 Education

The South African Schools Act of 1996 has made it compulsory for children between the ages of 7 and 15 (or attendance of Grade 1 to 9) to have access to quality education without discrimination. This is evident in the increased number of individuals who have completed Grade 9 or higher in the related municipalities. Rustenburg LM counts 288 993 (71%) pupils, Kgetlengrivier LM counts 21 650 (62%) pupils, and 701 499 (68%) pupils in the overall district. However, it can be concluded that the majority of the population living in the study area have achieved a level of educational attainment less than matric (Community Survey, 2016).

Table 5: Education Profile

Education Level	Bojanala Platinum DM	Rustenburg LM	Kgetlengrivier LM
Primary School	51 612 (5%)	20 429 (5%)	2 160 (6%)
Some Secondary School	375 431 (37%)	145 374 (36%)	11 904 (34%)
Grade 12 (Matric) +20 years and older	350 489 (33%)	146 888 (35%)	10 162 (29%)
Higher Education	44 943 (4%)	20 037 (5%)	1 588 (4%)
No Schooling	56 627 (6%)	19 215 (5%)	2 995 (9%)

6.7 Access to Healthcare

There are approximately one hundred and twenty-five healthcare facilities across the Bojanala Platinum District Municipality.

Ten of these are Community Health Care Centres, offering 24 hour service. A further seventeen facilities provide 24-hour services to complement the work of the Community Health Centres. In total there are nineteen Mobile Clinics servicing six hundred and seventy-four service points across the District. The Mobile Clinics mainly provide preventative and promotive health services (Bojanala Platinum IDP, 2021/22).

6.8 Economic Development Indicators

It must be noted that the mining sector is the main driver of Bojanala Platinum's economy and contributes the highest figure of R 71.5 billion (52.1%) of the total GVA in the district municipality's economy, which is more than half of the District's Gross Domestic Product (GDP). The district is also responsible for producing platinum, chrome, diamond, slate, and silica. The bulk of platinum mining activity is located in the Rustenburg Local Municipal area.

According to the Municipal IDP, 2020/21, Rustenburg's economy largely revolves around the production of platinum, which contributed 66% to provincial GVA in 2013, followed by the trade and finance sector which contributed 29% and 28%, respectively, in the same period. The decline in Rustenburg's GDP (-3.5%) in the year 2012 was influenced by the decline in the mining sector, which resulted in a negative growth in the overall province (Municipal IDP,2020/21).

Table 6 represents the number of mining houses and their commodities below.

Table 6: Representation of Mining Industries

Municipality	No of Mining Houses	Commodity
Rustenburg LM	20	Platinum and Chrome
Kgetlengrivier LM	5	Slate; Sand and Diamond

6.9 Labor Force

In Kgetlengrivier LM, 14 997 859 (45%) people are economically active (employed or unemployed but looking for work), and of these, 3 862 (12%) are unemployed. Of the 9 142 economically active youth (15 – 34 years) in the area, 27% are unemployed.

Rustenburg LM accounted for 196 080 (49%) employed people, while 70 391 (18%) were unemployed. The majority of individuals are employed in the formal sector in both Rustenburg LM, which accounts for 147 924 (75%) people, and Kgetlengrivier LM, accounting for 7 575 (49%) people (Community Survey, 2016).

6.10 Access to Electricity

There are approximately 1 363 691 (82%) households across Bojanala Platinum District Municipality who have access to in-house prepaid electricity. In the Rustenburg Local Municipality 480 213 households, 77% of the population, have access to electricity. There are 37 904 households (82%) in Kgetlengrivier LM who are connected to the electrical grid.

There are, however, households which are without access to electricity – Kgetlengrivier LM accounts for 3 846 households (7% of the local households), while Rustenburg LM has 70 356 households (11%) without electricity. Un-connected households are typically found in informal dwellings across the study area (Community Survey, 2016).

6.11 Water and Sanitation

According to the Community Survey 2016, 596 271 (95%) residents of the overall population in Rustenburg LM receive water from a local service provider, and 45 566 (77%) in Kgetlengrivier LM.

There is an increased number of households that make use of flush or chemical toilets – Rustenburg LM accounts for 376 561 (60%) and Kgetlengrivier LM accounts for 48 513 (82%). These services are provided for by the local municipality (Community Survey, 2016).

7 LOCAL STUDY AREA OVERVIEW

This section gives an overview of the direct study area and its receiving environment within a five-kilometer radius of the proposed project cluster.

The proposed Rhino Solar PV is located on the Portion 11 of the Farm Rhebokhoek 101. The site is approximately ten kilometers west of Rasimone.

The project area is located in a rural agricultural area. The area hosts diverse economic activities such as mining, tourism, hospitality, hunting, and agriculture. In addition to traditional beef raising and grain crops, many farms have shifted to game farming, ecotourism and citrus farming.

The Rhino project site is a commercial farm. Bonsmara and Beefmaster are popular cattle breeds in the neighboring livestock farms.

Table 7: Images of Cattle and Game Farming

A Rainbow Chicken Farm is located to the north-west of the solar cluster, across the adjacent Elandsrivier. Images of the farm are shown below.

Figure 9: Rainbow Chicken Farm

Tourism is popular in this area, with common activities being hunting, hiking, game tracking and associated leisure. There are several hotels, lodges, private bed and breakfast establishments, such as African Elegance Tented Lodge, Amritz Private Lodge, Sibusiso Private Game Lodge, Boeskloof Guest House, Selons River Lodge, Bulls in the Bush Lodge, and Keanah Ranch, all of which are located within the direct study area and offer accommodation and recreational activities. All facilities are located at distances greater than 1 000m from the fenceline of the proposed project.

Boshoek Central Business District is located approximately eight kilometers from the project area. The center is characterized by an Engen garage, retail stores, small-scale and large-scale business, and informal traders. The center also services farm communities nearby. The presence of a solar park is an opportunity with a positive impact on the local economy, as there are a number of businesses that would be capable of supporting solar operations.

Witkrans Citrus Nursery is another notable farm that is contributing positively to the local economy. It is anticipated that the solar farm will be an additional sustainable component to the area. More sustainable agricultural practices can also be introduced in the area to promote eco-tourism.

The Selons River Lodge is roughly 1.8 kilometers to the west of the project site. The facility offers accommodation and leisure.

Figure 10 below shows the elevation profile from the Selons River Lodge to the edge of the solar facility.

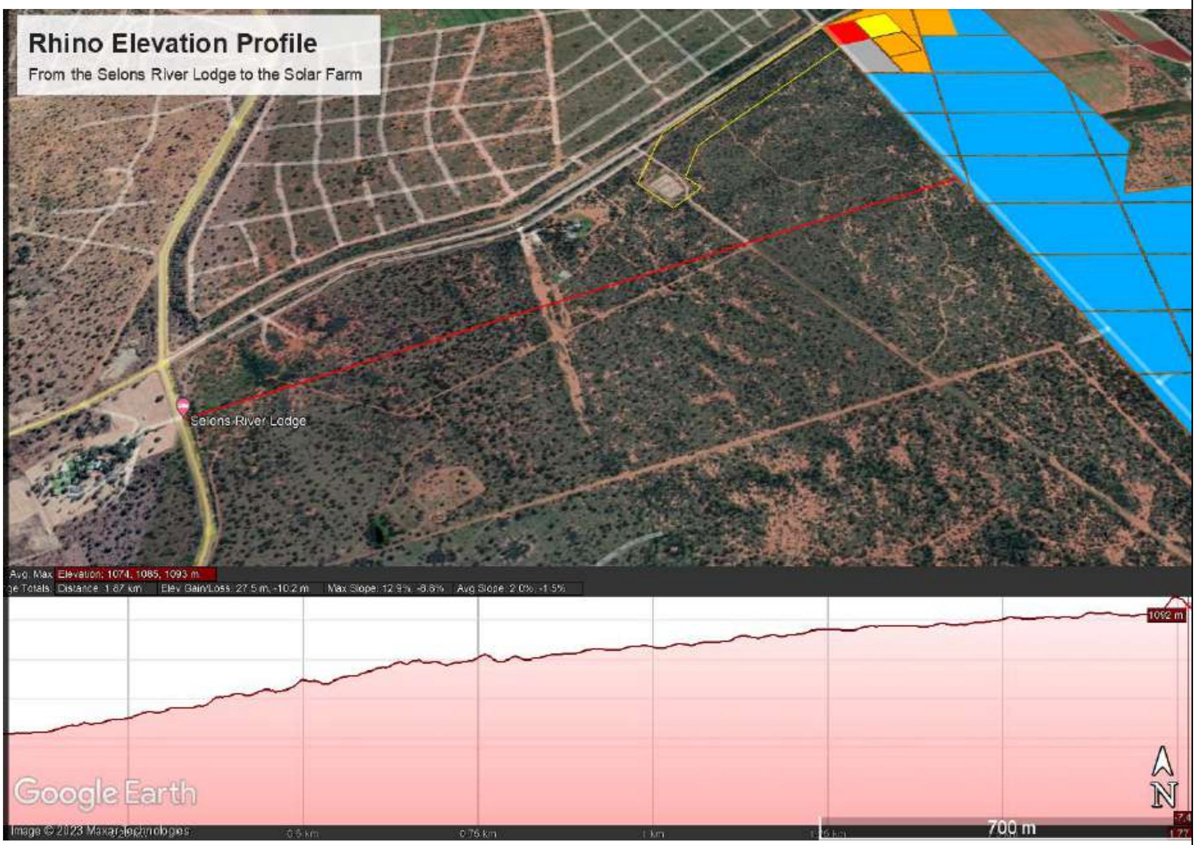


Figure 10: Elevation Profile from Selons River Lodge to Rhino Solar

Source: Google Earth

The Selons River Private Lodge will have a very limited view of the solar panels, the ground rising constantly towards the facility.

Furthermore, a Google flyover exercise was conducted to identify potential IAPs around the proposed project. Coordinates of the properties and infrastructure likely to be impacted by the project, in the direct study area, are listed in Appendix One.

7.1 Profile of the Receiving Environment

7.1.1 Settlements and infrastructure

Dwellings and properties are scattered around the project site. Landowners and farmers live and work on their farms. Approximately eight kilometers from the project area, there is the Phatsima village. This is a labour sending area, and the project is likely to attract people from this village.

7.1.2 Cultural/ Historical Background

The local communities have Afrikaaner and Batswana heritage. The traditional councils are important cultural features of the area and work together with the elected community structures in service delivery.

There is a powerful sense of cultural respect and valuing of wildlife and tourism.

The area is under the administration of the Royal Bafokeng. According to Thornhill & Selepe (2010:163), "The Royal Bafokeng nation has retained the unique cultural identity and traditional leadership structures and led by a hereditary kgosi (king)". This is evident in the royal protocols and processes that must be observed when accessing other areas or properties.

7.1.3 Access to basic services

Farm communities rely on farmers to provide basic services such as water, electricity, and sanitation. The main sources of electricity are generators and the small scale solar powered units. Boreholes and water reservoirs are common in this area. Sanitation facilities are adequately maintained, most farmers have installed flushing toilet systems in their residents.

Urban communities rely on municipal services, including that of water, sanitation and electrical supply.

7.1.4 Identified Economic activities.

The major economic activities identified in this area are listed below,

- Game, livestock, and crop agriculture;
- Mining;
- Tourism;
- Hunting;
- Trade, catering, and accommodation; and
- Manufacturing.

The economy in the area will be able to support many of the requirements of the proposed solar PV facility.

7.1.5 Community facilities

Health facilities are distributed in nearby towns and locations such as the Moses Kotane Hospital in Ledig, which is approximately thirteen kilometers from the Rhino project site. Moreover, there are public and private medical facilities in Boshoek and Rustenburg.

With reference to educational facilities, several schools are located within the study area. The closest school, Vuka Primary Farm School, is located approximately six kilometers from the three proposed project sites. Furthermore, there are other schools such as the Boshoek Primary school, Laerskool Boshoek Primary and Rusternburg Primary School as well as in Phatsima.

7.1.6 Road infrastructure

The main roads servicing the project site are R565 and N4. The road used to access the project site is the Lindleyspoort Road. The surroundings of the site area are characterized by graveled and underdeveloped routes. Potholes were also identified along the project area and local farmers are constantly sand filling the damaged routes as they get eroded repeatedly due to rain and lack of development. Accessibility to the area using the feeder graveled roads is a possible impact and mitigation measures such as the improvement of feeder roads will need to be implemented.

Figure 11; Gravel Road Leading to Rainbow Chicken Farm

7.1.7 Transport

Farmers provide transport to their workers and other residents. The type of vehicles operating in the vicinity vary, with minibuses, buses, taxis, and sedans identified along the Lindleyspoort road.

7.1.8 Livelihoods

The majority of the landowners reside on these farms. Workers depend on a mix of livelihood sources such as wage employment, local economic activities, and social grants for sustainable living.

Women are also employed in farms in the project area. Employment of women in farm activities assists with family food security.

The demographics of educational attainment and household sizes were discussed earlier in the report. The notable impacts of this project on livelihoods are positive as more economic drivers will be created and these will further improve the farming communities in this area.

7.1.9 Crime, Safety & Security

The local interviewees indicated that crime is not an issue within the area. Neighborhood watches ensure community involvement in ensuring safety and security around the project site.

Adjacent landowners have expressed concern regarding crime and trespassing due to an influx of people into the project area. Fear of livestock theft, and farm properties being vandalized were the major impacts highlighted.

7.2 Stakeholder Engagement

The World Bank's Environmental and Social Framework (2018:97) defines the stakeholder engagement process as a process that is inclusive and conducted throughout the project life cycle. The procedure further supports the development of strong, constructive, and responsive relationships that are important for successful management of a project's environmental and social risks.

The following stakeholder engagement methodologies were carried out as part of either the public participation process of an earlier Scoping process and as part of direct contacts with the affected parties.

7.2.1 Comments Made by the Public

The process of collating comments and inputs is still ongoing. Site notices have been placed around the project area to sensitize IAPs about the cluster of projects proposed in the area. A database of the potentially affected parties and community elected representatives were sent email notifications, which included a Background Information Document (BID). This document provided an overview and description of the proposed project.

7.2.2 Primary Data Collection Report

A baseline study of the area's infrastructure was conducted on Google Earth Pro to identify social receptors in the direct study area. The images in the following table show some of these receptors.

Table 8: Social Receptors in the Direct Study Area

<table>
<tr><td>
</td><td>
</td></tr>
<tr><td>Amritz Private Lodge</td><td>Entrance to Witkrans Citrus Nursery</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Solar Powered Farm Security Camera</td><td>Sihnecha Wild Boerdery</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Selons River Lodge</td><td>Keanah Ranch Bush Camp</td></tr>
</table>

7.2.3 Rapid Rural Assessment Process.

A site visit was conducted on the 12th and 15th of January 2023. The purpose of the visit was to compile and collect primary data on the receiving social environment, as well as to understand the expectations of the local people with reference to the proposed project.

7.2.4 Social assessment informant survey

Barrow, CJ (2000) suggests that the purpose of random interviews is to involve the diverse public in decision making, even those that are reluctant or marginalized. The following random interviews took place with the people listed in the table below.

Table 24: List of Interviewees

Name	Designation	Number of years living in the area
Mr C	Tenant Farmer	-
Mr A	Rainbow Chicken Farmer	-
Mr E	Tenant Farmer	-
Mr S	Farm Worker	6 years
Mr T	Resident	19 years
Ms A	Farm Worker	2 years
Mr T	Farm Worker	4 Years
Mr M	Resident	8 years
Mr MK	Resident	3 years
Mr O	Farm Worker	1 year
Ms C	Farm Worker	8 months

The purpose of the face-to-face stakeholder interactions was to establish and record unbiased views and/or comments of the proposed project, to ensure that all comments and issues raised during the EIA phase are included in the SIA report.

The overall attitudes that were generated from the outcomes of the interviews were mixed. The positive feedback recorded was the economic stimulus of the project on the local community. Furthermore, installation of the solar farm would alleviate the challenges of loadshedding and businesses closing their doors due to instability of the electricity supply from Eskom.

However, stakeholders raised concerns about the project being developed on agricultural land. Some tenant farmers indicated that they do not welcome the project and will oppose development. The overall background of problems raised was lack of communication, fear of private property damage, and trespassing. The area has expensive livestock and game animals. Concerns of theft were noted as well.

The table below is a summary of the community's needs analysis resulting from the interview conducted as part of the data collection survey and the observations conducted through the rapid rural assessment exercise.

Table 9: Summary of the Community's Needs

Key needs / Issues Identified	Mitigation methods
Livelihood economic opportunities	• There is a need to create more economic opportunities that will benefit the remaining working population with special emphasis on the empowerment of women and the youth. • Implementation of diverse economic activities and radically drive farming communities to be fully involved. • Create broad based economic activities.
Development of skills for the youth.	• Introduce skills development programmes that will target matriculants, school leavers and the unemployed as this will curb the rate of employment expectations from the seasonal jobs available in the farms for communities such as Phatsima. • Create technology and sustainable innovations that will further develop skills for the youth.
Roads Development	• Develop new tarred roads as this will encourage more transportation businesses to frequent the area.

8 IDENTIFICATION OF IMPACTS

8.1 Impacts and Mitigation Framework

Socio-economic impacts are expected to arise because of a proposed project. All impacts discussed in this section will follow a context of nature, extent, magnitude, duration, probability, and significance.

ISO 14001-2004 defines impacts as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects".

When considering an assessment of the impacts and their mitigation, the following definitions as per Table 9 apply.

Table 10: Impact and Mitigation Quantification Framework

Nature	The project could have a positive, negative, or neutral impact on the environment.
Extent	**Local** – extend to the site and its immediate surroundings. **Regional** – impact on the region but within the province.

	National – impact on an interprovincial scale. **International** – impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources: **Low** – natural and socio-economic functions and processes are not affected or minimally affected. **Medium** – affected environment is notably altered; natural and socio-economic functions and processes continue albeit in a modified way. **High** – natural or socio-economic functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	**Short term** – 0-5 years. **Medium term** – 5-11 years. **Long term** – impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. **Permanent** – mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability	**Almost certain** – the event is expected to occur in most circumstances. **Likely** – the event will occur in most circumstances. **Moderate** – the event should occur at some time. **Unlikely** – the event could occur at some time. **Rare/Remote** – the event may occur only in exceptional circumstances.
Significance	Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- **0** – Impact will not affect the environment. No mitigation necessary. **1** – No impact after mitigation. **2** – Residual impact after mitigation. **3** – Impact cannot be mitigated.
Mitigation	Information on the impacts together with literature from socio-economic science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased, and positive benefits are enhanced.
Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

A well-designed, well implemented, professionally managed solar park can bring significant socio-economic benefits to the communities that it serves. If configured or operated in a way that ignores significant socio-economic needs or potential impacts, the proposed project may have significant socio-economic costs or liabilities for the stakeholders and affected communities.

Therefore, assessing socio-economic impacts is a complex process due to the multi-dimensional nature of the human interactions. This occurs in situations where a particular impact affects a group of stakeholders differently. An inter-connection of impacts can also be encountered whereby several impacts are related and when assessed cumulatively; their impacts may be of significance.

The impact assessment scores both before and after mitigation were arrived at by the specialist team engaging in a modified version of the Delphi technique, where the team discussed the scores, and through a process of iteration arrived at a consensus for each of the values. Where additional information was needed to decide, the technique would be halted, the necessary information would be uncovered and included in the report, and the technique would be recommenced.

8.2 Identification of Activities and Aspects

An "Activity" is defined as a distinct process or risks undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation (International Organization for Standardization, 2011).

An aspect is defined as elements of an organisation's activities, products, or services that can interact with the environment.

To capture the impacts associated with the proposed infrastructure, an activity – aspect – impact table was created refer to the *table* below.

Table 11: Activity, Aspects and Impacts of the Project

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Planning Phase	Land Acquisition		Loss of agricultural production
			Loss of land through land acquisition for project infrastructure
	Servitude Rights		Some restrictions on use of productive land, owing to servitude rights being established
Construction Phase	Access into private property		Property Damage
			Risk of trespassing
	Solar Park Construction – piling, frame erection and solar panel mounting, electrical installation and rehabilitation	Employment of local staff	
		Opportunity for local business	
		Skills development	
			Noise
			Dust
			Cultural Resistance to Women in the Workplace
			Injuries and poor workforce health
			Increased community conflicts due to employment of outsiders

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
			Influx of people seeking employment and associated impacts (e.g., cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS)
			Livestock and game animal theft
	Transport of goods to site and employment of staff		Increased traffic
	Rehabilitation		Damage or wear to access roads
			Security
			Damage to property or equipment
	Electricity generation	Economic growth and induced impacts	
Scheme Operations	Supply of goods and services to the project	Opportunity for local business	
		Employment of local staff	
	Administration and Technical Input	Employment of local staff	
		Skills development	

8.3 Impact and Mitigation Assessment

Based on the project description as well as the applicable legislation and policy and planning issues, the impacts that have been identified have been classified in accordance with Vanclay's list of socio-economic impact variables (Vanclay, 2002; Wong, 2013). Vanclay's classification system is widely used in the social impact assessment field to determine the scope of the social impacts for a project. The fitting of the project impacts into the Vanclay classification, as carried out below, has been carried out to demonstrate completeness, as follows:

Health and Well-Being Impacts

- Injuries and poor workforce health

Quality and the Living Environment Impacts

- Risk of trespassing
- Dust
- Noise
- Increased traffic

- Damage or wear to access roads
- Security

Economic and Material Well-Being Impacts

- Economic growth and induced impacts
- Employment of local staff
- Opportunity for local business
- Skills development
- Loss of agricultural production
- Loss of land through land acquisition for project infrastructure
- Some restrictions on use of productive land, owing to servitude rights being established
- Damage to property or equipment
- Livestock and game animal theft

Cultural Impacts

- Increased community conflicts due to employment of outsiders
- Influx of people seeking employment and associated impacts

Gender Relations Impacts

- Cultural Resistance to Women in the Workplace

These categories are not exclusive, nor fully inclusive of the project specific impacts, and at times tend to overlap as certain processes may have an impact within more than one category.

8.4 Impacts during the Planning Phase

The planning phase of any project ensures the analysis of potential impacts, this allows the assessment of any risk to be measured from a scale of high, medium, or low. This pro-active approach ensures the identification of key social issues that can be mitigated before moving further to other phases of development in the project.

The assessment of the key social issues for the proposed project were identified based on the project related information including specialist studies, primary data collection methodologies, project team's familiarity with the project area and experience with similar project studies.

8.4.1 Land Acquisition and Servitude Rights

- Loss of land through project infrastructure
- Loss of agricultural production
- Some restrictions on use of productive land

During the planning phase of the project, it is expected that there will be impacts created by land acquisition and the acquiring of servitude rights. The authors view this as a low impact, given that the economic yield from agricultural land in the area is very much lower than the economic yield from a solar park. The economic impact – both in terms of contribution of the Gross Value Added to the regional study area, and in terms of jobs created, of the land being used as a solar park will far outweigh any possible agricultural use.

The farm portions directed affected by the production would be acquired from their owners and the land-use changed from agriculture to electricity generation. Servitude rights would have to be obtained, which would limit agricultural production on the land under servitude. This process will be conducted under a willing buyer, willing seller basis, with the seller being compensated for the loss of productive land.

These impacts will be experienced by the community from the start of construction, but the impacts will be created at the planning phase of the project.

There are mitigation measures that can be planned to reduce the negative impacts. These are below:

Table 12: Planning Phase Impacts – Land Acquisition and Servitude Rights

<table>
<tr><td colspan="2">Environmental Feature</td><td colspan="5">Land Acquisition and Servitude Rights</td></tr>
<tr><td colspan="2">Project life cycle</td><td colspan="5">All Phases</td></tr>
<tr><td colspan="2">Potential Impact</td><td colspan="5">Proposed Management Objectives / Mitigation Measures</td></tr>
<tr><td colspan="2">Loss of agricultural production</td><td colspan="5">This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the agricultural specialists in this regard and their mitigation measures should be adopted</td></tr>
<tr><td colspan="2">Loss of land through acquisition for project infrastructure</td><td colspan="5">Any land acquisition should be conducted on a willing buyer, willing seller basis and that the owner is not treated unfairly in the process.</td></tr>
<tr><td colspan="2">Some restrictions on use of productive land, owing to servitude rights being established</td><td colspan="5">Any servitude establishment should result in fair compensation for land owners.
The establishment of servitude rights should not reduce the existing productivity of land owner’s land holdings.</td></tr>
<tr><td></td><td>Nature</td><td>Extent</td><td>Magnitude</td><td>Duration</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Before Mitigation</td><td>Negative</td><td>Site</td><td>Moderate</td><td>Long Term</td><td>High</td><td>2</td></tr>
<tr><td>After Mitigation</td><td>Negative</td><td>Site</td><td>Low</td><td>Long Term</td><td>High</td><td>1</td></tr>
<tr><td>Significance of Impact and Preferred Alternatives</td><td colspan="6">The impact on project progress could be significant if land acquisition is not compensated. This can be effectively mitigated.

The impact has no consequence for project alternatives.</td></tr>
</table>

8.5 Impacts During the Construction Phase

The construction activity will impact the social environment both positively and negatively. Given the nature of the project area, construction activity is likely to cause several social nuisances as well as possible economic implications on the communities and commercial activities. With a project of this nature, most social impacts are experienced during the construction phase, as this is when construction related activities, relating to the influx of labour and the use of construction machinery occurs.

8.5.1 Economic Opportunities

- Employment of local staff
- Opportunity for local business
- Skills development

The project is expected to bring economic benefit to the local community through employment opportunities for labourers and locally owned businesses.

In addition to the economic value added, the construction phase was estimated to produce some 1 387 job years in the regional study area. Considering experience with renewable project implementation in South Africa, 111 job years (8%) are likely to accrue to females, and a total of 624 years (41%) are likely to accrue to youth.

The official youth unemployment rate in the region is likely higher than the general unemployment rate, this being the trend nationwide. This project has the potential to impact positively on this rate should employment practises targeted at workers (male and female) under 35 years old be adopted.

The high number of impoverished households shows that there are vulnerable communities in the study area. It is recommended that the appointed contractor use local SMME's and local unskilled labour as far as possible during the construction phase to enhance any local economic impact. In addition, this would increase the skills in the area after construction is completed.

In this way more project revenue will stay in the area, raising economic activity and increasing welfare, resulting in induced economic opportunity. In South Africa, most employment is generated through small and medium business. Given the size of the proposed project, should contracts between local SMMEs be implemented, it is likely that there will be an increase in employment by SMMEs for the duration of the contracts.

In particular, the project has the potential to create several opportunities for existing and new local SMMEs. These opportunities range from site clearing, to fencing, parts of the construction scope and supply of materials. There are also opportunities for community members to provide labour, catering, accommodation, and other services to the new workers.

Where possible, the project proponent should support and encourage the procurement of SMMEs and local or regional suppliers in line with government policy.

Education levels provide an indication of the level of skill in the community and the degree to which the community skills base can be increased. Attempts to break the poverty cycle of the project areas will require more than secondary school education. Higher education or further skills training is required. It is therefore important that the community members under-go skills development. It is recommended that the project proponent institute a skills development program during construction.

The project proponent should monitor the employment process. Employment audits should be conducted. It is important that women are also provided employment opportunities. Audits should pay attention to the employment process of women to ensure that exploitation does not take place.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 13: Construction Phase Impacts - Economic Opportunities

Environmental Feature	Economic Opportunities					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Employment of people locally	• Youth development should be considered as an initiative so that there is a benefit of transferring skills to the community. This can be achieved through the assistance of the local municipality.					
	• The main contractor should employ non-core labour from the regional study area as far as possible during the construction phase.					
Opportunity for local business	• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.					
Skills development	• A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills whilst in employment.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	Medium	Short Term	Likely	1
After Mitigation	Positive	Regional	Large	Short Term	Likely	3
Significance of Impact and Preferred Alternatives	Individuals who will benefit during the construction are limited to those who actively participate in the construction activity through employment, sub-contracting or other economic opportunities. Active local participation should be encouraged. The economic benefits of construction will take place irrespective of which alternative is presented.					

8.5.2 Noise, Dust and Traffic

- Increase in dust
- Noise impacts
- Increase in traffic
- Damage or wear to access roads

During the construction phase, there is a potential for communities to be exposed to increased dust, and noise. The site is in an isolated area where the number of community receptors is limited, conversely however there a few noise and dust generating activities in the area, hence small increases in noise and dust will be noticed by local communities.

The generation of dust stems from activities such as clearing of vegetation, piling and vehicle movement. This situation will be worse during the dry season and during windy seasons. Airborne particulates may pose a hazard to residents downwind of the construction site that suffer from upper respiratory tract problems. Mitigation through dust suppression will allow for this impact to be effectively managed.

During the construction, equipment will be required for the site clearance, and during piling and trench excavation for electrical connections. A degree of noise generation will be unavoidable. The degree of noise, frequency of noise and individual perception are all important considerations when determining the impact on noise. Adequate warning of high noise events such as blasting (if required owing to the nature of the subsoil material) should be communicated to the affected communities prior to carrying out such activities. Construction times should be limited to normal working hours.

Traffic in the local study area will increase during the construction phase. Traffic sources will be generated by staff working at the site, and from goods and material deliveries to the site. Vehicles to be used will range from sedans to Light Delivery Vehicles and light trucks to heavy good vehicles.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 14: Construction Phase Impacts – Noise, Dust and Traffic

Environmental Feature	Noise, Dust and Traffic					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Increase in Dust	• Dust can be mitigated using appropriate dust suppression mechanisms. • Limit road speeds on site through the erection of speed limits signage					
Noise impacts	• Prior notice should be given to surrounding communities of noisy events such as blasting. • Construction work should take place during working hours – defined as 07h00 to 17h00 on weekdays and 07h00 to 14h00 on Saturdays. Should overtime work be required, that will generate noise, notice should be given to the affected community or landowners.					
Increase in Traffic	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the traffic specialists in this regard and their mitigation measures should be adopted					
Damage or wear to access roads	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the traffic specialists in this regard and their mitigation measures should be adopted					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Nosie and dust during construction is to be expected. These can then be successfully mitigated through contractor controls and through the continuous monitoring of contractor progress during the construction phase. Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative that is most preferred and chosen.					

8.5.3 Cultural Resistance to Women in the Workplace

Gender relations are recognised as an important factor in the efforts to achieve equity across society. Construction is a male-dominated industry; however, skills development initiatives directed at women may mean it is an industry that could benefit from equitable representation.

Although equal access to employment across gender lines is a recognised right, the application of this right is often executed without careful consideration of the factors that may frustrate this right amongst women in the workplace. In this regard women are often subjected to cultural factors within the workforce from both peers on the job and from management who may resist both employing and promoting women, often based on cultural prejudices. Consequently, the International Labour Organisation points out that:

"Societies therefore have an obligation to create conducive social environment for all their citizens to be able to exercise their right to work, fully utilizing their human potential. Furthermore, evidence has shown that when women are employed and have their own income in their hands, there exist both direct and indirect social benefits for themselves and their households" (Otobe, 2014, p. 1).

With the employment of women during the construction phase of the project it is important to ensure that cultural factors do not hinder the process of employing women and ensuring that they enjoy equal opportunities to men in the workforce.

Following on from the above, the division of labour is a critical aspect that will also lead to various impacts during both the construction and operational phases of the project. During the construction phase of the project women will be integrated into the workforce, however, this will come with various challenges. Women and men work on different tasks, have different biological, sex, gender and health needs, and have different roles within the family, all of which need to be considered in order to create a workplace, without discrimination, that is accessible to both women and men on an equal basis (World Health Organization, 2006).

In introducing women into the workforce, it must be noted that women are over-represented amongst the poorer sectors of society, particularly within the more rural communities, and under-represented, both vertically in terms of responsibility and seniority as well as horizontally in respect of certain functional areas and job categories (Otobe, 2014, p. 22). This is especially the case in the local project area where the proportion of women to men is higher than the provincial average. Thus, the potential labour force is dominated by women.

The workplace should be free of harassment and employment practises should be transparent and free from any coercion or trading. The workplace should make adequate provision for separate gender changing areas and ablution facilities. As a result of the analysis above, the following impact/mitigation table has been generated.

