FINAL SCOPING REPORT

17 September 2021

THE PROPOSED INGWE PHOTOVOLTAIC SOLAR POWER PLANT NEAR POLOKWANE, LIMPOPO PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	:	14/12/16/3/3/2/2093
Project Title	:	Proposed Ingwe Solar Power Plant near Polokwane, Limpopo Province
Authors	:	Mrs. Carli van Niekerk Ms. Lisa Opperman Ms. Christia van Dyk
Client	:	Ingwe Solar Power Plant (RF) (Pty) Ltd
Report Status	:	Final Scoping Report
Submission date	:	17 September 2021

When used as a reference this report should be cited as: Environamics (2021) Final Scoping Report: Proposed Ingwe Solar Power Plant near Polokwane, Limpopo Province.

TABLE OF CONTENTS

PROJECT DETAIL **2**

TABLE OF CONTENTS **3**

LIST OF TABLES **6**

LIST OF FIGURES **7**

PLATES **8**

APPENDICES **9**

GLOSSARY OF TERMS AND ACRONYMS **10**

CONTEXT FOR THE DEVELOPMENT **12**

EXECUTIVE SUMMARY **14**

1 INTRODUCTION **17**

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT 17

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) 20

1.3 DETAILS OF SPECIALISTS 20

1.4 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT 19

1.5 STATUS OF THE EIA PROCESS 20

1.6 STRUCTURE OF THE REPORT 21

2 ACTIVITY DESCRIPTION **24**

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION 24

2.2 ACTIVITY DESRIPTION 26

2.3 PHOTOVOLTAIC TECHNOLOGY 29

2.4 LAYOUT DESCRIPTION 30

2.5 SERVICES PROVISION 33

3 LEGISLATIVE AND POLICY CONTEXT **36**

3.1 INTRODUCTION 36
3.2 LEGISLATIVE CONTEXT 38
3.3 POLICY CONTEXT 43
3.4 OTHER LEGISLATION 54
3.5 RELEVANT GUIDANCE 54
4 THE NEED AND DESIRABILITY 56
4.1 THE NEED FOR THE PROPOSED ACTIVITY 56
4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY 57
5 DESCRIPTION OF ENVIRONMENTAL ISSUES 60
5.1 CONSIDERATION OF ALTERNATIVES 60
5.1.1 No-go alternative 61
5.1.2 Location alternatives 61
5.1.3 Activity alternatives 62
5.1.4 Technical alternatives 63
5.1.5 Design and layout alternatives 65
5.1.6 Technology alternatives 66
5.2 PUBLIC PARTICIPATION PROCESS 69
5.2.1 General 69
5.2.2 Consultation process 71
5.2.3 Registered I&APs 71
5.2.4 Issues raised by I&APs and consultation bodies 72
5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE 72
5.3.1 Biophysical environment 72
5.3.2 Description of the socio-economic environment 86
5.4 SITE SELECTION MATRIX 90
5.5 CONCLUDING STATEMENT ON ALTERNATIVES 91

6 DESCRIPTION OF THE IMPACTS AND RISKS.....92

6.1 SCOPING METHODOLOGY..... 92

6.1.1 Checklist analysis..... 92

6.1.2 Matrix analysis..... 95

6.2 KEY ISSUES IDENTIFIED..... 108

6.2.1 Impacts during the construction phase..... 108

6.2.2 Impacts during the operational phase..... 129

6.2.3 Impacts during the decommissioning phase..... 140

7 CUMULATIVE EFFECTS ASSESSMENT.....144

7.1 Introduction..... 144

7.2 Geographic Area of Evaluation..... 144

7.3 Temporal Boundary of Evaluation..... 145

7.4 OTHER PROJECTS IN THE AREA..... 146

7.4.1 Existing projects in the area..... 146

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS..... 146

7.5.1 Soil, Land Capability and Agricultural Potential..... 147

7.5.2 Ecology..... 148

7.5.3 Avifauna..... 148

7.5.4 Social Impact Assessment..... 149

7.5.5 Visual Impact Assessment..... 149

7.5.6 Heritage..... 149

7.5.7 Paleontology..... 150

7.5.8 Traffic..... 150

7.6 IMPACT ASSESSMENT..... 150

7.6.1 Potential Cumulative Effects..... 151

7.7 CONCLUSION..... 154

8 PLAN OF STUDY FOR EIA.....156

8.1 INTRODUCTION 156

8.2 ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE 156

8.3 TASKS TO BE UNDERTAKEN 157

8.3.1 Project Description 157

8.3.2 Consideration of alternatives 158

8.3.3 Compilation of Environmental Impact Report 158

8.3.4 Public participation..... 158

8.4 ASPECTS ASSESSED 158

8.4.1 Specialist studies 160

8.4.2 Terms of reference for specialist studies 160

8.5 METHOD OF ENVIRONMENTAL ASSESSMENT 162

8.5.1 Impact Rating System 163

8.6 CONSULTATION WITH THE COMPETENT AUTHORITY..... 167

9 CONCLUSION 168

10 REFERENCES.....170

LIST OF TABLES

Table 1.1: Listed activities

Table 1.2: Details of specialists

Table 1.3: Estimated timeframe for completion of the 'scoping and EIA process'

Table 1.4: Structure of the report

Table 2.1: General site information

Table 2.2: Listed activities

Table 2.3: Technical details for the proposed facility

Table 2.4: Coordinates

Table 3.1: Legislative context for the construction of photovoltaic solar plants

Table 3.2: Policy context for the construction of a photovoltaic solar plants

Table 5.1: Land types, geology, and dominant soil types of the proposed development site

Table 5.2: Protected tree species of concern in the project area

Table 5.3: Declared weeds and invader plants

Table 6.1: Environmental checklist

Table 6.2: Matrix analysis

Table 6.3: Impacts and the mitigation measures during the construction phase

Table 6.4: Impacts and the mitigation measures during the operational phase

Table 6.5: Impacts and the mitigation measures during the decommissioning phase

Table 7.1: A summary of related facilities, that may have a cumulative impact, in a 30 km radius of the site

Table 7.2: Potential Cumulative Effects for the proposed project

Table 8.1: Aspects to be assessed

Table 8.2: The rating system

LIST OF FIGURES

Figure A: Locality Map

Figure B: Regional Map

Figure C: Footprint map

Figure D: Land capability classification Map

Figure E: Vegetation Map

Figure F: Cumulative Impacts Map

Figure G: Sensitivity and Layout Map

Figure H: Sensitivity, Similar Project and Layout Map

Figure I: CAD Layout

Figure J: Proposed access road distance to Wetland-Riparian Channel

Figure 2.1: Map indicating coordinate points of the proposed Ingwe Solar Power plant (including project site and access road)..... 32

Figure 2.2: Map indicating coordinate points of the proposed Ingwe Solar Power Plant proposed power line corridor, BESS and Substation. 33

Figure 5.1: Location of the preferred alternative for the Ingwe Solar Power Plant on the Farm Brandhoek No. 1211 62

Figure 5.2: Global horizontal irradiation values for South Africa (SolarGIS, 2021) 63

Figure 5.3: Bifacial vs Monoficial Solar Panel absorption. 68

Figure 5.4: Surrounding Landowners 71

Figure 5.5: The proposed development site (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium). 75

Figure 5.6: CBAs and Ecological Support Areas 76

Figure 5.7: Location of the project area in relation to listed protected areas 77

Figure 5.8: Man-made dam (exorheic depression) within the project area 79

Figure 5.9: Non-perennial channel and riparian woodland in the project area 81

Figure 5.10: Riparian / wetland delineation map of the proposed development site 81

Figure 5.11: Zone of Theoretical Visibility (ZTV) for the Solar Power Plant 84

Figure 5.12: Zone of Theoretical Visibility (ZTV) for the preferred power line 85

Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines 145

Figure 7.2: Process flow diagram for determining cumulative effects 147

PLATES

Plate 1: The site (taken towards the north)

Plate 2: The site (taken towards the north-east)

Plate 3: The site (taken towards the east)

Plate 4: The site (taken towards the south-east)

Plate 5: The site (taken towards the south)

Plate 6: The site (taken towards the south-west)

Plate 7: The site (taken towards the west)

Plate 8: The site (taken towards the north-west)

Plate 9: The current land use of the site

Plate 10: The N1 access road to the site (taken towards the north)

Plate 11: The N1 access road to the site (taken towards the south)

APPENDICES

Appendix A: EAP declaration & Curriculum Vitae

Appendix B: Screening report

Appendix C: Public Participation

- Appendix C1: Public participation plan
- Appendix C2: Press advertisement
- Appendix C3: On site notice
- Appendix C4: List of I&APs
- Appendix C5: Proof of correspondence
- Appendix C6: Written comments

Appendix D: Developer's Assessment

Appendix E: Specialist Reports

- Appendix E1: Specialist Terms of Reference (ToR)
- Appendix E2: Geotechnical Report
- Appendix E3: Terrestrial biodiversity impact assessment
- Appendix E4: Avifaunal Study
- Appendix E5: Visual Impact Assessment
- Appendix E6: Agricultural Compliance Statement – *to be included in the EIA Report*
- Appendix E7: Heritage Impact Assessment
- Appendix E8: Palaeontological Impact Assessment
- Appendix E9: Social Impact Assessment
- Appendix E10: Traffic Impact Assessment
- Appendix E11: Wetland Riparian Impact Assessment

Appendix F: Additional Information

GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and Environmental Affairs
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998

PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SPP	Solar Power Plant
VU	Vegetation Unit

CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fueled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DMRE (Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 IRP Update, 2010-2030), over the short term (of the next two or three years), clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000 MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

In response to the above, Ingwe Solar Power Plant (RF) (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located on the Farm Brandhoek No. 1211, Registration Division LS, Limpopo Province situated within the Makhado Local Municipality area of jurisdiction (refer to Figure A for the locality map). The project entails the generation of up to

150 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 400 hectares (including supporting infrastructure on site and the grid connection to the national grid). From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 1969.3 kwh/m².

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Makhado Local Municipality faces a number of challenges in addressing the needs and improving the lives of the community such as poverty and high unemployment (IDP, 2020-2022). The Makhado Local Municipality's Integrated Development Plan (IDP, 2020-2022) identifies the vision of the municipality as: "*a dynamic hub for socio-economic development by 2050*". The IDP does not explicitly deal with renewable energy development, but since the Municipality is focussing on socio-economic development, it may be argued that the proposed development will support the objective of economic growth and employment creation.

Ingwe Solar Power Plant (RF) (Pty) Ltd intends to develop a 150MW photovoltaic solar facility and associated infrastructure on the Farm Brandhoek No. 1211, Registration Division LS, Limpopo Province situated within the Makhado Local Municipality area of jurisdiction. The town of Polokwane is located approximately 64km southwest and Louis Trichardt is located approximately 38km north-northeast of the proposed development (refer to Figure A and B for the locality and regional map). The total footprint of the project will approximately be 400 hectares (including supporting infrastructure on site and the associated grid connection). The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access via a main road (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 324-327, as amended (2017), Environmental Authorisation is required for the Ingwe Solar Power Plant. The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- *Activity 24 (ii) (GN.R 327): "The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters"*
- Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*

- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectare or more of indigenous vegetation..."*
- Activity 10 (e)(i) (GN.R 324): "The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."

Activities required for the development of the solar facility which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 and 324) implies that the development could potentially have an impact on the environment that will require mitigation. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. Environamics has been appointed as the independent consultant to undertake the EIA on behalf of Ingwe Solar Power Plant (RF) (Pty) Ltd.

Regulation 21 of the EIA Regulations requires that a scoping report must contain the information set out in Appendix 2 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 2 of GNR326 requires that information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process undertaken be set out in the scoping report. It has been determined through the scoping process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically where the affected landowner is experiencing challenges and limitations in terms of the current agricultural land use. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarised below.

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 18-24 months. The potentially most significant impacts relate to Habitat destruction caused by clearance of vegetation, habitat Fragmentation, increased soil erosion and sedimentation, impact on the characteristics of the watercourse, displacement of priority avian species from important habitats, loss of important avian habitats as well as socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and impacts on daily living and movement patterns.

Impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally

associated with habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, collision when flying into power line infrastructure, electrocution when perched on power line infrastructure, visual impacts (road users and surrounding landowners). The operational phase will have a direct positive impact through the provision of employment opportunities and skills development for its duration, the development of non-polluting, renewable energy infrastructure and the contribution to Local Economic Development (LED) and social upliftment.

Impacts during the decommissioning phase:

The negative impacts generally associated with the decommissioning phase include: habitat destruction caused by clearance of vegetation, impact on the characteristics of the watercourse and the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created in the process. It is not expected that the facility will be decommissioned, but rather that the technology used will be upgraded.

Cumulative impacts:

The cumulative impacts for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Limpopo Province. No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

Regulation 23 of the EIA Regulations determine that an EIA report be prepared and submitted for the proposed activity after the competent authority approves the final scoping report. The EIA report will evaluate and rate each identified impact and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation Appendix 3 of the EIA Regulations.

1 INTRODUCTION

This section aims to introduce the Scoping Report and specifically to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include- (a) details of:
(i) the EAP who prepared the report; and
(ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The EIA Regulations No. 324, 325 and 327 outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

Table 1.1: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per the project description**:
GNR. 327 (as amended in 2017)	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a / one power line (132 kV) and an on-site HV/MV substation (130 MVA). For the preferred power line corridor, the power line will be constructed in a ~2.5km long and 100 m wide corridor. It is expected that generation from the facility will tie in with the Eskom TABOR

		275/132kV MTS Substation.
GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;"* • Activity 24(ii) is triggered as the internal roads of the solar power plant will vary between 6 and 12 meters in width. The main access road will have a maximum width of up to 12 meters and will be 180 m in length.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as the portions of the affected farm has been previously used for grazing and the property will be re-zoned to "special" use. The development footprint of the solar power plant will be 400ha in extent.
GNR. 325 (as amended in 2017)	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 150 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of the vegetation type the preferred site falls within the Carletonville Dolomite Grassland which is described by Mucina and Rutherford (2006) as 'vulnerable'. Activity 15 is triggered since portions of the site have not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be

		400 ha.
GNR. 324 (as amended in 2017)	Activity 10 (e)(i)	• *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."* • Activity 10 (e)(i) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in closed containers to be located on bunded surfaces with a capacity of 80 cubic metres, to be located within the development footprint of the project. The project is located within the Limpopo Province.

The activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 and 324) for the project implies that the development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. According to Appendix 2 of Regulation 326 the objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an identification of impacts and risks and ranking process of such impacts and risks;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an identification of impacts and risks inclusive of identification of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence,

extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and

- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

This report is the Final Scoping Report submitted to the Department of Forestry, Fisheries and the Environment (DFFE) for review and comment. According to Regulation 326 all registered I&APs and relevant State Departments (including Organs of State) have been allowed the opportunity to review and provide comment on the scoping report. The Draft Scoping Report was made available to I&APs and all relevant State Departments. They were requested to provide written comments on the report within 30 days of receiving it. All issues identified and comments received during the review period have been documented and compiled into a Comments and Response Report included as part of this Final Scoping Report.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the EIA and prepare all required reports. All correspondence to the EAP can be directed to:

Contact person:	Lisa Opperman
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	084 920 3111 (Cell)
Electronic Mail:	lisa@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the EIA. In terms of the independent status of the EAP a declaration is attached as Appendix A to this report. The expertise of the EAP responsible for conducting the EIA is also summarized in the curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix E to this report. The expertise of the specialists is also summarized in their respective reports.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Avifaunal Study	Agreenco	ASH Haagner	PO Box 19896 Noordbrug, 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Terrestrial biodiversity impact assessment	AGES Limpopo	Dr. BJ Henning	PO Box 2526, Polokwane 0700	Cell: 015 291 1577	bhenning@ages-group.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	NATURA VIVA CC	Dr. John Almond	PO Box 12410 Mill Street Cape Town, 8010	Cell: 021 462 3622	naturaviva@universe.co.za
Agricultural & Soils Impact Assessment	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Phala Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus 9515	Cell: 082 316 7749	phala.env@gmail.com
Social Impact Assessment	Phala Environmental Consultants	Marelie Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	phala.env@gmail.com
Traffic Assessment Study	BVi Consulting Engineers	Liza van Zyl	Edison Square, Century City, 7441	Cell: 060 557 7467	dirkvdm@bviwc.co.za
Geotechnical Feasibility Investigation	SMEC	Richard Roberts	267 Kent Avenue, Ferndale, Randburg, 2194	Tel: 011 369 0600	johannesburg@smec.com

1.4 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT

The table included below provides an indication of the specialist studies identified by the DFFE Screening Tool Report (Appendix B), an indication of whether the studies are undertaken or not and a motivation or confirmation of the studies being included or not.

Study identified in the DFFE Screening Tool	Study included?	Confirmation / motivation
Agricultural Impact Assessment	Yes	The Agricultural Study will be included as part of the EIA Report for the project should the DFFE accept the Scoping Report and give approval for the commencement of the EIA Phase.
Landscape / Visual Impact Assessment	Yes	Refer to Appendix E5.
Archaeological and Cultural Heritage Impact Assessment	Yes	Refer to Appendix E7.
Palaeontological Impact Assessment	Yes	Refer to Appendix E8.
Terrestrial Biodiversity Impact Assessment	Yes	Refer to Appendix E3.
Aquatic Biodiversity Impact Assessment	Yes	Refer to Appendix E11.
Avian Impact Assessment	Yes	Refer to Appendix E4.
Civil Aviation Assessment	No	The Civil Aviation Authority has been consulted regarding the development of the project since the commencement of the EIA Process. No specific negative impacts or issues have been raised to date by the CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity, but rather low sensitivity.
Defence Assessment	No	The defence theme sensitivity is low for the entire extent of the site and the grid connection corridor.
RFI Assessment	No	The RFI theme sensitivity is medium for the entire extent of the site and the grid connection corridor.
Geotechnical Assessment	Yes	Refer to Appendix E2.
Socio-Economic Assessment	Yes	Refer to Appendix E9.
Plant species Assessment	Yes	Refer to Appendix E3. The Terrestrial Biodiversity Impact Assessment also includes the relevant Plant Species Assessment.

Animal Species Assessment	Yes	Refer to Appendix E3. The Terrestrial Biodiversity Impact Assessment also includes the relevant Animal Species Assessment.

1.5 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 326. Table 1.2 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A pre-application meeting request and public participation plan was submitted to DFFE on 05 March 2021.
- The DFFE accepted the public participation plan in an email dated 29 March 2021.
- A newspaper advertisement was placed in the Limpopo Mirror, on 25 June 2021, informing the public of the EIA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 15 April 2021.
- Site notices were erected on site on 15 April 2021 for the informing the public of the commencement of the EIA process.
- An application form and the draft Scoping Report was submitted to DFFE on 17 August 2021.
- The draft Scoping Report was made available for a 30-day review and comment period from 18 August 2021 to 16 September 2021.

It is envisaged that the Final Scoping Report will be submitted to the Department in August 2021 and that the Final Scoping Report will be accepted by the Department in October 2021. The EIA process should be completed within approximately nine months of submission of the Draft Scoping Report, i.e. by April 2022 – see Table 1.3.

Table 1.3: Estimated timeframe for completion of the 'scoping and EIA process'

Activity	Prescribed timeframe	Timeframe
Site visit		April 2021
Public participation (BID, press advert, site notice)	30 Days	25 June – 26 July 2021
Submit application form and DSR	-	By 17 Aug. 2021
Public participation (DSR)	30 Days	18 Aug. – 16 Sept. 2021

Submit FSR	44 Days	Sept. 2021
Department acknowledges receipt	10 Days	Oct. 2021
Department approves/reject	43 Days	By Nov. 2021
Public participation (DEIR)	30 Days	Nov. 2021
Submission of FEIR & EMPr	-	Dec. 2021
Department acknowledges receipt	10 Days	Dec. 2021
Decision	107 Days	March 2022
Department notifies of decision	5 Days	March 2022
Registered I&APs notified of decision	14 Days	March 2022
Appeal	20 Days	April 2022

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 2 of Regulation No.326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: **Structure of the report**

Requirements for the contents of a scoping report as specified in the Regulations		**Section in report**
Appendix 2. (2) - A scoping report must contain all the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include-		
(a)	details of -	1
	(i) the EAP who prepared the report; and	
	ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	

	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered;	
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.	
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	3
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including –	5
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) the outcome of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(g)	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6

	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
(i)	a plan of study for undertaking the environmental impact assessment process to be undertaken, including-	8
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	
	(ii) a description of the aspects to be assessed as part of the EIA process;	
	(iii) aspects to be assessed by specialists;	
	(iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists;	
	(v) a description of the proposed method of assessing duration and significance;	
	(vi) an indication of the stages at which the competent authority will be consulted;	
	(vii) particulars of the public participation process that will be conducted during the EIA process; and	
	(viii) a description of the tasks that will be undertaken as part of the EIA process;	
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	
(j)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A to the report
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	(iii) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	
(k)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and I&APs on the plan of study for undertaking the EIA;	
(l)	where applicable, any specific information required by the CA; and	N/A
(m)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 ACTIVITY DESCRIPTION

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(b) the location of the activity, including-

(i) the 21-digit Surveyor General code of each cadastral land parcel;

(ii) where available, the physical address and farm name;

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity applied for at an appropriate scale, or, if it is-

(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including-

(i) all listed and specified activities triggered;

(ii) a description of the activities to be undertaken, including associated structures and infrastructure.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a photovoltaic solar facility and associated infrastructure on the Farm Brandhoek No. 1211, Registration Division LS, Limpopo Province situated within the Makhado Local Municipality area of jurisdiction. The proposed development is located in the Limpopo Province in the northern interior of South-Africa (refer to Figure B for the regional map). The town of Polokwane is located approximately 64km southwest and Louis Trichardt is located approximately 38km north-northeast of the proposed development (refer to Figure A for the locality map).

The project entails the generation of up to 150MW electrical power through photovoltaic (PV) panels. The total footprint of the project will approximately be 400 hectares (including supporting infrastructure on site) – refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Ingwe Solar Power Plant (RF) (Pty) Ltd from the property owner, De Nysschen Broers Boerdery CC for the life span of the project (minimum of 20 years). It is expected that generation from the facility will tie in with the Eskom Tabor 275/132 kV MTS substation.

Table 2.1: **General site information**

Description of affected farm portion	<u>Solar Power Plant:</u> • Farm Brandhoek No. 1211 <u>Power Line Corridor:</u> • Farm Brandhoek No. 1211 • Remaining Extent of Portion 2 of the Farm Leeuwdoorns 472 • Portion 1 of the Farm Brandhoek 419 • Farm Joppa 1209 • Portion 1 of the Farm Joppa 473
21 Digit Surveyor General codes	<u>Solar Power Plant:</u> • Farm Brandhoek No. 1211 - T0LS00000000121100000 <u>Solar Power Plant:</u> • Farm Brandhoek No. 1211 - T0LS00000000121100000 • Remaining Extent of Portion 2 of the Farm Leeuwdoorns 472 - T0LS00000000047200002 • Portion 1 of the Farm Brandhoek 419 - T0LS00000000041900001 • Farm Joppa 1209 - T0LS00000000120900000 • Portion 1 of the Farm Joppa 473 - T0LS00000000047300001
Title Deed	T28119/2013
Photographs of the site	Refer to the Plates
Type of technology	Photovoltaic solar facility
Structure Height	• Panels ~6m, • buildings ~ 6m, • power lines ~32m and • battery storage facility ~8m

Battery storage	Within a 4ha area within the development footprint
Surface area to be covered	Approximately 400 ha
Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure 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 equivalent to the latitude at which the site is located in order to capture the most sun.
Laydown area dimensions	Assessed 400 hectares for the development of the solar power plant and a 2.5 km long and 100 m wide corridor for the placement of the proposed power line.
Generation capacity	Up to 150MW
Expected production	165-205 GWh per annum

The site is located in a rural area and is bordered by agricultural land uses. The site survey revealed that the site currently consists of grazing for cattle – refer to plates 1-11 for photographs of the site. The property on which the development is to be established is owned by De Nysschen Broers Boerdery CC.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per the project description**:
GNR. 327 (as amended in 2017)	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a / one power line (132 kV) and an on-site HV/MV substation (130 MVA). For the preferred power line corridor, the

		power line will be constructed in a ~2.5km long and 100 m wide corridor. It is expected that generation from the facility will tie in with the Eskom TABOR 275/132kV MTS Substation.
GNR. 327 (as amended in 2017)	Activity 24(ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;"* • Activity 24(ii) is triggered as the internal roads of the solar power plant will vary between 6 and 12 meters in width. The main access road will have a maximum width of up to 12 meters and will be 180 m in length.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as the portions of the affected farm has been previously used for grazing and the property will be re-zoned to "special" use. The development footprint of the solar power plant will be 400ha in extent.
GNR. 325 (as amended in 2017)	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 150 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of the vegetation type the preferred site falls within the Carletonville Dolomite Grassland which is described by Mucina and Rutherford (2006) as 'vulnerable'. Activity 15 is triggered since portions of the site have not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares

		of indigenous vegetation will be removed. The development footprint of the solar power plant will be 400 ha.
GNR. 324 (as amended in 2017)	Activity 10 (e)(i)	• *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."* • Activity 10 (e)(i) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in closed containers to be located on bunded surfaces with a capacity of 80 cubic metres, to be located within the development footprint of the project. The project is located within the Limpopo Province.

The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- Site clearing and preparation: Certain areas of the site and access road will need to be cleared of vegetation and some areas may need to be levelled.

- Civil works to be conducted:

    - Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
    - Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
    - Construction of access and inside roads/paths – Access will be obtained from the R505 Regional Road onto a proposed new gravel access road situated adjacent the development footprint where direct access will be obtained to the facility. An internal site road network will also be required to provide access to the solar field and associated infrastructure.
    - Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e. semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce up to 150MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.

- Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Ingwe Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with Tabor 275/132kV MTS Substation. The Project will inject up to 100MW into the National Grid. The installed capacity will be approximately 150MW.

  There is one connection line route proposed to the Tabor 275/132kV MTS Substation and is approximately 2.5 km long. The proposed power line route should be assessed within a 100m wide corridor. The area surrounding the substation were also assessed.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:

  - Office (~200 m²);
  - Switch gear and relay room (~400 m²);
  - Staff lockers and changing room (~200 m²); and

- Security control (~60 m²)

- Battery Energy Storage System – Up to 500 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m³ of batteries and associated operational, safety and control infrastructure.

- Storage of dangerous goods – Storage facilities will be required for limited dangerous for the construction and operation of the solar power plant. The storage will be within SABS approved containers with a combined capacity of 80 cubic meters, which will be located on bunded surfaces within the development footprint of the facility.

- Roads – Access will be obtained from the N1 National Road onto a proposed new gravel access road situated adjacent the development footprint where direct access will be obtained to the facility. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding properties. Fencing with a height of 2.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan will consider and adhere to the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site – refer to figure G. The total surface area proposed for layout options include the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power line, onsite substation and switching station and perimeter fences). Limited features of environmental significance exist on site apart from the man-made dam (exorheic depression), non-perennial channels and riparian woodlands. Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	400 Hectares (EIA footprint)
Number of inverters required	Minimum 50
Area occupied by inverter / transformer stations / substations / BESS	Central inverters+ LV/MV trafo: 20 m^2 HV/MV substation with switching station: 15 000 m^2 BESS: 4 000 m^2
Capacity of on-site sub- and switching station	Minimum 130MVA in HV/MV substation
Area occupied by both permanent and	Permanent Laydown Area: 300ha

construction laydown areas	Construction Laydown Area: ~2000 m^2
Area occupied by buildings	Security Room: ~60 m^2 Office: ~200 m^2 Staff Locker and Changing Room: ~200 m^2
Battery storage facility	Maximum height: 8 m Maximum volume: 1740 m^3 Capacity: 500MW
Length of internal roads	Approximately 20 km
Width of internal roads	Between 6 & 12 meters
Proximity to grid connection	Approximately 2.5 kilometers (preferred alternative)
Height of fencing	Approximately 2.5 meters

Table 2.4 provide the coordinate points for the proposed project site and power line corridor.

Table 2.4: Coordinates

Coordinates			
Project Site	A	23°22'46.82"S	29°46'1.60"E
	B	23°22'44.89"S	29°44'35.76"E
	C	23°21'56.42"S	29°44'36.19"E
	D	23°21'56.30"S	29°46'7.56"E
	E	23°22'29.82"S	29°46'8.09"E
Proposed Access Preferred	1	23°22'45.91"S	29°46'2.07"E
	2	23°22'45.69"S	29°45'56.39"E
Alternative Access	1	23°22'11.38"S	29°46'20.81"E
	2	23°22'17.12"S	29°46'15.24"E
	3	23°22'25.68"S	29°46'9.76"E
	4	23°22'45.27"S	29°46'7.56"E
	5	23°22'45.84"S	29°46'1.46"E
	6	23°22'45.71"S	29°45'56.39"E
100m wide Power Line Corridor (preferred alternative)	1	23°22'41.73"S	29°45'55.19"E
	2	23°22'48.64"S	29°46'51.70"E
	3	23°22'30.08"S	29°46'51.34"E
	4	23°22'29.89"S	29°47'4.16"E
	5	23°22'53.40"S	29°47'4.29"E
	6	23°22'53.40"S	29°46'8.56"E
	7	23°22'46.39"S	29°46'1.79"E
	8	23°22'47.43"S	29°46'1.36"E
	9	23°22'47.17"S	29°45'50.07"E

	10	23°22'41.82"S	29°45'49.94"E
Battery Energy Storage Facility (BESS)	A	23°22'34.56"S	29°45'48.03"E
	B	23°22'34.52"S	29°45'55.03"E
	C	23°22'40.93"S	29°45'55.15"E
	D	23°22'41.02"S	29°45'48.15"E
Substation	A	23°22'41.70"S	29°45'55.20"E
	B	23°22'41.76"S	29°45'49.97"E
	C	23°22'45.02"S	29°45'50.03"E
	D	23°22'44.91"S	29°45'55.29"E