Table 15: Construction Phase Impacts - Cultural resistance towards women

Environmental Feature	Cultural resistance towards women
Project life-cycle	All phases
Potential Impact	Proposed Management Objectives / Mitigation Measures

<table>
<tr><td colspan="2" rowspan="7">Cultural resistance towards women because of increased gender representation in the workforce</td><td colspan="5">• Sensitise staff in respect of gender issues that are pertinent to the workplace.</td></tr>
<tr><td colspan="5">• Ensure gender inclusivity and equity with respect to all compensation.</td></tr>
<tr><td colspan="5">• Prioritise gender inclusivity and equity in access to resources, goods, services and decision making with the aim of empowering women.</td></tr>
<tr><td colspan="5">• Promote equal job opportunities for women and men during the construction phase</td></tr>
<tr><td colspan="5">• Employment practises should be demonstrated free of coercion or harassment.</td></tr>
<tr><td colspan="5">• Develop a grievance procedure to specifically address gender matters. There should be a policy on harassment that is well understood by all.</td></tr>
<tr><td colspan="5">• There should be separate changing and ablution facilities for men and women, and they should be clearly marked as such.</td></tr>
<tr><td></td><td>Nature</td><td>Extent</td><td>Magnitude</td><td>Duration</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Before Mitigation</td><td>Negative</td><td>Site</td><td>Moderate</td><td>Short term</td><td>High</td><td>2</td></tr>
<tr><td>After Mitigation</td><td>Positive</td><td>Site</td><td>Low</td><td>Short term</td><td>High</td><td>1</td></tr>
<tr><td>Significance of Impact and Preferred Alternatives</td><td colspan="6">The employment of women during the construction phase will have moderately negative impacts should workforce integration not be addressed. If workforce integration is successfully implemented, the impact on the project be positive.

The impact has no influence on the choice between project alternatives.</td></tr>
</table>

8.5.4 Injuries and Poor Workforce Health

The impacts of construction can affect the health and safety of those working on the construction site. These impacts can be mitigated in the Environmental Management Programme (EMPr) and through adherence to the Occupational Health and Safety Act 85 of 1993.

An influx of workers is often characterised by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates.

It is expected that this influx will be limited owing to the large pool of potential workers for the project being available in the local study area. The fact that the labour sending areas, such as Phatsima and Rasimone are close to the construction site will obviate the need for communal living conditions that may increase the chances for the spread of disease.

There should also be awareness and education campaigns on health and socio-economic risks such as HIV/AIDS.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 16: Construction Phase Impacts – Injuries and Poor Workforce Health

Environmental Feature		Injuries and Poor Workforce Health				
Project life cycle		Construction Phase				
Potential Impact		Proposed Management Objectives / Mitigation Measures				
Injuries and poor workforce health		• The provisions of the OHS Act 85 of 1993 and the Construction Regulations of 2014 should be implemented on all sites; • Account should be taken of the safety impacts on the local community when carrying out the longitudinal aspects of the project, such as the access road • Contractors should establish HIV/AIDS awareness programmes at their site camps. • Measures should be taken to provide condoms and, where necessary, access to counselling to address any risks to health				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	The potential significance of the impact is high if a lack of attention to this aspect results in injuries to staff. The implementation of a safety system on site will minimise the risk of injuries and poor staff health during the construction phase. The impact has no influence on the choice between project alternatives.					

8.5.5 Influx of Job Seekers

- Influx of people seeking employment and associated impacts
- Increased community conflicts due to employment of outsiders

It is expected that the impact of this influx will be limited owing to the large pool of potential workers for the project being available in the local study area. The fact that Phatsima is close to the construction site will ensure that the workforce is able to live at home for the duration of the construction project.

An influx of workers is often characterised by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates. There is an increased risk associated with the gathering of construction workers in a concentrated area and the availability of disposable income which may attract prostitution. In this regard the World Bank (Gender in Agriculture Sourcebook, 2009, pp. 367-368) indicates that there is a strong link between infrastructure projects and health as:

"Transport, mobility, and gender inequality increase the spread of HIV and AIDS, which along with other infectious diseases, follow transport and construction workers on transport networks and other infrastructure into rural areas, causing serious economic impacts."

Furthermore, social pathologies, such as alcohol abuse, risky sexual behaviour, and gambling should be considered, and appropriate measures taken to limit adverse consequences from this.

The above discussion above has generated the below impact table.

Table 17: Construction Phase Impacts - Influx of Job Seekers

<table>
<tr><td colspan="2">Environmental Feature</td><td colspan="5">Influx of Job Seekers</td></tr>
<tr><td colspan="2">Project life cycle</td><td colspan="5">Construction Phase</td></tr>
<tr><td colspan="2">Potential Impact</td><td colspan="5">Proposed Management Objectives / Mitigation Measures</td></tr>
<tr><td colspan="2">Influx of people seeking employment and associated impacts
(e.g., cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS)</td><td colspan="5">• All employment of locally sourced labour should be controlled and formalised. No employment should take place from the project gate and contracts of employment should be entered into taking into account the Labour Relations Act;
• If possible, and if the relevant Ward Councillors deems it necessary, the employment process should include the affected Ward Councillors and their ward committee.
• To limit the growth of informal settlements in the project area, labour should be sourced from existing labour sending areas, from people who resided in the area prior to appointment. This process should include the Ward Councillor to ensure that only local residents are employed, rather than labour migrants.
• No staff accommodation should be allowed on site;
• To limit the growth of settlements near the project site the project proponent should provide worker transport to and from the work site for the duration of construction.
• The risk exists that un-controlled Spaza/informal trader shops may open next to the site to cater for construction workers. These should be controlled by the contractor to limit their footprint and to ensure that the municipal by-laws are complied with.</td></tr>
<tr><td colspan="2">Increased community conflicts due to employment of local and non-local labourers</td><td colspan="5">• Programmes should be developed to boost the local economy. These should be in the form of Corporate Social Responsibility (CSR) that will favour local empowerment.</td></tr>
<tr><td></td><td>Nature</td><td>Extent</td><td>Magnitude</td><td>Duration</td><td>Probability</td><td>Significance</td></tr>
<tr><td>Before Mitigation</td><td>Negative</td><td>Site</td><td>Moderate</td><td>Short term</td><td>High</td><td>2</td></tr>
<tr><td>After Mitigation</td><td>Negative</td><td>Site</td><td>Low</td><td>Short term</td><td>High</td><td>1</td></tr>
<tr><td>Significance of Impact and Preferred Alternatives</td><td colspan="6">The unmitigated significance of the impact is high as community attitudes can be altered. The implementation of the overall mitigation measures is essential and necessary to minimise the impact from job-seekers influx and community impacts.

The impact has no influence on the choice between project alternatives</td></tr>
</table>

8.5.6 Property and Security Impacts

- Risk of trespassing
- Livestock and game animal theft
- Security
- Damage to property or equipment

During the construction phase, it is expected that there will be impacts on the agriculture, livestock, and game animals, as well as on private property. There is a risk of construction workers trespassing on neighbouring farms. Livestock and game in the area are valuable and so it is necessary to mitigate the risks of theft or of poaching. In carrying out construction activities there is a risk that damage to private property will occur owing to construction activities.

Mitigation measures include the project proponent, prior to construction, planning for the management of workers by taking measures such as readily identifiable clothing, having the site fenced and secured and taking measures to ensure workers do not congregate outside the site before or after working hours. A security policy must be drafted and strictly enforced by the contractors.

In relation to the analysis above, the following mitigation measures are presented:

Table 18: Construction Phase Impacts - Property and Security Impacts

Environmental Feature	Property and Security Impacts					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Risk of trespassing	• A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards trespassing.					
Livestock and game animal theft	• There should be clear demarcation of the area in development so that livestock and game animals are prevented from wandering nearby.					
Security	• The camp site and the project areas should be fenced for the duration of construction; • All contractors' staff should be easily identifiable through their respective uniforms; • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards crime, trespassing and not gathering outside the site. • Security staff alone should be allowed to reside at contractor camps and no other employees.					
Damage to property or equipment	• If a risk exists of damage taking place on a property owing to construction, a condition survey should be undertaken prior to work commencing. • The contractor is to acknowledge and make good any damage that occurs on any property as a result of construction work; • Where crops are damaged, compensation is to be paid to the farmer for the proven loss of these crops; • The farmer should be compensated for any loss of income experienced on account of the contractor.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Property and security impacts during construction are to be expected and must be mitigated. Such impacts can be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor progress performance during the construction phase.					

	Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative that is most preferred and chosen

8.5.7 Influx of Job Seekers

- Job seekers influx into the community
- Community conflict over employment of non-locals
- Increased health risk
- Increased social pathologies

It is expected that this influx will be limited owing to the large pool of potential workers for the project being available in the local municipalities. The fact that Phatsima is close to the construction site will ensure that labour is able to live at home for the duration of the construction project.

An influx of workers is often characterised by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates. There is an increased risk associated with the gathering of construction workers in a concentrated area and the availability of disposable income which may attract prostitution. In this regard the World Bank (Gender in Agriculture Sourcebook, 2009, pp. 367-368) indicates that there is a strong link between infrastructure projects and health as:

"Transport, mobility, and gender inequality increase the spread of HIV and AIDS, which along with other infectious diseases, follow transport and construction workers on transport networks and other infrastructure into rural areas, causing serious economic impacts."

There should also be awareness and education campaigns on health and social risks such as HIV/AIDS, COVID-19 and crime prevention. Furthermore, social pathologies, such as alcohol abuse, risky sexual behaviour, and gambling should be considered, and appropriate measures taken to limit adverse consequences from this.

The above discussion above has generated the below impact table.

Table 19: Construction Phase Impacts - Influx of Job Seekers

Environmental Feature	Influx of Job Seekers
Project life cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Job seekers influx into the community.	• All employment of locally sourced labour should be controlled and formalised. No employment should take place from the project gate and contracts of employment should be entered into taking into account the Labour Relations Act; • If possible, and if the relevant Ward Councillors deems it necessary, the employment process should include the affected Ward Councillors and their ward committee. • To limit the growth of informal settlements in the project area, labour should be sourced from existing labour sending areas, from people who resided in the area prior to appointment. This process

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	should include the Ward Councillor to ensure that only local residents are employed, rather than labour migrants. • No staff accommodation should be allowed on site; • To limit the growth of settlements near the project site the project proponent should provide worker transport to and from the work site for the duration of construction.					
Increased community conflicts due to employment of local and non-local labourers	• Programmes should be developed to boost the local economy. These can be in the form of Corporate Social Responsibility (CSR) that will favour local empowerment.					
Increase health risk	• Measures should be taken to provide condoms and, where necessary, access to counselling to address any risks to health.					
Increased social pathologies such as crime, drug abuse and sexual behaviours.	• The mitigation method will require a change in community values and attitudes; This can be done through creating social awareness, and educating the workforce with regards crime awareness and social pathology prevention					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Negative	Site	Low	Short term	High	1
Significance of Impact and Preferred Alternatives	The significance of the impact is high as community attitudes can be altered. The implementation of the overall mitigation measures is essential and necessary to minimise the impact from job-seekers influx and community impacts.					

8.5.8 Security

- Ensuring the security of the project site

There are safety concerns related to the construction activity. Landowners adjacent to similar projects, generally express security concerns, including an increase in crime rates once an area experiences an increase in population owing to the number of construction workers on site.

Mitigation measures include the project proponent, prior to construction, planning for the management of workers by taking measures such as readily identifiable clothing, having the site fenced and secured and taking measures to ensure workers do not congregate outside the site before or after working hours. A security policy must be drafted and strictly enforced by the contractors.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 20: Construction Phase Impacts - Security

Environmental Feature	Security
Project life cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Ensuring the security of the project site	• The camp site for the project and the longitudinal construction sub-site laid down areas should be fenced for the duration of construction;

	• All contractors' staff should be easily identifiable through their respective uniforms; • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards crime, trespassing and not gathering outside the site could be conducted. • Security staff should only be allowed to reside at contractor camps and no other employees.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Disturbances and irritation during construction are to be expected. These can then be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor proceedings and performance during construction phase.					

8.6 Impacts on Operational Phase

8.6.1 Economic Impact

- Economic growth and induced impacts
- Opportunity for local business
- Employment of local staff
- Skills development

The positive economic and material well-being impacts associated with the project include: support to the national grid through the generation of electricity; stimulus to the national and regional study area in the form of spending associated with the project; and increase in employment opportunities; and increased opportunities for SMMEs.

Jobs created during the operational phase of the project will be limited when compared to the construction phase, but 175 jobs will be created directly by the project over its 20-year operational lifespan. In total it was estimated that 96 jobs in total will be created in this timeframe in the South African economy owing to the project.

Economic opportunities will range from the supply of labour and skills to the project, supply of materials and equipment and an increase in wholesale and retail trade in the regional economy.

To ensure that economic activity derived from the project is localised as far as possible, measures should be adopted to increase local procurement of the human resources.

As a result of the analysis above, the following operational phase impact/mitigation table has been generated.

Table 21: Operational Phase Impacts - Economic Impacts (positive)

Environmental Feature	Economic Impacts (positive)					
Project life-cycle	Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Economic growth and induced impacts	• The solar park will stimulate the local economy through the provision of jobs and through local procurement. • It will contribute to the improvement of the national electricity supply at a price that has been set by a competitive bidding process					
Opportunity for local business	• Local SMMEs should be given an opportunity to participate in the operation of the project through the supply of services, material or equipment.					
	• A procurement policy promoting the use of local business where possible, should be put in place and applied throughout the operational phases of the project.					
Employment of local staff	• Women should be given equal employment opportunities and encouraged to apply for positions.					
Skills development	• A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills whilst in employment.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	High	Long Term	Likely	3
After Mitigation	Positive	Regional	High	Long Term	Likely	3
Significance of Impact and Preferred Alternatives	The solar park will provide economic stimulus to the regional study area for the long-term. The solar park should adopt policies that are supportive of local procurement and support for local enterprises. The impact has no influence on the choice between project alternatives					

9 ANALYSIS OF ALTERNATIVES

An analysis of the project alternatives is carried out below.

9.1 No-Go Alternative

The No-Go alternative will present the following implications:

- There will be no contribution employment and skills development to the local community.
- The local economy will remain unchanged like the area and will not attract new economic investment like ecotourism.
- The opportunity to improve the overall supply of electricity in the regional will be missed; and
- The economic stimulus presented by the project will be foregone.

There will be less economic development as there will be no opportunities for SMMES and local laborer's. Having taken into consideration the project aims of electricity generation using renewable power sources and considering the assessment above which does not indicate any fatal socio-economic flaws, the benefits from the project going ahead, from a socio-economic perspective, will be larger than not proceeding. The "No-go" option is not supported by this study.

9.2 Technical Alternatives

No site alternatives are proposed for this project.

Based on the environmental impact assessment and the suggested mitigation measures, two internal layout alternatives were proposed during the currency of the project.

The first was a layout proposal which places the BESS to the north of the facility, along with the alternative transmission line route. The second layout alternative proposed placing the BESS to the south of the facility, along with the relocated transmission line.

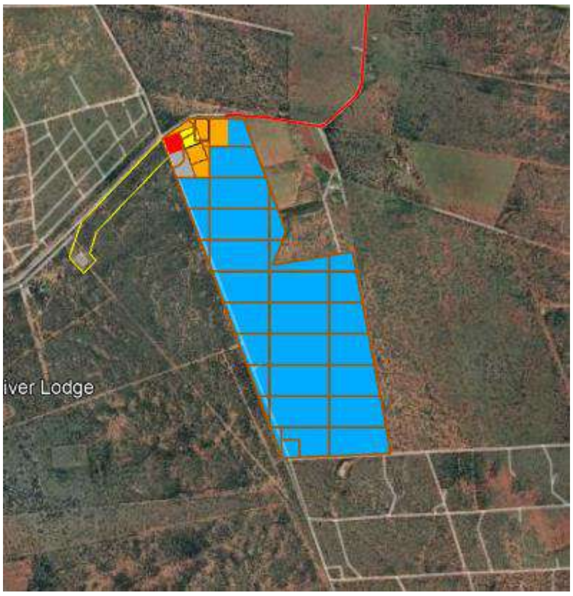	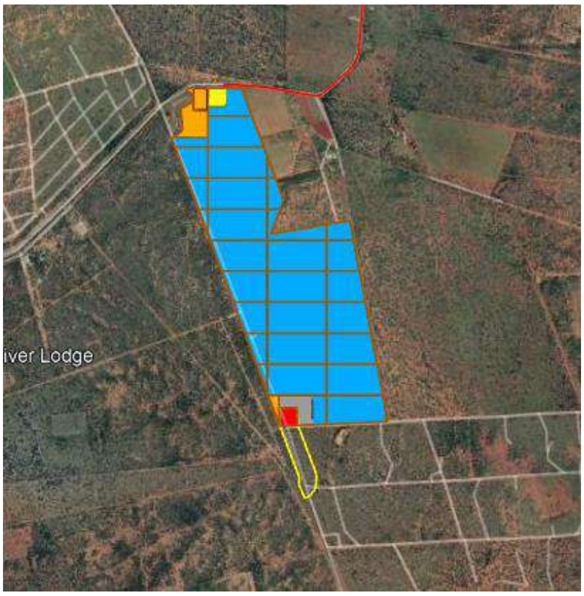
Scoping Phase Layout	EIR Layout

Figure 12: Rhino Solar Alternative Layouts

The social impacts of the two layouts are similar. It is for this reason that SIA does not express a preference between the two layouts.

10 Site Sensitivity Verification

The site sensitivity was verified by means of the methodology and findings of this report. There is no social theme for this project in the screening tool, hence this report conforms with the Environmental Impact Assessment regulations requirements.

The methodology establishes existing land use and includes motivation and evidence of such land use. The nature of this study and its impacts dictate that a larger study area than the immediate site and its adjoining properties be assessed. In this sense, the precise nature of the land development on the site is not relevant in this case.

11 IMPACT STATEMENT

An impact statement is required as per the NEMA regulations regarding the proposed development.

The regional study area is a rural economy with a narrow base. The project site has few social receptors surrounding the site, and the project has a low footprint on the social environment. The social and economic impacts of the project are expected to be positive in the sense that the local economy will be stimulated and broadened. The negative impacts are limited in nature and scope and can be successfully mitigated by management rules and practices. It is therefore found that the project, once the recommended mitigation measures have been implemented, has a net positive impact on the social environment of the regional study area.

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APPENDIX E8: Visual Impact Assessment

SPECIALIST ASSESSMENT

ENVIRONMENTAL VISUAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED RHINO SOLAR PHOTOVOLTAIC PROJECT NEAR RUSTENBURG, NORTWEST PROVINCE, SOUTH AFRICA.

ENVASS
GROUP OF COMPANIES

PREPARED FOR:	RHINO SOLAR (PTY) LTD
PREPARED BY:	ENVIRONMENTAL ASSURANCE (PTY) LTD.
SUBMITTED TO:	NEMAI CONSULTING CC
MONTH:	MAY 2023
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DOCUMENT CONTROL

Document Title	Environmental Visual Impact Assessment Report for the Proposed Rhino Solar Photovoltaic Project West of Boshoek near Rustenburg, North-west Province, South Africa.
Report Number	SPS-VIA-049-23_24 RSPV
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Submitted to	Client: Nemai Consulting CC Contact Person: Jacqui Davis Position: Environmental Consultant
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QUALITY CONTROL

	Originated By:	Internal Reviewer:	Technical Reviewer:
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Signature			
Date	11-05-2023	12-05-2023	12-05-2023
Revision Date 1	12 June 2023		

DISCLAIMER

DECLARATION OF INDEPENDENCE

I, **Andre Buys**, in my capacity as a specialist consultant, hereby declare that I: -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of this project, other than remuneration for the work performed in terms of the National Environmental Management Act 107 of 1998;
- Have and will not have vested interest in the proposed and/or existing activity nor will I engage myself in any conflicting interest associated with this project;
- I undertake to disclose and provide to the competent authority any material or information at my disposal regarding this project as required in terms of National Environmental Management Act 107 of 1998;
- Based on the information provided to me by the client and in addition to information obtained during the course of this study, I have presented the results and conclusion with regard to this project to the best of my professional ability;
- I reserve the right to modify aspects pertaining to this study should additional information become available through ongoing research and further work on this field;
- I undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study; and
- I am duly qualified and experienced to undertake the work at hand.

Andre Buys (Environmental Consultant)

Environmental Consultant	Relevant expertise
Andre Buys	Has completed a B.Sc. in Geography and Geology, followed by a B.Sc. (Hons) Geography and Geology. He has comprehensive experience and knowledge on compliance monitoring, geohydrological studies, project management and specialist reporting. As an environmental consultant, Andre has provided several environmental monitoring assessments, audits and specialist input services.

EXECUTIVE SUMMARY

This report has been prepared by Environmental Assurance (Pty) Ltd. (hereafter referred to as "ENVASS") as an independent environmental consultancy was appointed by Rhino (Pty) Ltd to undertake a visual impact assessment for the proposed development of a Photovoltaic (PV) Site, Facility substation, and an 88 kV /132 kV powerline between the facility substation and the exiting Eskom Rhino Substation, near Rustenburg in the Northwest Province, South Africa (referred to as the "Project"). The assessment is required as part of an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998), for the approval of the proposed project. The scope of the assessment focussed on the current visual baseline conditions of the study area and the possibility of the proposed project having a visual impact.

RESULTS AND IMPACT STATEMENT

From the results obtained in this study, it is expected that the construction of the proposed project will contribute to localised visual impacts, however, the visual impacts are expected to be **moderate to low** if proactively managed. Mitigation measures are recommended under Section 9 to reduce potential visual impacts. Both the alternatives were assessed and had the same findings. It can be recommended to utilize alternative 2, due to it being further away from the first sensitive receptor.

The assessment found that the proposed project itself will have the greatest potential visual impact among those activities assessed. Secondary visual impacts are expected to include dust generation during construction, solar glint and glare, and night-time illumination. Several mitigation measures have been identified to address the anticipated impacts.

The Project could potentially have a moderate visual impact on surrounding land users located near the proposed solar facility and associated infrastructure. This impact may be mitigated to low. The visual impact on the users of roads and the local residents and homesteads within the region (i.e., beyond the 5km radius) is expected to be low for the proposed solar energy facility, both before and after the implementation of mitigation measures. The potential visual impact of construction activities on sensitive visual receptors located near to the proposed solar energy facility is likely to be of moderate significance and may be mitigated to low. The potential visual impact associated with lighting at the facility at night and daytime glare is expected to be of moderate significance and may be mitigated to low.

The anticipated visual impacts are expected to be of low significance with the implementation of appropriate mitigation, and the project development is not considered to be fatally flawed from a visual perspective.

SPECIALIST'S RECOMMENDATION

Considering the project assessment, it is the specialist's reasoned opinion that the proposed project be allowed, provided that the findings within this report are considered along with the recommendations made towards the management of the proposed project. All mitigation measures recommended herein should be considered and included in the Environmental

Management Programme (EMPr) relevant to the proposed project. It is of the specialists' opinion that Alternative 2 be used for the construction due to the construction sites being further away from an identified sensitive receptor.

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ACRONYMS

ACRONYM	EXPANSION
BESS	Battery Energy Storage System
DEM	Digital Elevation Model (*also* DTM or "Digital Terrain Model")
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ENVASS	Environmental Assurance (Pty) Ltd.
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographic Information System
GPS	Global Positioning System
IDW	Inverse Distance Weighting
km	Kilometres
LiDAR	Light Detection and Ranging
NEMA	National Environmental Management Act
PV	Photovoltaic
SLR	Single Lens Reflex
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VP	Viewpoint
VT	Vegetation Type

GLOSSARY

TERM	DEFINITION
Cumulative impact	Cumulative impacts can result from individually minor but collectively significant activities taking place over a period.
Critical viewpoints	Important points from where viewers will be able to view the proposed or actual development and from where the development impact may be significant.
Environmental Impact Assessment	A public process that is used to identify, predict, or cause the least damage to the environment at a cost acceptable to society, in the long term as well as in the short term.
Field of view	The field of view is the angular extent of the observable world that is seen at any given moment. Humans have an almost 180º forward-facing field of view. Note that human stereoscopic (binocular) vision only covers 140º of the field of view in humans; the remaining peripheral 40º have no binocular vision due to the lack of overlap of the images of the eyes. The lower the focal length of a lens (see below), the wider the field of view.
Focal length	The focal length of a lens is a measure of how strongly the lens converges (focuses) or diverges (defocuses) light. Focal length refers to the "strength" of a lens, in other words how many times the lens magnifies an image (brings it closer) or widens an image (makes it look further away). The standard lens on most Single-Lens Reflex (SLR) cameras have a focal length of 50 mm. Using a 50 mm lens as a start, a 200 mm lens will magnify an image four times (i.e,. 4 x magnification). The focal length of an average human eye is 22 mm.
Impact (Visual)	A description of the effect of an aspect of the development on a specified component of the visual, aesthetic, or scenic environment within a defined time and space.
Land cover	The surface cover of the land usually expressed in terms of vegetation cover or the lack of it. Related to but not the same as Land use.
Land use	What land is used for based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation, and physical processes.
Landscape	An area, as perceived by people, the character of which is the result of the action and interaction, of natural and/ or human factors.
Landscape character	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.
Landscape quality	A measure of the physical state of the landscape. It may include the extent to which typical landscape character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a variety of reasons.

TERM	DEFINITION
Mitigation	Any action taken or not taken in order to avoid, minimise, rectify, reduce, eliminate, or compensate for actual or potential adverse visual impacts.
Scenic value	Degree of visual quality resulting from the level of variety, harmony and contrast among the basic visual elements.
Sense of place	The character of a place, whether natural, rural or urban. It is allocated to a place or area through cognitive experience by the user.
Viewshed	The theoretical area within which an observer is likely to see a specific structure or area in the landscape. It is generated from a digital terrain model (DTM) made up of 3D contour lines of the landform. Intervening objects, structures or vegetation will modify the view shed at ground level.
Visual absorption capacity (VAC)	The ability of elements of the landscape to "absorb" or mitigate the visibility of an element in the landscape. Visual absorption capacity is based on factors such as vegetation height (the greater the height of vegetation, the higher the absorption capacity), structures (the larger and higher the intervening structures, the higher the absorption capacity) and topographical variation (rolling topography presents opportunities to hide an element in the landscape and therefore increases the absorption capacity).
Visual character	The overall impression of a landscape created by the order of the patterns composing it; the visual elements of these patterns are the form, line, colour and texture of the landscape's components. Their interrelationships are described in terms of dominance, scale, diversity and continuity. This characteristic is also associated with land use.
Visual exposure	Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance.
Visual quality	Subjective evaluation of the visible components of the environment by viewers.
Visually sensitive	Areas in the landscape from where the visual impact is readily or excessively encountered.

1. INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Environmental Assurance (Pty) Ltd (ENVASS), as an independent environmental consultancy, was appointed by Rhino Solar (Pty) Ltd to undertake a visual impact assessment for the proposed development of the Rhino Photovoltaic (PV) Site, Facility substation and 88 kV /132 kV powerline between the facility substation and the exiting Eskom Rhino Substation project near Rustenburg, in the Northwest Province (refer to Figure 1). This document reports on the visual impact assessment conducted and outlines findings and recommendations made towards the Environmental Impact Assessment (EIA) process undertaken for the proposed project. The proposed facility will be constructed on the remaining extent of Portion 2 of the Farm Rhebokhoek 101, Portion 31 of the Farm Stoomrivier 236 as well as Portion 26 of the Farm Stoomrivier.

1.2 LOCALITY

The proposed site is situated approximately fifteen (15) kilometres west of a small community namely Boshoek, which is an additional thirty-six (36) kilometres north-west of the City Rustenburg (CBD). It falls under the jurisdiction of the Bojanala Platinum District Municipality and governed by the Rustenburg Local Municipality. The proposed project area is in close proximity to major roads such as the R565 as well as an unnamed road which leads to Lindleyspoort towards the west of the site. The R565 provides access to Northam (to the North) as well as Rustenburg (to the south) ultimately joining up with the N4 highway. The footprint of the project is approximately 125 hectares (ha). The surrounding area can be characterized by agricultural, residential and commercial activities. According to the SA Renewable Energy EIA Application (REEA) Database, there are no (0) renewable energy applications have been made for properties located near Boshoek. The proposed site ranges from approximately 1087 to 1101 metres above mean sea level (mamsl), predominantly flat, with a slight drop in elevation from the north to south. Large hills and mountains can be seen in the distance (further north). The vegetation in the area consists mainly of grasses, shrubs, and trees, as the study area is surrounded by agricultural activities whilst the majority of the study area is currently utilized for grazing of livestock and game. The surrounding area includes several reserves and game farms, which are home to a variety of wildlife species. Overall, the landscape and terrain around Boshoek are typical of the Central Bushveld region of South Africa, consisting of dominant Zeerust Thornveld type vegetation, with wide open spaces and a mix of natural grassland, open woodland, commercial annual crops (rain-fed / dry land) and Fallow land (old fields (bush).

1.3 ACTIVITY DESCRIPTION

The proposed project consists of the following systems, sub-systems or components (amongst others):

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy.
- PV modules and mounting structures which will consist of either Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems.
- Inverters and transformers.
- Battery Energy Storage System (BESS) area up to 4ha.
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance.
- Grid connection infrastructure. It is estimated that the maximum size of the facility substation will not exceed 1 ha.
- Construction of a PV Site, facility substation and 88 kV /132 kV (65 MW) powerline between the facility substation and the exiting Eskom Rhino Substation. Each facility will require inverter-stations, transformers, switchgear, and internal electrical reticulation (underground cabling).
- Temporary construction laydown area up to 5 ha.
- Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
- Internal roads will be up to 6 m wide, to allow access to the Solar PV modules for operations and maintenance activities.
- Main Access Road is up to 8 m wide. The site is accessible via the gravel roads from several farms not to be disclosed.

The project can be separated into three (3) phases namely the construction, operational and decommissioning phases. Per phase the following activities can conceivably occur and not limited.

- **Construction phase -** During the implementation of the Project, the following construction activities will be undertaken:
    - Pegging the footprint of the development;
    - Establishing access roads;
    - Preparing the site (fencing, clearing, levelling and grading, etc.);
    - Establishing the site office;
    - Establishing laydown areas and storage facilities;
    - Transporting equipment to site;
    - Undertaking civil, mechanical and electrical work; and
    - Reinstating and rehabilitating working areas outside of permanent development footprint.

- **Operational phase -** Once the solar park is up and running the facility will be largely self- sufficient. Operational activities associated with the maintenance and control of the Solar PV Plant will include the following (amongst others):
    - Testing and commissioning the facility's components;
    - Cleaning of PV modules;
    - Controlling vegetation;
    - Managing stormwater and waste;
    - Conducting preventative and corrective maintenance; and
    - Monitoring of the facility's performance.

- **Decommissioning -** PV panels are guaranteed to produce at least 80% of their rated power for 20 to 30 years. In practice, PV panels will perform satisfactorily well beyond this timeframe. At the end of the 20–30-year lifespan, two scenarios exist for the PV panels:
    - The old, redundant panels can be disposed of (at a registered disposal facility designated for this purpose); or
    - The panels can be recycled, by either using their components to fix or make new panels, or be donated for use elsewhere (e.g., for the electrification of rural schools and clinics).

Table 1: Technical details of the proposed PV Plant (Nemai Consulting CC)

No.	Component	Description / Dimensions Alternative 1	Description / Dimensions Alternative 2
1	Height of PV panels	Estimated at approximately up to 5.5 m	Estimated at approximately up to 5.5 m
2	Area of PV Array	Up to approximately 112ha	Up to approximately 115ha
3	Area occupied by substations	Up to 1ha	Up to 1ha
4	Capacity of on-site substation	Medium voltage (up to 88 kV) to high voltage (132 kV) 88/132kV Main Transmission substation and LILO powerlines.	Medium voltage (up to 88 kV) to high voltage (132 kV) 88/132kV Main Transmission substation and LILO powerlines.
5	BESS	Area up to ± 4ha	Area up to ± 4ha
6	Area occupied by both permanent and construction laydown areas	Temporary: Up to 5ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)	Temporary: Up to 5ha Permanent: Up to 1 ha (located within the area demarcated for temporary construction laydown)
7	Area occupied by buildings	Up to 1ha	Up to 1ha
8	Length of internal roads	Up to 10km	Up to 10km
9	Width of internal roads	The internal roads will be up to 6 m wide.	The internal roads will be up to 6 m wide.

No.	Component	Description / Dimensions Alternative 1	Description / Dimensions Alternative 2
		The access roads will be up to 8 m wide.	The access roads will be up to 8 m wide.
10	Proximity to grid connection	Approximately 750 m	Approximately 750 m
11	Height of fencing	Estimated at up to 3.5m	Estimated at up to 3.5m
12	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing	Type will vary around the site, welded mesh, palisade and electric fencing

Figure 3 below is a representation of the study area, including the proposed infrastructure layout. A set of two alternatives is evident in terms of the BESS, OHL-Corridor and the Substation. The two alternatives will be assessed and the deemed most effective site with the least impact will be recommended.

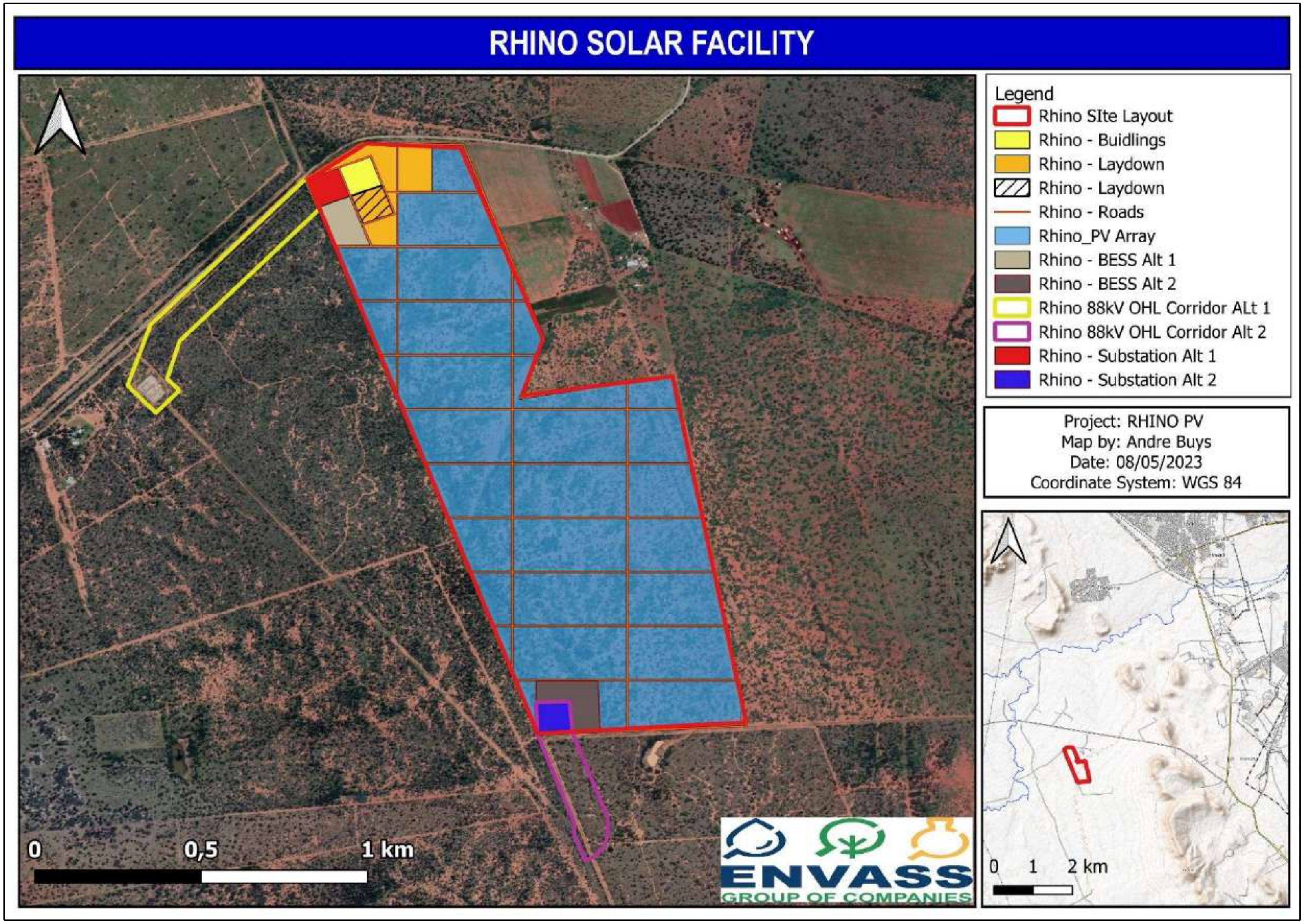

Figure 1: Proposed project locality and layout map

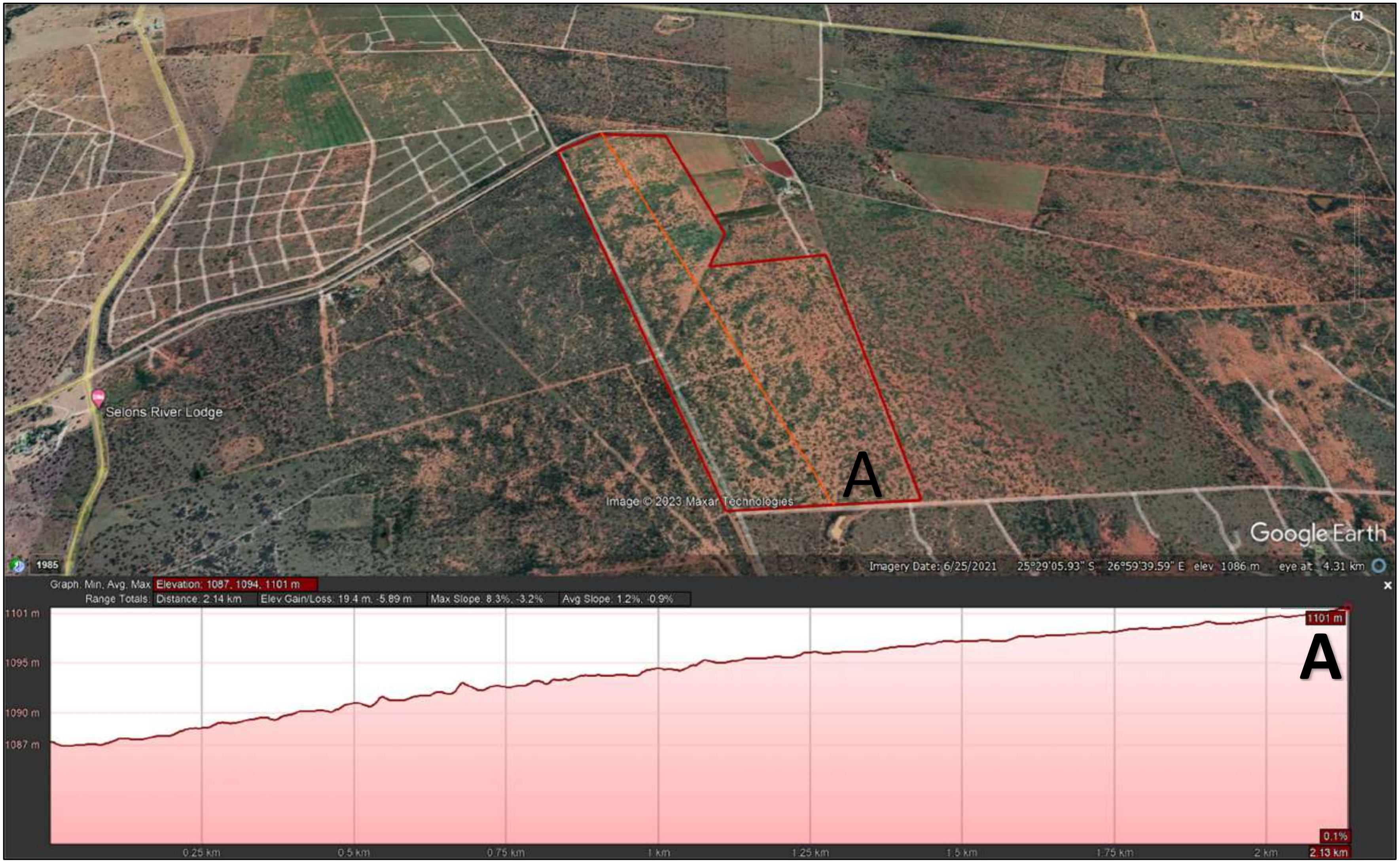

Figure 2: Elevation Profile (maximum elevation to south-east – point A)

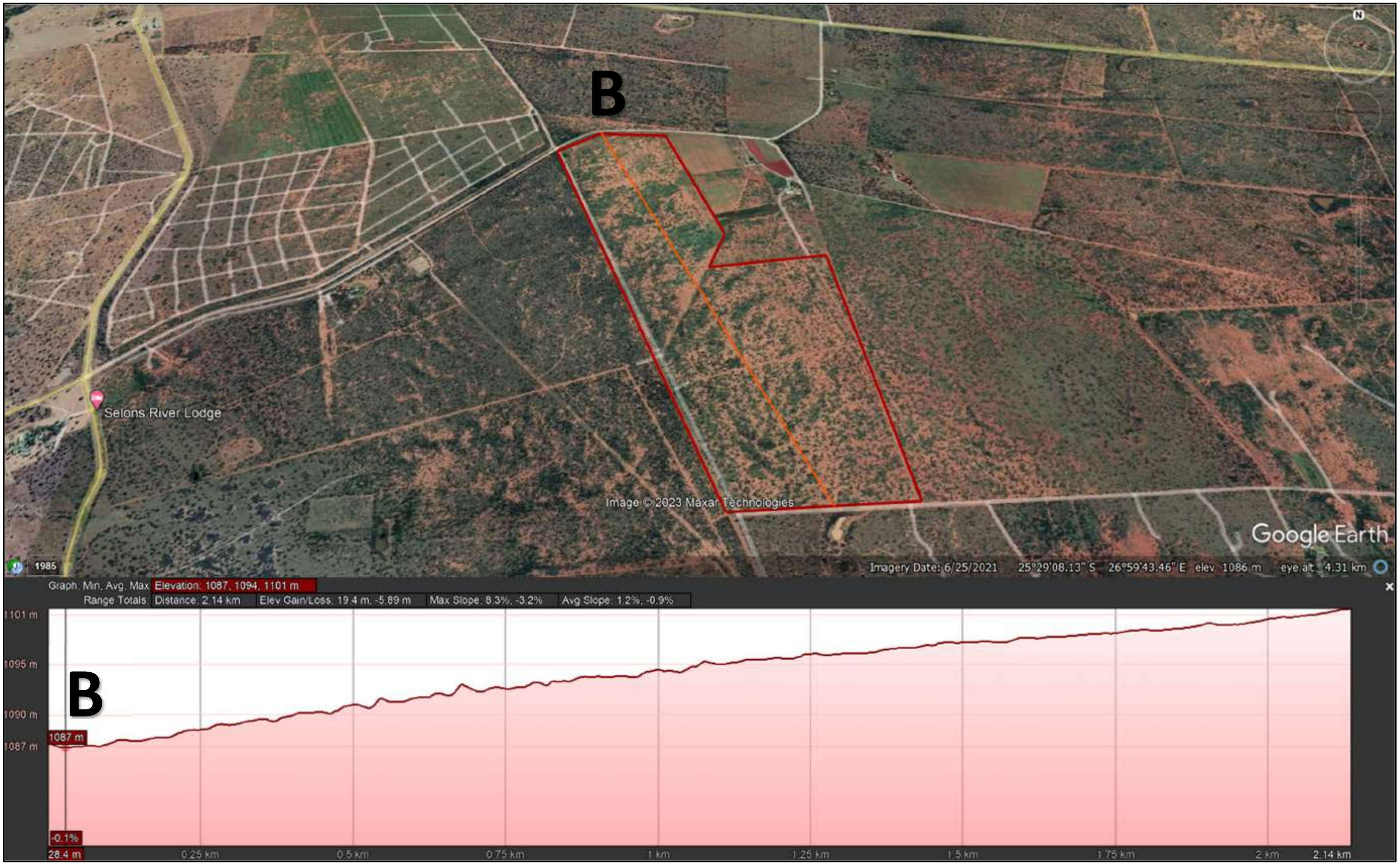

Figure 3: Elevation Profile (minimum elevation to the north-west – point B)

1.4 DELINEATION OF THE VISUAL STUDY AREA

The study area for the VIA comprises of the spatial extent of the project footprint and related activities, as well as an associated buffer area. For the purposes of this VIA, the study area was defined as a ten (10) km radius around the physical footprint of all surface components of the project. The distance of ten (10) km was selected based on the location of sensitive receptors, topography, and the elevation of the proposed area. For the purposes of this VIA, the term 'site' refers to the area that will be physically affected by the proposed activities. Similarly, the term 'study area' refers to the area that will potentially be visually affected by the project and represents the ten (10) km radius buffer around the visible components of the proposed infrastructure.

2. LEGISLATIVE CONTEXT AND REFERENCES

Section 28 of the National Environmental Management Act (NEMA, Act 107 of 1998) places a duty of care on any person causing, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing, or, insofar as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped and rectify such pollution of the environment. The measures required in terms of subsection (1) may include measures to:

- Investigate, assess, and evaluate the impact on the environment.
- Inform and educate employees on the environmental risk of their work and the way tasks must be performed in order to avoid causing significant pollution or degradation of the environment.
- Cease, modify or control any activity or processes causing pollution or degradation.
- Contain or prevent the movement of pollutants or the cause of degradation.
- Eliminate any source of the pollution or degradation; or
- Remedy the effects of pollution or degradation.

In addition to this, the Protected Areas Act (57 of 2003) Section 17 is intended to protect natural landscapes and the National Heritage Resources Act (25 of 1999) provides legislated protection for listed proclaimed sites such as urban conservation areas, natural reserves and proclaimed scenic routes. This legislation is applicable to the study and will be used in the determination of the possible visual impact of the proposed development.

Requirements of Appendix 6 of the NEMA: EIA Regulations (2014, as amended). The following is an extract of the requirements:

Specialist reports

1. (1) A specialist report prepared in terms of these Regulations must contain—

(a) details of—

(i) the specialist who prepared the report; and

(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;

(cA) an indication of the quality and age of base data used for the specialist report;

(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;

(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;

(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

(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;

(g) an identification of any areas to be avoided, including buffers;

(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;

(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 or activities;

(k) any mitigation measures for inclusion in the EMPr;

(l) any conditions for inclusion in the environmental authorisation;

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;

(n) a reasoned opinion—

(i) whether the proposed activity, activities or portions thereof should be authorised;

(iA) regarding the acceptability of the proposed activity or activities; and

(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, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

(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.

3. PURPOSE AND SCOPE

3.1 PURPOSE

The purpose of this assessment is to determine the visual impact of the proposed activity. The visual impact assessment will describe the existing visual characteristics of the proposed site and surrounding environment to establish the baseline characteristics of the receiving environment. If it is found that the possibility exists for visual impacts to pose a problem, recommendations will be made as to prevent and/or mitigate the possible impacts. This will be done to prevent disturbances to the receiving environment. This report also aims to give effect to the requirements and legislation as promulgated in South Africa. Please refer to Section 2 for detailed legislative requirements for the study. Key aspects for the purpose of this document are to:

- Description of the existing visual characteristics of the proposed site and its surroundings.
- Determining areas from which the proposed development will be visible.
- Visual Impact Assessment (VIA) in order to assess the significance of the visual impacts determined to be caused by the proposed development; and
- Recommendation of possible mitigation measures.

3.2 SCOPE

The scope includes the visual impact assessment of the proposed project (refer to Figure 3). This document reports on the visual impact assessment conducted, and outlines findings made supported by recommendations to the authorisation of the proposed project. The site is located approximately fifteen (15) kilometres west of a small community namely Boshoek, which is an additional thirty-six (36) kilometres north-west of the City Rustenburg (CBD).

4. METHODOLOGY AND UNDERTAKING

4.1 SITE ESTABLISHMENT

An initial desktop site assessment was conducted to determine suitable locations regarding the visual impact assessment. The result of the desktop study is the identification of areas or activities, which could possibly contribute to the deterioration of the visual characteristics of the area.

Site baseline characterisation (and subsequent fieldwork) occurred on the 24th of April 2023 for the visual assessment. The site baseline characterisation was conducted to undertake the visual assessment of the current characteristics of the receiving environment. The field survey included photographic evidence at the various viewpoints, which were used as a basis for determining the potential visual ability and visual impacts of the proposed development. Various viewpoints were identified based on the sensitivity and visual impact of the area.

The VIA was conducted following the methodology:

- Site visit and orientation.
- Describing the landscape character or visual baseline based on:

  - Photographs of the project site and larger study area were taken during a field visit conducted on the 24th of April 2023.
- A review of available aerial photography and topographical maps, in relation to:
  - Natural elements; and
  - Human-made elements.
- Determining the area/s where the project will be visible from.
- Determining the visual resource value of the landscape in terms of:
  - The topographical character of the site and its surroundings and potential occurrence of landform features of interest;
  - The presence of water bodies within the study area;
  - The general nature and level of disturbance of existing vegetation cover within the study area; and
  - The nature and level of human disturbance and transformation evident.
- Determine the visual absorption capacity of the receiving visual landscape.
- Determining the receptor sensitivity to the proposed project.
- Determine the magnitude of the impact, by considering the proposed project in terms of aspects of VIA, namely:
  - Visibility.
  - Visual intrusion; and
  - Visual exposure.
- Assessing the impact significance by relating the magnitude of the visual impact to its:
  - Duration.
  - Severity; and
  - Geographical extent.
- To recommend mitigation measures to reduce the potential visual impacts of the project.

4.2 ASSUMPTIONS AND LIMITATIONS

The following is relevant to the field of VIA and the findings of this study:

- Determining the value, quality and significance of a visual resource or the significance of the visual impact that any activity may have on it, in absolute terms, is not achievable. Visual perception is by nature a subjective experience, as it is influenced largely by personal opinions and world views. For instance, what one viewer may experience as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education, and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. It is therefore impossible to conduct a visual assessment without relying to some extent on the opinion of an experienced consultant, which is inherently subjective. The subjective opinion of the visual consultant is however unlikely to materially influence the findings and recommendations of this study, as a wide body of scientific knowledge exists in the industry of VIA, on which findings are based.
- A once-off field survey was sufficient to characterise the baseline visual characteristics of the site.

- The primary objective of this study was to assess the visual environment.
- The fieldwork relevant to this study was a once-off assessment that was conducted.
- A preliminary layout was available. Detailed dimensions, such as the vertical offset of proposed surface infrastructure above ground level, were however not available and were assigned based on experience from similar infrastructure in previous projects.
- All viewsheds were based on terrain level. As such these viewsheds do not incorporate distractive views in the form of vegetation or land use (infrastructure, buildings, etc.).
- This study did not include an illumination or social assessment.
- The assessment of impacts and recommendation of mitigation measures was informed by the site-specific aspects identified and based on the assessor's working knowledge and experience with similar activities.

4.3 BASELINE VISUAL ENVIRONMENT

The visual baseline assessment was informed by a field visit, assessment of on-site photographs and Google Earth imagery. To determine the visual resource value of the study area, specific attention was given to the following aspects:

- The nature of existing vegetation cover, in terms of its overall appearance, density and height, and level of disturbance.
- The general topographical character of the study area, including prominent or appealing landforms, and their spatial orientation in terms of the project sites.
- The nature and level of human transformation or disturbance of the study area.
- The location, physical extent, and appearance of water bodies within the study area if present; and
- The perceived level of compatibility of existing land uses in terms of the study area and each other.

4.4 DESCRIPTION OF AFFECTED AREA AND ENVIRONMENT

This section provides a brief overview of the visual baseline environment and context in which the proposed project will take place.

The proposed site is located approximately fifteen (15) kilometres west of a small community namely Boshoek, which is an additional thirty-six (36) kilometres north-west of the City Rustenburg (CBD). The proposed project is accessed by tar and gravel roads, which are linked to the R565 as well as an un-named tar road from Boshoek to Lindleyspoort. The areas affected by the proposed Project footprint are rural in nature. The Project's PV Site is currently utilized as grazing farms and was historically used for agricultural purposes. The surrounding area can be characterized by agricultural, commercial and residential activities. According to the SA REEA Database, there were no (0) renewable energy applications that have been made for properties located in a thirty (30) km radius of the study area.

Table 2: Desktop study attributes and descriptions relevant to the study area.

Hydrological Setting (DWS, 2012)	
Water Management Area (WMA)	Bojanala
Sub-WMA	Elandsrivier Sub-Catchment Area
Quaternary Catchment Area	A22D
Sub-Quaternary Reach (SQR)	A22D – 00941 to 00966 (Selons) PES: Class C (Moderately modified)
Ecoregion (Kleynhans *et al.*, 2005) (bold indicates most dominate attributes)	
ATTRIBUTES	**Bushveld Basin (8)**
Terrain Morphology: Broad division (dominant types in bold) (Primary)	**Plains; Low Relief;** **Plains; Moderate Relief;** Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to high Relief Closed Hills. Mountains; Moderate and High Relief
Vegetation types (dominant types in bold) (Primary)	**Mixed Bushveld;** Clay Thorn Bushveld; Waterberg Moist Mountain Bushveld (limited).
Altitude (m a.m.s.l) (secondary)	700 – 1700 (1700 – 1900 very limited)
MAP (mm) (modifying)	400 – 600
Coefficient of Variation (% of annual precipitation)	25 - 35
Rainfall concentration index	55 - > 65
Rainfall seasonality	Early to mid-summer
Mean annual temp. (°C)	14 - 22
Mean daily max. temp. (°C): February	22 - 32
Mean daily max. temp. (°C): July	14 - 24
Mean daily min. temp. (°C): February	12 - 20
Mean daily min temp. (°C): July	0 - 6
Median annual simulated runoff (mm) for quaternary catchment	20 - 100
Landcover within the study area (DEA, 2020)	
Landcover Category (DEA, 2020)	
Desktop Delineation	**Site Conditions**
Open Woodland	The onsite conditions for the most part mimic the presumed desktop landcover classes.
Dense forest and woodland	
Fallow Land & Old Fields (bush)	
Natural Grassland	

National Wetland Map Version 5 (NWM5), National Freshwater Ecosystem Priority Areas (NFEPA's) (Driver *et al*., 2011) and Strategic Water Source Areas (SWSA) (Le Maitre *et al*., 2017)	
NWM5	No wetlands occur within the project area.
Fish sanctuary	The project area does not fall within a catchment that has been flagged as a fish sanctuary.
NFEPA Rivers	No rivers fall within the study area.
NFEPA Wetlands	The project area does not consist of artificial wetlands. A wetland is found in close proximity of the southern border.
WetVeg	The project area falls over one (WetVeg) unit namely the Central bushveld Group 2.
SWSA	The project area does not fall within a SWSA.
Geology and Soils (Council for Geosciences 2008; Schultze *et al*., 1992; MacFarlane & Bredin, 2016)	
Geology and Soil	The project area is underlain by Shale, minor limestone / dolomite, basalt and tuff from of the Pretoria Group within the Transvaal Supergroup. It forms part of the Silverton Lithostratic unit. The Soil types range from vertic, melanic and red structured horizons.
Conservation Attributes (SANBI, 2018; SANBI, 2006-18; DFFE, 2021)	
CBA	CBAs are areas that are important for conserving biodiversity. • A portion of the study area occurs within a CBA at a desktop level.
ESA	ESAs are areas that are important to ensure the long-term persistence of species or functioning of other important ecosystems. • A portion of the study area occurs within an ESA.
Threatened Ecosystems	The project area does not fall within a threatened ecosystem
Protected Areas	These are areas that are considered protected and imperative for conservation purposes: • The project area does not fall within a protected area.
Vegetation Types	The primary or reference vegetation unit of the study area is the Zeerust Thornveld. It falls within the Savanna Biome and the Central Bushveld Bioregion. This vegetation unit is classified as 'Poorly Protected' (Skowno *et al*, 2019), however of low concern. During the infield assessment, the general vegetation structure was observed to be minimally transformed by linear activities and agricultural activities.
Key: CBA – Critical Biodiversity Area EI: Ecological Importance ES: Ecological Sensitivity ESA – Ecological Support Area m a m s l: Metres Above Mean Sea Level NFEPA: National Freshwater Ecosystem Priority Area NWM5: National Wetland Map Version 5; PA – Protected Areas PES: Present Ecological State REC: Recommended Ecological Class SWSA: Strategic Water Source Area	

Refer to Section 5.1 for figures that illustrate various views from and of the site from different angles. These provide a visual indication of the current state and possible areas of importance for the determination of the possible impact.