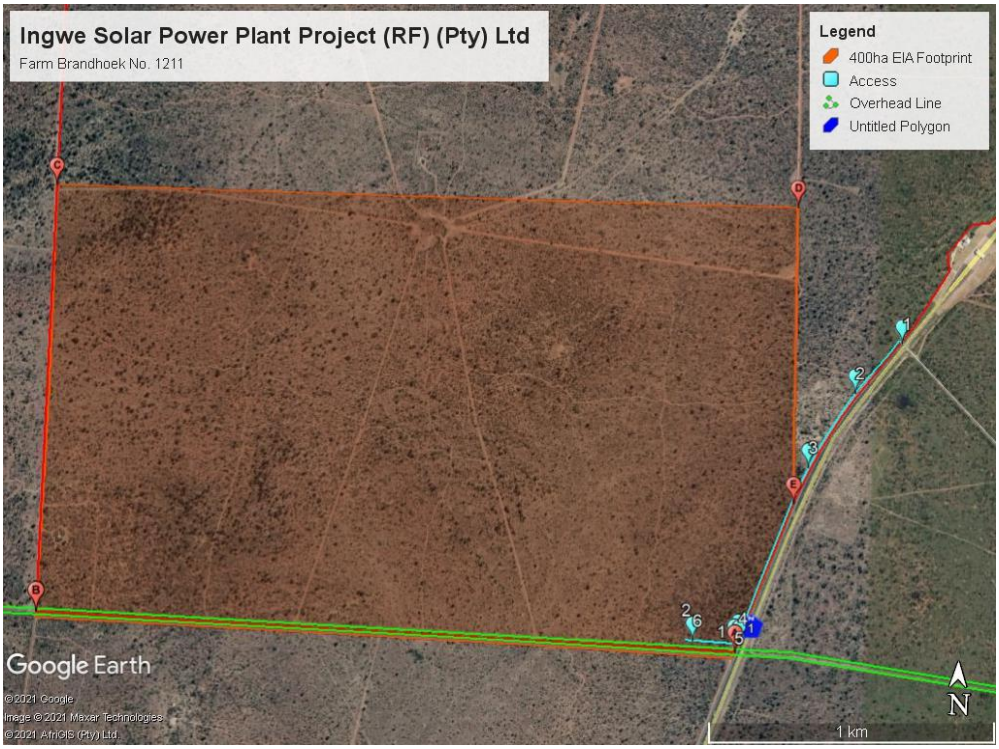


Figure 2.1: Map indicating coordinate points of the proposed Ingwe Solar Power plant (including project site and access road)

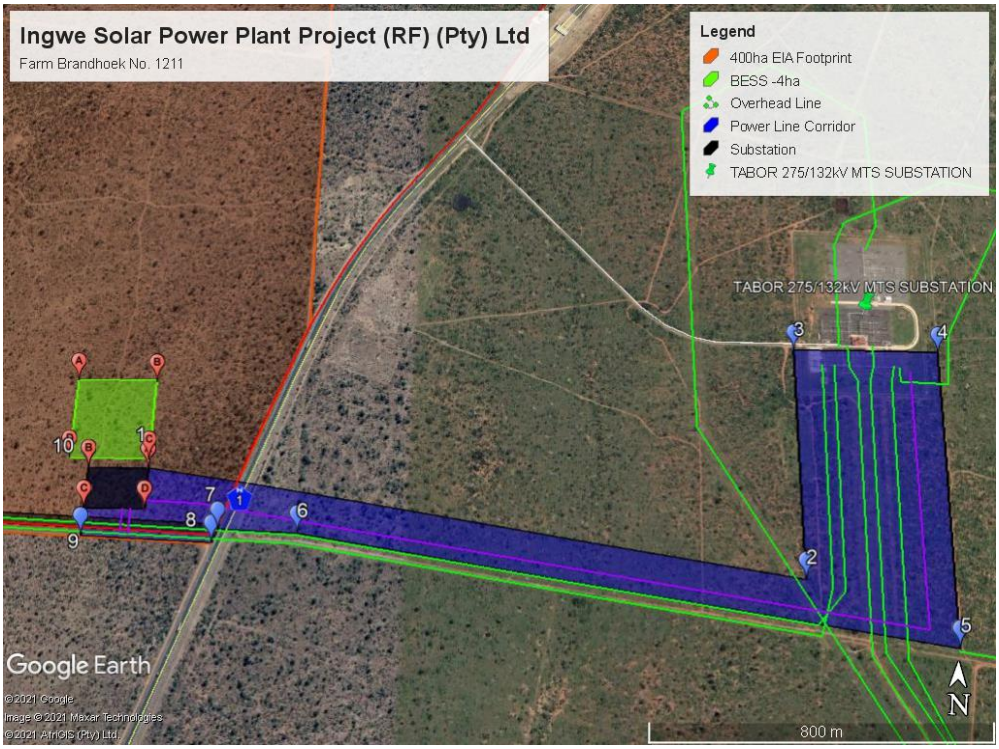


Figure 2.2: Map indicating coordinate points of the proposed Ingwe Solar Power Plant proposed power line corridor, BESS and Substation.

2.5 SERVICES PROVISION

The following sections provides information on services required on the site e.g. water, sewage, refuse removal, and electricity.

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources, or alternatively from the local municipality. The Department of Water and Sanitation confirmed the water resource availability in the relevant catchment management area in order to ensure sustainable water supply (refer to Annexure F). A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has obtained preferred bidder status by the Department of Mineral Resources and Energy.

The estimated maximum amount of water required during construction is 1200m³ per month during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 4200m³ per annum. The majority of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning, the total amount of 460000 panels will require 920 000 litres per wash. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quarterly cleaning (March, May, July, and September). This totals approximately 4,200,000 litres

per annum for washing and allows 200,000 litres per annum (or 548 litres per day) for toilet use, drinking water, etc. This total to approximately 4 200m³ of water required per annum. Drinking water supplied will comply with the SANS:241 quality requirements and it is noted that the Makhado Local Municipality remains the Water Service Authority in the area.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of stormwater, the capture and use of rainwater from gutters and roofs would be considered by the developer. Furthermore, indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Stormwater management and mitigation measures will be included in the Environmental Management Programme (EMPr) to be submitted as part of the EIR.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed landfill site. The construction- and hazardous waste will be removed and disposed of at licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality. The relevant Local Municipality(s) will be contacted, to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years).

2.5.4 Electricity

During the construction phase of the development, electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the farm will be utilised. This will depend on the Engineering, Procurement, and Construction (EPC) contractor appointed. During operation electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sourced from the photovoltaic plant, and from the electricity connection at night.

2.6 Decommissioning of the facility

The operating period will be 20 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures to improve the efficiency of the facility as the technology improves.

The specifications of these new panels will be the same as the current panels under consideration, but the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that are the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase.

The decommissioning process will consist of the following steps:

- The PV facility would be disconnected from the Eskom grid.
- The inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- Wastewater storage conservancy tank would be responsibly removed and area would be rehabilitated.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

The rehabilitation of the site would form part of the decommissioning phase. The aim would be to restore the land to its original form (or as close as possible). The rehabilitation activities would include the following:

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and
- Restoration of the surface to the original contours and application of hydro seeding.

3 LEGISLATIVE AND POLICY CONTEXT

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the DFFE as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in the IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The National Forests Act, 1998 (Act 84 of 1998)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Energy Plan (IEP) (2016)
- Integrated Resource Plan (IRP) for South Africa (2010-2030) (2019)
- National Development Plan of 2030 (2012)
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Limpopo Provincial Spatial Development Framework (PSDF) (2014)

- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Vhembe DM Final Integrated Development Plan (IDP) 2020–2021 (2020)
- Makhado Local Municipality Draft Integrated Development Plan 2020-2021 (2020)
- Makhado LM Local Municipality Spatial Development Framework (2018)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 3.1 and 3.2 to provide a reference framework for the implications for the proposed activity.

3.2 LEGISLATIVE CONTEXT

Table 3.1: Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa (Act No. 108 of 1996)	National Government	1996	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that "everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people's environmental right and places government under a legal duty to act as a responsible custodian of the country's environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development. The development of the Ingwe Solar Power Plant and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.
The National Environmental Management Act (Act No. 107 of 1998)	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) and	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the

	the Limpopo Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. The EIA process undertaken for the Ingwe Solar Power Plant is in-line with the requirements of NEMA for the Application for Environmental Authorisation.
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble). Considering that the Ingwe Solar Power Plant is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.
The National Water Act (Act No. 36 of 1998)	Department of Water Affairs (now known as Department of Water and Sanitation)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible

			under the Act. Chapter 4 of the Act lays the basis for regulating water use. The site is located within the A71C and A71D quaternary catchments and is situated in the Limpopo Water Management Area. Should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license.
National Environmental Management: Waste Act (Act No. 59 of 2008)	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered.
National Environment Management: Air Quality Act (Act No. 39 of 2004)	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.

The National Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	1999	The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS for the Ingwe Solar Power Plant and all relevant documents were submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix E7.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long term lease agreement.

			An Agricultural Compliance statement will be undertaken for the Ingwe Solar Power Plant and will be included as part of the EIR.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. A Terrestrial biodiversity impact assessment has been undertaken for the Ingwe Solar Power Plant and is included in Appendix E3.
The National Roads Act, 1998 (Act No. 7 of 1998)	South African National Roads Agency Limited (SANRAL)	1998	This Act makes provision for a national roads agency for the Republic to manage and control the Republic's national roads system and take charge, amongst others, of the development, maintenance and rehabilitation of national roads within the framework of government policy. As access to the site proposed for development is off the N1 national road, SANRAL has been consulted as part of this EIA process.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the construction of photovoltaic solar plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The White Paper on the Energy Policy of the Republic of South Africa	Department of Mineral Resources and Energy	1998	The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives: • Increasing access to affordable energy services • Improving energy governance • Stimulating economic development • Managing energy-related environmental and health impacts • Securing supply through diversity • Energy policy priorities The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist. The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include: • Minimal environmental impacts in operation in comparison with traditional supply technologies; and • Generally lower running costs, and high labour intensities. Disadvantages include: • Higher capital costs in some cases; • Lower energy densities; and

			• Lower levels of availability, depending on specific conditions, especially with sun and wind based systems. The Ingwe Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.
The White Paper on Renewable Energy	Department of Mineral Resources and Energy	2003	This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix). The Ingwe Solar Power Plant is in line with this paper as it proposes the generation of renewable energy from the solar resource.
Integrated Energy Plan (IEP) (2016)	Department of Mineral Resources and Energy	2016	The Integrated Energy Plan (IEP) (which was developed under the National Energy Act (No. 34 of 2008)), recognises that energy is essential to many human activities, and is critical to the social and economic development of a country. The purpose of the IEP is essentially to ensure the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising associated adverse environmental impacts. Energy planning therefore needs to balance the need for continued economic growth with social needs, and the need to protect the natural environment.

			The 8 key objectives of the integrated energy planning process, are as follows: • Objective 1: Ensure security of supply. • Objective 2: Minimise the cost of energy. • Objective 3: Promote the creation of jobs and localisation. • Objective 4: Minimise 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. • Objective 8: Increase access to modern energy. The Ingwe Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.
Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2019	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.25GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro, and gas. Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant

			performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018. According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5. The Ingwe Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.
National Development Plan of 2030	The Presidency: National Planning Commission	-	The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge. The development of the Ingwe Solar Power Plant will contribute to the intervention strategy as identified within the plan.
National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretches over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2)

			knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow: - SIP 8: Green energy in support of the South African economy; - SIP 9: Electricity generation to support socio-economic development; and - SIP 10: Electricity transmission and distribution for all. SIP 8 according to the Plan "*support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities*". The purpose of SIP 9 according to the Plan is to "*accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances*". SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" (RSA, 2012:20). The Ingwe Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource which supports socio-economic development and will contribute to meeting the electricity demand of the country as set out in this plan.
New Growth Path Framework	Department of Economic Development	-	The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b). This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy on the long-term. It is stated in the framework that in order for this framework to reach its

			objectives, the Government is committed to: - Identify the possible areas of employment creation; and - Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b). This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term. Considering that the construction of and investment in renewable energy is a key are identified within the framework, the Ingwe Solar Power Plant is considered to be in-line with the framework.
Climate Change Bill	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2018	On 08 June 2018 the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill: • Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance; • Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response; • Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and

			environmental development to proceed in a sustainable manner. Ingwe Solar Power Plant comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee	2010 - 2030	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility: • SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. • SIP 9: Electricity generation to support socio-economic development: The proposed Springbok Solar Power Plant is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. Ingwe Solar Power Plant could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs.

Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2014	The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit.
Limpopo Provincial Spatial Development Framework (PSDF)	Limpopo Provincial Government	2014	The formulation of a Spatial Development Framework, being a macro spatial plan for the Limpopo Province and its municipalities requires some statement on the spatial development objectives which guided the formulation of the macro spatial plan and hierarchy of settlements. The main objective with the provincial SDF was to formulate a spatial framework which would guide and encourage equitable distribution of investment in terms of a functional settlement hierarchy, to achieve spatially balanced development across the Limpopo Province and support investment in sustainable settlements. Other spatial development objectives which guided the formulation of the macro spatial plan as well as policy and strategy formulation for implementation are: • The review and confirmation of the hierarchy of settlements (both towns and villages) by

establishing an optimal and functional spatial pattern for districts and thus the Limpopo Province over time;

- Rationalize and promote the optimal use of land and protection of natural resources by taking into account high/moderate potential agricultural areas, high/moderate environmental sensitivity areas and mining/mineral deposit areas as well as other relevant factors;
- The establishing of a functional spatial pattern with a hierarchy of settlements which provides a sound basis for long term sustainable economic growth to amongst others increase income and employment in both the formal and informal sectors in urban, as well as rural areas;
- Provide guidelines for the development of transportation and utility networks to strengthen the functional linkages between settlements in terms of a hierarchy of settlements; and
- The successful integration of planning on macro (national and provincial) level and micro (district and local municipality) level.

Secondary objectives pertaining to the Environmental aspects and Agricultural potential of soils, namely:

The objectives of adding an environmental perspective to the spatial framework are:

- To ensure that resources in the province are used to their fullest potential in promoting, protecting and managing a sustainable environment;
- To include information contained in available databases to assist with decision making at strategic and project level assist in decision-making.
- To identify areas with high, moderate and low environmental sensitivity in order to assist with the correct placement of proposed developments from a strategic perspective;
- To ensure that environmental issues are identified and adequately addressed from the early planning phases and mitigated to an acceptable level; and
- To determine the environmental approach and studies needed for proposed developments in

			the different sensitivity areas The development of the Ingwe Solar Power Plant is in-line with the framework based on the contributions and opportunities presented by a development of this nature.
Vhembe District Municipality Draft Integrated Development Plan (IDP) 2020-2021	Vhembe District Municipality	2020	The long-term vision of the Vhembe DM is to be the: "A Developmental Municipality focusing on Sustainable Service Delivery and Socio-Economic Development towards an Equal Society." The above stated vision defines what the Vhembe DM would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is: "To be an accountable and community driven municipality in addressing poverty and unemployment through sustainable socio-economic development and service delivery". The SIPS provide an integrated framework for the delivery and implementation of social and economic infrastructure across the face of South Africa. Some of the SIPSs include catalytic projects that can be used to fast-track growth, address unemployment and reduce poverty and inequality. Due to the various nature and geographic spatial locations, the municipality is only involved in a few of the SIPS. The municipality's plans will be aligned with these SIPs in an effort to respond to national government's service delivery initiatives. Furthermore, work is to be done to align key cross-cutting areas, namely human settlement planning and skills development in line with each of the Strategic Infrastructure Projects, especially: - Green Energy in support of the South African economy (SIP 8): Supporting sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010). - Electricity Generation to support socio-economic development (SIP 9): acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy; and addressing historical imbalances. Considering the plans for the alignment of the DM's plans with SIP 8 and SIP 9 it is confirmed that the Ingwe Solar Power Plant is in line with the plan.