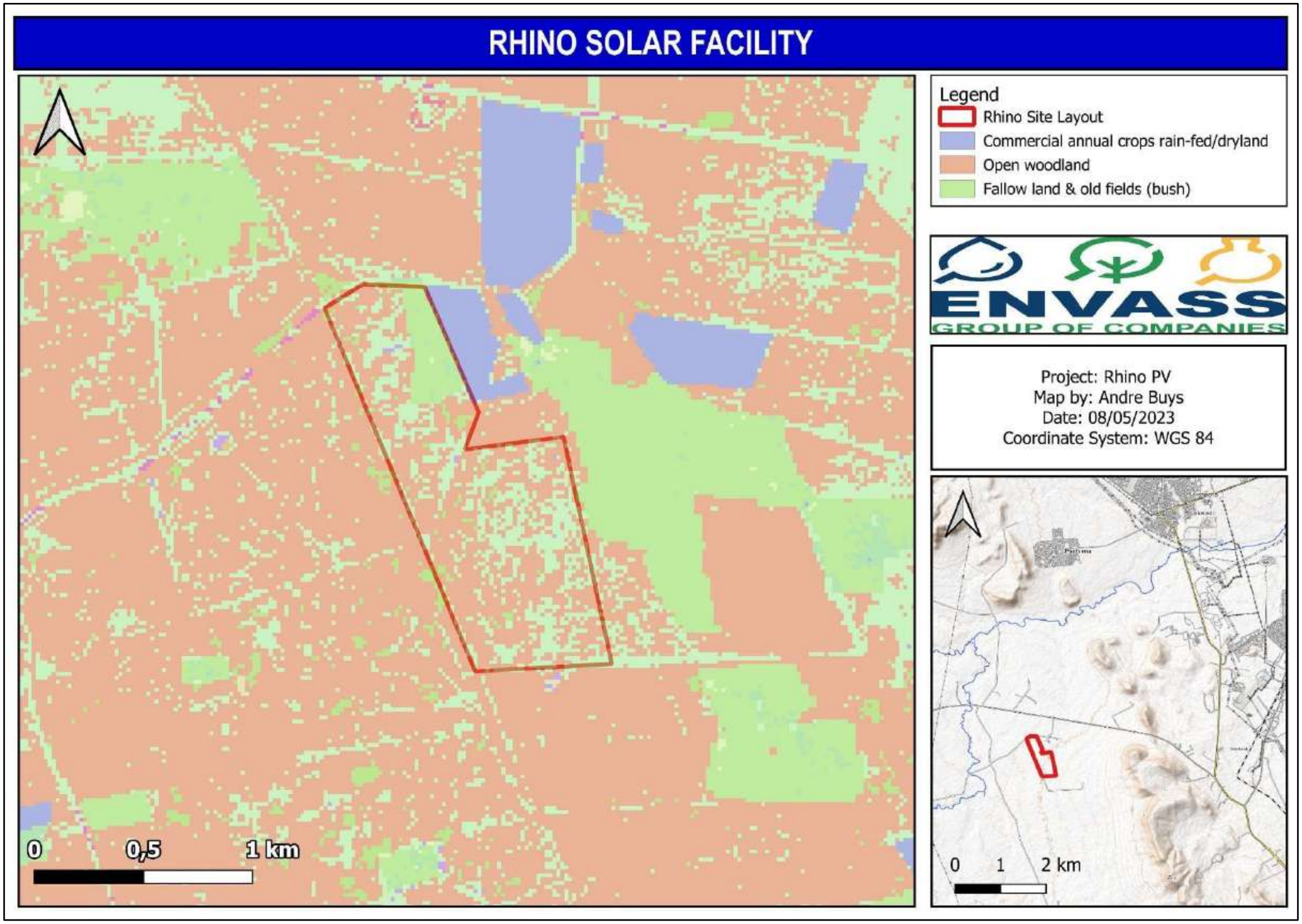

Figure 4: Proposed Rhino Solar PV Landcover

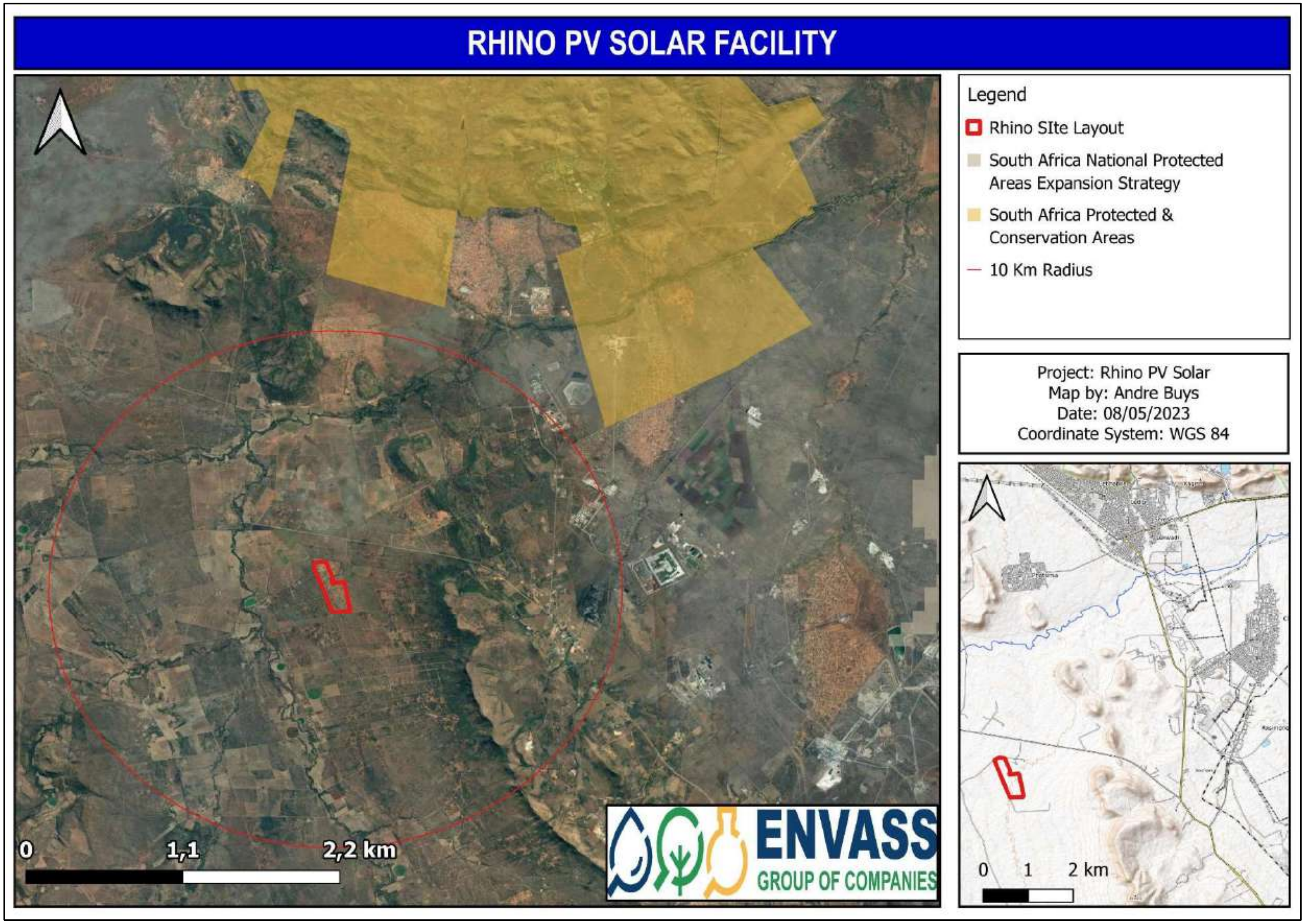

Figure 5: Proposed Rhino Solar PV Protected Areas

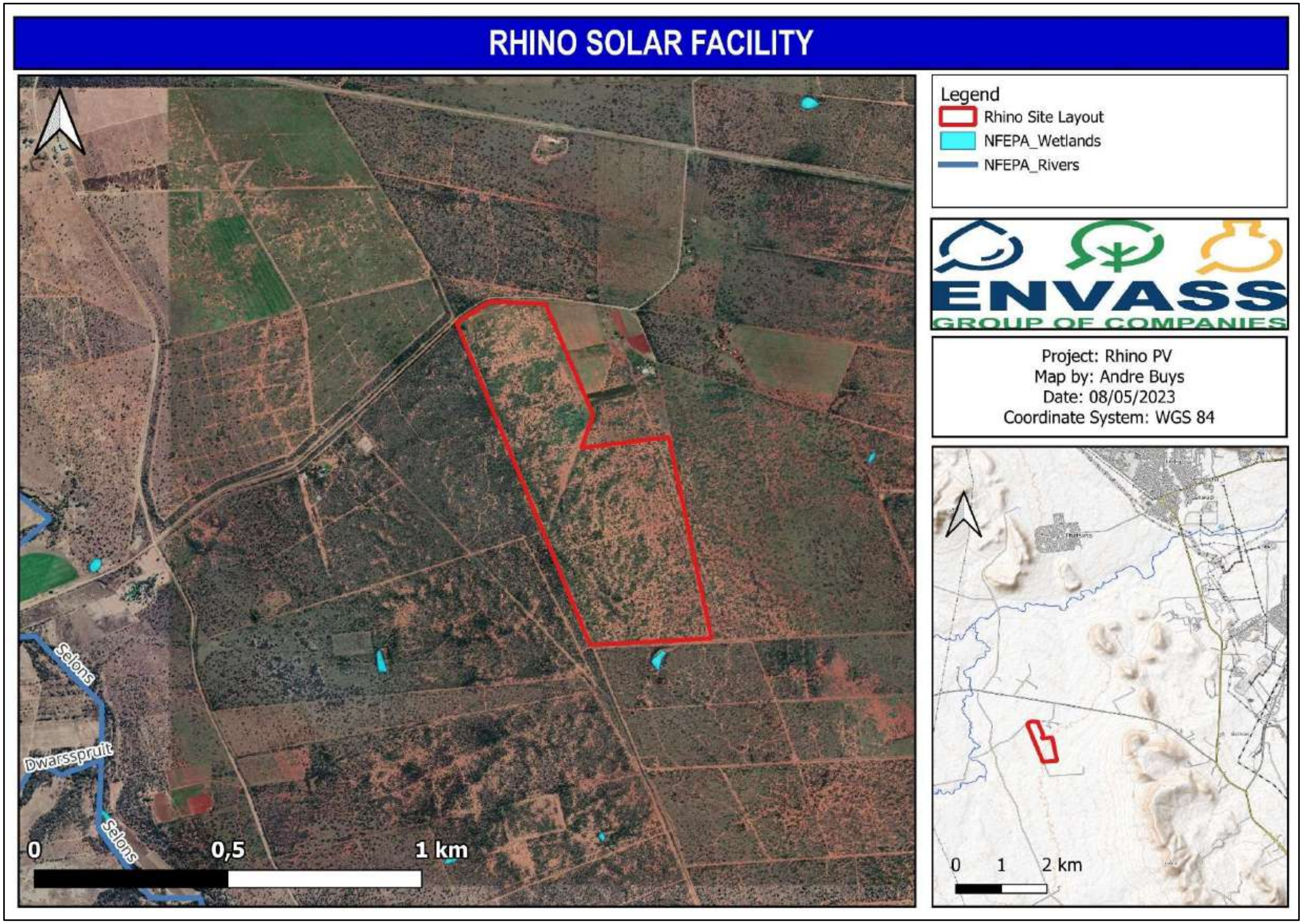

Figure 6: Proposed Rhino Solar PV Watercourses

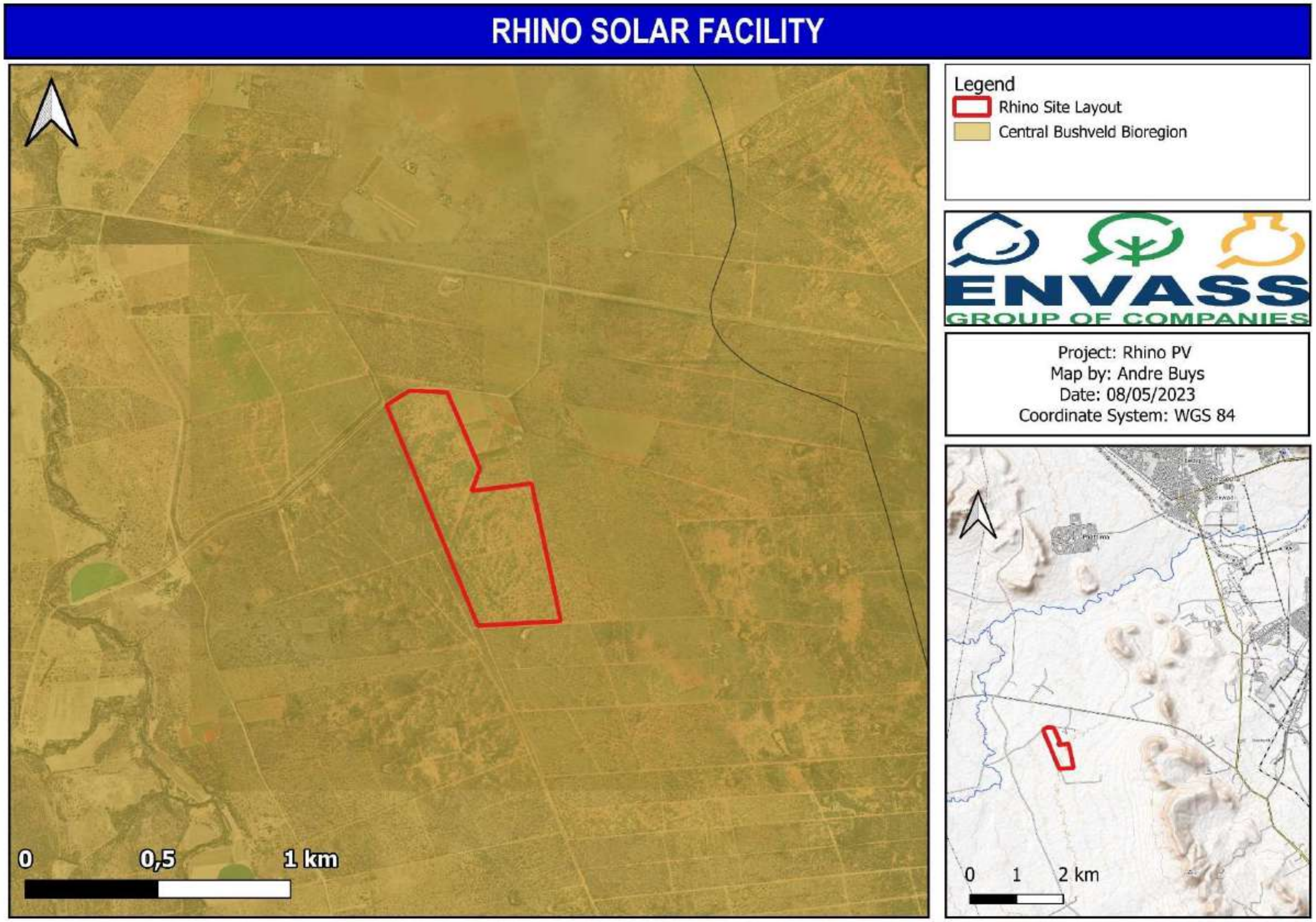

Figure 7: Proposed Rhino Solar PV Bioregion

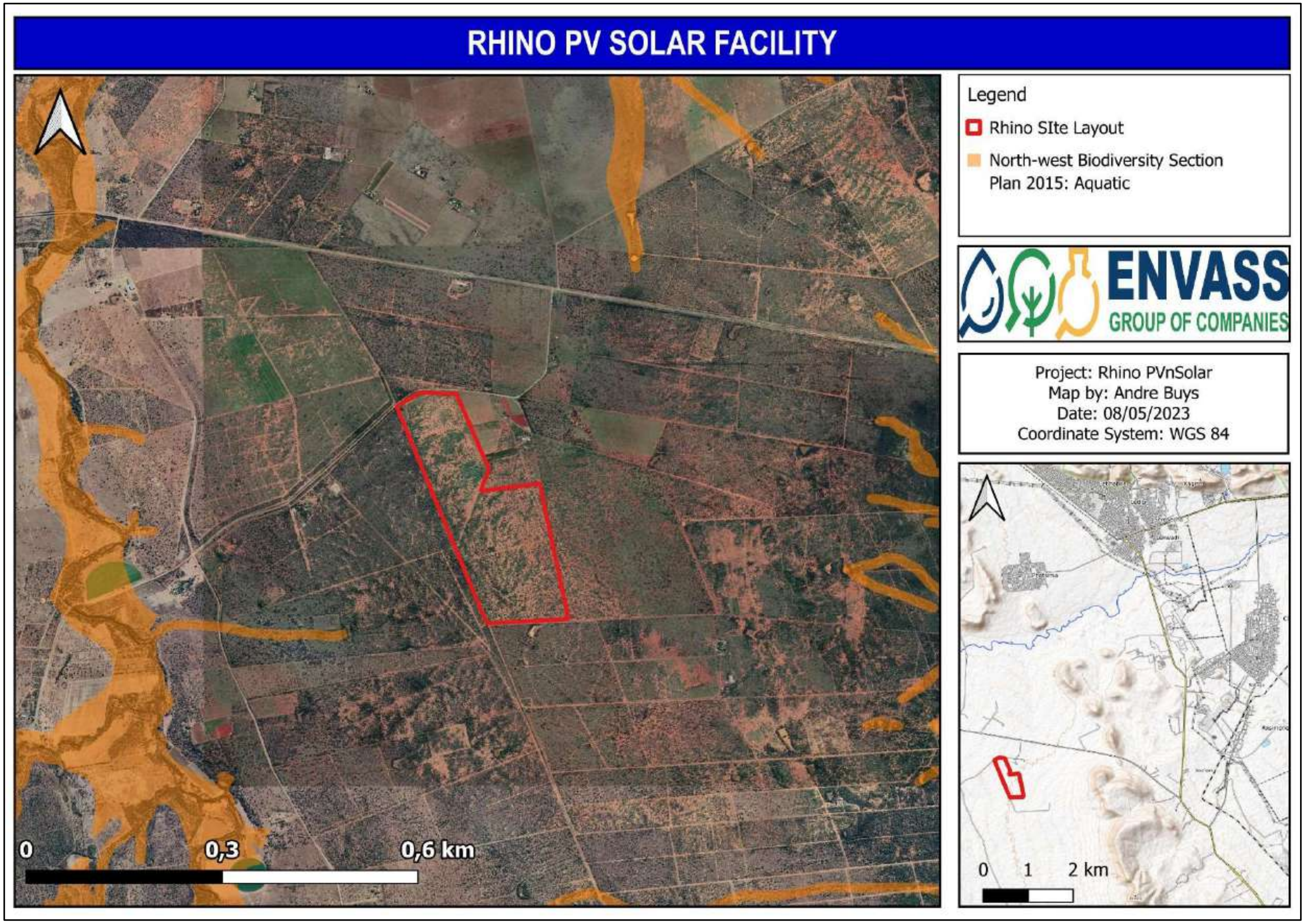

Figure 8: Proposed Rhino Solar PV CBAs and ESAs

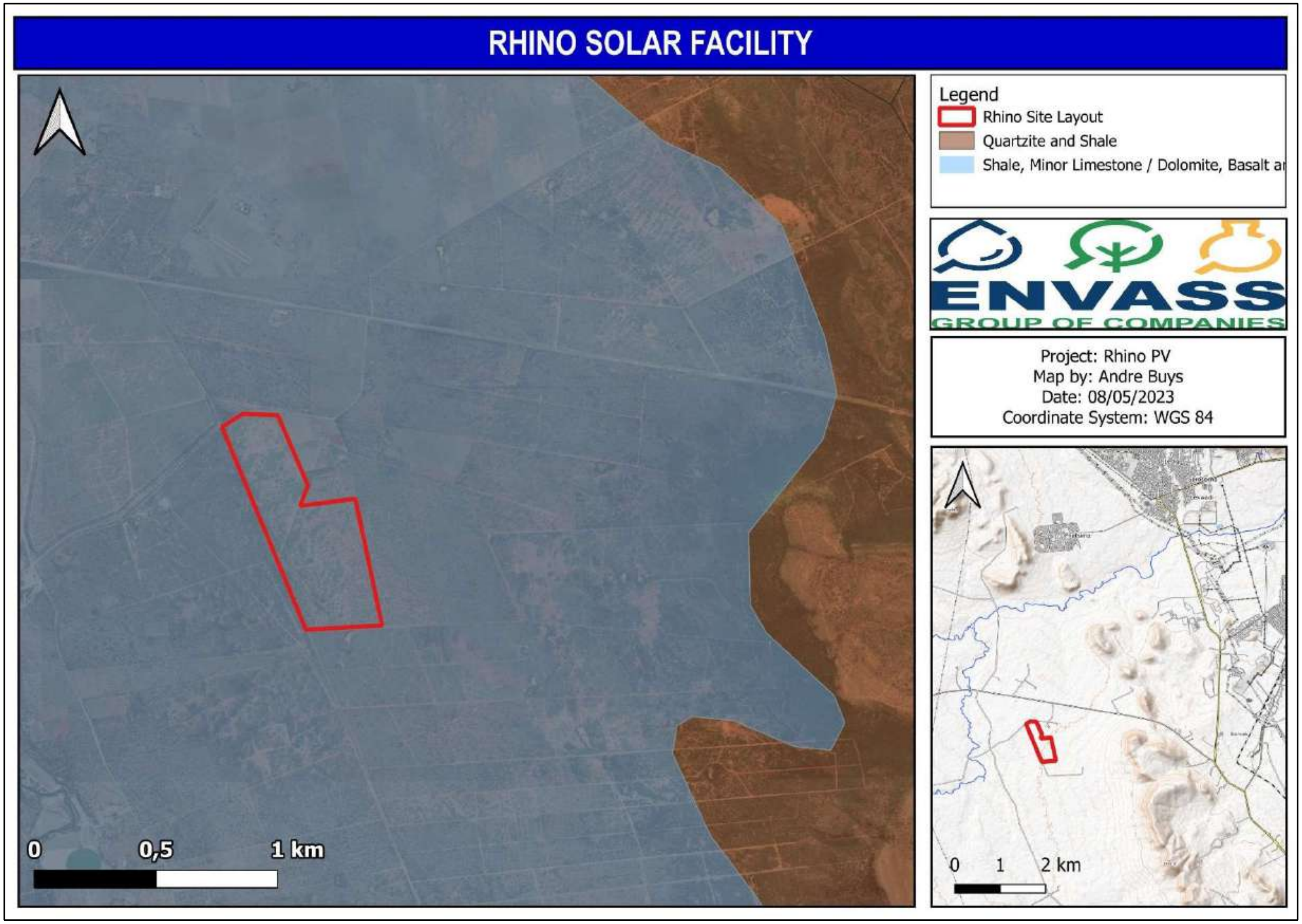

Figure 9: Proposed Rhino Solar PV Geology

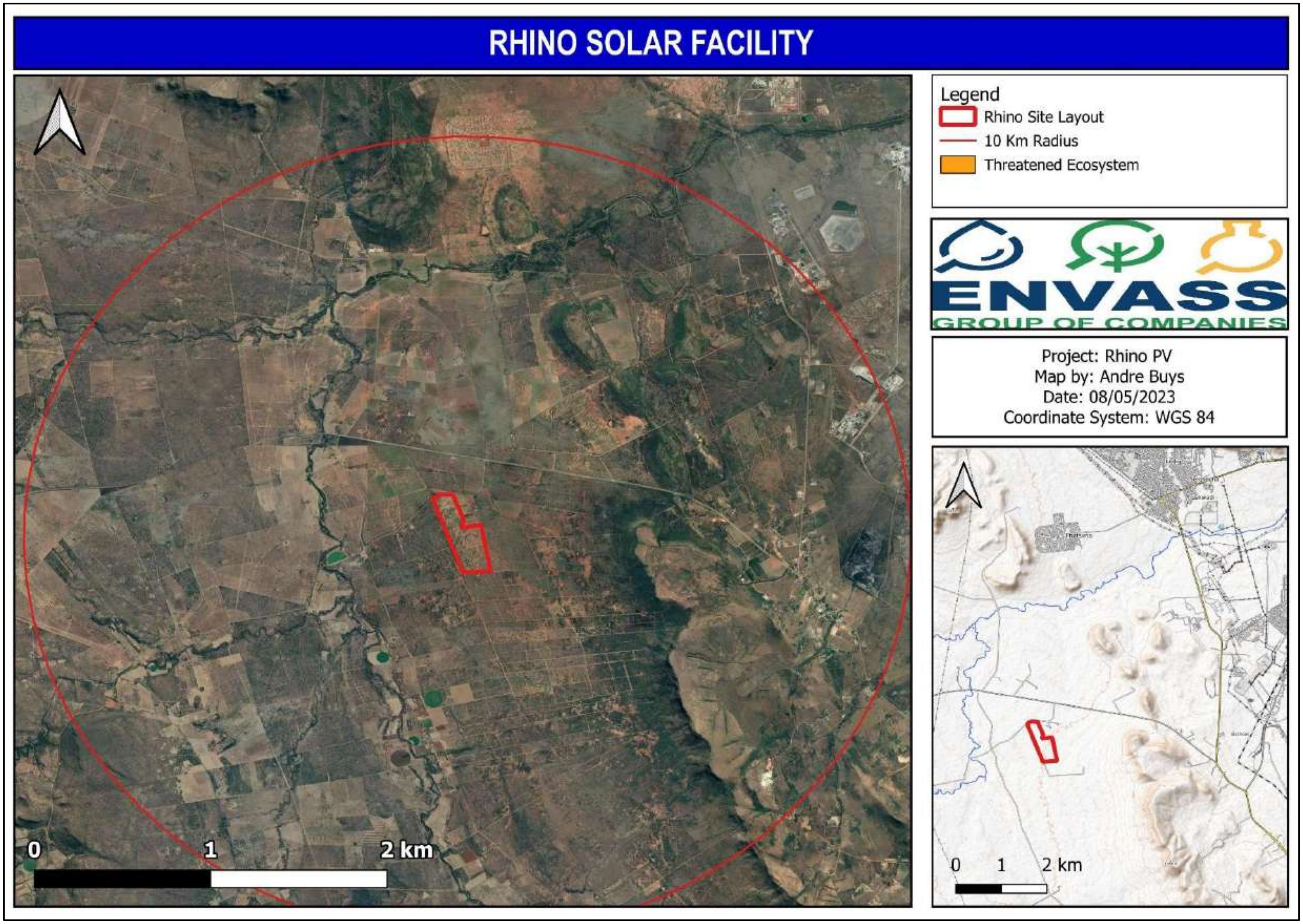

Figure 10: Proposed Rhino Solar PV Threatened Ecosystem (None within 10 km radius)

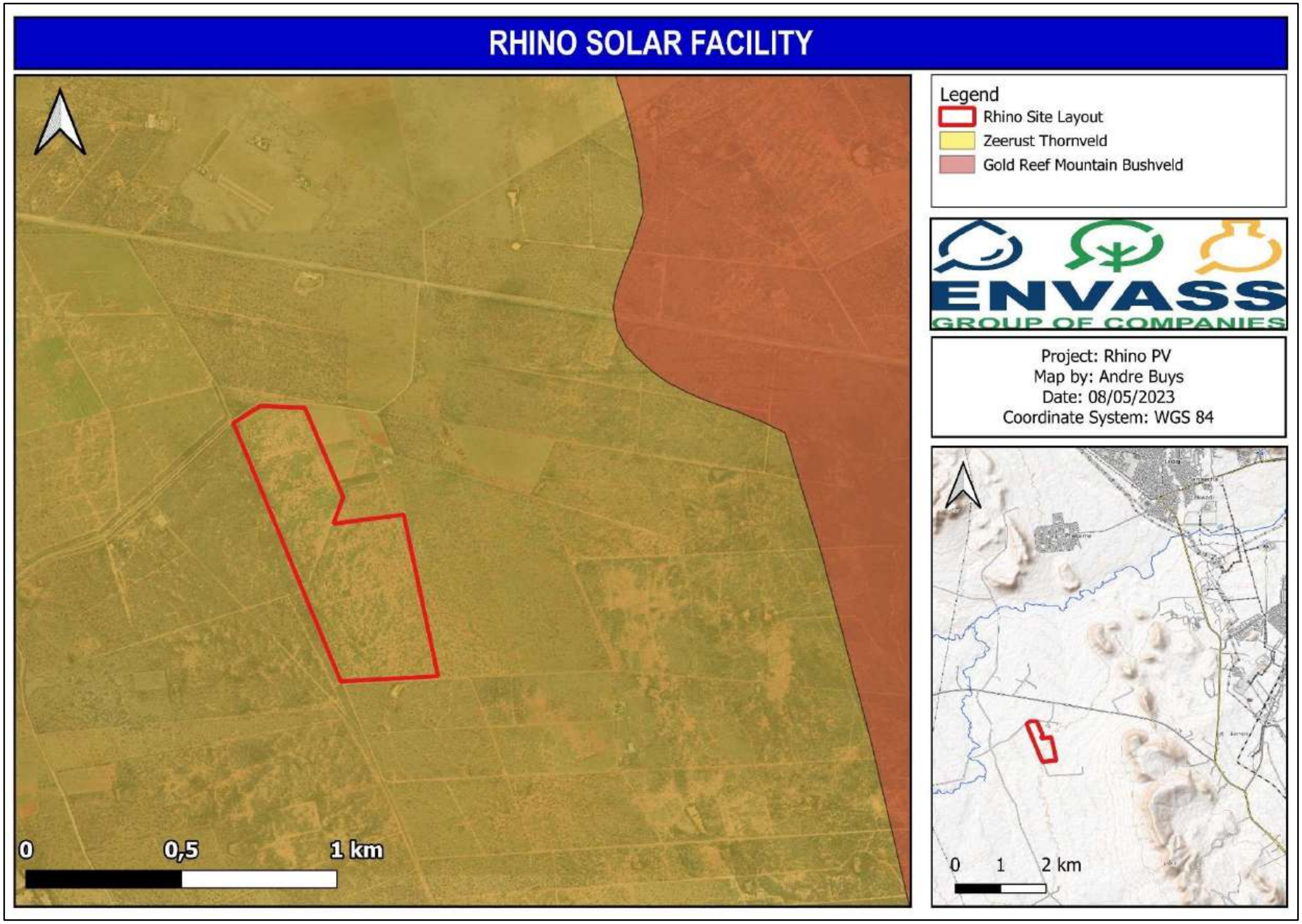

Figure 11: Proposed Rhino Solar PV Vegetation

4.5 SENSE OF PLACE

Sense of place is a unique collection of qualities and characteristics that include visual, cultural, social, and environmental. Sense of place is what makes one city or town different from another and what makes our physical surroundings unique. The proposed site is located near a small town Boshoek.

Boshoek is a small city, located in close proximity of Rustenburg in the North-west province of South Africa. The sense of place of Boshoek is shaped by its history, location, culture, and natural surroundings.

History:
Boshoek is a quaint little mountain village that is found in the centre of the Pilanesberg Mountain Range. The area is familiar with a vast majority of Mining activities in and around the town dating back a few hundred years.

Location:
Boshoek is situated in the heart of the Pilanesberg mountain Range, near Rustenburg in the North-west province, surrounded by fertile farmland, grazing fields, rolling hills and mines. Additionally, one of the largest economic hubs of South-Africa is just over 100 kilometres away known as Johannesburg. Tranquillity and serenity, peace and quiet, fresh mountain air and crystal-clear mountain streams bring an immediate calm and languor to the predominantly outdoor experience that is this part of area at Boshoek.

Culture:
The Boshoek community is a predominantly Sepedi-speaking town (84%), with a rich cultural heritage. The city is home to several different African cultures, with isiXhosa and Xitsonga speaking occupants. Various working opportunities, tourist attractions (Sun City), Sport Stadiums (Royal Bafokeng), Game Reserves and National Parks all form part of the diverse culture and attractions.

Natural Surroundings:
Boshoek is surrounded by the natural beauty of the North-west province, with its rolling hills, grasslands, and game reserves. A few rivers (Selons and Elands) can be found to the west and north of the site respectively. The region is also known for its birdlife and Game, with several Parks, Nature Reserves and birdwatching sites located in and around Boshoek.

In summary, the sense of place of Boshoek is shaped by its rich history, location in the heart of the Pilanesberg in the North-west province, cultural heritage, and natural surroundings. The town offers visitors a chance to experience the beauty of the South African countryside, as well as a glimpse into its past, as well as enjoying the best of some of the tourist attractions South Africa can offer.

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5. VISUAL CHARACTERISATION

5.1 VIEWPOINTS

Since topography and visual landscape modification has already occurred as a result of various activities in the area, the viewshed is only a theoretical study. For this VIA to be more accurate, viewpoints have been identified and a visual inspection was conducted from these points to identify the current state of the environment and to provide information that can assist in determining the severity of the visual impact of the proposed activity. As indicated in Figure 12, nine (09) viewpoints were identified from where characterisation were conducted, and corresponding visual influence and characteristics have been defined.

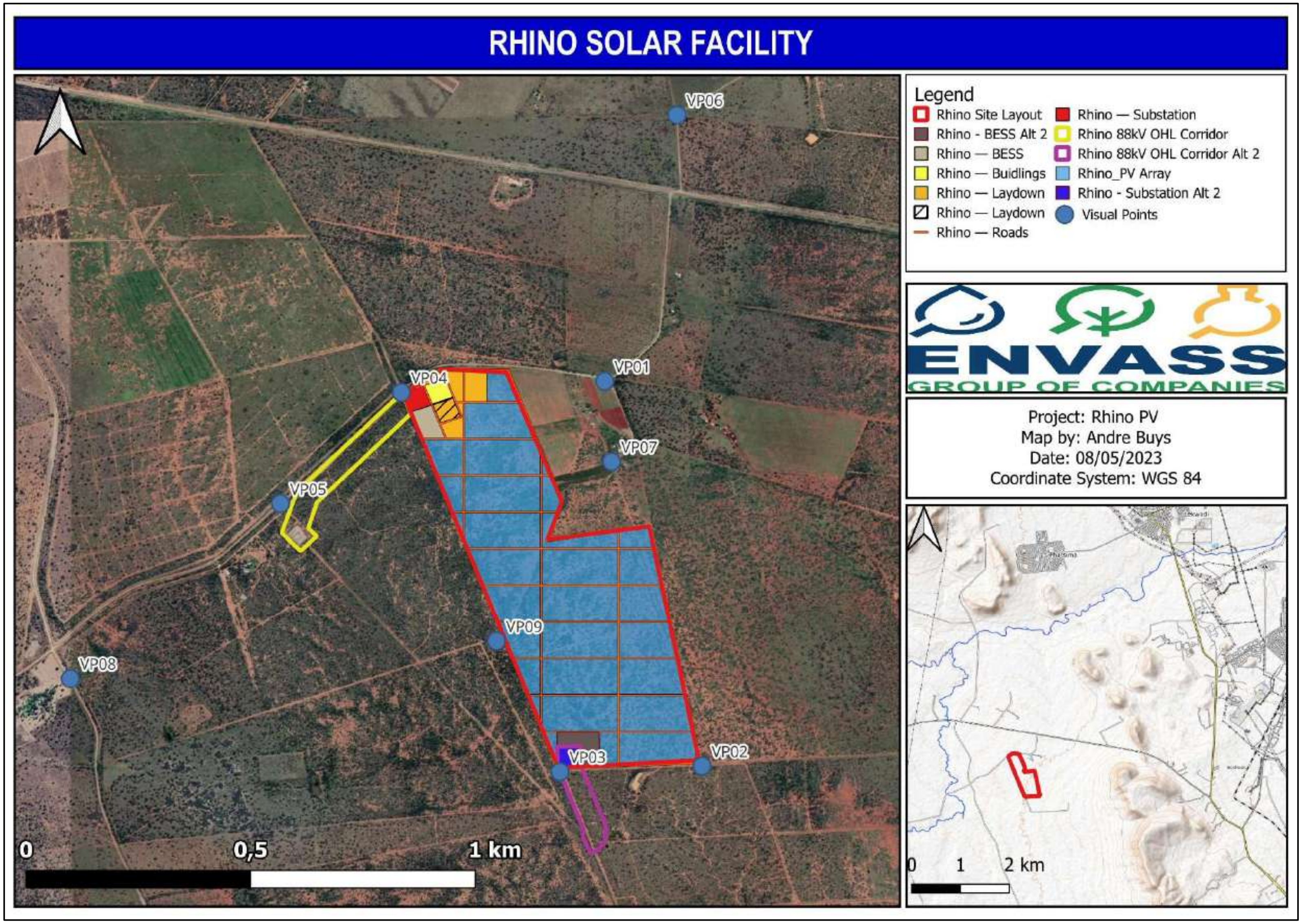

Figure 12: Viewpoints of the proposed Rhino PV Solar

5.1.1 Viewpoint 1 (V1):

Viewpoint 1 is located along the Gravel Road at an entrance to the farm where the proposed solar facility will be located. It is just south of the unnamed tar road from Boshoel to Lindleyspoort. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation which a high coverage of trees to the north and east and grain / crop fields to the south and west. The city of Boshoek is located to the east, whilst the study area is located to the south. In addition, powerlines, shrubs and trees of various heights are visible in the distance.

Figure 13: View 1 (North)

Figure 14: View 2 (East)

Figure 15: View 3 (South)

Figure 16: View 4 (West)

5.1.2 Viewpoint 2 (V2):

Viewpoint 2 is located to the south-eastern border point of the proposed study area. View 1 (North) and View 4 (West) has been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation which a high coverage of bush, trees and larger shrubs. The specific area is being utilized for livestock and game grazing fields.

Figure 17: View 1 (North)

Figure 18: View 2 (East)

Figure 19: View 3 (South)

Figure 20: View 4 (West)

5.1.3 Viewpoint 3 (V3):

Viewpoint 3 is located at the southwestern boundary corner. View 1 (North) and View 2 (East) has been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, powerlines, shrubs, and trees of various heights are visible in the distance. The farm fence and boundary is evident on View 3 (South) and View 4 (West).

Figure 21: View 1 (North)

Figure 22: View 2 (East)

Figure 23: View 3 (South)

Figure 24: View 4 (West)

5.1.4 Viewpoint 4 (V4):

Viewpoint 4 is located near Gravel Road which is the entrance to the farm. It is situated at the North-western boundary corner of the study area. View 3 (South) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of lush vegetation including bush, shrubs and Trees (natural grassland and old fallow lands). In addition, powerlines are visible in the distance. The existing powerlines are visible to the North, East and West.

Figure 25: View 1 (North)

Figure 26: View 2 (East)

Figure 27: View 3 (South)

Figure 28: View 4 (West)

5.1.5 Viewpoint 5 (VP5):

Viewpoint 5 is located further North-west than Viewpoint 4 along the same Gravel Road. The Proposed Alternative 1, 88 KV CHL Corridor is directly south of this viewpoint. View 2 (East) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, powerlines, scattered shrubs, and trees of various heights are visible in the distance.

Figure 29: View 1 (North)

Figure 30: View 2 (East)

Figure 31: View 3 (South)

Figure 32: View 4 (West)

5.1.6 Viewpoint 6 (VP6):

Viewpoint 6 is located further North on the opposite side of the Tar Road from Boshoek to Lindleyspoort. View 3 (South) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, scattered shrubs, and trees of various heights are visible in the distance. The topography slightly changes to mountains and hills towards the north and south.

Figure 33: View 1 (North)

Figure 34: View 2 (East)

Figure 35: View 3 (South)

Figure 36: View 4 (West)

5.1.7 Viewpoint 7 (VP7):

Viewpoint 7 is located to the eastern centre of the project area near the farm worker's houses. View 3 (South) and View 4 (South) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, powerlines, scattered shrubs, and trees of various heights are visible in the distance. Houses and Stores are located to the north and south and are approximately 600m from the project area.

Figure 37: View 1 (North)

Figure 38: View 2 (East)

Figure 39: View 3 (South)

Figure 40: View 4 (West)

5.1.8 Viewpoint 8 (VP8):

Viewpoint 8 is located approximately 2km to the centre of the project area. View 2 (East) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, scattered shrubs, and trees of various heights and existing powerlines are visible in the distance.

Figure 41: View 1 (North)

Figure 42: View 2 (East)

Figure 43: View 3 (South)

Figure 44: View 4 (West)

5.1.9 Viewpoint 9 (VP9):

Viewpoint 9 is located directly west of the western boundary towards the middle of the study area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation which a high coverage of dwarf, trees and larger shrubs. View 2 (East) have been taken towards the proposed study area. The city of Boshoek is located to the east. In addition, shrubs and trees of various heights are visible in the distance. An unknown Game Farm is located to the West of this viewpoint.

Figure 45: View 1 (North)

Figure 46: View 2 (East)

Figure 47: View 3 (South)

Figure 48: View 4 (West)

5.2 VISUAL RESOURCE VALUE OF THE STUDY AREA

The visual resource value refers to the visual quality of an environment and how the environment appeal to our senses. According to Crawford (1994), landscape quality increases when:

- Prominent topographical features and rugged horizon lines exist.
- Water bodies such as streams or dams are present.
- Untransformed indigenous vegetation cover dominates.
- Limited presence of human activity, or land uses that are not visually intrusive or dominant prevail.