Makhado Local Municipality Final Integrated Development Plan (IDP) 2020-2021	Makhado Local Municipality	2020	The vision of the Makhado is to be "A developmental municipality dedicated to the social and economic upliftment of its communities." The Mission Statement is: "Sustainable service delivery through: transparent administration, dedicated staff, implementation of municipal programmes and consultation with communities". The development of the Ingwe Solar Power Plant will contribute to the local economy of the area and therefore assist (albeit to a limited extent) to socio-economic growth.
Makhado Local Municipality Spatial Development Framework	**Makhado Local Municipality**	**2018**	The spatial development vision is aligned with the municipal general vision and mission statements: "A developmental Municipality dedicated to the social and economic upliftment of its communities". Its mission is: "Sustainable service delivery through transparent administration, dedicated staff, implementation of municipal programmes and consultation with communities". The municipal area is characterised by low to medium income, high unemployment and low skills. Because of the high level of needs in the area, the Municipality has been categorized as a Priority 1 Investment Area in the Province. Taking also into account the National Spatial Development perspective which states that economic growth and employment creation should be focussed in areas where it will be most effective and sustainable in terms of local potential, and supporting restructuring (addressing the mismatch where people have to live and work), the spatial development vision for Makhado LM was formulated: "Address key national, provincial and local priorities by focussing the provision of socio-economic infrastructure in areas with the highest growth potential (with prospects of the highest return on capital and social upliftment) but still attending to the basic needs of people elsewhere." The development of the Ingwe Solar Power Plant will contribute to the local economy of the area and therefore assist (albeit to a limited extent) to socio-economic growth and the alleviation of poverty.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

- Planning legislation governing the rezoning process and approval of the layout plan.
- Design standards and legislation for services provision such as water, sewerage, electricity, etc.
- Municipal bylaws related to building plans, building regulations, etc.

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEA, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

3.6 CONCLUSION

The EIA was undertaken in accordance with the EIA Regulations (2017) published in GNR 326, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents and national guidelines.

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed development. For this reason, the proposed development project will be assessed in terms of its fit with the key legislative, policy and planning documents discussed above.

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the development of the Ingwe Solar Power Plant. The White Paper on the Energy Policy of the Republic of South Africa of 1998 stated that due to the fact that renewable energy resources operate from an unlimited resource base, i.e. the sun, renewable energy can increasingly contribute towards a long-term sustainable energy supply for future generations. This policy further highlights that due to the unlimited resources base of renewable energy in South Africa, renewable energy applications, like PV solar energy and associated infrastructure, are more sustainable in terms of social and environmental costs. The Integrated Resource Planning for Electricity for South Africa of 2010–2030, the National Infrastructure Plan of South Africa and the New Growth Path Framework all support the development of the renewable energy sector. In particular, the IRP also indicated that 43% of the energy generation in South Africa is allocated to renewable energy applications. On a District and Local level limited attention is given explicitly to renewable sources like PV solar energy, however the documents reviewed do make provision for increase energy supply and efficiency in improving the quality of lives in terms of efficient physical infrastructure as well as socio-economic growth. At Provincial, District and Local level the policy documents support the applications of renewables.

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed Ingwe Solar Power Plant is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include – (f) a motivation for the need and desirability of the activity in the context of the preferred location.

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the Word bank estimates that these results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO_2 emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 as per table 4.1 below:

Table 4.1: Published Draft IRP 2018 (Approved by Cabinet for Consultation)

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	**33 847**	**1 860**	**4 696**	**2 912**	**7 958**	**11 442**	**600**	**11 930**	**499**	**2600**
Installed Capacity Mix (%)	**44.6**	**2.5**	**6.2**	**3.8**	**10.5**	**15.1**	**0.9**	**15.7**	**0.7**	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The facility's contribution towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Limpopo Province. The project will likely encounter widespread support from government, civil society and businesses,

all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment.

- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will soon be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.

- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO2 emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.

- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies).

- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.

- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better quality environment for employees and nearby communities.

- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the power plant. In

future, this experience can be employed at other similar solar installations in South Africa.

- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full time basis. Approximately 800 employment opportunities will be created during the construction and operational phases.

- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.

- Effective use of resources – Due to the climate limitations, the site is totally unsuitable for cultivated crops, and viable agricultural land use is limited to grazing only. The proposed development in this specific area will generate alternative land use income through rental for energy facility, which will have a positive impact on agriculture. It will provide the landowner with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.

- Increased access to electricity: The Vhembe District Municipality's IDP (2020) highlights that according to the 2016 Community Survey, 93.74% of households have access to electricity for lighting. This figure declines for the local municipality where 88,1% have access to electricity for lighting.

- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(h) a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including –

(i) details of all the alternatives considered;

(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.

(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(ix) the outcome of the site selection matrix;

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and

(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;

5.1 CONSIDERATION OF ALTERNATIVES

The 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 (refer to Appendix D) was conducted by the developer on the Farm Brandhoek No. 1211 and the farm was found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site. A single alternative site on the same farm has been identified (Subsolar, 2021).

The following sections explore different types of alternatives in relation to the proposed activity in more detail.

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. 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 grazing for livestock farming (refer to the photographs of the site). The area has limited agricultural potential and is unsuitable for cultivation. 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.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the solar power plant. No other properties have at this stage been secured by Ingwe Solar Power Plant (RF) (Pty) Ltd in the Polokwane/ Louis Trichardt area to potentially establish the Ingwe solar power plant. From a local perspective, the Farm Brandhoek No. 1211 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The proposed development falls within an area used for grazing and the site is therefore considered to have limited environmental sensitivity as a result. In terms of the DFFE screening tool the entire proposed site is classified as less than high (low to medium) sensitive for impacts on agricultural resources (refer to Appendix B for the screening report). The fairly low annual rainfall proves that the climate of the area is a limiting factor to the land capability. Therefore, the agricultural potential is limited on site and the land use change is unlikely to result in significant impacts on national agricultural production.

No alternative areas on the Farm Brandhoek No. 1211 have been considered. Provision was made after the initial investigation and specialist studies to exclude any sensitive areas or no-go areas recommended by the specialist, such as the wetlands or riparian areas. Therefore, a single preferred location alternative was assessed – refer to Figure 5.1. The size of the site made provision for the exclusion of any sensitive environmental features that arose as part of the EIA proses.

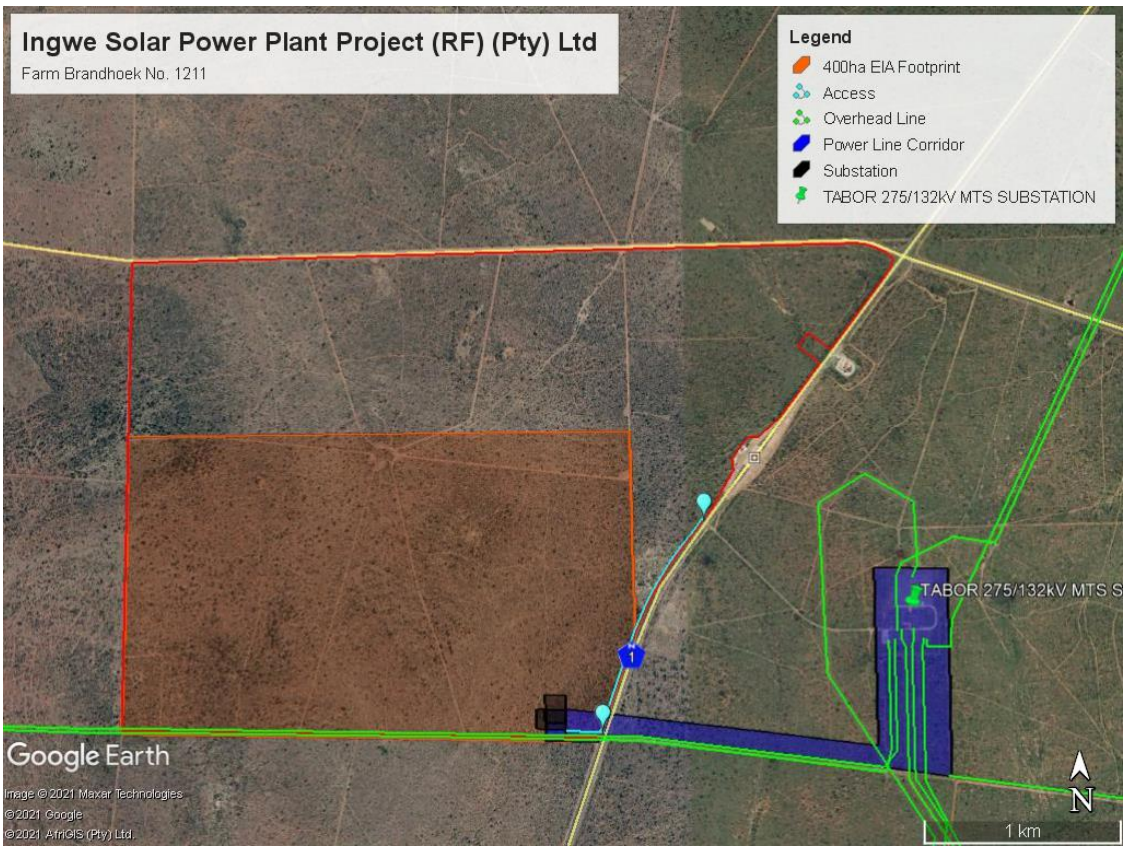


Figure 5.1: Location of the preferred alternative for the Ingwe Solar Power Plant on the Farm Brandhoek No. 1211

5.1.3 Activity alternatives

The scoping process also needs to consider if the development of a solar PV facility would be the most appropriate land use for the particular site.

- Photovoltaic (PV) solar facility – Ingwe Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Ingwe Solar Power Plant (RF) (Pty) Ltd is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for of the Polokwane area – refer to Figure 5.2. The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all the components can be recycled.

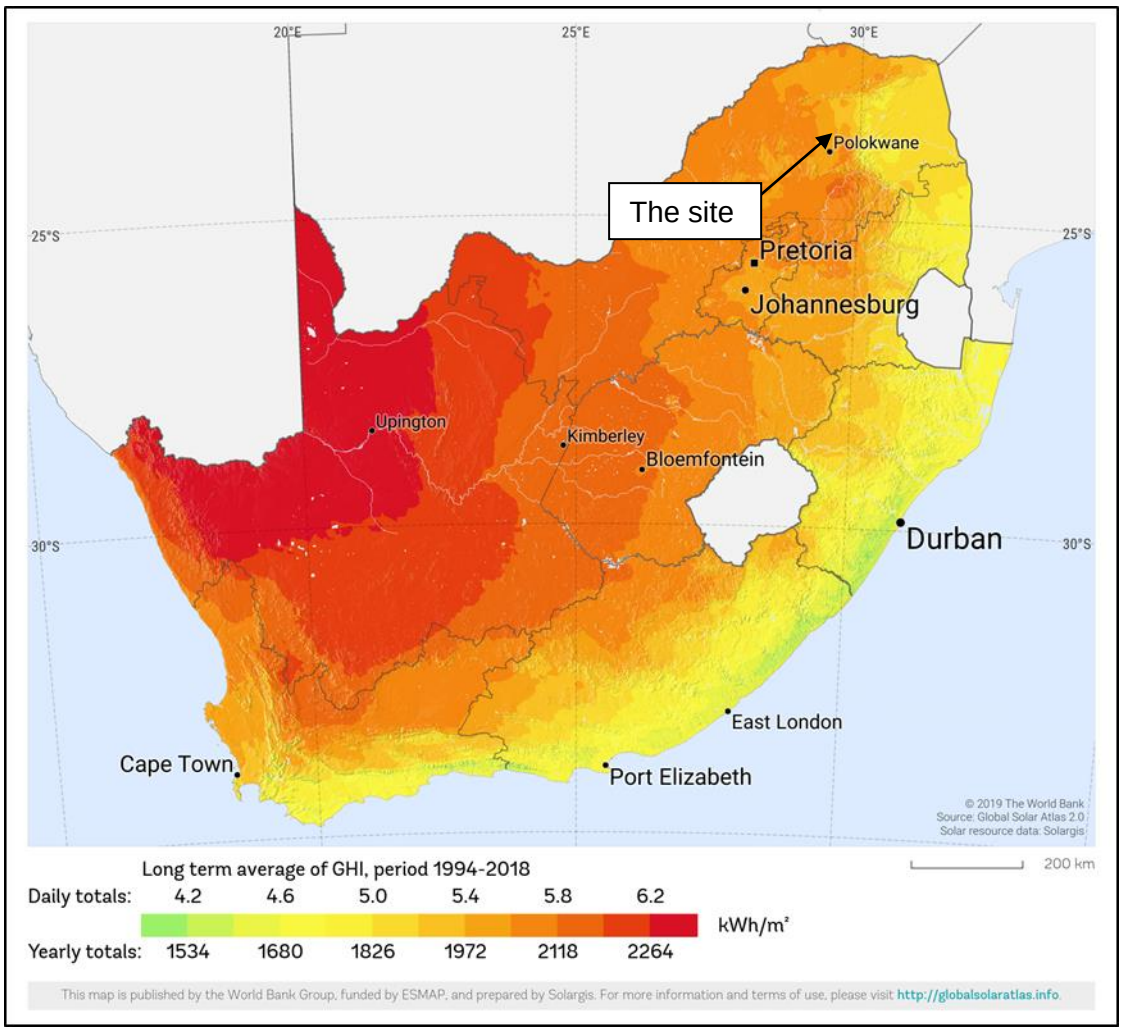


Figure 5.2: Global horizontal irradiation values for South Africa (SolarGIS, 2021)

- Wind energy facility - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.

- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also the local area. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP as part of the energy mix of the country. Therefore, this alternative will not be considered further in this report.

5.1.4 Technical alternatives

Possible technical alternatives for the development of a solar PV facility needs to be considered during the EIA process.

5.1.4.1 Distribution lines

It is expected that generation from the facility will tie in with the Tabor 275/132 kV MTS Substation. One route is proposed from the onsite substation to the Tabor substation. Within the preferred corridor (east of farm) a new line of approximately 2.5 km will be constructed to the Tabor MTS substation. The proposed power line was assessed within a 100m wide corridor. The area surrounding the substation was also assessed to allow for micro siting. An 132kV overhead distribution line is the only preferred alternative for the applicant due to the following reasons:

- **Overhead Distribution Lines** - Overhead lines are less costly to construct than underground lines. Therefore, the preference for overhead lines is mainly based on cost. Overhead lines allow high voltage operations, and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler et al, 2006).

  The overall weather conditions in the Limpopo Province are unlikely to cause damage and faults on the proposed overhead distribution power line. Nonetheless, if a fault occurs, it can be found quickly by visual means using a manual line patrol. Repair to overhead lines is relatively simple in most cases and the line can usually be put back into service within a few days. In terms of potential impacts associated with overhead distribution lines these include visual intrusion and threats to sensitive habitat (where applicable).