The criteria incorporated for the visual resource assessment is highlighted in the Table 3 below. The landscape is rated either high, moderate or low depending on factors such as sense of place, current views and aesthetic appeal.

Table 3: Visual Resource Value Criteria

Visual Resource Value	Criteria
High (3)	Pristine or near-pristine condition/little to no visible human intervention visible/ characterised by highly scenic or attractive natural features, or cultural heritage sites with high historical or social value and visual appeal/characterised by highly scenic or attractive features/areas that exhibit a strong positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to be of particular importance to conserve and which may be sensitive to change.
Moderate (2)	Partially transformed or disturbed landscape/human intervention visible but does not dominate view, or that is characterised by elements that have some socio-cultural or historic interest but that is not considered visually unique/scenic appeal of landscape partially compromised/noticeable presence of incongruous elements/areas that exhibit positive character, but which may have evidence of degradation/erosion of some features resulting in areas of more mixed character. These landscapes are less important to conserve but may include certain areas or features worthy of conservation.
Low (1)	Extensively transformed or disturbed landscape/human intervention is of visually intrusive nature and dominates available views/scenic appeal of landscape greatly compromised/visual prominence of widely disparate or incongruous land uses and activities/areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

- **Topography –** From north to south the elevation increased from 1087m to 1101m above sea level over a distance of approximately 2,8km. From west to east the elevation drops from 1091m to 1100m above sea level over a distance of approximately 1,24km. The topography or terrain morphology of the region is broadly described as plains with low to moderate relief. The main topographical feature on the site is a deemed drainage line (in the crop fields which is wetted to the north) that flows from east to west. Therefore, the topography is considered to have a **moderate** value.

- **Hydrology –** There are no visually prominent water drainage courses within the proposed project area. From a wetland perspective, there is one (1) NFEPA wetlands (artificial), which are located right next to the southern boundary of the development boundary, which are visible. Therefore, the aesthetic value of the hydrology is **moderate**.
- **Vegetation cover –** The landscape is primarily characterized by grassy plains and old cultivated fields. The vegetation in the area consists mainly of grasses, shrubs, and trees. The visual resource value of the proposed site's vegetation cover is rated **moderate**.
- **Land use –** The main land use is agriculture and livestock grazing, while land use activities within the broader area are predominantly described as agricultural and formal residential areas. The visual resource value of the study area is therefore considered to be **moderate**.

A resource value is subjectively applied, based on the specialist's expertise and experience in assessing visual impacts. A value is applied to the visual resources with each resource able to receive a maximum score of three (3) and counted to reach a final score out of twelve (12). The **total** is counted, and final score rated as:

- Low, equal to 4 – 6.
- Moderate, equal to 7 – 9, and
- High, equal to 10 - 12.

The values applied to the study area is detailed in Table 4 below.

Table 4: Visual resource value determination

VISUAL BASELINE ATTRIBUTES	TOPOGRAPHY	HYDROLOGY	VEGETATION	LAND USES
Visual resource value score	2	2	2	2
			Total	**8**

Based on the above score ranges, the overall visual resource value of the study area is rated as **moderate** (8).

5.3 VISUAL ABSORPTION CAPACITY

According to Oberholzer (2008), Visual Absorption Capacity (VAC) can be defined as an '*estimation of the capacity of the landscape to absorb development without creating a significant change in visual character or producing a reduction in scenic quality*'. VAC was determined by considering the nature and occurrence of vegetation cover, topographical characteristics, and human structures. A further major factor is the degree of visual contrast between the proposed new project and the existing elements in the landscape.

5.3.1 Visual Absorption Capacity Weighting Factor

To account for the fact that visual impacts are expected to be more intrusive in landscapes with a lower VAC than in those with a higher VAC (regardless of the visual quality of the landscape), a weighting factor is incorporated into the impact magnitude determination, as indicated in Table 5.

Table 5: Visual absorption capacity weighting factor

VISUAL RESOURCE VALUE OF RECEIVING LANDSCAPE	LOW VAC	MODERATE VAC	HIGH VAC
High resource value	High (1.2)	High (1.2)	Moderate (1.0)
Moderate resource value	High (1.2)	Moderate (1.0)	Low (0.8)
Low resource value	Moderate (1.0)	Low (0.8)	Low (0.8)

The majority of vegetation cover is predominately dominated by grasses, shrubs and scattered trees, while the topographical characteristics (flat to gentle), which can conceivably result in a **low** VAC. The visual resource value of the study area has been determined to be **moderate** and the VAC of the study area has been rated as **low**. Therefore, a **high** (1.2) weighting factor in terms of VAC is applied during the impact assessment.

5.4 VISUAL RECEPTOR SENSITIVITY AND INCIDENCES

Receptor sensitivity refers to the degree to which an activity will impact the receptors and depends on how many persons see the project, how frequently they are exposed to it and their perceptions regarding aesthetics. Receptors of the proposed project can be broadly categorised into two (2) main groups, namely:

- People who live or work in the area, and who will be frequently exposed to the project components (resident receptors); and
- People who travel through the area and are only temporarily exposed to the project components (transient receptors).

Resident receptors located outside the proposed site include:

- Resident receptors would include the employees of the agricultural activities, residents and the local farming communities that are present outside the proposed project area.

Transient receptors located outside the proposed site include:

- The un-named tar road from Boshoek to Lindsly is the only main road located near the proposed site. The roads situated near the proposed site are predominately used for access to the surrounding areas, tourism attractions, residential areas, and agricultural activities. The proposed project area may potentially be visible from the tar road, while the visibility may be reduced due to vegetation obstructing the view from the roads at certain points. The visual receptor sensitivity and incidence can be classified as high, moderate or low, as indicated in Table 6.

Table 6: Visual receptor and sensitivity criteria

NUMBER OF PEOPLE THAT WILL SEE THE PROJECT (INCIDENCE FACTOR)	
High	Towns and cities, along major national roads (e.g., thousands of people).
Moderate	Villages, typically less than 1 000 people.
Low	Less than 100 people (e.g., a few households).
RECEPTOR PERCEIVED LANDSCAPE VALUE (SENSITIVITY FACTOR)	
High	People attach a high value to aesthetics, such as in or around a game reserve or conservation area, and the project is perceived to impact significantly on this value of the landscape.
Moderate	People attach a moderate value to aesthetics, such as smaller towns, where natural character is still plentiful and in close range of residency.
Low	People attach a low value to aesthetics, when compared to employment opportunities, for instance. Environments have already been transformed, such as cities and towns.

The following ratings have therefore been applied to the identified visual receptor groups:

- **Resident Receptors:** Resident receptors comprise a high number of people (incidence factor) living around the proposed project area:
  - People living and working in the surrounding areas will rate a moderate value (sensitivity factor) to the project; and

- **Transient Receptors:** People travelling through and near the proposed site will be moderate as the proposed site is located adjacent to the un-named road from Boshoek to Lindsley, approximately 2km (being the main roads to access these areas), constituting a moderate number of people (incidence factor). It is expected that travellers will attach a moderate degree of value to the current setting and visual character of the proposed site (sensitivity factor) due to the activities already established in the area. Hence, this receptor group has also been given a moderate sensitivity rating.

To determine the magnitude of a visual impact, a weighting factor that accounts for receptor sensitivity is determined (Table 7), based on the number of people that are likely to be exposed to a visual impact (incidence factor) and their expected perception of the value of the visual landscape and project impact (sensitivity factor).

Table 7: Weighting factor for receptor sensitivity criteria

RECEPTOR SENSITIVITY	HIGH INCIDENCE	MODERATE INCIDENCE	LOW INCIDENCE
High Sensitivity	High (1.2)	High (1.2)	Moderate (1.0)
Moderate Sensitivity	High (1.2)	Moderate (1.0)	Low (0.8)
Low Sensitivity	Moderate (1.0)	Low (0.8)	Low (0.8)

Based on the receptor sensitivity assessment and the above criteria, a **moderate** weighting factor (1.0) in terms of this aspect is applied during the impact magnitude determination.

6. BASELINE VISUAL ASSESSMENT

6.1 IMPACT IDENTIFICATION

Solar PV facilities are considered long-term in nature and long-term structures will be constructed. The primary visual impacts associated with a change from the current state of the site (fallow lands, cultivated fields and grassland vegetation) to a solar PV facility will have the greatest visual impact due to the visibility of the site from sensitive receptors. The visual impacts will be assessed based on a synthesis of criteria (nature of impact, extent, duration, probability, intensity, status, degree of confidence, level of significance and significance after mitigation) as defined by the NEMA Environmental Impact Assessment (EIA) regulations (2014, as amended). The nature of the visual impacts will be the visual effect that the activity would have on the receiving environment. These visual impacts would be:

- The construction and operation of the proposed PV facility and its associated infrastructure may have a visual impact on the study area, especially within (but not restricted to) a 1 - 5km radius of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

- Visibility from sensitive receptors. The proposed development will be visible from receptors outside the proposed project area. These include:
  - Site personnel at the operation;
  - People travelling to work and commercial activities in the surrounding areas;
  - People travelling on the surrounding access routes to their place of residence;
  - Surrounding farming communities; and
  - Surrounding residential areas.

6.2 IMPACT MAGNITUDE CRITERIA

The magnitude of a visual impact is determined by considering the visual resource value and VAC of the landscape within which the project will take place, the receptors potentially affected by it, together with the level of visibility of the project components, their degree of visual intrusion and the potential visual exposure of receptors to the project, as further elaborated on in the sections below:

6.2.1 Theoretical Visibility

Theoretical visibility was determined by conducting a Viewshed analysis and using Geographic Information System software with three-dimensional topographical modelling capabilities:

- The Digital Elevation Model (DEM) for the Viewshed analysis was acquired; and
- A 10 km area surrounding the site was used due the topography of the area.

The Viewshed was modelled on the above-mentioned DEM and the layout plan supplied by Nemai Consulting, using Esri ArcGIS for Desktop software, 3D Analyst Extension. A viewshed was modelled to account for the PV facility and its associated infrastructure, that will be constructed.

Table 8: Rating of level of visibility

LEVEL OF THEORETICAL VISIBILITY OF PROJECT ELEMENTS	VISIBILITY RATING
More than half of the study area	High
Between a quarter and half of the study area	Moderate
Less than a quarter of the total project study area	Low

When considering the viewshed analysis, the visibility rating is **moderate.**

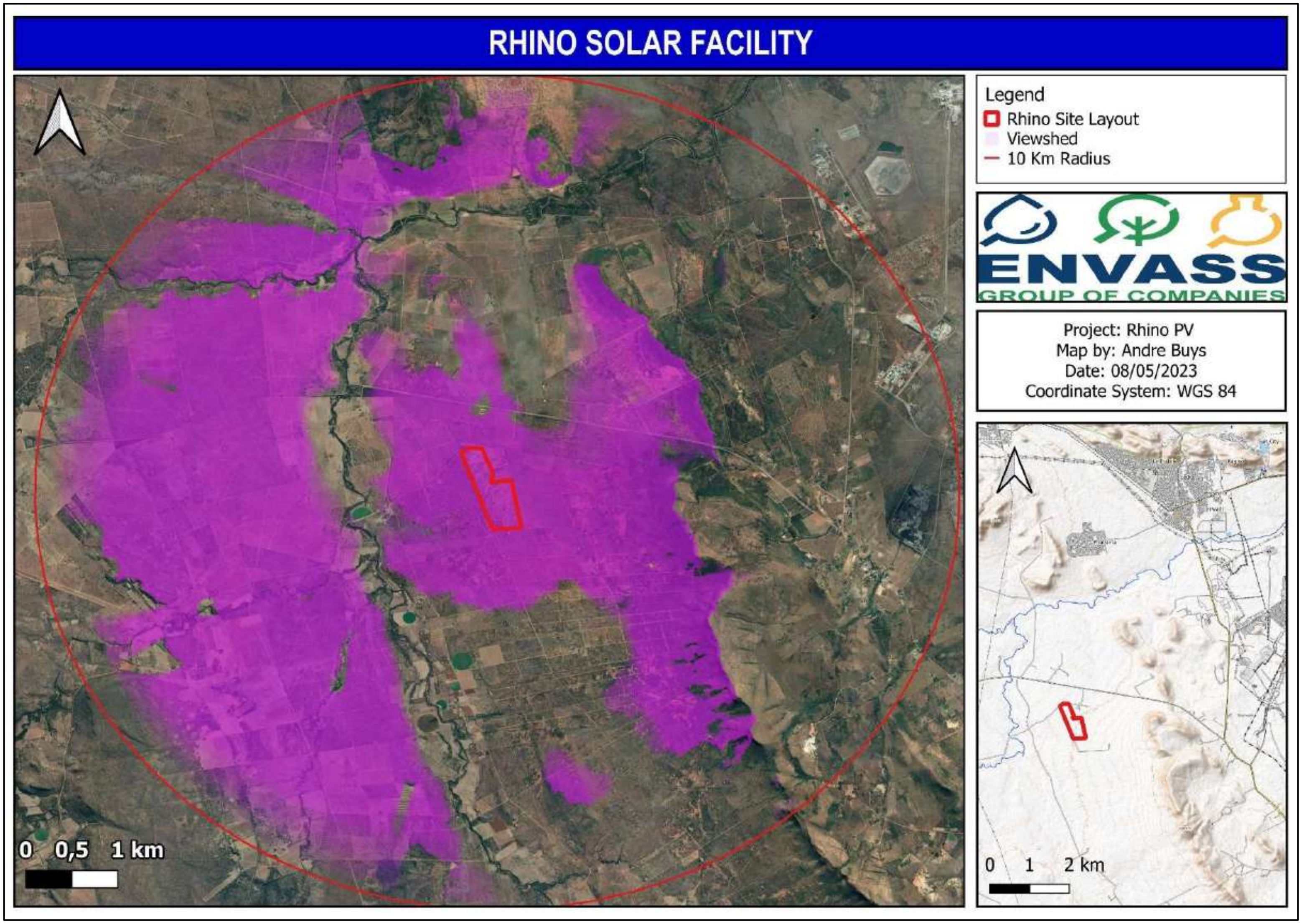

Figure 49: Viewshed analysis for the proposed Rhino PV Solar

6.3 VISUAL INTRUSION

Visual intrusion deals with how well the project components fit into the ecological and cultural aesthetic of the landscape. An object will have a greater negative impact on scenes considered to have a high visual quality than on scenes of low quality.

Given that the study area has a **low** VAC (due to vegetation and the flat to gentle landscape) and **moderate** visual resource value, the proposed project will have a **moderate** (without mitigation measures) visual intrusion on surrounding sensitive receptors. Ensuring that vegetation is retained on the periphery of these areas, and wherever possible, lights be directed downwards as to avoid illuminating the sky and limit the reflection from the solar panels, the visual impact on the surrounding environment will be **moderate** depending on the proximity to the sensitive receptors.

The altered visual environment during the construction and operational phases will lead to **moderate** (without mitigation measures) levels of visual intrusion, with **moderate** levels of compatibility with the surrounding land uses as well as moderate visual contrast. The level of visual intrusion because of the proposed project, with specific mention of vegetation clearing, removal of topsoil and solar PV infrastructure, is considered to be **moderate** (without mitigation measures) during the construction and operational phases, in line with the **low** VAC. The perceived visual impacts associated with the construction and operational phases are **moderately** (without mitigation measures) intrusive to the receiving environment.

6.4 VISUAL EXPOSURE

The visual impact of a development diminishes at an exponential rate as the distance between the observer and the object increases. The impact at 1 000 m would be 25% of the impact as viewed from 500 m. At 2 000 m, it would be 10 % of the impact at 500 m. The inverse relationship of distance and visual impact has been an important component in visual analysis literature (Hull and Bishop, 1998).

For the purposes of this assessment, close-range views (equating to a high level of visual exposure) are views over a distance of 500 m or less, medium-range views (equating to a moderate level of visual exposure) are views of 500 m to 2 km, and long-range views are over distances greater than 2 km (low levels of visual exposure). Limited sensitive receptors are located within 2 km of the site and are limited to people working in the area, residents and the number of farms surrounding the site.

For the purposes of this assessment, visual exposure in terms of all identified impacts has therefore been rated as **low** as the majority of the high sensitivity, sensitive receptors, are located more than 5 km from the project site.

6.5 IMPACT MAGNITUDE METHODOLOGY

The expected impact magnitude of the proposed project was rated, based on the above assessment of the visual resource value of the site, as well as level of visibility, visual intrusion, visual exposure and receptor sensitivity as visual impact criteria. The process is summarised below:

- *Magnitude = [(Visual quality of the site x VAC factor) x (Visibility + Visual Intrusion + Visual Exposure)] x Receptor sensitivity factor.*

Table 9: Magnitude Criteria

MAGNITUDE SCORE	MAGNITUDE RATING
20.1≤	High
13.1 - 20.0	Moderate
6.1 - 13.0	Low
≤6.0	Negligible

6.5.1 Impact Magnitude Determination

Based on the visual resource, VAC, receptor sensitivity and impact assessment criteria assessed in the preceding sections, the magnitude of the various impacts identified was determined for each phase of the project.

Table 10: Construction Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Site establishment • This will involve the vegetation clearance, stripping and stockpiling of soil in areas designated for surface infrastructure. Site Clearing of the project footprint: • Removal of vegetation leading to increased visual contrast and loss of VAC and increase visual intrusion on sensitive receptors. • Alteration of current landscape features impacting on landscape character and sense of place. Construction activities of infrastructure • Construction of the solar PV facility and associated infrastructure. Construction vehicle movement and increased human activity in and around project site. General and hazardous waste management Formation of dust plumes as a result of construction activities.	2	1.2	2	2	2	1.0	14.4 (Moderate)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Use of security lighting. Topographical and vegetation alteration which will lead to increased visual intrusion and potential impact on sense of place.							
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

Table 11: Operational Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place. Solar PV facility and associated infrastructure being visible. Vehicles and increased human activity in and around the Solar PV facility. Solar glint and glare Night-time illumination due to security lighting and lighting within the solar PV facility and associated infrastructure.	2	1.2	2	2	2	1.0	14.4 (Moderate)
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

Table 12: Decommission Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Removal of all structures and recycling of the structure and cables. Removal of any foundations and filling of holes created and shaped to appear natural. Rehabilitation and restoration of the footprint.	2	1.2	2	2	2	1.0	14.4 (Moderate)
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

6.6 IMPACT ASSESSMENT RATING METHODOLOGY

The significance of the identified impacts will be determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Table 13: Ranking scales for assessment of occurrence and severity of factors

INTENSITY (MAGNITUDE)		
The intensity of the impact is determined by examining whether the impact is destructive or benign, whether it has a significant, moderate or insignificant visual impact.		
Insignificant	0	The visual impact of the development will have no effect on the environment.
Minor	2	The visual impact of the development is minor and will not result in an impact on processes.
Low	4	The visual impact of the development is low and will cause a slight impact on processes.
Moderate	6	The visual impact of the development is moderate and will result in processes continuing but in a modified way.
High	8	The visual impact of the development is high, processes are altered to extent that they temporarily cease.
Very high	10	The visual impact of the development is very high and results in complete destruction of patterns and permanent cessation of processes.
DURATION		
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.		
(T)emporary	1	The impact either will disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase. (0-1.5 years).
(S)hort term	2	The impact will be relevant through to the end of a construction phase (2 – 5 years).
(M)edium term	3	The impact will last up to the end of the development phases, where after it will be entirely negated. (5 – 15 years).
(L)ong term	4	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter. (>15 years).
(P)ermanent	5	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact is transient.
SPATIAL SCALE (EXTENT)		
Classified of the physical and spatial aspect of the impact		
(F)ootprint	0/1	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
(S)ite	2	The impact could affect the whole, or a significant portion of the site.
(R)egional	3	The impact could affect the area including the neighbouring settlements, the transport routes and the adjoining towns.

(N)ational	4	The impact could have an effect that expands throughout the country (South Africa).
(I)nternational	5	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
PROBABILITY		
This describes the likelihood of the impact occurring. The impact may occur for any length of time during the life cycle of the activity. The classes are rated as follows:		
(I)mprobable	0/1	The possibility of the Visual Impact occurring is none, due to the circumstances, design. The chance of this Visual Impact occurring is zero (0%)
(P)ossible	2	The possibility of the Visual Impact occurring is very low, due either to the circumstances or design. The chance of this Visual Impact occurring is defined as 25% or less
(L)ikely	3	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of the Visual Impact occurring are defined as 50%
(H)ighly Likely	4	It is most likely that the Visual Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
(D)efinite	5	The Visual impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

Table 14 below provides the ranking and score, which is used to determine the significance (with equation 1 below) and ranking of the possible impact on the proposed site. The score is then compared to Table 15 where the range of significance rating, with and without mitigation, is provided.

Table 14: Assessment Criteria and Ranking Scale

PROBABILITY (P)		**MAGNITUDE (M)**	
Description Meaning	Score	Description Meaning	Score
Definite / don't know	5	Very High	10
Highly likely	4	High	8
Likely	3	Moderate	6
Possible	2	Low	4
Improbable	1	Minor	2
Never	0	Insignificant	0

DURATION (D)		SPATIAL SCALE (S)	
Description Meaning	Score	Description /Meaning	Score
Permanent	5	International	5
Long Term	4	National	4
Medium	3	Regional	3
Short term	2	Local/Site	2
Temporary	1	Footprint	1/0

Equation 1: Significance Rating

SP (Significant Points) = Consequence (Extent + Duration + Severity) x Likelihood (Probability)

Table 15: Significance Rating Scale without mitigation and with mitigation

SR < 30	**LOW (L)**	Visual Impact with have little real effect and should not have an influence on or require modification of the project design or alternative mitigation. No mitigation is required.
30 > SR < 60	**MEDIUM (M)**	Where Visual Impact could have an influence on the decision unless it is mitigated. An impact or benefit, which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged.
SR > 60	**HIGH (H)**	Impact is significant, mitigation is critical to reduce impact and visual exposure. Resulting impact could influence the decision depending on the possible mitigation. An impact, which could influence the decision about whether or not to proceed with the project.

6.7 POTENTIAL VISUAL IMPACT OF THE PROPOSED PROJECT

Using the above criteria, the results of the impact significance assessment before and after mitigation, for the Construction, Operational and Decommissioning Phases are presented below.

Table 16: Impact assessment before and after mitigation

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Construction	Site establishment • This will involve the vegetation clearance and stripping of soil in areas designated for surface infrastructure.	6	2	3	3	33	**Medium**	6	2	3	2	22	**Low**
	Site Clearing of the project footprint: • Removal of vegetation leading to increased visual contrast and loss of VAC and increase visual intrusion on sensitive receptors. • Alteration of current landscape features impacting on landscape character and sense of place.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**
	Construction of Solar PV facility and associated infrastructure.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**
	Construction vehicle movement and increased human activity in and around the proposed site.	6	2	3	2	22	**Low**	6	2	3	1	11	**Low**
	General and hazardous waste management.	2	2	2	2	12	**Low**	2	2	2	1	6	**Low**
	Formation of dust plumes as a result of construction activities.	4	2	3	2	18	**Low**	4	2	3	1	9	**Low**
	Use of security lighting.	4	2	2	2	16	**Low**	4	2	2	1	8	**Low**
	Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Operational	Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place.	6	4	3	4	52	**Medium**	6	4	3	2	26	**Low**
	Increased vehicle and human activity in and around the Solar PV facility and associated infrastructure.	6	4	3	2	26	**Low**	6	4	3	1	13	**Low**
	Night-time illumination due to security lighting and lighting associated with the Solar PV facility and associated infrastructure.	6	4	2	3	36	**Medium**	6	4	2	2	24	**Low**
	Potential visual impact of solar glint and glare as a visual distraction.	6	4	3	3	39	**Medium**	6	4	3	2	26	**Low**

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Decommissioning	General decommissioning and closure activities leading to visual intrusion on sensitive receptors.	6	1	3	2	20	**Low**	6	1	2	2	14	**Low**
	Dismantling and removal Solar PV facility and associated infrastructure.	6	1	3	1	10	**Low**	6	1	2	1	7	**Low**
	Cleaning, landscaping, and replacement of soils over the disturbed area.	6	1	3	1	10	**Low**	6	1	2	1	7	**Low**
	Waste generation and disposal	4	1	2	2	14	**Low**	4	1	2	1	7	**Low**
	Ineffective rehabilitation leading to landscape scarring, permanent visual contrast and a permanent alteration of the landscape character and sense of place.	6	4	3	3	39	**Medium**	6	1	2	3	21	**Low**

7. RESULTS AND DISCUSSION

Results of the visual impact assessment indicated that from a visual perspective, the proposed project and related activities are the main project components that are expected to result in a visual impact. Receptors located within 2km of the proposed site will have the **moderate** (without mitigation) visual impact. Within a 5 km radius of the proposed project, residential areas and farming communities will have a **low** (without mitigation) visual impact. Beyond the 5 km study area, there are some areas where the development is discernible. However, the visual impacts are generally of **moderate to low** magnitude and impact. Local low and high-level vegetation will provide limited screening; however, the proposed solar PV facility and associated infrastructure can conceivably be visible to the sensitive receptors located near the proposed project boundary. The visual impacts associated with the Project and associated infrastructure will occur once construction has been completed and will be long term in nature.

In terms of the potential cumulative impacts, the proposed site is surrounded by various commercial and agricultural activities. In addition, according to the REEA Database, there are two (2) renewable energy applications have been made for properties located near the project site. Most of the proposed site currently grassland vegetation and the clearance and subsequent development of the site will result in the alteration of this space. Consequently, the development of this site will add cumulatively to the loss of sense of place. While the result in a change in the sense of place for those areas that look onto the project site, the magnitude of the impact is likely to be **low** as most of the sensitive receptors are located more than 5km from the project site.

Based on the results of the impact assessment, the majority of the potential visual impacts were considered to be **moderate** before mitigation and with the successful implementation this can be reduced to low. With regards to the proposed activities, due to the terrain of the proposed boundary, vegetation, VAC, and current land uses, the proposed activities are expected to result in a **moderate** visual impact on the receiving environment. The proposed activities will have a long-term temporal visual impact, due to the very nature of the Project and associated infrastructure. The activity will have a localised visual impact over a long-term duration. The activity will be able to continue with the implementation of appropriate mitigation strategies during the construction, operational and decommissioning phases.

Both the alternative options have been assessed, and a similar finding and recommendation is reasonable for both Alternatives.

8. FINDINGS

From the impact assessment results obtained, potential visual impacts may be present within the construction, operational and decommissioning phases. From the assessment, the proposed activities can conceivably have a **moderate** (without mitigation) visual impact on the surroundings and the natural and topographical environment.

Impacts are likely to be largely localised and within 5 km of the proposed project boundary, while significant visual impacts with regards to the proposed activities are expected at the sensitive receptors located within 2km of the proposed project boundary. It should be mentioned that an estimation of the impact distance is difficult to determine in terms of the visual impact assessment as it does not incorporate distractive views in the form of vegetation or land use (infrastructure, buildings, etc.), however, with successful mitigating implementation the significance can be reduced.

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period. Cumulative visual impacts resulting from landscape modifications because of the proposed activities in conjunction with other commercial activities are likely to be of moderate significance, however, it can be reduced with the successful implementation of the proposed mitigation measures.

9. MITIGATION MEASURES

As there are certain visual impacts from the proposed solar development project, mitigation measures have been developed and are provided within this section.

Visual mitigation can be divided into two (2) options. Typically using a combination of the two (2) options is most effective. The first option is an attempt to "hide" the source of the visual impact from view, by placing visually appealing elements between the viewer and the source of the visual impact. The second option aims to minimise the severity of the visual impact itself. This can be achieved in numerous ways for example limiting heights or by blending the infrastructure to match the surrounding environment.

During the construction phase, the following mitigation measures should be implemented to minimise the visual impact.

- General site management:
  - Maintain the construction site in a neat and orderly condition at all times;
  - Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing;
  - Ensure that rubble, litter, and disused construction materials are managed and removed regularly; and
  - Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way.

- Height and Orientation:
  - The height and orientation of the solar panels should be considered during the design phase. Panels should be oriented to minimize glare and reflection, and their height should be kept as low as possible to reduce their visual impact.
- Infrastructure:
  - All constructed facilities and buildings should cause minimum visual disturbance by reducing the contrast and blending in with the surrounding vegetated natural area. This could be achieved by painting rooftops and walls of buildings in the hues and tones of the surrounding vegetation and/or by adding matt paints to highly reflective surfaces, as well as sharp protruding features on the structures. All of these solutions are subject to the technical design of individual buildings and facilities and should be pursued by the

technical design and/or construction team, taking into consideration added value from reduced visibility, engineering feasibility and cost.
    - Enhancing the natural landscape in the area around the proposed development with moderate height indigenous trees to hide the buildings and infrastructure.
- Dust Management:
    - Implement dust suppression using a water cart to minimise airborne dust;
    - Enforce a 50 km/h speed limit on-site for Light-Duty Vehicles and a 40 km/h speed limit for large construction vehicles and machinery.

During the operational phase the following mitigation measures should be implemented to minimise the visual impact.

- Light pollution management:
    - Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination.
    - Avoid up-lighting of structures by rather directing lighting downwards and focusing on the area to be illuminated.
    - Reduce the height and angle of illumination from which floodlights are fixed as much as possible while still maintaining the required levels of illumination.
    - Lighting should be shielded in areas where specific objects are to be illuminated.
    - Minimise the use of lighting, where possible.
    - Lighting should exclude the blue-rich wavelengths and be closer to the red-rich wavelength spectrum. Globes used in lighting outside areas should be warm white. This also applies to light spilling out from within buildings. A colour temperature of no more than 3000 Kelvins is recommended for lighting.
    - Light intensity of illuminating lights should be limited as far as possible, i.e., to limit lighting to areas required to serve operational functionality.
    - Illumination where not permanently required should be fitted with timers, motion-activated sensors or be dimmable to reduce total light emitted.

- Site management:
    - Shape any slopes and embankments to a maximum gradient of 1:4 and vegetate, to prevent erosion and improve their appearance.
    - Utilise vegetation screens as visual screening devices around the proposed project where possible, specifically buildings.
    - Plant indigenous trees in landscaped areas where possible, as well as around the solar PV facility and associated infrastructure.
    - Eradicate invasive alien plant species.

During decommissioning and closure phase, the following mitigation measures should be implemented to minimise the visual impact.

- Eradicate invasive alien plant species;
- Remove all built infrastructure; and
- Re-shape all footprint areas to be as natural in appearance as possible and revegetate using locally occurring vegetation.

10. CONCLUSION AND RECOMMENDATIONS

The project site and surrounding area can be characterized by residential, commercial, tourism, and agricultural activities. According to the REEA Database, there are two (2) renewable energy applications have been made for properties located near the project site. The proposed site ranges from approximately 1087 to 1101 metres above mean sea level (mamsl). predominantly flat, with slight hills and mountains located towards the North and North-east. The landscape is characterized a mix of natural grassland, open woodland, commercial annual crops (rain-fed / dry land) and Fallow land (old fields (bush), typically of the Central bushveld region of South Africa. The surrounding areas comprises with a mix of residential activities, agricultural, tourism and commercial activities. The vegetation in the area consists mainly of grasses, shrubs, and scattered trees.

Several potential risks to the receiving aesthetic and visual environment as a result of the proposed activities have been identified, relating to impacts on the visual character and sense of place, visual intrusion and visual exposure and visibility. The significance of these impacts may be reduced should appropriate and effective mitigation measures be implemented. The proposed Project and associated infrastructure can conceivably have a **moderate impact** on the visual environment, while secondary impacts, such as dust emission, solar glint and glare and lighting at night, will also manifest as visual disturbances from project initiation. The study area comprises of residential activities, agricultural and commercial activities which have had a visual impact on the natural environment. Therefore, the proposed project has been predicted to have a **moderate** impact before mitigation on the visual environment. After appropriate and effective mitigation measures the impact is rated as **moderate to low**. Both the alternative options have been assessed, and a similar finding and recommendation is reasonable for both Alternatives.

The proposed activities should therefore have a **moderate to low** visual impact on the receiving environment and is thus not fatally flawed from a visual impact perspective. Considering the project, it is the specialist's opinion that the proposed activities be allowed, provided that the findings within this report are considered along with the recommendations made towards the management of the proposed activity. All recommendations should be included in the Environmental Management Programme (EMPr) relevant to the proposed project.

11. REFERENCES

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APPENDIX A – SPECIALISTS CURRICULUM VITAES

ENVIRONMENTAL ASSURANCE (PTY) LTD

ANDRE BUYS

ENVIRONMENTAL CONSULTANT / BUSINESS UNIT HEAD

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Date of Birth : 18 November 1991; Place of Birth : South Africa

Ethnic Group and Gender: White Male ; Disabilities : None

AREAS OF EXPERTISE

- Compliance Monitoring
- Specialist Report (Visual and Noise assessments)
- Project Management
- Potable, Ground and Surface Water Quality
- Scientific Report Writing
- Data Analysis & Interpretation
- Hydrogeology
- Soil classification
- Ambient Air and Particulate Matter Quality
- Noise Monitoring
- Geophysics
- GIS, Surfer, Wish, QGIS, ARC GIS and WRPLOT software
- Customer Relationships

CAREER HISTORY

Employer
Period
Position
Responsibilities

ENVIRONMENTAL ASSURANCE (PTY) LTD

Andre holds a B.Sc. in Environmental Sciences, followed by a B.Sc. (Hons) specializing in Geology, Geography and Hydrology. He has comprehensive experience and knowledge on compliance monitoring, project management and specialist reporting. As an environmental consultant, Andre has provided several environmental monitoring and geohydrological assessments and specialist input services.

BUSINESS UNIT HEAD / ENVIRONMENTAL SPECIALIST
Environmental Specialist, Environmental Control Officer and Auditor
June 2022 – Current

- Develop and maintain environmental compliance monitoring programmes in conjunction with site audits and assessments. Monitoring co-ordination and planning of all relevant projects. Maintaining data and results from monitoring programmes and databases. Determining financial provision of mine closures. Compile and overseeing reports on water-, soil-, air-quality and site findings, with interpretation of results and recommendations. Conduct and report on specialist assessments Maintain and build customer relationships with guidance on environmental matters and updates on environmental legislation. Market to potential clients with site specific marketing material. Additionally, conducting Geohydrological studies including Groundwater resource development, Geophysical surveys, Conceptual modelling, Pump tests, Borehole siting, Borehole logging, Groundwater remediation programmes and hydrocensus'.

EDUCATION AND QUALIFICATIONS

North-West University; Honours BSc. Hydrogeology and Hydrology - 2014
North-West University; Degree BSc. Environmental Science Geology and Geography – 2013

PROFESSIONAL STATUS
Registration
Membership

Registered as a Professional Natural Scientist (119183) with the South African Council of Natural Scientific Professions (SACNASP)

PROJECT EXPERIENCE

PROJECT DESCRIPTION	CLIENT
Environmental Compliance Monitoring	Assmang Dwarsrivier
	Tronox Namakwa Sands
	Tronox KZN
	Samancor Ferrometals
	CEMZA Cement
	Northam Platinum Zondereinde
	Northam Platinum Eland
	Northam Platinum Maroelabult
	Wescoal Mining Elandspruit
	Wescoal Mining Keaton
	Neosho Moabsvelden
	Wescoal Processing Plant
	Wescoal Khanyisa
	Exxaro Grootegeluk
	Exxaro Thabametsi
	Exxaro Grootegeluk Depot
	AECI Mining and Explosives
	Calodex Enstra Waste Disposal Facility
	Anglo American Whiskey Creek
	Keywest Shopping Centre
	Glencore Chrome Kroondal
	Glencore Chrome Rietvly
	Glencore Chrome Boshoek
	Kelvin Power Station
	Potchefstroom Dolomite Risk Project
Groundwater Resource Development and Geophysics	Ganyisa Groundwater Resource Development
	Moretele Groundwater Provision
	Polokwane Groundwater Resource Development
	Majakaneng Water Provision
	Steelpoort Pipeline Geophysical Investigation
	Swaziland Waste Disposal Site Investigation
Environmental Control Officer	Moretele Road Construction Phase 2
	Zululand Anthracite Colliery – Report Approval and Sign-off
Environmental Auditor	Makoya Blinkpan External EMPr Auditor
	Sephaku Cement External Water Use License Auditor
	Ocon Bricks External Water Use License Auditor
	Ocon Bricks External EMPr Auditor
Software Modelling and GIS	Ganyisa Groundwater Resource Development

	Moretele Groundwater Provision
	Polokwane Groundwater Resource Development
	Majakaneng Water Provision
	Steelpoort Pipeline Geophysical Investigation
	Swaziland Waste Disposal Site Investigation

CERTIFICATION

I, **ANDRE BUYS**

Declare that, to the best of my knowledge, all the information contained herein is true.

Signature:____________________

On the_________09______ day of __May____ 2023.

APPENDIX E9: Transport Impact Assessment

RHINO SOLAR PV FACILITY
NORTH WEST PROVINCE

Transport Impact Assessment

June 2023
Issue 01

Prepared by:

iWink Consulting (Pty) Ltd

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RHINO SOLAR PV FACILITY
TRANSPORT IMPACT ASSESSMENT

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Annexure C: Impact Rating Methodology

EXECUTIVE SUMMARY

This report serves as the Transport Impact Assessment aimed at determining the traffic impact of the proposed Rhino Solar PV Energy Facility near Rasimone in the North West Province. The proposed project is located approximately 9 km west of Rasimone and 29 km north-west of Rustenburg. The Rhino Solar PV project forms part of a proposed cluster of three solar energy facilities, which will comprise:

- Onderstepoort Solar 1 – up to 240 MW
- Onderstepoort Solar 2 – up to 240 MW
- Rhino Solar PV – up to 65 MW

Onderstepoort Solar 1 and Onderstepoort Solar 2 will be dealt with in separate reports.

The three solar projects will be located in close proximity to each other within the Rustenburg and Kgetlengrivier Local Municipalities within the Bojanala Platinum District Municipality of the North West Province of South Africa. The sites will respectively accommodate a solar power facility and associated support structures and facilities to allow for the generation and evacuation of electricity.

A feasible access road was assessed considering sight lines, access spacing requirements and road safety aspects and are discussed in this report. It is recommended to ensure that the access point is kept clear of vegetation and any other obstructions to ensure sight lines are kept.

In general, non-motorised transportation (NMT) is a dominant mode of transportation in rural areas, with private cars and minibus/taxis being the second-most used mode of transport, followed by buses. Currently, there are no known future planned public transport facilities in the vicinity of the site. However, generally the developer or appointed contractor of a renewable energy project will provide shuttle busses for workers during the construction phase.

The highest trip generator for the project is expected during the construction phase. The actual construction stage peak hour trips are dependent on the construction period, construction programming, material availability, component delivery, abnormal load permitting etc. The decommissioning phase is expected to generate similar trips as the construction phase. The traffic impact during the operational phase is considered negligible.

For the construction and decommissioning phases, the impact expected to be generated by the vehicle trips is an increase in traffic and the associated noise, dust, and exhaust pollution. Based on the high-level screening of impacts and mitigation, the project is expected to have a negative low impact during the construction and decommissioning stages including the recommended mitigation measures.

RHINO SOLAR PV PROJECT

1 INTRODUCTION

1.1 Project Description

Rhino Solar PV (Pty) Ltd is proposing the development of a commercial solar energy generation facility and associated infrastructure on farm portions located near Rasimone in the North West Province. The proposed project will be located in a rural environment around 9 km west of Rasimone and 29 km north-west of Rustenburg (see **Figure 1-1**). The project will comprise of a contracted capacity of up to 240 MW.

A development area has been identified and within this identified development area, the development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas.

The proposed development footprint is 125 ha and the affected farm properties are:

- Portion 11 of the Farm Rhebokhoek No. 101;
- Farm No. 571;
- Portion 31 of the Farm No. 236;
- Portion 13 of the Farm No. 101; and
- Remaining Extent of Portion 7 of the Farm No. 101.

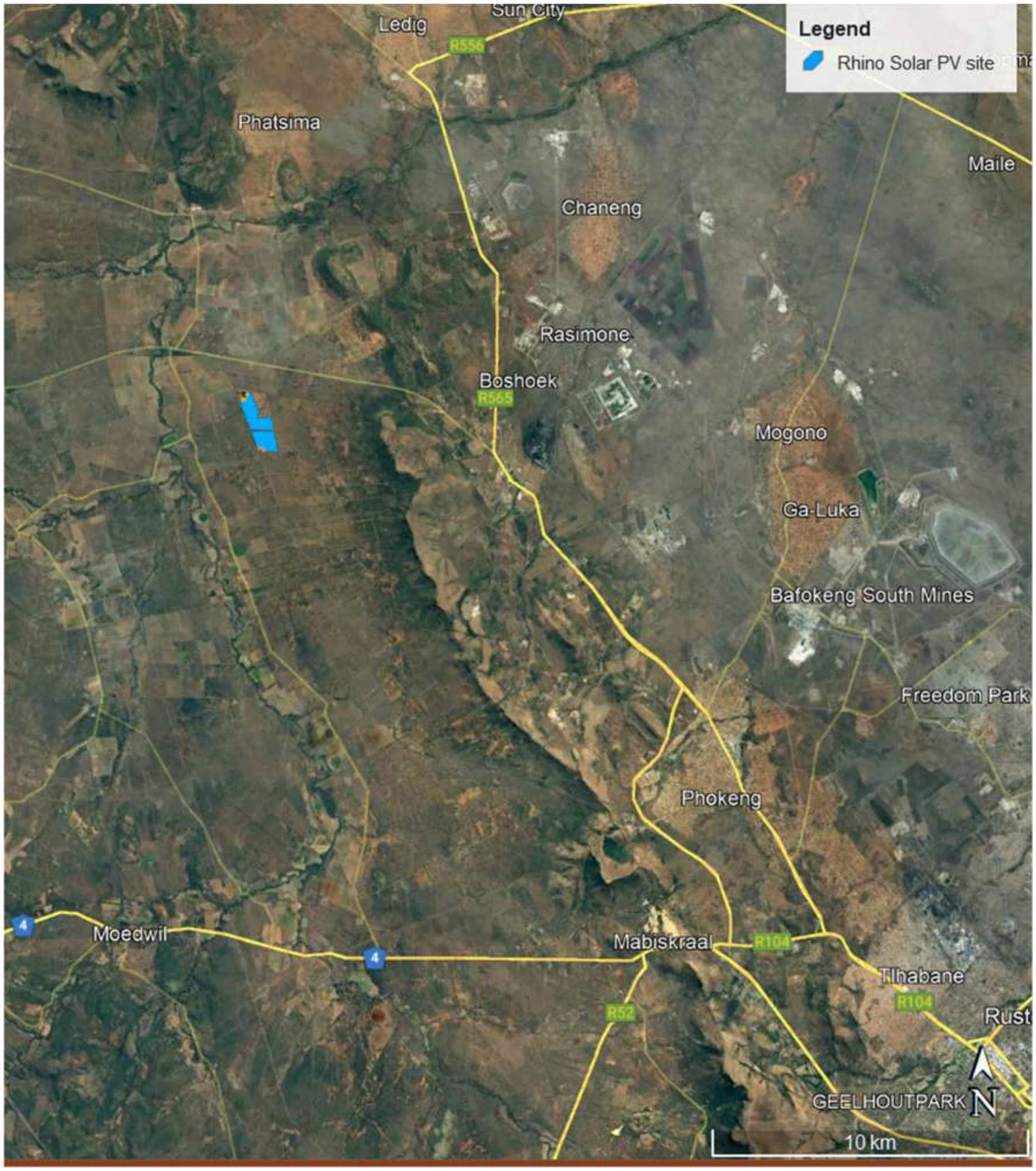

Figure 1-1: Aerial View of location of the Rhino Solar PV site

The proposed project details are summarized in **Table 1-1.**

Table 1-1:Project information

Facility Name:	Rhino Solar PV Energy Facility
Applicant:	Rhino Solar PV (Pty) Ltd
Farm property:	Portion 11 of the Farm Rhebokhoek No. 101; Farm No. 571; Portion 31 of the Farm No. 236; Portion 13 of the Farm No. 101; and Remaining Extent of Portion 7 of the Farm No. 101.
Province:	North West
Extent:	~125 ha
Capacity:	Up to 65 MW
Number of panels:	Estimated 130 000 panels
Type of Technology:	Photovoltaic
Structure orientation:	It is expected that the panels will be mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle towards North with the angle of tilt optimised for cost and system performance.
BESS:	Generally, either Lithium Battery (such as Lithium Iron Phosphate or Lithium Nickel Manganese Cobalt oxides) or Vanadium Redox technology is considered for a project of this nature. The main components of the BESS include the batteries, power conversion system and transformer which is assumed to be stored in various rows of containers. Footprint of BESS: up to 4 ha.
Inverter:	Sections of the PV array will need to be wired to inverters. The inverter is generally a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. Cabling will comprise communication, AC and DC cables. The cabling between the project components and the facility substation will be at a voltage of up to 33 kV.
Operations and Maintenance (O&M) building footprint:	O&M area normally up to 1 ha, including security gate house, ablutions, workshops, storage and warehousing areas, site offices, Switch gear, control centre and relay room.

Laydown area:	A typical construction camp area is around 100 m x 50 m (~5 000m^2). Typical laydown areas are 100 m x 200 m (~2 000m^2). Sewage - portable toilets and septic tanks. Footprint: up to 5 ha. Permanent laydown area up to 1 ha (to be located within the area demarcated for the temporary construction laydown).
Internal Roads:	Internal roads need to be provided to the site and between project components inclusive of stormwater infrastructure. As far as possible, internal roads will follow existing gravel roads and paths, of which some may require widening/upgrading. Further internal roads will need to be constructed with a width of 6 m. The length of internal roads needs to be confirmed. The site access roads will be up to 8 m wide. Where/if required, for turning circle/bypass areas will need to be constructed.
Fencing height:	Up to 3.5 m.
Grid infrastructure / Substation:	An on-site substation will be provided and an 88 kV LILO powerline will be provided between the on-site substation and the existing Eskom 88kV powerlines.
Site access:	Via a public road from R556

1.2 Scope and Objectives

The Transport Impact Assessment is aimed at determining the traffic impact of the proposed land development proposal and whether such development can be accommodated by the external transportation system.

The report deals with the items listed below and focuses on the surrounding road network in the vicinity of the site:

- The proposed development;
- The existing road network and any future road planning proposals;
- Trip generation for the proposed development during the construction, operation, and decommissioning phases of the facility;
- Anticipated traffic impact of the proposed development;
- Access requirements and feasibility of proposed access points;
- Determine a main route for the transportation of components to the proposed project site;
- Determine a preliminary transportation route for the transportation of materials, equipment and people to site;
- Recommend alternative or secondary routes, where possible and required;
- Assess Public Transport accessibility;
- Assess Non-motorised Transport availability; and
- Recommended high-level upgrades to the road network, if necessary.

1.3 Details of Specialist

Iris Sigrid Wink of iWink Consulting (Pty) Ltd. is the Traffic & Transportation Engineering Specialist appointed to provide a Transport Impact Assessment for the proposed Rhino Solar PV Project. Iris Wink is registered with the Engineering Council of South Africa (ECSA), with Registration Number 20110156. A curriculum vitae is included in **Appendix A** of this report.

A signed Specialist Statement of Independence is included in **Appendix B**.

1.4 Terms of Reference

There is no protocol relevant to traffic impact assessments and therefore the specialist study is undertaken according to Appendix 6 of the EIA Regulations (GNR 982, as amended). A transport specialist report should contain the following:

(a) details of-
  (i) the specialist who prepared the report; and
  (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
(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;
(g) an identification of any areas to be avoided, including buffers;
(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;
(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 or activities;
(k) any mitigation measures for inclusion in the EMPr;
(l) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion-
  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).
  (iA) regarding the acceptability of the proposed activity or activities, and

(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, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site access;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Traffic accommodation during construction.

2 APPROACH AND METHODOLOGY

The report deals with the traffic impact on the surrounding road network in the vicinity of the site during the:

- Construction phase;
- Operational phase; and
- Decommissioning phase.

This transport study includes the following tasks:

Project Assessment

- Communication with the project team to gain sound understanding of the projects.
- Overview of available project background information including, but not limited to, location maps, site development plans, anticipated vehicles to the site (vehicle type and volume), components to be transported and any resulting abnormal loads.
- Research of all available documentation and information relevant to the proposed facility.

Access and Internal Roads Assessment

- Assessment of the proposed access points including:
    - Feasible location of access points
    - Motorised and non-motorised access requirements
    - Queuing analysis and stacking requirements, if required
    - Access geometry
    - Sight distances and required access spacing
    - Comments on internal circulation requirements and observations

Haulage Route Assessment

- Determination of possible haulage routes to site regarding:
    - National routes
    - Local routes
    - Site access points
    - Road limitations due to abnormal loads

Traffic Estimation and Impact

- Construction, operational, and decommissioning phase vehicle trips
    - Generated vehicles trips
    - Abnormal load trips
    - Access requirements
- Investigation of the impact of the development traffic generated during construction, operation, and decommissioning.

Report (Documentation)

- Reporting on all findings and preparation of the report.

2.1 Information Sources

The following guidelines have been used to determine the extent of the traffic study:

- Project Information provided by the Client;
- Google Earth.kmz provided by the Client;
- Google Earth Pro Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
- Manual for Traffic Impact Studies, Department of Transport, 1995;
- TRH26 South African Road Classification and Access Management Manual, COTO; and
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1/Vol2), COTO, August 2012.

2.2 Assumptions, Knowledge Gaps and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by the client.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000 mm, total maximum width 4 300 mm and total maximum length 10 500 mm. It is envisaged that for this project the inverter, transformer, and switchgear will be transported to site in containers on a low bed truck and trailer. The transport of a mobile crane and the transformer are the only abnormal loads envisaged. The crane will be utilised for offloading equipment, such as the transformer.
- Maximum vertical height clearances along the haulage route are 5.2 m for abnormal loads.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Cape Town area, Johannesburg, or possibly in Pinetown/Durban.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for the construction of internal access roads will be sourced locally as far as possible.
- The final access points are to be determined during the detailed design stage. Only recommended access points at conceptual level can be given at this stage.
- Planned or approved projects in the vicinity of the site to be considered as part of the cumulative impacts.
- An 18 to 24-months construction period is assumed with some of the construction period dedicated to site prep and civil works.

2.3 Consultation Processes Undertaken

The Transport Impact Assessment is based on available project information and consultation with the developer.

3 LEGISLATIVE AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed project are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act 93 of 1996 and National Road Traffic Regulations, 2000),
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 General Description

The proposed Rhino Solar PV site is located in a rural environment near Rasimone in the North West Province (see **Figure 4-1**). The affected farm portions are Remaining Extent of Portion 2 the Farm Onderstepoort No. 98 and Portion 4 of the Farm Zwaarverdiend No. 234.

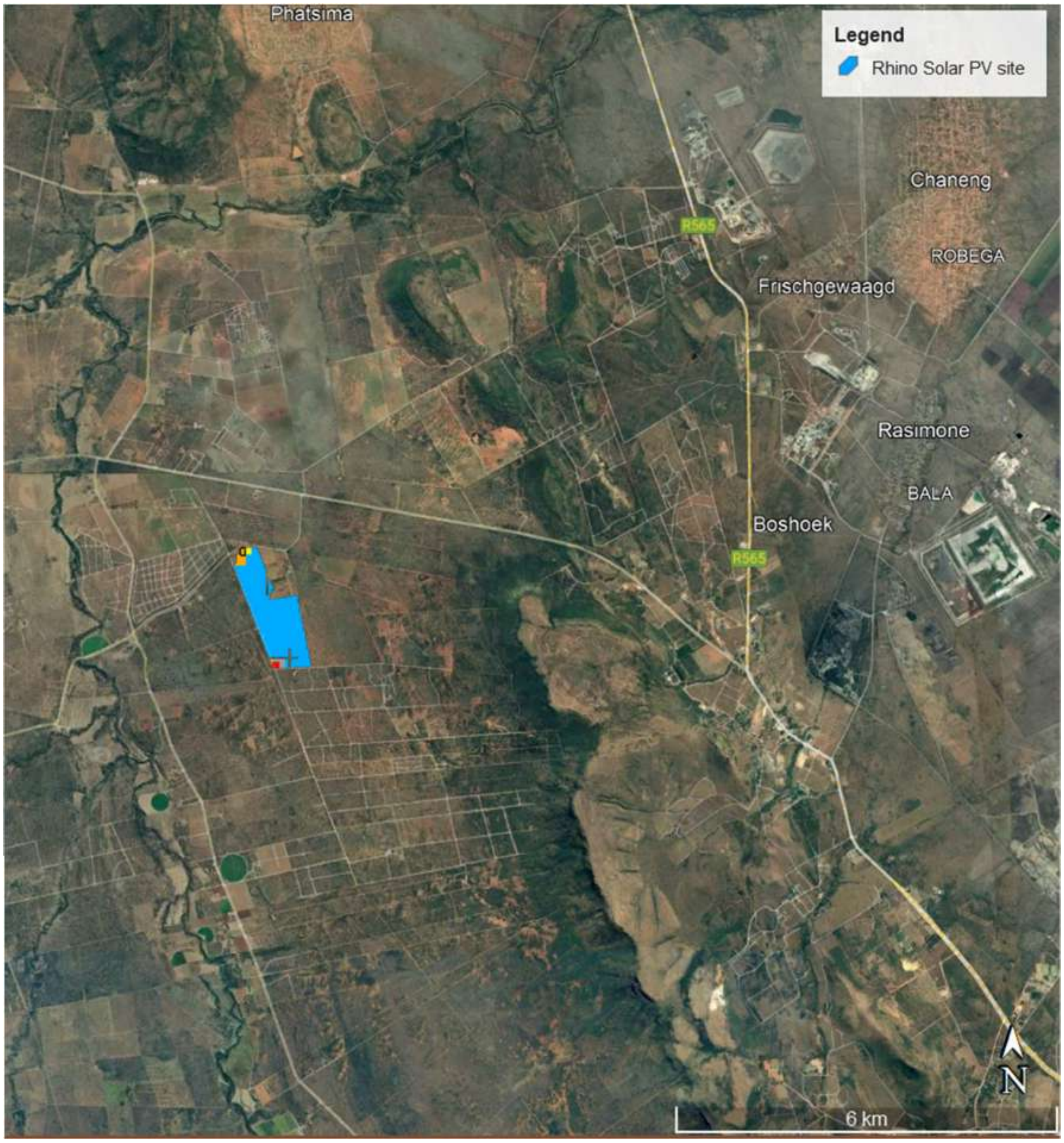

Figure 4-1: Aerial View of the proposed Rhino Solar PV project area

Figure 4-2 shows the other two proposed solar energy projects – Onderstepoort Solar 1 and Onderstepoort Solar 2 in the vicinity of the Rhino Solar PV site.

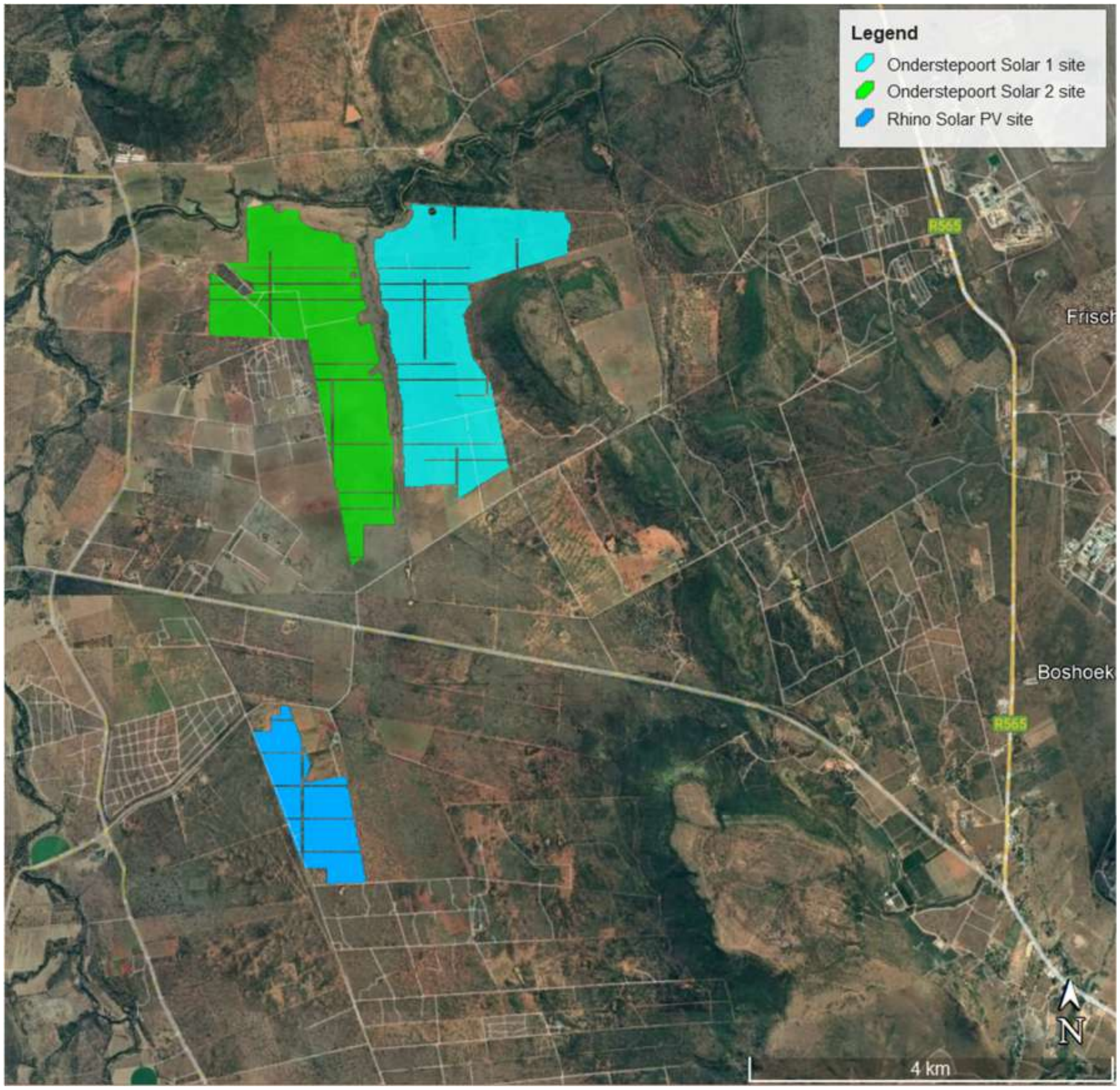

Figure 4-2: Aerial View of Onderstepoort Solar 1, 2 and Rhino Solar PV sites

The development footprint will contain the following infrastructure to enable the Rhino Solar PV facility to generate up to 65 MW:

- PV panels mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems;
- Inverters and transformers;
- Low voltage cabling between the PV panels to the inverters;
- Fence around the project development area;
- 33kV cabling between the project components and the facility substation;
- 88kV or132kV on-site facility substation;
- 88Kv LILO powerline between facility substation and existing Eskom 88 kV powerlines;
- Battery Energy Storage System (BESS);
- Site offices and maintenance buildings, including gate house and security building, control centre, offices and warehouses;

- Temporary and permanent laydown areas; and
- Access roads (up to 8m wide) and internal distribution roads (up to 6m wide).

4.2 Alternatives

The Department of Environmental Affairs and Tourism (DEAT) 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives, namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site assessment was conducted by the developer and the farm portion was found favorable due to its proximity to grid connections, solar radiation, site access and relative flat terrain. The greater area was considered based on these factors. However, environmentally sensitive and "no-go" areas, as identified by the specialists, were considered and avoided as far as possible, where required.

The following alternatives were considered in relation to the proposed activity:

<u>Location Alternatives</u>

The site selection process for a PV facility is almost always underpinned by a good solar resource. Other key considerations include environmental and social constraints, proximity to various planning units and strategic areas, terrain and availability of grid connection infrastructure.

Based on the above site-specific attributes, the study area is considered to be highly preferred in terms of the development of a solar PV facility. As such, no property / location alternatives will be considered.

<u>BESS</u>

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered: Solid state battery electrolytes and Redox-flow technology. Solid state battery electrolytes, such as lithium-ion (Li-ion), zinc hybrid cathode, sodium ion, flow (e.g., zinc iron or zinc bromine), sodium sulphur (NaS), zinc air and lead acid batteries, can be used for grid applications. Compared to other battery options, Li-ion batteries are highly efficient, have a high energy density and are lightweight. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019). Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy.

<u>Design and layout alternatives</u>

It is customary to develop the final/detailed construction layout of the solar PV facility only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or an alternative programme, after which major contracts are negotiated and final equipment suppliers identified.

For the purpose of the application process, site layout alternatives will not be comparatively assessed, but rather a single layout will be refined as additional information becomes available throughout the EIA process (e.g., specialist input, additional site surveys, ongoing stakeholder engagement).

The development area has been selected as a practicable option for the facility, considering technical preference and constraints, as well as initial No-Go layers informed by specialist site surveys. The layout alternative presented in this report avoids all no-go/high sensitivity areas identified by all the specialists.

Technology alternatives: Solar panels

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon (Mono-facial and Bi-facial) and thin film. The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability.

Due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

No-go alternative

This alternative considers the option of ‘do nothing’ and maintaining the status quo. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

4.2.1 Specialist comment regarding alternatives

From a transport engineering perspective, the alternatives listed above (i.e., electrical infrastructure location alternatives and the technology options for the BESS) are equally acceptable as it does have a nominal impact on the traffic on the surrounding road network.

4.3 Proposed Access

The proposed access road towards the site is shown in **Figure 4-3** and will be located off the R556, which is gravel surfaced in the vicinity of the access location. Construction vehicles will travel from the R565 onto the R556 to the proposed access to enter the site (see **Figure 4-4;** indicating the surrounding roads).

The proposed access has been assessed in line with access spacing requirements, required sight lines and road safety considerations.