  The choice of structure to be used for the power line will be determined in consultation with Eskom once the Engineers have assessed the geotechnical and topographical conditions and decided on a suitable structure which meets the prescribed technical requirements. The choice of structures to be used will not have any adverse impacts on the environment. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd

- **Underground Distribution Lines** - Underground cables have generally been used where it is impossible to use overhead lines (for example due to space constraints). Underground cables are oil cooled and are also at risk of groundwater contamination. Maintenance is also difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines.

5.1.4.2 Battery Energy Storage Facility (BESS)

It is proposed that a nominal up to 500 MWh Battery Energy Storage Facility for grid storage would be housed in stacked containers, or multi-storey building, with a maximum height of 8m and a maximum volume of 1,740m^3 of batteries and associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. While there are various battery storage technologies available, the preferred alternative is the utility-scale Lithium-ion (Li-ion) battery energy storage. Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life (Divya KC et al., 2009).

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the base load and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer, which also included the consideration of sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. A draft layout plan is included as figure G but it should be noted that the final layout plan will be submitted as part of the EIA Report.

The layout follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, fencing and servitudes are considered. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, power lines, BESS and perimeter fences). With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure 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 equivalent to the latitude at which the site is located in order to capture the most sun.

The choice of pylon structure to be used for the power line will be determined in consultation with Eskom and does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, ecological and heritage impacts of erecting a power line. No defined structure has been confirmed at this stage and will depend on Eskom's technical requirements. The 132kV line must be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd. The structure to be utilised for the power line towers will also be informed by the local geotechnical and topographical conditions. The following alternatives are considered with regards to the proposed structures:

<u>Steel lattice towers:</u>
The steel lattice towers provide the following advantages over the other tower types available:

- Enables multipath earthing which enhances the overall electrical performance of the power line.
- Is visually less obtrusive than the mono-pole options.
- Is more practicable that other options i.e. more cost effective and more practical to construct and maintain.

- Is safer to work on than the monopole and wood pole structures.
- Is more durable than the wood pole structures.

Steel monopoles:
The steel monopole is considered less suitable than the steel lattice towers for the following reasons:

- Is visually more intrusive than the lattice towers.
- Is more expensive than the lattice towers.
- Requires more steel than the lattice towers.
- Is more difficult to erect.
- Is not as safe to work on as the lattice towers.

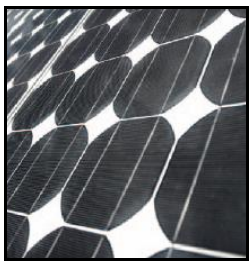
Wood poles:
Wood pole structures are only used in extreme circumstances where a visual impact needs to be avoided. Wood pole structures may be cheaper to produce and to construct, but they have one tenth of the lifespan of the metal counterparts and are far more susceptible to weather conditions which makes them less efficient and practicable. The wood pole structure is also more susceptible to having the cross arms burnt off by electrical faults as well as being susceptible to deformation with height.

5.1.6 Technology alternatives

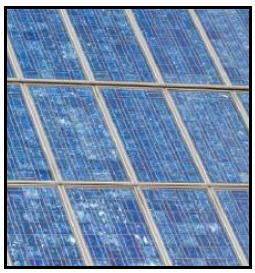
There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon and thin film. These technologies are discussed in more detail below:

- Crystalline (high efficiency technology at higher cost):

  Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



  - Mono-crystalline Silicon - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.



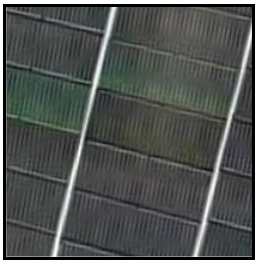
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

- Thin film (low-cost technology with lower efficiency):

Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:

- Cadmium Telluride (CdTe) - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.

- Amorphous Silicon - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- Copper, Indium, Gallium, Selenide (CIGS) - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications, and is considered a developing PV technology (First Solar, 2011).

- **Bifacial panels:**

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in

traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that, that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves to be most 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. However, 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.

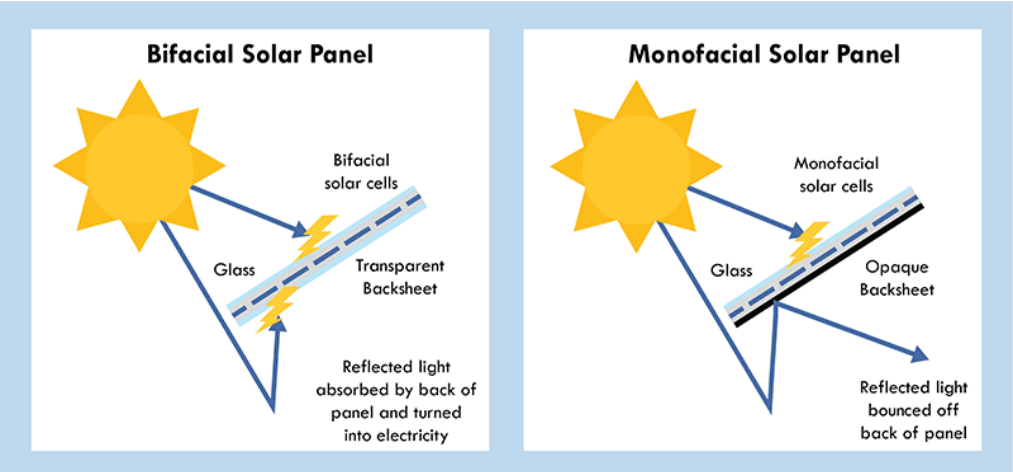


Figure 5.3: Bifacial vs Monoficial Solar Panel absorption.

5.1.6.1 Overhead power line

The following alternatives may be considered for the overhead power line:

- **Single Circuit Overhead Power Line**

  The use of single circuit overhead power lines to distribute electricity is considered the most appropriate technology and has been designed over many years for the existing environmental conditions and terrain as specified in the Eskom Specifications and best

international practice. Based on all current technologies available, single circuit overhead power lines are considered the most environmentally practicable technology available for the distribution of power. This option is considered appropriate for the following reasons:

- More cost-effective installation costs;
- Less environmental damage during installation; and
- More effective and cheaper maintenance costs over the lifetime of the power line.

- **Double Circuit Overhead Power Line**

  Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the same tower structure) to minimise impacts. However, the use of double-circuiting has a number of technical disadvantages:

  - Faults or problems on one power line may mean that the other power line is also disabled during maintenance, and this will affect the quality of supply to an area. Larger and taller towers as well as more towers are required for double-circuit power lines.

  The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be offline as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44.

5.2.1 General

The public participation process was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts;
- The sensitivity of the affected environment and the degree of controversy of the project; and
- The characteristics of the potentially affected parties.

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken in line with the approved public participation plan (refer to Appendix C1):

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Limpopo Mirror) on the 25 June 2021 (see Appendix C2) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement (by 26 July 2021).

- Site notices

  Site notices were placed on site in Afrikaans, English and Sepedi on 15 April 2021 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 17 May 2021. Photographic evidence of the site notices is included in Appendix C3.

  It must be noted that there was an error on the Sepedi site notice which was placed and therefore, the Sepedi site notice will be replaced during the EIA phase of the project.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, were directly informed of the EIA process via registered post, telephone calls, WhatsApps and emails. For a complete list of I&APs with their contact details see Appendix C4 to this report. It was expected from I&APs to provide their inputs and comments by 8 July 2021.

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via registered post, WhatsApp or email to all surrounding landowners and occupiers on 07 June 2021, as relevant. The surrounding landowners were given the opportunity to raise comments within 30 days. Eight farmer's contact details could be obtained – refer to figure 5.4. For a list of surrounding landowners see Appendix C4. The surrounding landowners were given the opportunity to raise comments by 8 July 2021. To date no comments have been received from surrounding landowners.

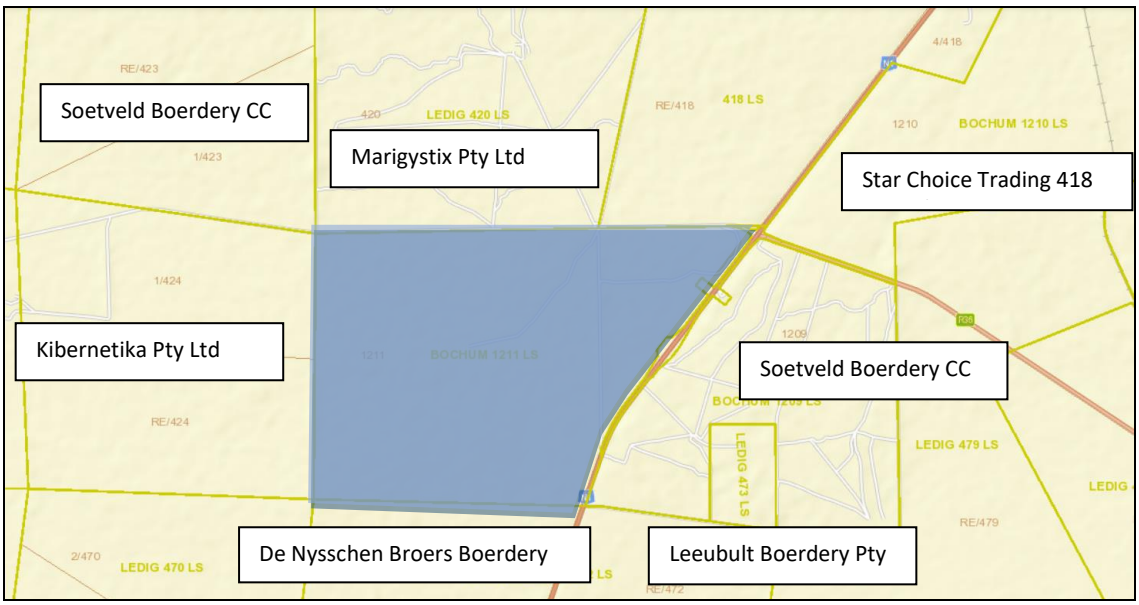


Figure 5.4: Surrounding Landowners

- <u>Circulation of Draft Scoping Report</u>
  Copies of the draft Scoping report were provided to all I&APs via courier, Dropbox and/or email, as relevant. Hard copies of the report were made available on request. I&AP's and organs of state were requested to provide their comments on the report from 18 August 2021 until 16 September 2021. All issues identified have been recorded and documented and compiled into a Comments and Response Report included as part of this Final Scoping Report (refer to Appendix C5).

5.2.2 Consultation process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C4 and C5.

5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) "*A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application*."

This report is the Final Scoping Report. The Draft Scoping Report was made available to all potential and/or registered I&APs and State Departments. They were provided with a copy

of the Draft Scoping Report and were requested to provide written comments on the report within 30 days. All issues identified during this review period have been documented and compiled into a Comments and Response Report included as part of this Final Scoping report, refer to Appendix C5.

5.2.4 Issues raised by I&APs and consultation bodies

To date comments have been received from some consultation bodies and are included in Appendix C5. All comments received during the circulation of the draft Scoping Report have been included in this final Scoping Report. The full wording and original correspondence are included in Appendix C5.

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred alternative.

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to the Table 1.2. However, due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view apart from the man-made dam (exorheic depression), non-perennial channels and riparian woodlands.

5.3.1.1 Geology

A review of the geological map of Polokwane (map series 2328, scale 1: 250 000) indicates the site to be underlain by dark grey to light grey biotite-hornblende gneiss, with mafic granite and banded gneiss of the Goudplaats Gneiss over the majority of the site and metapelite of the Bandelierkop Complex along the southern boundary of the site. The in-situ weathering of granite/ gneiss geology is likely to have resulted in residual soils with potentially collapsible soil grain structure. In this instance clay “bridges” form between other soil particles (predominantly sand) and will soften when wetted, leading to rapid and large settlements under loading. Potentially collapsible soils can often be observed within profiles as a “pinholed” structure within the soil matrix.

The specialist conducted the fieldwork on 12 March 2021. It comprised the mechanical excavation of trial pits by Case 580T tractor loader backhoe (TLB). The trial pit profiles were logged from surface by observing the excavation progress and examination of the exposed in-situ profiles and soil arisings. Representative samples were recovered from the individual strata within the trial pits for laboratory testing. The trial pits were excavated in a systematic manner across the proposed dam areas to delineate the underlying soil and rock horizons, to gauge the spatial variability of the horizons and to generate samples for laboratory testing.

The profiles observed within the trial pits generally comprised a thin cover of sandy topsoil overlying medium dense residual clayey sand, often with some gravel constituent. Very soft to soft rock gneiss (or metapelite in BI/T10) was encountered underlying the sand at depths of between 0.3-1.0 m below EGL, with refusal occurring shortly thereafter, either on medium hard rock gneiss, generally between 1.0-1.5 m below EGL, or due to slow progress, with the rock mass becoming progressively more competent with depth. Some “pinholing” was observed within the sandy soils, indicating potential for a collapsible soil structure. No groundwater was encountered within the trial pits.

Laboratory tests were scheduled to confirm the observations made during on-site investigations, to establish indicative engineering parameters and identify any problem soils that may be present. The various tests and pertinent information from these tests are summarised in geotechnical report (refer to Appendix E2).

The sample material type descriptions indicated in Table 4-1 are taken from the laboratory testing results and purely based on the grading percentages. In general, and in reality, soils exhibiting greater that 30% clay particles will act as a clay from the point of view of potential expansion and materials properties. The tests generally showed the soils to be of low plasticity.

The soils subsequently generally classify as “Low” potential expansiveness, according to the Van der Merwe method. However, the Van der Merwe method of clay expansiveness assessment is known to be problematic when predicting heave in certain soil types (Expansive Soils – State of the Art, AAB Williams, JT Pidgeon and PW Day, 1985). The generally low linear shrinkage and relatively low clay content confirms the “Low” potential expansiveness risk.

Ground Conditions

The profiles observed within the trial pits generally comprised a thin cover of sandy topsoil overlying medium dense residual clayey sand, often with some gravel constituent. Very soft to soft rock gneiss (or metapelite in BI/T10) was encountered underlying the sand at depths of between 0.3-1.0 m below EGL, with refusal occurring shortly thereafter, either on medium hard rock gneiss, generally between 1.0-1.5 m below EGL, or due to slow progress, with the rock mass becoming progressively more competent with depth. Some “pinholing” was observed within the sandy soils, indicating potential for a collapsible soil structure.

Laboratory testing undertaken on residual soils and soft rock samples indicate the materials to be of low plasticity with “Low” potential expansiveness characteristics. It is evident from the laboratory test results and location of the trial pit, that this sample from BI/T10 originates from the metapelite rock mass, with noticeably different geotechnical properties.

Groundwater Conditions

No groundwater was observed within the trial pits. However, shallow perched water tables are anticipated to form at the interface between soils and rock mass following heavy and/ or sustained rainfall.

Foundation recommendations are provided in the geotechnical study (refer to Appendix E2).

5.3.1.2 Soils and agricultural potential

Geology is directly related to soil types and plant communities that may occur in a specific area (Van Rooyen & Theron, 1996). A Land type unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The land type unit represented within the study area is the Fa10 land type. The soil types in the study area are mostly determined by position on the landscape, and the most dominant soils on the development site are red yellow apedal soils of the Hutton soil form derived from gneiss and shallow soils of the Glenrosa soil form.

Table 5.1: Land types, geology, and dominant soil types of the proposed site

Land type	Soils	Geology
Bc48	Plinthic catena: eutrophic; red soils widespread, upland duplex and margalitic soils rare	Leucocratic migmatite and gneiss, grey and pink hornblende-biotite gneiss, grey biotite gneiss; minor muscovite-bearing granite, pegmatite, and gneiss of the Hout River Gneiss Formation. Also, metapelite of the Bandelierkop Complex.

The entire proposed site is classified on the screening tool as less than high (low to medium) sensitivity for impacts on agricultural resources (refer to figure 5.5). The fairly low annual rainfall proves that the climate of the area is a limiting factor to the land capability. This has been confirmed by the site sensitivity verification. The level of agricultural assessment that is required for sites of less than high sensitivity is an Agricultural Compliance Statement. Because of the less-than-high sensitivity of the site, agricultural impacts are of low significance and are acceptable. The agricultural compliance statement must be applicable to the preferred site and proposed development footprint. The statement will therefore be complete once the layout of the facility has been finalised based on the sensitivities identified for the other specialist disciplines during the scoping phase. The statement will therefore be included as part of the EIR.

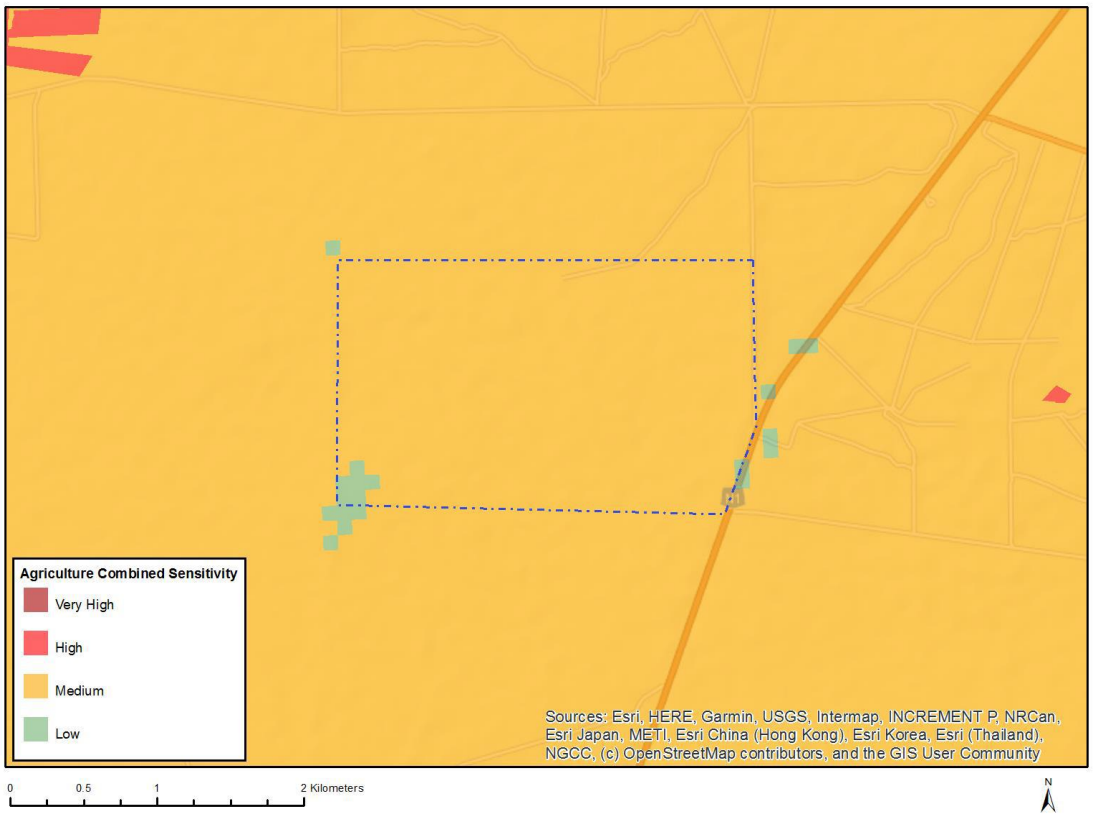


Figure 5.5: The proposed development site (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium).

5.3.1.3 Vegetation and landscape features

According to the Terrestrial Biodiversity Assessment (Appendix E3) the development site lies within the Savanna biome which is the largest biome in Southern Africa. The Savanna Biome is characterized by a grassy ground layer and a distinct upper layer of woody plants (trees and shrubs). The environmental factors delimiting the biome are complex and include altitude, rainfall, geology, and soil types, with rainfall being the major delimiting factor. Fire and grazing also keep the grassy layer dominant.

The most recent classification of the area by Mucina & Rutherford shows the site to be part of the Makhado Sweet Bushveld. Makhado Sweet Bushveld is distributed in the Limpopo Province straddling the Tropic of Capricorn. It occurs on the plains south of the Soutpansberg, east of the Waterberg and on the apron surrounding the Blouberg and Lerataupje Mountains, and north of the Polokwane Platea and west of the escarpment, with extensions to Mokopane to the south and to the north of Vivo. Makhado Sweet Bushveld occurs on slight to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Short and shrubby bushveld with a poor developed grass layer. The vegetation around the alignments consists of game and hunting farms as well as cattle grazing activities and small-scale agricultural activities. This vegetation type has a Least Concern conservation status, with the conservation target 19%, with just over 1% statutorily conserved mainly in the Bellevue Nature Reserve. Some 27% already transformed, mainly by

cultivation, with some urban and built-up areas. The southwestern half of the unit has densely populated rural communities

Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes. The proposed development site is located in Other Natural Areas (ONA). The management objective for this area is to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern (refer to figure 5.6).

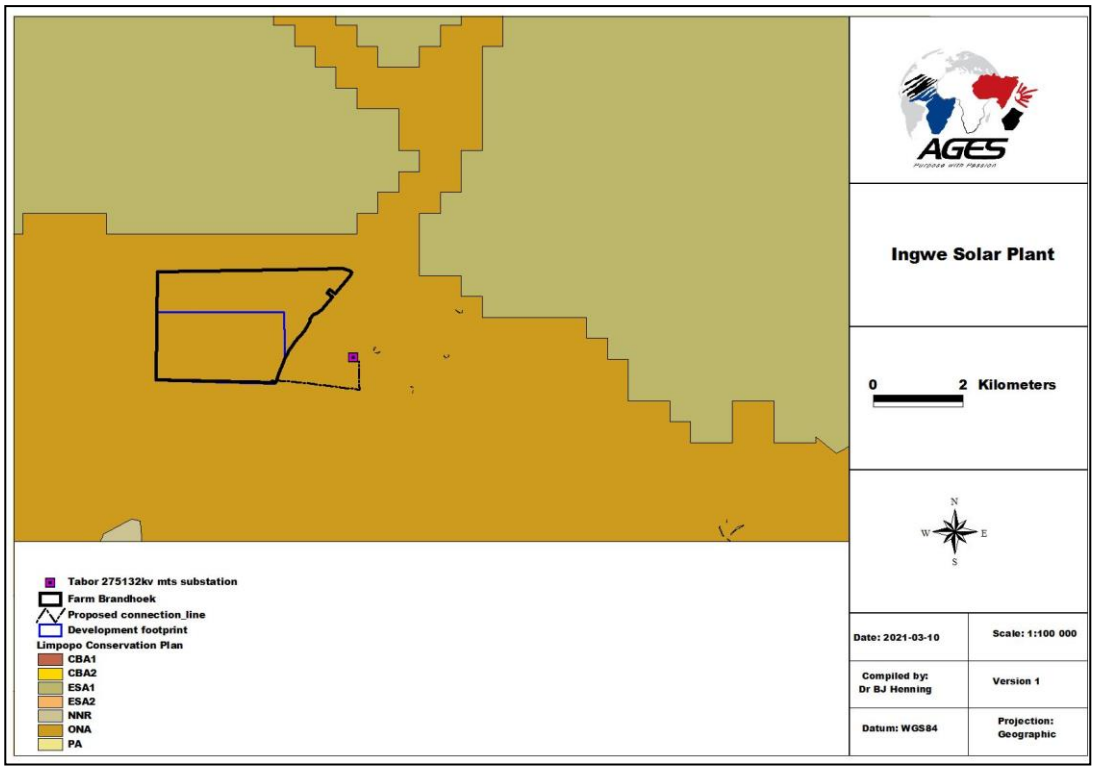


Figure 5.6: CBAs and Ecological Support Areas

Protected Areas (PA) and National Protected Area Expansion Strategy (NPAES)

Officially protected areas, either Provincially or Nationally that occur close to a project site could have consequences as far as impacts on these areas are concerned. For the proposed development and associated infrastructure no protected areas occur in proximity, with the closest being the Machaka Nature Reserve to the south.

The NPAES are areas designated for future incorporation into existing protected areas (both National and informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning. The Blouberg / Langjan NPAES occur near the project area (refer to figure 5.7).

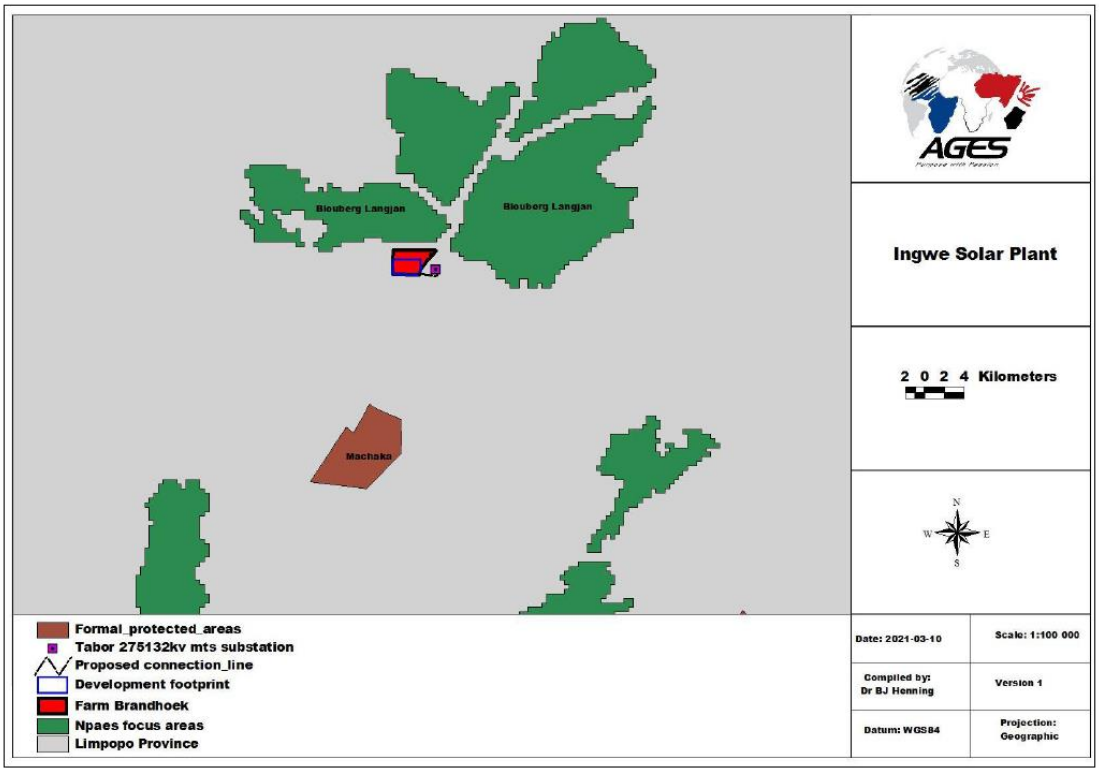


Figure 5.7: Location of the project area in relation to listed protected areas

Red Data, Protected and Endemic Plant Species

According to the Terrestrial biodiversity impact assessment (refer to Appendix E3), two tree species listed as protected under the national list of declared protected tree species as promulgated by the National Forest Act (NFA), 1998 (No. 84 of 1998) was observed in the project area. The trees species listed in National Forest Act protected tree species list (Table 5.2) have a wide distribution in Southern Africa, although these trees have an importance in terms of medicinal, cultural and heritage value to local communities. The following protected tree species of concern occur in the area:

Table 5.2: Protected tree species of concern in the project area

Species	National Conservation	Status in project area
Boscia albitrunca	Protected (NFA)	Widespread
Sclerocarya birrea	Protected (NFA)	Widespread

The listed protected tree species in terms of the National Forest Act of 1998, may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected,

removed, transported, exported, donated, purchased, or sold – except under license granted by Department of Forestry, Fisheries and the Environment (DFFE) or a delegated authority. Obtaining relevant permits are therefore required prior to any impact on these individuals.

Alien Invasive Species

According to the Terrestrial biodiversity impact assessment (refer to Appendix E3) the following alien invasive and exotic plant species were recorded on site during the surveys as stipulated in the Alien and Invasive Species Regulations (GNR 599 of 2014)

Table 5.3: Declared weeds and invader plants

Species	Category
Agave sisalana	2
Datura stramonium	1b
Achyranthes aspera	1b
Opuntia ficus-indica	2

The Alien and Invasive Species Regulations (GNR 599 of 2014) are stipulated as part of the National Environmental Management: Biodiversity Act (10/2004). The regulation listed a total of 559 alien species as invasive and further 560 species are listed as prohibited and may not be introduced into South Africa. Below is a brief explanation of the relevant categories of Invasive Alien Plants as per the regulation.

- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.

- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy, or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.

National Freshwater Ecosystem Protected Areas (NFEPAs)

The project area is not located close to any NFEPA river, with the Sand River located to the west of the site representing a NFEPA River, although this river will not be impacted on by the development. No NFEPA wetlands occur near the proposed development site.

Wetlands

One wetland type was identified on the site for the proposed solar development, while the other water courses in the area are classified as rivers with riparian woodland. The wetland type are as follows: Man-made dams (exorheic depressions).

The other drainage features on site are all classified as different river types or channels. The wetland / riparian map and regulated areas for the wetlands and rivers are presented in Figure 5.10.

Exorheic depressions

The man-made dams in the project area represent depressions that are classified as exorheic depressions with channelled inflow. As the definition of an Inland System includes all inland aquatic ecosystems (i.e., not just wetlands), lakes and other open waterbodies are types of Inland Systems in terms of the Classification System, even if they are artificial such as dams. Man-made dams are therefore classified as aquatic systems since the landform characteristics of such systems fit the definition of a depression in that they typically have closed (or near closed) elevation contours and increase in depth from the perimeter to a central area of greatest depth. Lakes and other open waterbodies that have a maximum depth greater than two metres are called limnetic systems. The vegetation associated with the dams is mostly sedges and bulrushes depending on the depth of the water and the substrate. Species such as *Persicaria serullata, Typha capensis, Schoenoplectus corymbosus, Ludwigia stolonifer and Leersia hexandra* mostly grow along the shallow edges of dams and pans in the project area on a muddy substrate (refer to figure 5.8).

Figure 5.8: Man-made dam (exorheic depression) within the project area

River channels

All rivers, wetlands and streams with their associated riparian vegetation in the project area are ecologically sensitive, forming important, limited and specialised habitats for several

plant and fauna species. The species composition is unique and relatively limited in distribution and coverage. These habitats also form linear corridors linking different open spaces.