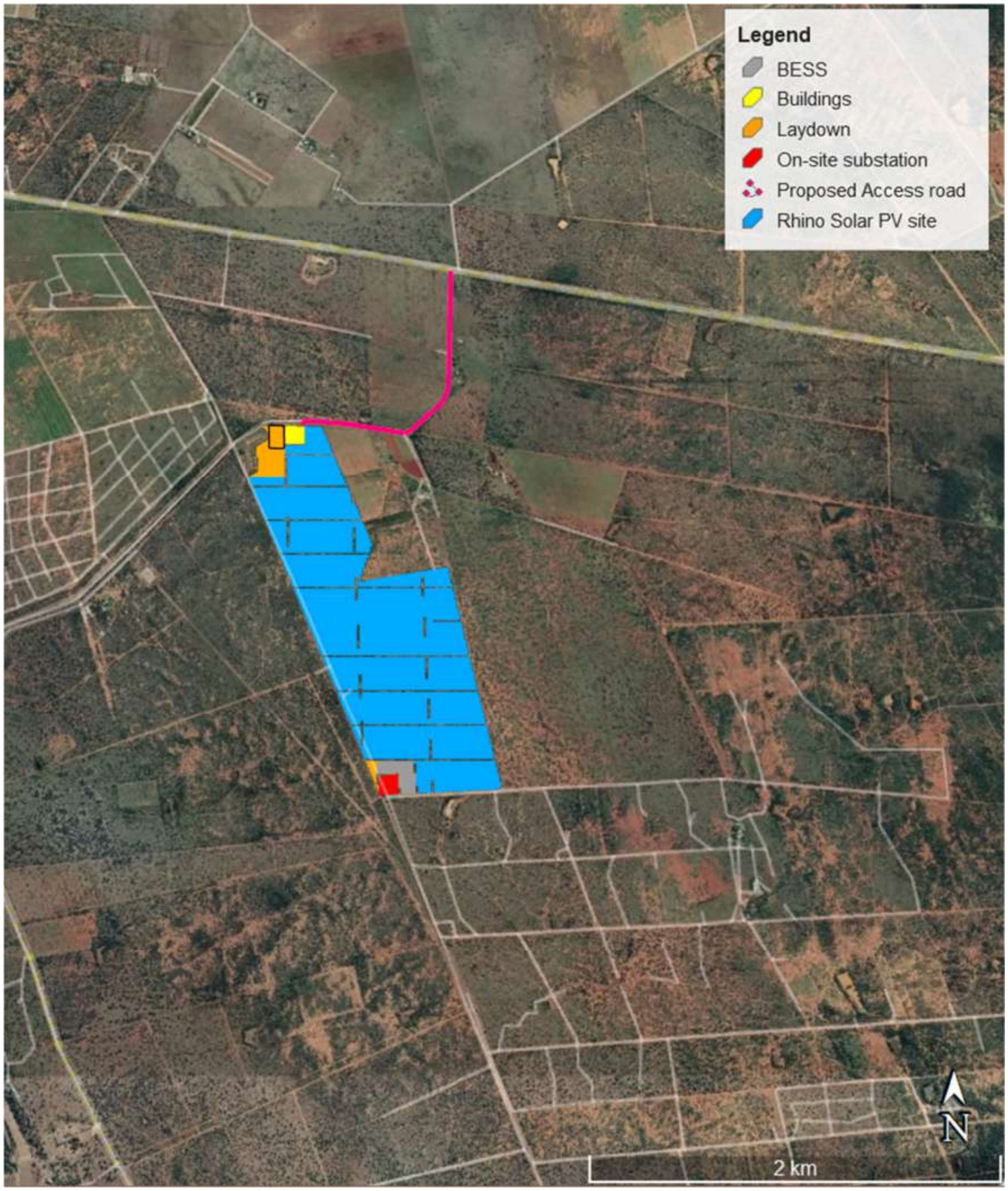

Figure 4-3 Aerial view of proposed Access road to the project site

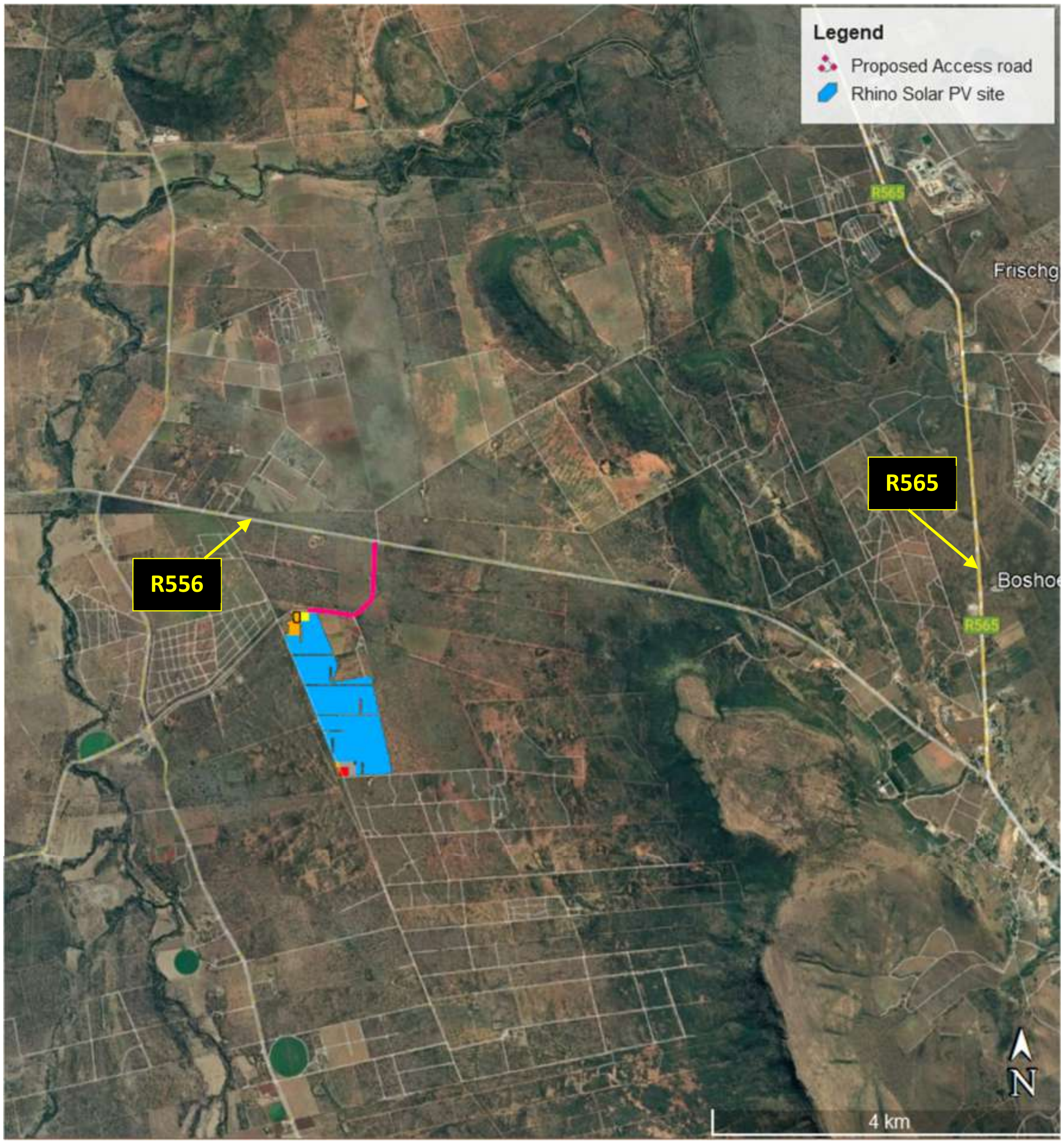

Figure 4-4: Aerial view of external roads towards the project site

The actual site access control will then need to be placed with a stacking space of at least 25 m from the shared farm road to ensure that at least one large construction vehicle can stack in front of the security control without obstructing other vehicles.

In accordance with *Figure 2.5.5(a) of the TRH17 Guidelines for the Geometric Design of Rural Roads* (see **Figure 4-5**), the shoulder sight distance for a stop-controlled condition on a road with a speed limit of 80 km/h, needs to be a minimum of 350 m for the largest vehicle (5m set back from the intersecting road).

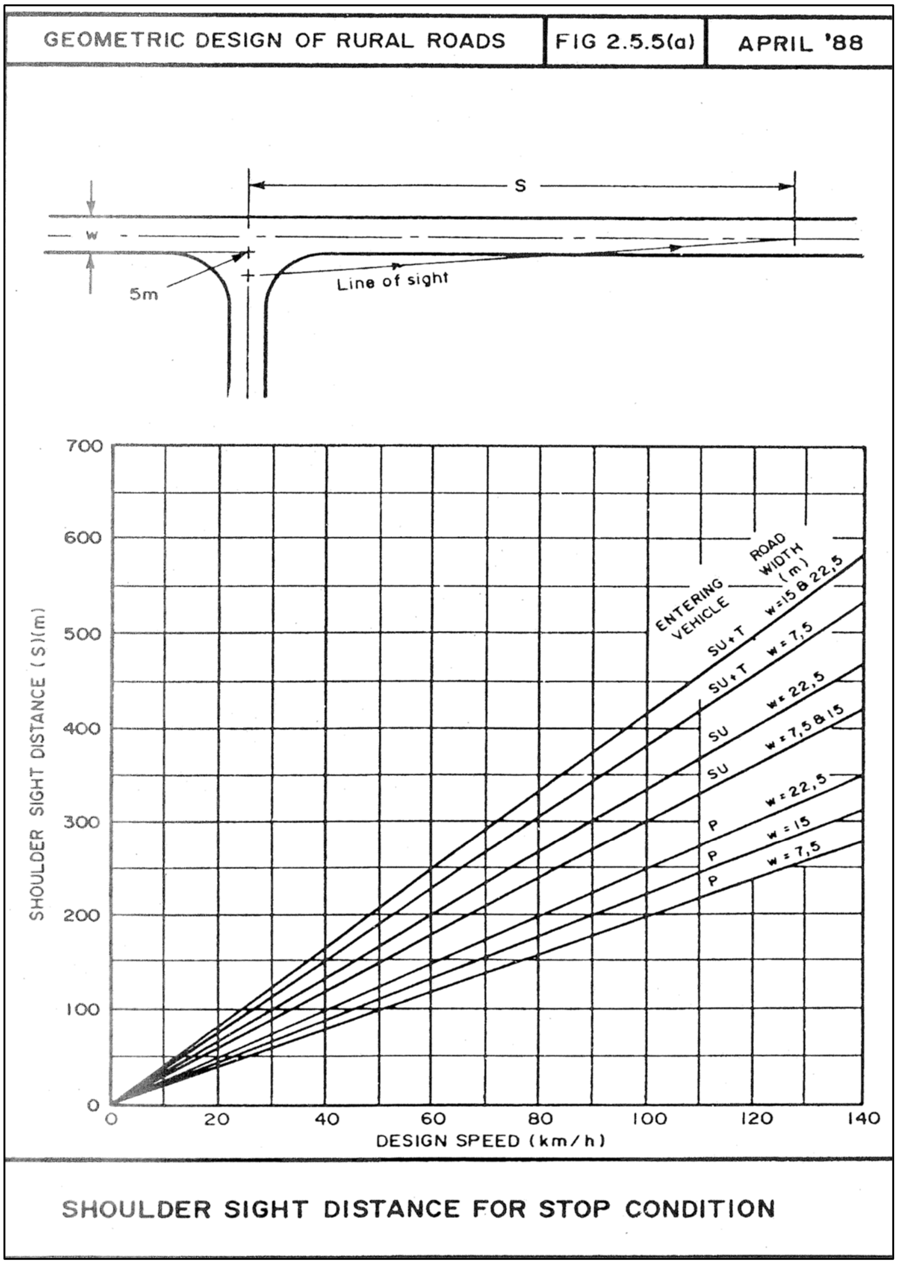

Figure 4-5: Shoulder sight distance (TRH17)

The required minimum shoulder sight distances are met in both directions at the intersection of the proposed access road and the public road (see **Figure 4-6**).

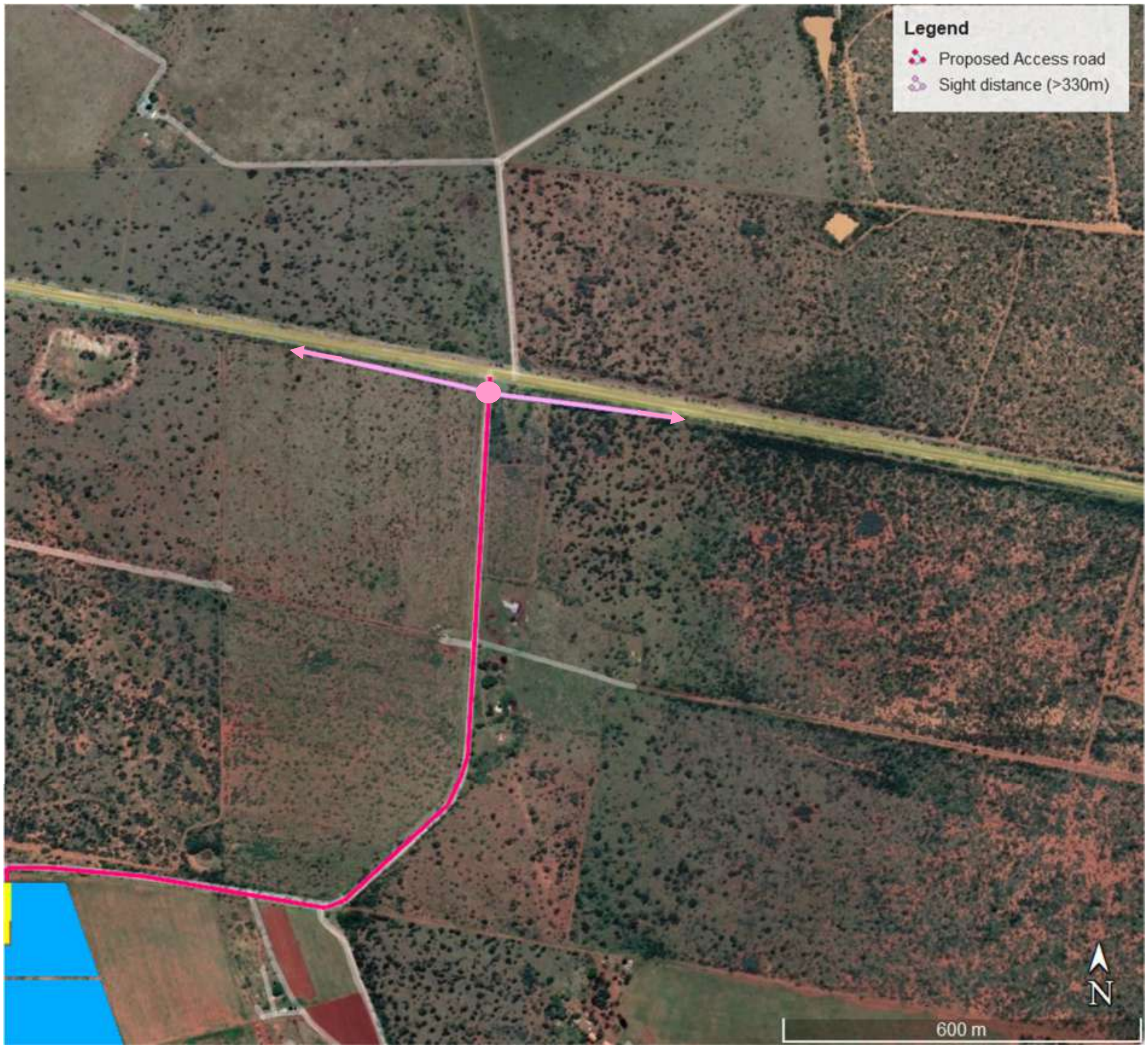

Figure 4-6: Required Sight distances at access point towards the site

4.3.1 General

The access roads leading from the surrounding road network towards the site need to be maintained if damaged by haulage vehicles. The radii at the accesses onto the site need to be large enough to allow for all construction vehicles to turn safely.

During the construction phase, temporary road signage in line with *South African Road Signs Manual (SARTSM*) will need to be erected along the public road in the vicinity of the project to alert drivers of construction vehicles turning into and out of the road.

4.4 Internal Roads

The geometric design and layout for the internal roads from the recommended access points need to be established at detailed design stage. Existing structures and services, such as drainage structures, signage and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that the gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed.

The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

4.4.1 Transportation of Materials, Plant and People to the proposed site

It is assumed that the materials, plant, and workers will be sourced from the surrounding towns as far as possible, such as Rasimone.

4.4.2 Public Transport and Non-Motorised Transport

In terms of the National Land Transport Act (NLTA) (Act No.5 of 2009), the assessment of available public transport services is included in this report. The following comments are relevant in respect to the public transport availability for the proposed developments.

It is expected that minibus taxis travel along the R565, which is located approximately 9 km travel distance to the site. However, in many cases, the developer or appointed contractor of a large-scale project, such as many renewable energy projects, provides shuttle buses or similar for workers during the construction phase.

5 DESCRIPTION OF THE TRANSPORT ROUTES TO SITE

5.1 Port of Entry

The two closest ports of entry for imported components are the Port of Richards Bay and the Port of Durban, which were therefore taken into consideration.

5.1.1 Port of Richards Bay

The Port of Richards Bay is situated on the coast of KwaZulu-Natal and is a deep-sea water port boasting 13 berths. The terminal handles dry bulk ores, minerals and break-bulk consignments with a draft that easily accommodates Cape size and Panamax vessels. The Port is operated by Transnet National Ports Authority. The Port of Richards Bay is located approximately 790 km from the project site traveling via the N4, R50 and R34 (see **Figure 5-1**).

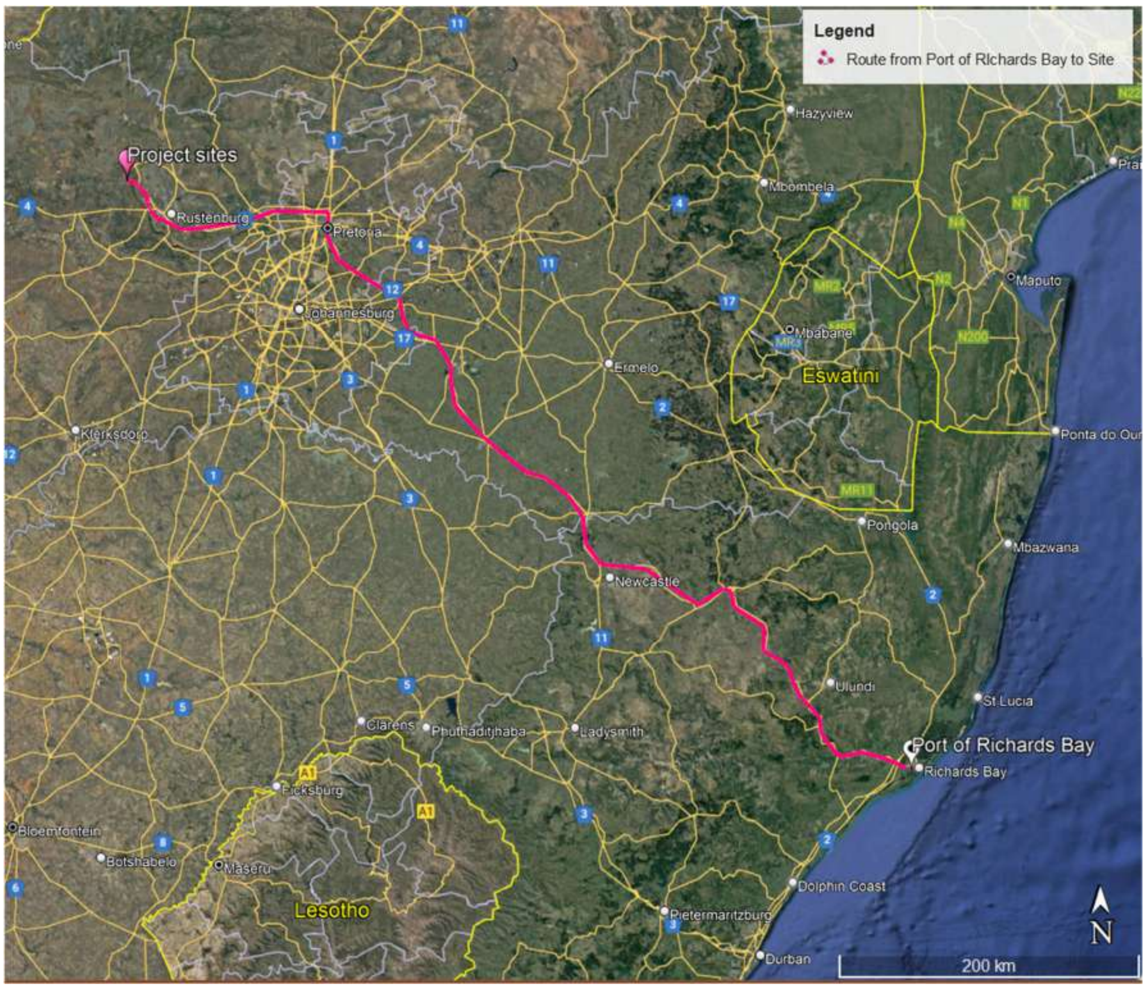

Figure 5-1: Route from Port of Richards Bay to project site

5.1.2 The Port of Durban

The Durban container terminal is one of the largest container terminals in the African continent and operates as two terminals Pier 1 and Pier 2. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia. Various capacity creation projects are currently underway, including deepening of berths and operational optimization. The terminal currently handles 65% of South Africa's container volumes. (Transnet Port Terminals, n.d).

The Port of Durban is located approximately 740 km via the N3 from the proposed project (**Figure 5-2**).

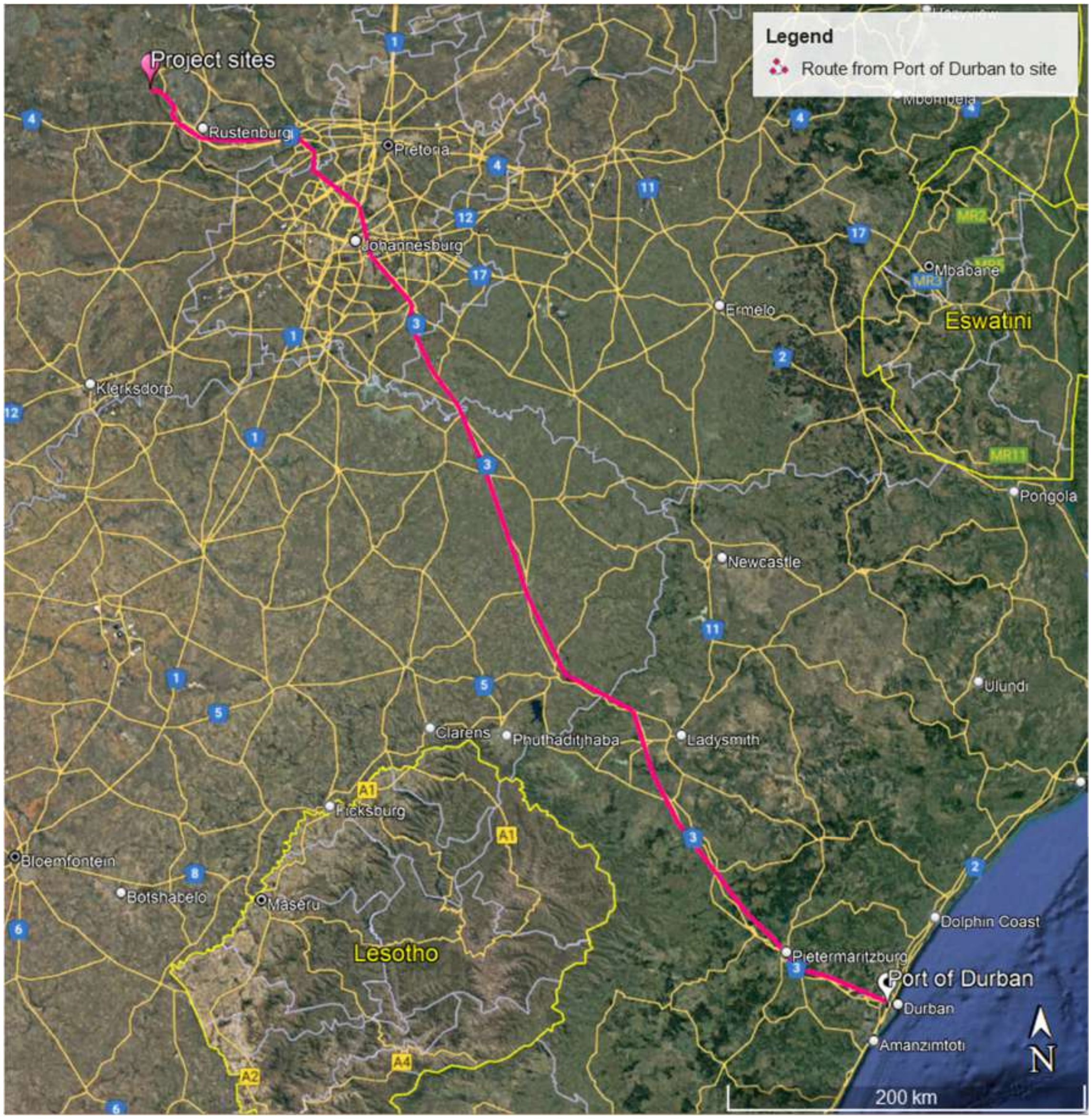

Figure 5-2: Route from Port of Durban to the project site

5.2 Transportation requirements

It is anticipated that the following vehicles will access the site during construction:

Solar PV:

- Conventional trucks within the freight limitations to transport building material to the site;
- 40ft container trucks transporting solar modules, frames, and the inverter, which are within freight limitations;
- Flatbed trucks transporting the solar modules and frames, which are within the freight limitations;
- Light Differential Vehicle (LDV) type vehicles transporting workers from surrounding areas to site;
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to site; and
- The transformers will be transported as abnormal loads.

Grid/power Line:

- Conventional trucks within the freight limitations to transport building material to the site,
- Light vehicles and buses transporting workers from surrounding areas to site,
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to the site,
- The transformer transported in an abnormal load,
- Abnormal mobile crane for assembly on site, and
- Transmission tower sections transported by abnormal load.

5.3 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

- Length: 22 m for an interlink, 18.5 m for truck and trailer and 13.5 m for a single unit truck
- Width: 2.6 m Height: 4.3m measured from the ground. Possible height of load – 2.7 m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on the front axle and 9t on the single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will necessitate an application to the Department of Transport and Public Works for a permit that will give authorisation for the conveyance of said load. A permit is required for each Province that the haulage route traverses.

In addition to the above, the preferred routes for abnormal load travel should be surveyed prior to construction to identify any problem areas, e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification. After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, to ensure that the vehicle can travel without disruptions. It needs to be ensured that gravel sections (if any) of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

There are bridges and culverts along the National and Provincial routes, which need to be confirmed for load bearing capacity and height clearances. However, there are alternative routes which can be investigated if the selected route or sections of the route should not be feasible.

Any low hanging overhead lines (lower than 5.1 m), e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

5.4 Further Guideline Documentation

The Technical Recommendations for Highways (TRH) 11: “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

5.5 Permitting – General Rules

In general, the limits recommended in TRH 11 are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing of permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

5.6 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer,
- the load which may be carried by the tyres,
- the damaging effect on pavements,
- the structural capacity on bridges and culverts,
- the power of the prime mover(s),
- the load imposed by the driving axles, and
- the load imposed by the steering axles.

5.7 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e., loads that cannot, without disproportionate effort, expense, or risk of damage, be divided into two or more loads for the purpose of transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit:

- Width,
- Height,
- Length,
- Front Overhang,
- Rear Overhang,
- Front Load Projection,
- Rear Load Projection,
- Wheelbase,
- Turning Radius, and
- Stability of Loaded Vehicles.

5.7.1 Route for Components manufactured within South Africa

In South Africa, more than half (52%) of the manufacturing industry's national workforce resides in three metros - Johannesburg, Cape Town, and eThekwini. It is therefore anticipated that elements ,that can be manufactured within South Africa, will be transported to the site from the Cape Town, Johannesburg, or Pinetown/Durban areas. Components will be transported to site using appropriate National and Provincial routes. It is expected that the components will generally be transported to site with normal heavy load vehicles.

5.7.1.1 Route from Cape Town Area to Site – Locally sourced materials and equipment

Cape Town has a large manufacturing sector with twenty-six (26) industrial areas located throughout the metro. The proposed industrial hubs being considered to source the required materials and components is currently unknown. With quite an extensive and widespread industrial market, a specific route to the site cannot be considered at this point in time, but it is expected that a majority of the route length will be similar to the routes considered for the haulage of imported materials and equipment. No road limitations are envisaged along the route for normal load freight. The estimated a travel distance is around 1 480 kms via the N1(see **Figure 5-3**).

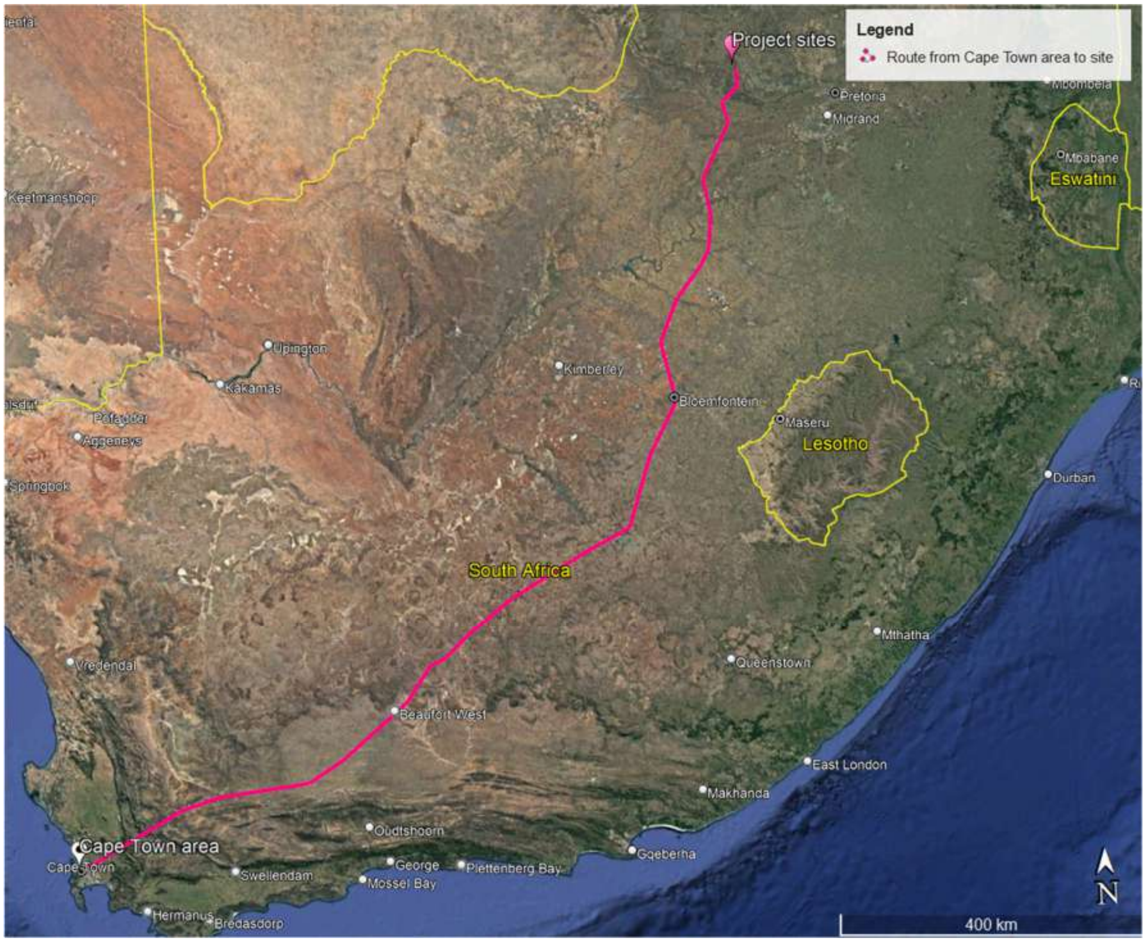

Figure 5-3: Route from Cape Town area to project site

5.7.1.2 Route from Johannesburg Area to Site – Locally sourced materials and equipment

If components from Johannesburg are considered, normal loads from Johannesburg to the proposed site can be transported via the route as shown in **Figure 5-4** below. No road limitations are envisaged along the route for normal load freight. The distance from the Johannesburg area to site is approximately 160 km via the R24 and N4.

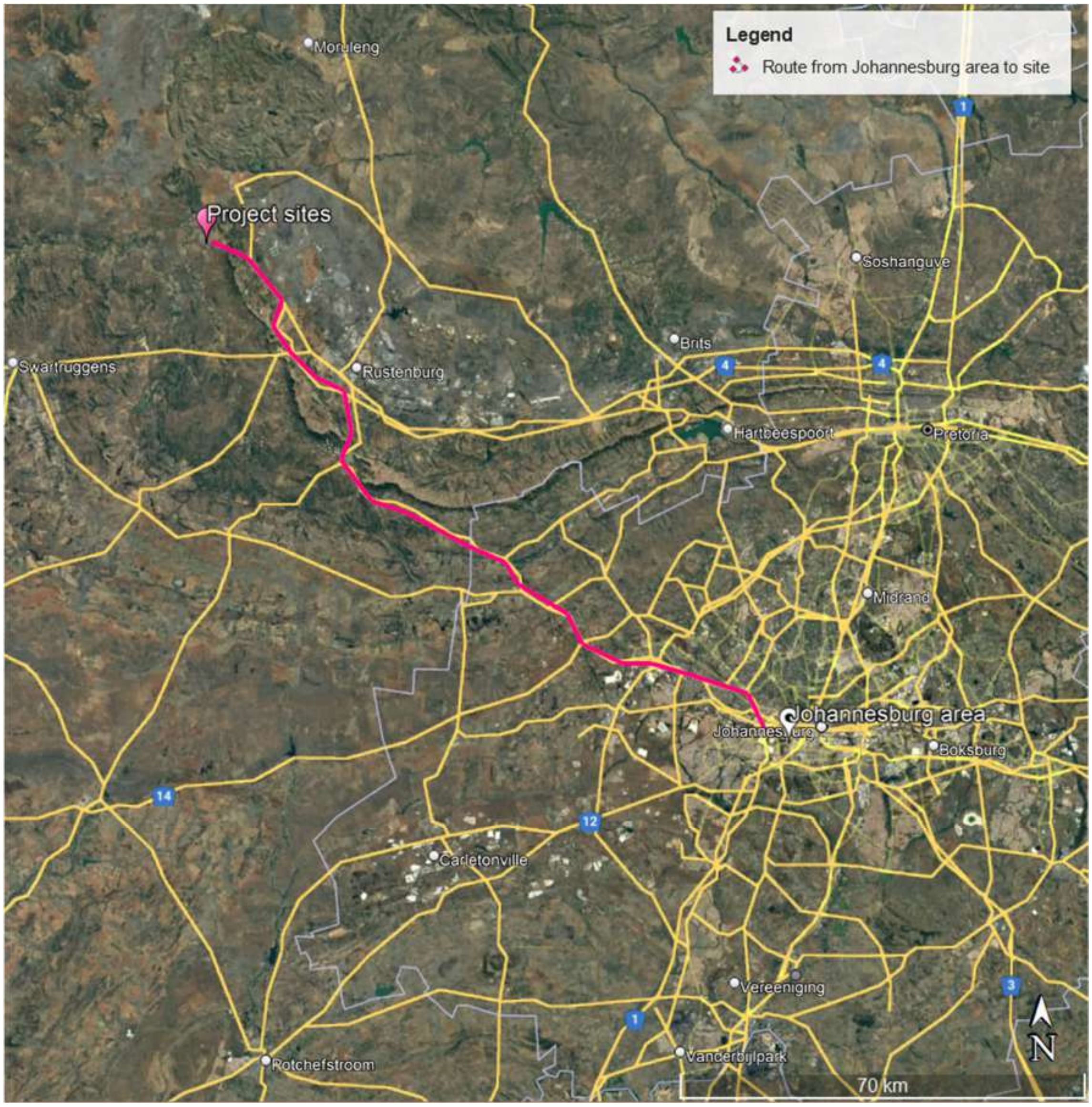

Figure 5-4: Route from Johannesburg area to project site

5.7.1.3 Route from Pinetown area to Site - Locally sourced materials and equipment

Normal loads can transport elements via two potential routes from Durban and Pinetown to the site. No road limitations are envisaged along the route for normal load freight. The travel distance from Pinetown to the site via the N3 is approximately 720 km (see **Figure 5-5**).