The drainage channels of the project area (refer to figure 5.9) eventually flow into the Sand River. The riverine woodland would be important dry season refuge areas for many fauna species in their natural state. It is also a centre of floral diversity. Riparian areas have been identified as important dry season refuge areas for a variety of large mammal species. The impacts on the sensitive riparian ecosystems, regardless of the source, need to be restricted. Impacts on this system include erosion, habitat loss and degradation and the associated impacts on faunal and floral diversity, dewatering of marshes and wetlands, water abstraction as well as increased sedimentation. Continued impacts on the riverine ecosystems may also ultimately reduce the capacity of this system to absorb dramatic flooding events. The band of trees that occurs along the channel can be classified as riparian vegetation. This vegetation is very important for connectivity with adjacent vegetation as well as a migratory route for riparian animals.

The non-perennial drainage channels are characterized by a channel that cuts through a slightly undulating landscape. The non-perennial riverine areas form narrow, sandy riverbeds. These riverine areas support low riparian woodland dominated by species such as *Vachellia karroo, Vachellia tortilis, Euclea divinorum and various grasses such as Panicum maximum and Eragrostis rotifer.*

The importance of conserving the ecosystem as part of the ecosystem cannot be underestimated and subsequently no development can be supported on the periphery of the drainage channel. A buffer zone of at least 32 meters should be adapted from the edge of the riparian woodland.

Most of the drainage channels on site are non-perennial. Channels are subdivided further within this level of the hierarchy into six geomorphological zones. These zones are based largely on gradient which influences flow velocity and channel characteristics such as substratum particle size that are important characteristics of riverine habitat types. The following geomorphological zones occur in the project area and described as follows:

- Lowland River: a low-gradient alluvial fine-bed channel. It may be confined but has a fully developed meandering pattern within a distinct floodplain that develops in unconfined reaches where there is increased silt content in bed or banks. Characteristic gradient: 0.0001- 0.001.

Figure 5.9: Non-perennial channel and riparian woodland in the project area

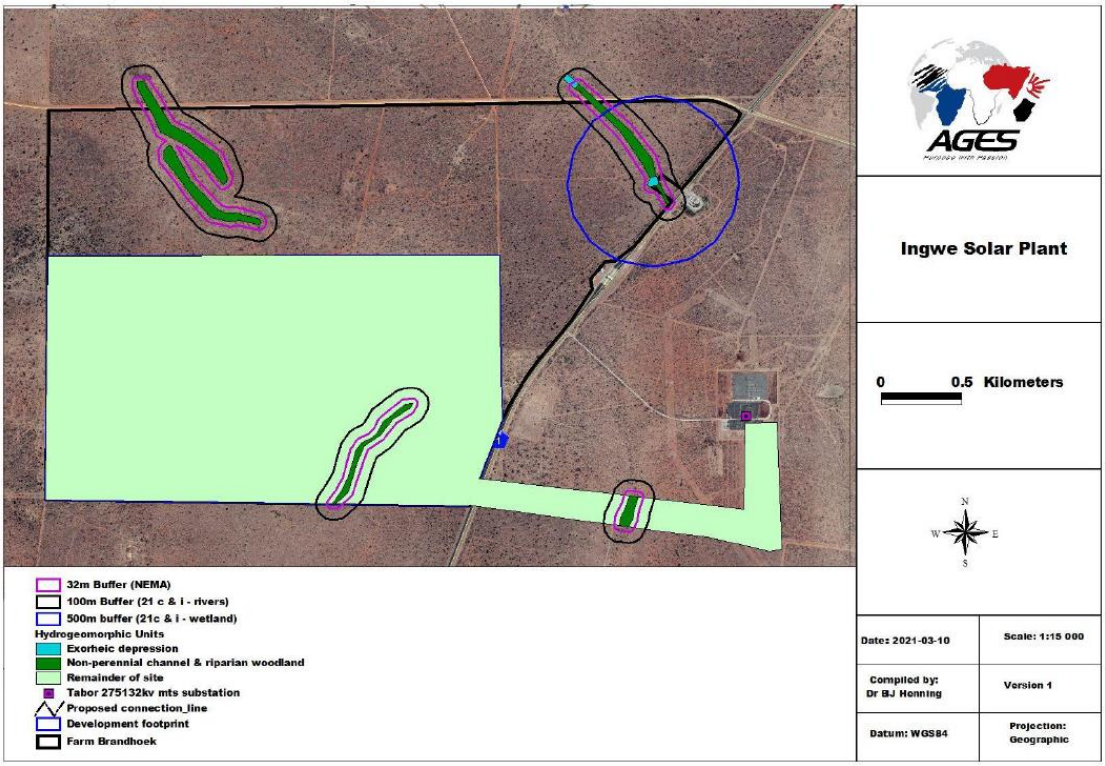


Figure 5.10: Riparian / wetland delineation map of the proposed development site

5.3.1.4 Climate

The project area normally receives between 400-600 mm of rain per year, with most rainfall occurring during summer. It receives the lowest rainfall in July and the highest in March. The monthly distribution of average daily maximum temperatures shows that the mean annual minimum temperatures for the project area range from 4.1- 6°C, while the mean annual maximum range from 27.1-29°C. The region is the coldest during July when the mercury drops to 5°C on average during the night.

5.3.1.5 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life and birds on site. The following section will discuss the state of biodiversity on the site in more detail.

5.3.1.5.1 Avifaunal

According to the Avifaunal Assessment conducted in April 2021 (refer to Appendix E4), the site is situated in an area of high avifaunal diversity, high regional habitat intactness and many priority power line-sensitive species have a reasonable chance of occurring on site. The resident avifauna is also represented by relatively high species richness and abundance, for which the total transformation of habitat will generate impacts. The area is not within an IBA, and it has been identified as 'Low Avian Sensitivity' by DFFE's screening tool. No priority species were recorded on the site; however, some have been confirmed for the wider SABAP2 pentads in similar habitats (Cape Vulture, European Roller, Verreaux's Eagle) or have a reasonable chance of at least occasional occurrence based on habitat and distribution (Bateleur, Secretarybird, Lanner Falcon, Red-footed Falcon, White-backed Vulture Lappet-faced Vulture, Tawny Eagle, Martial Eagle, Pallid Harrier, Southern Ground-Hornbill, Black Stork, Marabou Stork, Abdim's Stork, African Grass Owl). There was only one endemic or near-endemic species that was, previously recorded in the wider SABAP2 pentads (Fiscal Flycatcher) in similar habitat.

The 132 kV power lines are expected to be quite high and some species that are sensitive to power line collisions occur on site (Black-winged Kite, Crested Francolin, Greater Kestrel, Helmeted Guineafowl, Pale Chanting Goshawk, Pied Crow, Red-crested Korhaan, Swainson's Spurfowl) or have been recorded during SABAP2 assessments (Amur Falcon, Black Kite, Black-chested Snake Eagle, Brown Snake-Eagle, Cape Vulture, Egyptian Goose, European Roller, Hadeda Ibis, Lilac-breasted Roller, Little Grebe, Natal Spurfowl, Purple Roller, Reed Cormorant, Steppe Buzzard, Verreaux's Eagle, Wahlberg's Eagle, Western Barn Owl, Western Cattle Egret, White Stork, Yellow-billed Kite), or have a reasonable chance of occurring on site (White-backed Vulture, Lappet-faced Vulture, Secretarybird, Bateleur, Tawny Eagle, Martial Eagle, Red-footed Falcon, Lanner Falcon, Pallid Harrier, Abdim's Stork, Marabou Stork, Southern Ground-Hornbill).

5.3.1.5.2 Ecological

The Terrestrial biodiversity impact assessment (refer to Appendix E3) confirmed that no animals were restricted or endemic to the area. Two major fauna habitats were observed in the area namely the Mixed woodland and Riparian woodland. The woodland area of the lower-lying plains and open valleys play an important role as habitat for various generalized fauna species. Birds and arboreal reptiles would utilize the larger trees species (marula) for breeding, roosting, and foraging. The riparian woodland along the banks of the riverine systems is important habitat for various birds, mammals and Herpetofauna (reptiles and amphibians) as well as playing an important role as a dispersal corridor. Many different bird species prefer these dense habitat types associated with riparian woodland in the area.

Most of the habitat types are still intact. Therefore, the expected mammalian richness on these areas is considered high. Red data mammals that still roam freely in the area include larger predators such as leopard and brown hyena (red data). Antelope species such as klipspringer, kudu, bushbuck, and duiker will roam freely through the area and are not restricted by game fences. Smaller mammal species such as honey badgers and serval can become habituated to anthropogenic influences, while other species such as brown hyena will rather move away from the construction activities and will seldom use the area. Many of the bat species of conservation concern in the project area are cave-dependant for roosting. Any individuals that utilize the area would therefore either be foraging or migrating and would not be affected by the localized loss of habitat due to the development.

There is only one amphibian species of conservation concern that have a distribution that includes the development area namely the giant bullfrog, although the development will not impede on any habitats that was observed on the farm Brandhoek No. 1211, namely the dams. Breeding habitat of frogs and toads can be found mostly in the dams in the project area, although none of these areas will be affected by the proposed development.

The EIA screening tool indicated that the *Acinonyx jubatus* (Cheetah) and the *Thoradiscus viridicrus* (Green-kneed Seedpod Shieldback) are Species of Conservation Concern (SCC). The potential that cheetahs occur in the project area are considered low due to the vast home ranges that these predators patrol in the Limpopo Province. The close presence of the N1 freeway and the farming activities and disturbances would cause the species to move to neighbouring areas where prey species abound (game farms, reserves etc.). No signs of cheetahs were documented in the area.

The Green-kneed Seedpod Shieldback represents terrestrial insects, but unlike most decticines occur in Mesic, not drought tolerant habitat. They hide by day in thickets and become active at dusk when they climb plants to feed on smaller insects. After dark, the males call the females are silent. The sound of a male choir can carry some distance. The eggs hatch from late spring to early summer. They reach adulthood from late summer to autumn. The status of the species is currently considered uncertain since only known from six localities in Limpopo pre-1985. Considering the distribution map below it would appear as though this species prefers mountainous habitat associated with the Soutpansberg and escarpment, although the species might forage into the project area occasionally. The

habitat is however not considered as optimal. No signs of any individuals were confirmed for the project area

5.3.1.6 Visual landscape

The visual impact of photovoltaic facility depends on the complex relationship between the visual environment (landscape), the development (object), and the observer/receptor (e.g. farmer). The establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low. The visual landscape is already degraded due to the large number of mines and Eskom electricity infrastructure in the area. Furthermore, the technology considered for this development will be non-reflective.

The site is located in an area with a low significance in elevation, meaning that the site is not located on a mountain or at the foot of a mountain, with an insignificant difference in elevation. The preferred site is located at an above mean sea level (amsl) of approximately 1132m at the highest elevation and at an amsl of 1099m at the lowest elevation. The landform and drainage described above is unlikely to limit visibility. The proposed development is not visible from the town of Polokwane or Louis Trichardt, due to the elevation and distance, but might be visible to the settlement of Ga-Pasha located approximately 6km south of the proposed development. Areas within 5km (such as the N1 road, Capricorn Toll Plaza and game farming) from the proposed development might have a clear view without taking existing screening into account.

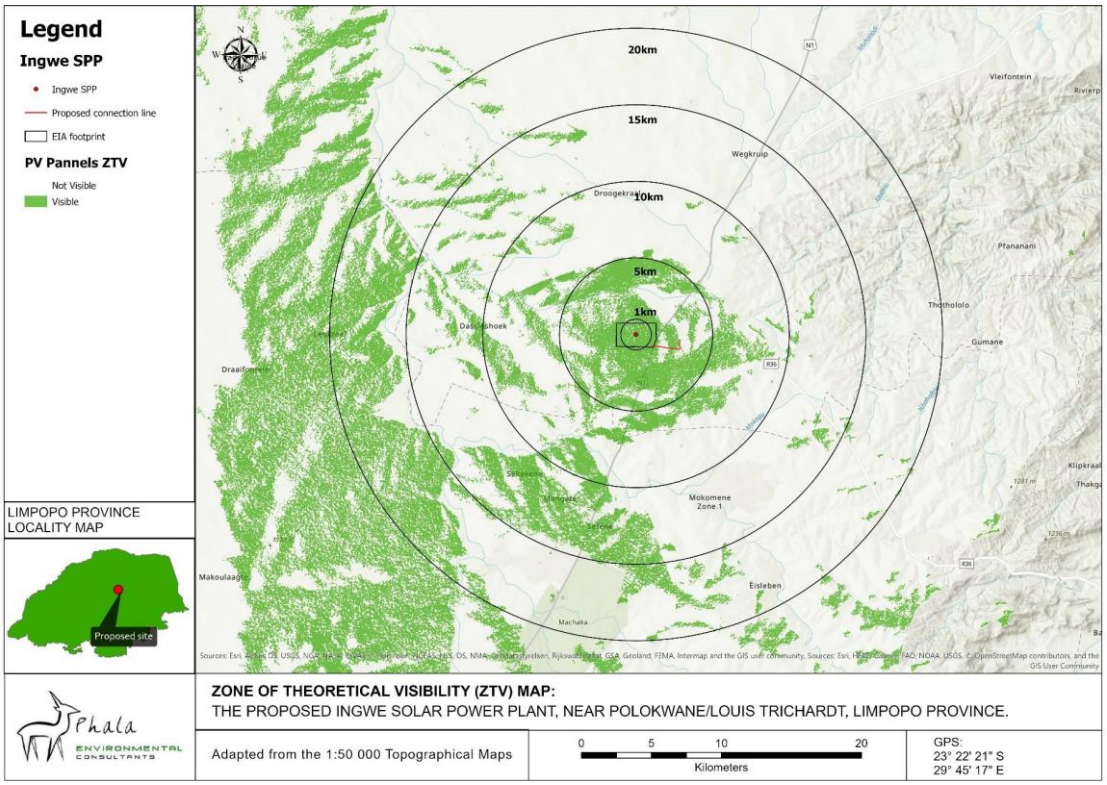


Figure 5.11: Zone of Theoretical Visibility (ZTV) for the Solar Power Plant

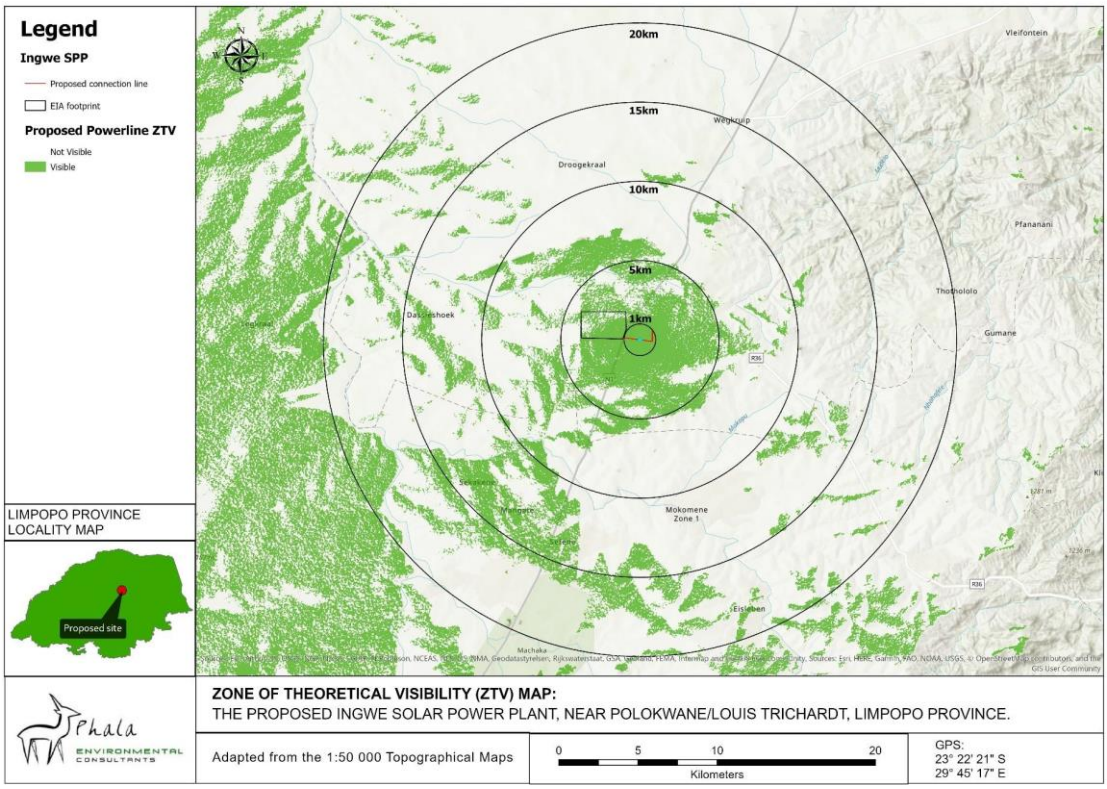


Figure 5.12: Zone of Theoretical Visibility (ZTV) for the preferred power line

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance and is characterised by agricultural activities. No buffer areas or areas to be avoided are applicable for this development.