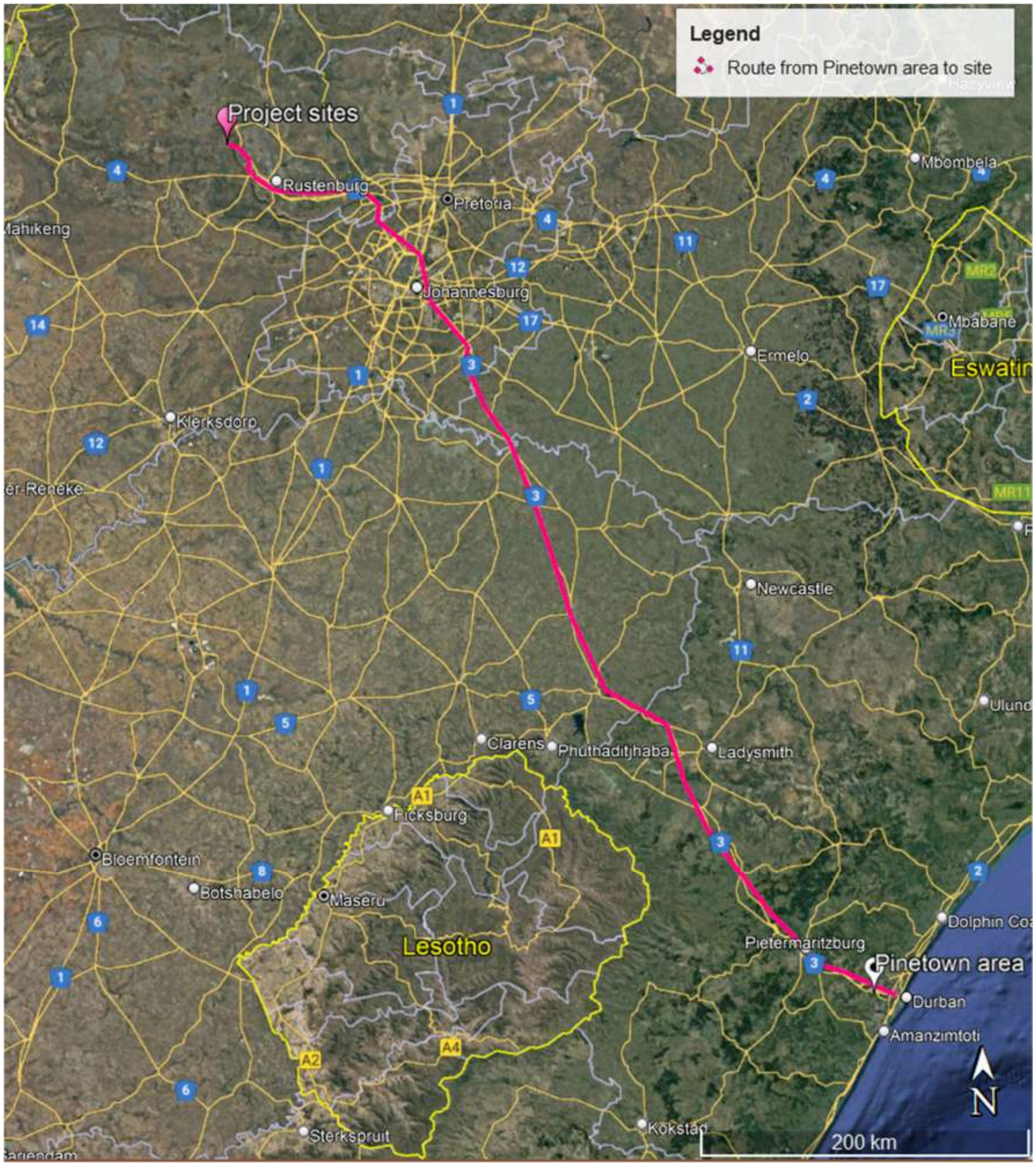

Figure 5-5: Route from Pinetown area to the project site

5.7.2 Surrounding road network

The construction vehicles for the proposed Facility will take access from a public road via the R565 located to the east of the site as described under 4.3. The R565 connects Rustenburg with smaller districts (i.e., Phokeng, Boshoek, Sun City, Tsitsing and Lekgalong before reconnecting with the N4 at Belong (see **Figure 5-6**). According to the road classification of the surrounding road network as per the *Road Infrastructure Strategic Framework for South Africa (RISFSA)* and *COTO's TRH26 South African Road Classification and Access Management Manual*, the R555 and the R540 can be classified as **Class 3 rural minor arterials**, which typically carries inter-district traffic between:

- Small towns, villages and larger rural settlements (population typically less than about 25 000);
- Smaller commercial areas and transport nodes of local importance that generate relatively high volumes of freight and other traffic in the district (public transport and freight terminals, railway sidings, small seaports and landing strips);
- Very small or minor border posts;
- Tourist destinations;
- Other Class 1, 2 and 3 routes.
- Smaller centres than the above when travel distances are relatively long (longer than 50 to 100 km).

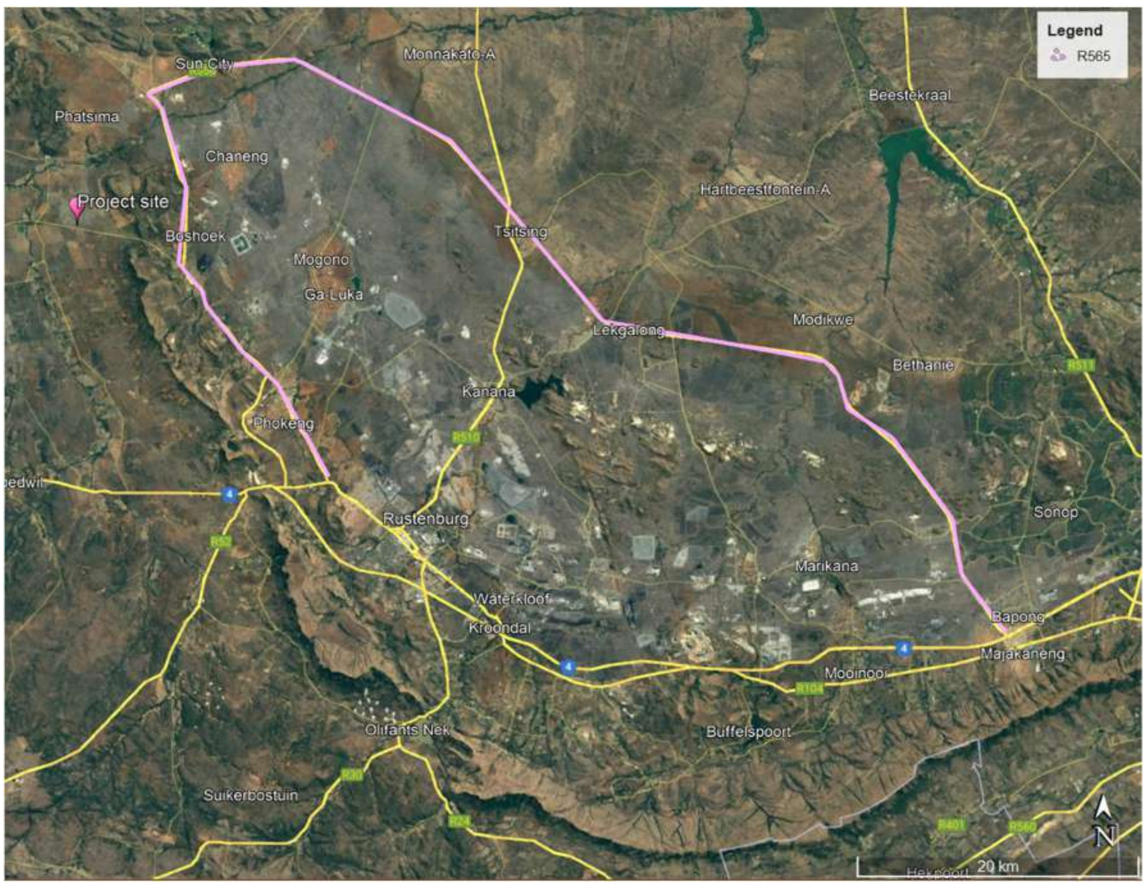

Figure 5-6: Aerial view of R565

6 ISSUES, RISKS AND IMPACTS

6.1 Identification of Potential Impacts/Risks

The potential impact on the surrounding environment is expected to be generated by the development traffic, of which traffic congestion and associated noise, dust, and exhaust pollution form part of. It must be noted that the significance of the impact is expected to be higher during the construction and decommissioning phases because these phases generate the highest development traffic.

6.2 Construction phase

This phase includes the transportation of people, construction materials and equipment to the site. This phase also includes the construction of the solar power facility and associated infrastructure, including grid connections, construction of footings, roads, excavations, trenching, and ancillary construction works. This phase will temporarily generate the most development traffic.

6.2.1 Nature of impact

The nature of the impact expected to be generated at this phase would be traffic congestion and delays on the surrounding road network as well as the associated noise, dust, and exhaust pollution due to the increase in traffic.

6.2.2 Significance of impact without mitigation measures

Traffic generated by the construction of the solar facility will have a notable impact on the surrounding road network. The exact number of trips generated during construction can only be determined later in the project when the contractor and the haulage company are appointed and once more detail is available regarding the staff requirements and where equipment is sourced from. In the interim, an estimate will be made as follows for the purpose of this report.

6.2.3 Estimated peak hour traffic for the solar panel components

At present, solar panels are locally produced in South Africa by only a few select firms. The largest of them is located in Pinetown, Kwa-Zulu Natal. Owing to their limited annual production capacity of approximately 325MW, the bulk of solar modules being deployed on South African PV projects are imported, primarily from the Far East. Where panels are sourced locally, these are typically delivered to site via flatbed trucks.

For the purpose of the Transport study and calculation of trips, it is assumed that all panels will be imported. Considering a loading capacity of around 600 solar panels per 40tf container, the total number of trips will result in approximately 217 trips for a 65 MW development. Spacing the transport of the panels over a one-month period (i.e., 22 workdays), **the daily number of trips would result in approximately 10**. Looking at a maximum of 40% of these trips occurring during the peak traffic periods, the number of trips for the delivery of the panels during peak traffic will be around 4 trips, which can be accommodated by the external road network.

6.2.4 Estimated staff trips

From experience with similar projects, around 150 workers are estimated to be active on-site during construction and **the resulting daily staff trips are then 48** (shown in **Table 6-1**).

Table 6-1: Estimation of daily staff trips

Vehicle Type	Number of vehicles	Max. Number of Employees
Car	4	4 (assuming 1 occupant)
Bakkie	4	6 (assuming 1.5 occupants)
Taxi – 15 seats	4	60
Bus – 80 seats	1	80
Total	***13***	***150***

6.2.5 Estimated material trips

The exact number of vehicle trips for the transportation of materials during the construction phase depends on the type of vehicles, planning of the construction, source/location of construction material, etc. However, for the purpose of this study, it was estimated that at the peak of construction, **approximately 100 construction vehicle trips will access the site per day**.

The total estimated daily site trips, at the peak of construction, are shown in **Table 6-2** below.

Table 6-2: Estimation of daily site trips

Activity	Number of daily trips
Solar panel component delivery	10
Staff transport	13
Material delivery	100
Total	**123**

With the recommended mitigations in this report, the impact on the surrounding road network and the general traffic is deemed acceptable, as the 123 trips will be distributed over a 9-hour workday. It is expected that the majority of the trips will occur outside the peak hours.

It must also be noted that vehicle trips from material delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Project planning can be used to reduce material delivery during peak hours.

The development traffic impact during the construction phase can be assessed as manageable, considering that the construction phase is temporary in nature and mitigation measures, mentioned in this report, are adhered to and keep the impact level low.

6.3 Operational Phase

This phase includes the operation and maintenance of the Rhino Solar PV Facility throughout its life span.

6.3.1 Nature of impact

The nature of the impact expected to be generated at this phase would be traffic and the associated noise, dust and exhaust pollution due to the operational traffic trips.

6.3.2 Estimated peak hour traffic generated during operation

The exact number of permanent staff expected for the operational phase is still unknown. Based on similar studies, it can be estimated that approximately 25 full-time employees will be stationed on site. Assuming a worst-case scenario of 40% of the trips occurring during peak traffic periods, approximately 10 peak hour trips are estimated for the operational phase, which will have a nominal impact on the external road network.

It is assumed that the solar modules would need to be cleaned twice a year. No further information on which cleaning method and technology will be used is available at this point in time. The following assumptions have been made to estimate the resulting trips generated from transporting water to the site:

- 5 000-liter water bowsers to be used for transporting the water (water bowsers between 5 000-litre and 18 000-litre are available in South Africa. For the purpose of this study, the smallest bowser was chosen);
- Approximately 5 litres of water needed per panel;
- Assuming that a maximum of 130 000 panels are used, this would amount to approximately 130 vehicle trips; and
- Solar modules will be cleaned twice a year.

To limit any traffic impact on the surrounding road network, it is recommended to schedule these trips outside of peak traffic periods and to clean the solar modules over the course of a few days i.e., spread the trips over a 5-day work week, which would reduce the daily trips to 26 and the peak hour trips to max 10 (i.e., max ~40%). Additionally, the provision of rainwater tanks on site or borehole water would decrease the number of trips.

6.3.3 Proposed general mitigation measures

The following are general mitigation measures to reduce the impact that the additional traffic will have on the road network and the environment:

- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads located within the site boundary, including the main access road to the site and the site access roads, during the construction phase, if required.
- Regular maintenance of gravel roads located within the site boundary, including the access roads to the site, by the Contractor during the construction phase and by the Owner/Facility Manager during the operational phase, if required.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- The Contractor should ensure that all drivers, entering the site, adhere to the traffic laws.
- Vehicular movements within the site boundary are the responsibility of the respective Contractor and the Contractor must ensure that all construction road traffic signs and road markings (where applicable) are in place. It should be noted that traffic violations on public roads are the responsibility of Law Enforcement, and the public should report all transgressions to Law Enforcement and the Contractor.

- If required, low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by the haulage company and communicated beforehand with the service provider of the OHL) to accommodate the abnormal load vehicles. The Contractor and the Developer are to ensure that the haulage company is aware of this requirement.
- The haulage company is to provide evidence to the Contractor and the Developer that any affected overhead lines have been moved or raised.
- The preferred route should be surveyed by the developer to identify problem areas (e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification). After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that delivery will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. The "dry-run" should be undertaken within the same month that components are expected to arrive. The haulage company is to provide evidence that the route has been surveyed and deemed acceptable for the transportation of the abnormal load.
- The Contractor needs to ensure that the gravel sections of the haulage routes (i.e., the site access road and the main access road to the site) remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a grader to obtain a camber of between 3% and 4% (to facilitate drainage) and regular maintenance blading will also be required. The geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional.

6.3.4 Significance of impact with mitigation measures

It should be noted that the construction phase is temporary and short term in nature and the associated impacts can be mitigated to an acceptable level.

The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network and the impact on the local traffic will be low as the existing traffic volumes are deemed to be low. Dust suppression will result in significantly reducing the impact.

6.3.5 Decommissioning phase

This phase will have similar impacts and generated trips as the Construction Phase.

6.3.6 Cumulative Impacts

To assess a cumulative impact, it is generally assumed that all currently approved and authorized projects within a 30 km radius would be constructed at the same time. At the time of preparing this report, no other planned or authorized projects were known as per *DFFE Renewable Projects Database,* besides the Onderstepoort Solar 1 and Onderstepoort Solar 2 projects.

This is a precautionary approach as in reality, these projects would be subject to a highly competitive bidding process and not all the projects may be selected to enter into a Power Purchase Agreement. Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when operational, do not add any significant traffic to the road network.

7 IMPACT ASSESSMENT

7.1 Potential Impact during the Construction Phase

The construction phase will generate traffic including transportation of people, construction materials, water, and equipment (abnormal trucks transporting the transformers). The exact number of trips generated will be determined at a later stage. Based on the high-level screening of impacts, a negative low impact rating can be expected during the construction phase with mitigation measures (see **Table 7-2**).

Nature of the impact

- Temporary increase in traffic, noise and dust pollution associated with potential traffic.

The impact methodology as provided by the client has been utilised (see **Annexure C**).

7.2 Potential Impact (Operational Phase)

Nature of the impact

- Noise and dust pollution associated with potential traffic.

The traffic generated during this phase will have a nominal impact on the surrounding road network. The impact evaluation is shown in **Table 7-3** .

7.3 Potential Impacts during the Decommissioning Phase

This phase will have a similar impact as the construction phase (i.e., traffic congestion, air pollution and noise pollution) as similar trips/movements and associated noise and pollution are expected (see **Table 7-2**).

7.4 Cumulative Impacts during the Construction Phase

For the cumulative impact during the construction phase, any planned or approved projects in a 30km radius are considered. At the time of preparing this report, there were no known authorized or planned developments in a 30 km radius. Only the Onderstepoort Solar 1 (240 MW) and Onderstepoort Solar 2 (240 MW) projects were taken into consideration.

7.5 Impact Assessment Summary

The overall impact significance findings, following the implementation of the proposed mitigation measures, are shown in **Table 7-1** below.

Table 7-1: Summary of overall Impact Significance

Rhino Solar PV Project	Overall Impact Rating
Construction (Pre-mitigation measures)	Negative Medium
Operational (Pre-mitigation measures)	Negative Low
Construction (Post-mitigation measures)	Negative Low
Operational (Post-mitigation measures)	Negative Low

Table 7-2: Impact Table – Construction Phase / Decommissioning Phase

TRAFFIC & TRANSPORT						
CONSTRUCTION / DECOMMISIONING PHASE						
Potential Impact		**Mitigation**				
Increase of construction vehicles on the roads will occur, which may have an impact on communities and general traffic; increase of noise and dust pollution.		• Stagger component delivery to site • Reduce the construction period where possible • Stagger the construction phase • The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. • Staff and general trips should occur outside of peak traffic periods as much as possible • Maintenance of haulage routes • Design and maintenance of internal roads				
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	National	Low	Short-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	National	Low	Short-term	Likely	2

Table 7-3: Impact Table – Operational/Maintenance Phase

TRAFFIC & TRANSPORT						
OPERATIONAL PHASE						
Potential Impact		**Mitigation**				
Slight increase of vehicle trips due to permanent staff traveling to site, periodically (bi-annual) trips to site for transport of water and irregular maintenance trips.		▪ Source on-site water supply if possible. ▪ Utilise cleaning systems for the panels needing less vehicle trips. ▪ Schedule trips for the provision of water for the cleaning of panels outside peak. traffic times as much as possible.				
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Long-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Long-term	Likely	1

Table 7-4: Impact Table – Construction Phase / Decommissioning Phase - Cumulative

TRAFFIC & TRANSPORT						
CONSTRUCTION / DECOMMISIONING PHASE - CUMULATIVE						
Potential Impact	**Mitigation**					
Further increase of development trips during construction phase if Onderstepoort Solar 1, Onderstepoort Solar 2 and Rhino Solar PV will be constructed at the same time.	• Same mitigation measures as Table 7-2. It is noted that it is deemed unlikely that all three developments will be constructed at the exact same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the respective projects.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	National	High	Short-term	Likely	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	National	Medium	Short-term	Likely	2

Table 7-5: Impact Table – Operational/Maintenance Phase - Cumulative

TRAFFIC & TRANSPORT						
OPERATIONAL PHASE - CUMULATIVE						
Potential Impact	**Mitigation**					
Increase of vehicle trips due to permanent staff traveling to site, periodically (bi-annual) trips to site for transport of water and irregular maintenance trips.	▪ Same mitigation measures as Table 7-3.					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Long-term	Likely	1
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Long-term	Likely	1

8 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed Rhino Solar PV project as well as the associated infrastructure do not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting its targets for renewable energy. Hence, the no-go alternative is not a preferred alternative.

9 CONCLUSION AND RECOMMENDATIONS

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Rhino Solar PV project were identified and assessed.

- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and to be found to be able to be accommodated by the road network including the recommended mitigation measures.
- During operation, it is expected that maintenance and security staff will periodically visit the facility and water be transported to site possibly twice a year for the cleaning of panels. The generated trips can be accommodated by the external road network and the impacts are rated **negative low** with mitigation measures.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be of medium negative impact. However, after mitigation a rating of **negative low** impact can be given.
- The traffic generated during the decommissioning phase will be similar to or even less than the construction phase traffic and the impact on the surrounding road network will also be considered to be of **negative low** impact after mitigation.
- No other projects, besides Onderstepoort Solar 1 and Rhino Solar PV, within a 30km radius from the project site were known at the time of preparing this report. With mitigation, the cumulative impact ca be rates as **negative low**.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Dust suppression of internal gravel roads and the access roads.
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods.
- A “dry run” of the preferred route by the haulage company. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor.
- Design and maintenance of the internal gravel roads and maintenance of the access roads.
- If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company and agreed on with the service provider of the OHL) or raised to accommodate the abnormal load vehicles.

The construction and decommissioning phases of a solar power facility are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is of temporary nature, i.e., the impact of the solar power facility on the external traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

The proposed development of the Rhino Solar PV Energy Facility is supported from a traffic engineering perspective provided that the recommended mitigation measures are adhere to.

10 REFERENCES

- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- Transnetportterminals.net. n.d. *Transnet Port Terminals*. [online] Available at: <https://www.transnetportterminals.net/Ports/Pages/default.aspx>
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads

Annexure A: Specialist Expertise

SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156) and obtained her Master of Science degree in Civil Engineering in Germany in 2003. She has more than 20 years of experience in a wide field of traffic and transport engineering projects.

Iris left Germany in 2003 and has gained work experience as a traffic and transport engineer in South Africa and Germany. She has technical and professional skills in traffic impact studies, public transport planning, non- motorised transport planning and design, design and development of transport systems, project planning and implementation for residential, commercial, and industrial projects.

Her passions are the renewable energies and road safety, and she is highly experiences in providing traffic and transport engineering advise.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader and is a regular speaker at conferences, seminars and similar.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrEng	Registered with the Engineering Council of South Africa No. 20110156 Registered Mentor with ECSA
MSAICE	Member of the South African Institution of Civil Engineers
ITSSA	Member of ITS SA (Intelligent Transport Systems South Africa)
SAWEA	Member of the South African Wind Energy Association
SARF	South African Road Federation: Committee Member of Council
SARF WR	South African Road Federation Western Region – Chair
SARF RSC	South African Road Federation National Road Safety Committee
IRF	Registered as International Road Safety Audit Team Leader

EDUCATION

1996 – Matric (Abitur)	Carl Friedrich Gauss Schule, Hemmingen, Germany
1998 - Diploma (Draughtsperson)	Lower Saxonian State Office for Road Engineering
2002 – BSc Eng (Civil)	Leibniz Technical University of Hannover, Germany
2003 - MSc Eng (Civil & Transpt)	Leibniz Technical University of Hanover, Germany

***Master Thesis on the Investigation of the allocation of access rights** to the European rail network infrastructure - Research of the feasibility of the different bidding processes to allocate access rights of railway operators in the European railway market. Client: Technical University of Berlin and German Railway Company.*

SUMMARY OF EXPERIENCE

iWink Consulting (Pty) Ltd – Independent Consultant

2022 – present
Position: Independent Consultant – working as an independent Specialist in the field of Traffic & Transport Engineering, Renewable Energies and Road Safety.

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2016 – 2022
Position: Associate / Division Head: Traffic & Transport Engineering

Jeffares & Green (Pty) Ltd

2012 – 2016
Position: Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2010 - 2012
Position – Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2004 - 2010
Position – Traffic & Transport Engineer

Schmidt Ingenieursbüro, Hannover, Germany

2000
Position – Engineering Assistant

Leibniz University of Hannover, Germany

2000 - 2003
Position – Engineering Researcher - Institute for Road & Railway Engineering

SELECTION OF PROJECTS

Please note: The below lists show only a *selection* of projects that Iris has been involved in over the last 20 years. More information and a complete Schedule of Experience can be made available on request.

RENEWABLE ENERGY PROJECTS

Transport Impact Assessments /Traffic Management Plans for:

- Mayogi Solar PV Project
- AGV Red Sands Solar Project
- Cradock – Kaladokhwe WEFs
- Britstown WEFs
- Highveld Solar Cluster
- Dealsville & Bloemfontein Solar PV
- Great Karroo Wind and Solar Cluster
- Ummbila Emoyeni Solar Project
- Poortjie Wind&Solar
- Hydra B Solar Cluster
- Choje Windfarm, Eastern Cape
- Richards Bay Gas to Power Project
- Oya Black Mountain Solar Project
- De Aar Solar Project
- Euronotus Wind & Solar Cluster
- Pienaarspoort Wind Energy Project
- Karreebosch Wind Energy Project
- Dyasonsklip Solar Project
- Kuruman Windfarm
- Bloemsmond Solar Farms
- Hendrina Wind Energy Project
- Orkney Solar Project
- Bulskop Solar Project
- Hyperion Solar & Thermal Project
- Gromis & Komas Wind Energy Projects
- Kudusberg & Rondekop Wind Energy Projects
- Bayview Windfarm
- Coega West Windfarm
- Suikerbekkie Solar Project
- Poortjie Solar Project
- Northam Solar Project

- Sibanye Solar Project
- Du Plessis Dam Solar Project
- Mercury Solar Project
- Aberdeen Wind Energy Project
- Saldanha Wind and Solar Projects
- Ummbila Emoyeni Wind Energy Project
- Springhaas Solar Project

Clients:

- G7 Energies
- ABO Wind Renewable Energies
- Atlantic Renewable Energy Partners
- Mulilo
- Acciona
- Enel
- Engie
- DNV GL
- Enertrag
- Scatec Solar
- Red Rocket Energies
- Windlab
- Mainstream
- Africoast
- Genesis

FURTHER PROJECTS

Traffic Impact Studies & Site Development Plan Input:

- Nooiensfontein Housing Development, City of Cape Town
- Belhar Housing Development, City of Cape Town
- Baredale Phase 7, City of Cape Town
- Beau Constantia Wine Farm
- Constantia Glen Wine Farm
- Eagles Nest Wine Farm
- Groenvallei Parking Audit, City of Cape Town
- Kosovo Housing Development, Western Cape Government
- Enkanini Housing Development, Stellenbosch
- Delft Housing Development, City of Cape Town
- Secunda Sasol, Free State
- Marula Platinum Mine
- InnerCity Transport Plan, City of Cape Town
- Stellenbosch Road Master Plan
- Nyanga Public Transport Interchange
- Crawford Campus Cape Town
- Durban RoRo Car Terminal, Transnet

- Durban Farewell Container Site
- Msunduzi Waterfront Housing Development
- Transnet Park Site – Traffic Management and Evacuation Plans
- UWC Bellville Medical Campus
- Bloekombos District Hospital
- Malabar Extension 3, Port Elizabeth

Traffic Engineering for Roads Projects:

- Ekhurhuleni Bus Stops and Intersection Safety Assessments
- Namibia Noordoewer to Rosh Pina, Road Agency Namibia
- N2 Section 19 Mthatha – NMT Studies
- R63 Alice to Fort Beaufort – NMT, Road Link and Intersection Studies
- N2 Kangela to Pongola Upgrade
- Cofimvaba Eastern Cape – NMT, Road and Intersection Upgrades
- Stellenbosch R44 Traffic Signals
- Secunda Traffic Signals
- Fezile Dabi District Gravel Roads Upgrade, Free State Province
- Zambia RD Rehabilitation Project
- R61 Eastern Cape – NMT Studies, SANRAL

CONTINUED PROFESSIONAL DEVELOPMENT (CPD)

*Last five years*full CPD list available*

2023 – International Traffic Safety Conference, Doha – Speaker

2022 – 7th Regional Conference for Africa & PIARC International Seminar on Rural Roads and Road Safety - Speaker

2022 – Non-motorised Transport Seminar (SARF) – Co-Organizer / Speaker

2021 – SARF KZN Road Safety Considerations (SARF) – Guest Speaker

2021 – Road Safety Audit Course (IRF) – Guest Speaker

2021 – Legal Obligations / Road Safety Act (SARF) – Presenter

2020 – Understanding Road Accidents (SARF)

2020 – Road Safety Auditor Course (SARF) – Co-Lecturer

2018 – African Road Conference (IRF/SARF/PIARC)

2018 – Road Safety in Engineering (SARF) – Presenter

2016 - SATC Road Safety Audit Workshop Pretoria (SARF)

2015 - Non-motorised Transport Planning (SARF

Annexure B: Specialist Statement of Independence

I, Iris Sigrid Wink, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations, and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist: I Wink ______________________

Name of Company: iWink Consulting (Pty) Ltd

Date: 06-06-2023

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Rhino Solar PV Facility

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	iWink Consulting (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100
Specialist name:	Iris Wink			
Specialist Qualifications:	MSc Eng (Civil_			
Professional affiliation/registration:	PrEng 20110156			
Physical address:	44 Plattekloof Street, Plattekloof Glen			
Postal address:	Same			
Postal code:	7460	Cell:	082 691 9096	
Telephone:	n/a	Fax:	n/a	
E-mail:	iris@iwink.co.za			

2. DECLARATION BY THE SPECIALIST

I, IRIS WINK, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

iWink Consulting (Pty) Ltd

Name of Company:

19/05/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, IRIS WINK, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

iWink Consulting (Pty) Ltd

Name of Company

19/05/2023

Date

Signature of the Commissioner of Oaths

19/05/2023

Date

GUSTAV HEINRICH WEHMEYER
KOMMISSARIS VAN EDE
COMMISSIONER OF OATHS
PRAKTISERENDE PROKUREUR R.S.A.
PRACTISING ATTORNEY R.S.A.
MAHOGANYSINGEL 8, BELLVILLE
7530, R.S.A.

Annexure C: Impact Rating Methodology

Nature (/Status) The project could have a positive, negative or neutral impact on the environment.
Extent • Local - extend to the site and its immediate surroundings. • Regional - impact on the region but within the province. • National - impact on an interprovincial scale. • International - impact outside of South Africa.
Magnitude Degree to which impact may cause irreplaceable loss of resources. • Low - natural and social functions and processes are not affected or minimally affected. • Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way. • High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration • Short term - 0-5 years. • Medium term - 5-11 years. • Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. • Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability • Almost certain - the event is expected to occur in most circumstances. • Likely - the event will probably occur in most circumstances. • Moderate - the event should occur at some time. • Unlikely - the event could occur at some time. • Rare/Remote - the event may occur only in exceptional circumstances.
Significance Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- 0 – Impact will not affect the environment. No mitigation necessary. 1 – No impact after mitigation. 2 – Residual impact after mitigation. 3 – Impact cannot be mitigated.

Example:

FLORA CONSTRUCTION PHASE						
Potential Impact	Mitigation					
Proliferation of alien invasive species.	• To prevent unnecessary alien plant infestations, an alien plant monitoring and eradication programme needs to be in place, at least until the disturbed areas have recovered and properly stabilised. • The construction area and immediate surroundings should be monitored regularly for emergent invasive vegetation. • Promote awareness of all personnel. • Larger exotic species that are not included in the Category 1b list of invasive species could also be allowed to remain for aesthetic purposes					
Without Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Medium	Medium-term	Almost certain	2
With Mitigation	Status	Extent	Magnitude	Duration	Probability	Significance
	Negative	Local	Low	Short-term	Likely	1