5.3.1.7 Traffic consideration

The site for the Ingwe Solar Power Plant is located off N1 National Road, where an existing gravel road will be utilised to access the Farm Brandhoek No. 1211.

According to the Traffic Impact Study (Appendix E10) the photovoltaic (PV) equipment and relevant components will be transported to the Farm Brandhoek No. 1211 over a distance of 1970 km or 960 km from either the Port of Saldanha or the Port of Durban, respectively. The proposed Ingwe PV solar power plant will generate additional traffic on the surrounding road network in three (3) distinct phases, namely: construction, operational and decommissioning. It must be noted that these three phases will generate traffic consecutively and not simultaneously, and therefore will be considered separately from each other.

<u>Construction phase:</u>

Trips generated during the construction phase will primarily comprise of transporting equipment, power plant components, personnel, construction and other facility materials. These trips will comprise of normal, medium and heavy vehicles. Another contributor to trips generated during the construction phase will be daily commuters/workers. The

construction phase of Ingwe PV solar power plant will generate approximately 23 329 trips over the fourteen (14) month period.

Operational phase:

The traffic impact during the operational phase will therefore be insignificant, as only thirty-five (35) people will work at the PV solar power plant.

Decommissioning phase:

The decommissioning phase will start at the end of the Ingwe PV solar power plant lifetime (25 – 30 years) and will last approximately six (6) months, involving a team of fifty (50) workers. Same as with the operational phase, the traffic impact will be insignificant.

5.3.2 Description of the socio-economic environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

5.3.2.1 Socio-economic conditions

The According to the Social Impact Assessment (attached as Appendix E9) the construction phase for an entire SPP will extend over a period of 12-18 months. The anticipated capital expenditure value of the proposed Ingwe SPP on completion will be approximately R1.5 Billion. The construction phase in terms of employment will employ approximately 800 workers and of those employment opportunities likely to be generated, approximately 60% will accrue to low skilled workers, 25% to semiskilled workers, and 15% to skilled workers. It is anticipated that the operation of the project is likely to create between 35-99 employment opportunities, comprising of low-skilled, semi-skilled, and skilled opportunities. Employment opportunities include safety and security staff, operation and monitoring, and maintenance crew.

The Vhembe District Municipality is a Category C municipality located in the northern part of the Limpopo Province. It shares borders with Zimbabwe and Botswana in the north-west and Mozambique in the south-east through the Kruger National Park. The Limpopo River valley forms the border between the district and its international neighbours. The district includes the Transvaal, and areas that were previously under Venda and Gazankulu Bantustan's administration. It is comprised of four local municipalities: Musina, Thulamela, Makhado and Collins Chabane. The district municipal offices are located in the town of Thohoyandou. It covers a geographical area of 25 596km² and is predominantly rural. It is a legendary cultural hub, and a catalyst for agricultural and tourism development. The main towns in the DM include: Makhado, Malamulele, Musina and Thohoyandou. The main economic sectors are Mining, community service and finance.

The Makhado Local Municipality is a Category B municipality situated within the Vhembe District in the Limpopo Province. It borders with Musina in the north, Greater Giyani in the south (Mopani District), Thulamela in the east, and Molemole in the west (Capricorn District). It is one of four municipalities in the district, making up almost a third of its

geographical area, which covers 7 605km^2. The municipality was first established on 31 October 1934 as the Louis Trichardt Town Council. With the new municipal demarcation, a number of municipalities were established in 1997. However, following the Municipal Structures Act of 1998, the municipalities were merged into an NP344 Municipality that is now known as the Makhado Municipality. It is divided into four regions: Makhado (previously Louis Trichardt), Vuwani, Dzanani and Waterval. The LM has a total population of 416 728 according to the 2016 Community Survey, living in 116 371 households of which 95,6% have access to electricity for lighting, 7,3% have access to piped water inside the dwelling and 49% are female headed. The LM had a Dependency ratio of 64,8 in 2016. The main economic sectors in the municipality are Community services (30%), finance (29%), trade (15%) and transport (13%).

5.3.2.2 Cultural and heritage aspects

According to the Heritage Impact Assessment (attached as Appendix E7) the cultural landscape qualities of the region essentially consist of a rural setup. In this the human occupation is made up of a pre-colonial element consisting of limited Stone Age occupation, Iron Age occupation, as well as a much later colonial (farmer) component. A much smaller component is an urban one, which is actually expanding rapidly at present due to population increase and as well as people moving to economic centres in search of work.

Stone Age

Human occupation of the larger geographical region took place since Early Stone Age (ESA) times. This is evidenced by the scattered stone tools found in a secondary context (open surface material), where they have been exposed in gravel terraces by rivers and streams as well as areas of sheet erosion. Normally this material is viewed to have a low significance and the localities where they are found are referred to as find spots rather than sites.

During the Middle Stone Age (MSA) human population in the region increased dramatically as is evidenced by the large number of finds pots in the larger region. This was the result of people becoming more mobile, occupying areas formerly avoided. According to Thackeray (1992) the MSA is a period that still remains somewhat murky, as much of the MSA lies beyond the limits of conventional radiocarbon dating. However, the concept of the MSA remains useful as a means of identifying a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. In the larger region, Mason (1962) has identified a variant of the MSA that became known as the Pietersburg Culture.

Open sites were still preferred near watercourses. These people were adept at exploiting the huge herds of animals that passed through the region, on their seasonal migration. As a result, tools belonging to this period also mostly occur in the open or in erosion dongas. Similar to the ESA material, artefacts from these surface collections are viewed not to be in a primary context and have little or no significance.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Also, for the first time we

now get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA.

LSA people preferred, though not exclusively, to occupy rock shelters and caves and it is this type of sealed context that make it possible for us to learn much more about them than is the case with earlier periods. They have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes. During an extensive survey, Eastwood & Cnoops (1994) identified a number of sites containing rock art in the western section of the Soutpansberg.

Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Silver Leaves, southeast of Tzaneen dating to AD 270. Closer to the study area, dates of AD 430 and 415 have been obtained from sites at Klein Afrika and Happy Rest, near Schoemansdal. Other sites, more to the west, yielded dates centring around c. AD 800.

The occupation of the larger geographical area (including the study area) intensified after the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable. Population movements, competition for resources, etc. created tensions amongst different groups and people were forced to congregate into large towns for defensive purposes. These stone-walled villages were almost always located near cultivatable soil and a source of water.

Historic period

Shona-speaking chiefdoms moved from Zimbabwe to settle south of the Limpopo river from about AD 1400. Here they incorporated earlier Sotho-speakers and, after more than 100 years, this gave rise to the Venda language. By about AD 1690 the Singo, who was part of the Rozwi in Zimbabwe, entered the area and conquered most of the Venda.

It is said that the origin of all Tlokwa people can be traced to Tlokweng on the Mooi River near Potchefstroom, where they had the thakadu (ant-bear) as their totem. From here can be traced the Tlokwa tribes of North West Province, Free State, Lesotho, KwaZulu-Natal, Botswana and Limpopo Province. Exactly when this segregation took place, can no longer be determined with any clarity. It is however justifiable to estimate that the northward movement of the Tlokwa took place before the year 1700.2 According to tradition, they first settled at Moletane in the Potgietersrus district, but early in the eighteenth century they moved further northward.

By the middle of the 19th century, white trekkers started to enter the area, first settling at Schoemansdal during the 1840s and later establishing other towns in the area, also taking up farms. Whites moved into the area, first as hunters, traders and missionaries, with settlers following closely on their heels. One of the first white settlements was located and Shoemansdal to the west of Makhado (Louis Trichardt). Over time, farms were surveyed and new towns were laid out. Few settled on the northern side of the mountain, possibly

because of the isolation, malaria and hostile Venda-speakers. It was only after the beginning of the 20th century that whites started to occupy the area on a permanent basis.

Site specific review

From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing or the making of agricultural fields. Jeppe's Map dating to 1899 shows all the farms in the region as well as the road northwards cutting across the south-eastern corner of the farm Brandhoek No. 1211.

The 1937 version of the aerial photograph shows an agricultural field as well as a dam a short distance to the north. The R101, later the N1, passes approximately in its current alignment and an old farm road occurs to the west of that

No sites, features or objects of cultural significance dating to the Stone Age, the Iron Age or Historic Period were identified in the project area.

Palaeontology

According to the Palaeontological Impact Assessment (refer to Appendix E8) the project area for the proposed solar facility plus grid connection is situated in semi-arid terrain of very low topographic relief between c. 1110 and 1130 m amsl. Possible small pans but no major drainage lines are visible here on satellite images. Bedrock units mapped here comprise various high grade metamorphic rock units of early Precambrian (Archaean) age. These include (1) granitoid gneisses of the Goudplaats – Houtrivier Gneiss Suite which are estimated at 3.6 to 3.2 Ga (billion years) old (Robb et al. 2006) as well as (2) metapelites of Bandelierkop Complex, a component of the Archaean Limpopo Belt (Kramers et al. 2006). Judging from satellite images, levels of bedrock exposure here are probably very low, with extensive cover by sandy soils and downwasted gravels that are not mapped at 1: 250 000 scale. The geological map shows several corundum mineral occurrences in the region.

The Archaean (early Precambrian) basement rocks are high-grade metamorphic rocks and consequently entirely unfossiliferous. Neogene to Recent superficial deposits within the broader project area - viz. sandy soils, downwasted surface gravels, possible shallow pan sediments - are likely to be of Low to Very Low palaeosensitivity for the most part. However, these younger sediments might very occasionally contain important fossil biotas, notably the bones, teeth and horn cores of mammals (e.g. Klein 1984, MacRae 1999). Other potential late Caenozoic fossil biotas from these superficial deposits include non-marine molluscs (bivalves, gastropods), ostrich egg shells, trace fossils (e.g. calcretised termitaria and other insect burrows or nests, coprolites, rhizoliths), and plant remains such as peats or palynomorphs (pollens) in fine-grained, organic-rich alluvial horizons. Quaternary alluvial sediments may contain reworked Stone Age artifacts that are useful for constraining their maximum age.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the facility is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid. Studies of solar irradiation worldwide indicate that the Limpopo has a huge potential for the generation of power from solar.

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The Farm Brandhoek No. 1211 where the project is proposed to be located is considered favorable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The Limpopo receives the highest average of direct normal and global horizontal irradiation daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of 1969.3 kWh/m^2/year is relevant in the area.

- Site availability and access: The land is available for lease by the developer and consent has been provided by the affected landowner for the undertaking of the EIA process. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be easily obtained off N1 National Road, where an existing gravel road will be utilised to access the Farm Brandhoek No. 1211.

- Grid connection: In order for the PV facility to connect to the national grid a 132kV power line will be constructed within the identified 100m wide corridor towards the Tabor 275/ 132 kV MTS Substation. Available grid connections are becoming scarce and play a huge role when selecting a viable site.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 of this report. Due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view on the site, apart from the apart from the man-made dam (exorheic depression), non-perennial channels and riparian woodlands which will be avoided.

It is evident from the discussion above that the Farm Brandhoek No. 1211 may be considered favourable and suitable in terms of these site characteristics. As mentioned previously, no alternative areas on Farm Brandhoek No. 1211 have been considered. However, provision was made after the initial investigation and specialist studies to exclude any sensitive areas that may arise.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria, the site is identified as preferred due to fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of the 150 MW Ingwe Solar Power Plant on Farm Brandhoek No. 1211, is the preferred option. The final layout will be included as part of the Environmental Impact Report EIR). It may be concluded that this is the only location that will be assessed in further detail.

6 DESCRIPTION OF THE IMPACTS AND RISKS

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include-

(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts-

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;

(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(viii) the possible mitigation measures that could be applied and level of residual risk;

6.1 SCOPING METHODOLOGY

The contents and methodology of the scoping report aims to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.

- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 13 April 2021. The site visit was conducted to ensure a proper analysis of the site specific characteristics of the site. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible

consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	✕			A non-perennial channel and riparian woodland is located on the site.
II. A conservation or open space area		✕		None.
III. An area that is of cultural importance		✕		None.
IV. Site of geological significance		✕		None.
V. Areas of outstanding natural beauty		✕		None.
VI. Highly productive agricultural land		✕		None.
VII. Floodplain		✕		None.
VIII. Indigenous forest		✕		None.
IX. Grass land		✕		None.
X. Bird nesting sites	✕			The Avifaunal Study (refer to Appendix E4) states that large trees may serve as nesting and roosting sites for vultures.
XI. Red data species	✕			The Avifaunal Study (refer to Appendix E4) identified some priority species on the site (Cape Vulture, European Roller, Verreaux's Eagle) and some have been confirmed for the wider SABAP2 pentads in similar habitats or have a reasonable chance of at least occasional occurrence based on habitat and distribution.
XII. Tourist resort		✕		None.
2. Will the project potentially result in potential?				
I. Removal of people		✕		None.

II. Visual Impacts	×			The VIA (refer to Annexure H5) confirmed that the establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of months. The noise impact is unlikely to be significant and will be managed on site as required.
IV. Construction of an access road	×			Access will be obtained from the N1 National Road. An internal site road network will also be required. The access and internal roads will be constructed within a 25-meter corridor.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	×			Approximately 800 employment opportunities will be created during the construction phase and 99 employment opportunities during the operation phase of the SPP project.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during the facility's 20 years of production is approximately 4200 m^3 per annum.
VIII. Job creation	×			Approximately 800 employment opportunities will be created during the construction and 99 employment opportunities during the operational phases for the SPP.
IX. Traffic generation	×			It is estimated that the construction phase of Ingwe PV solar power plant will generate approximately 23 329 trips over the fourteen (14) month period.

X. Soil erosion	✕			The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		✕		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland		✕		None.
II. A conservation or open space area		✕		The Blouberg / Langjan NPAES occur near the project area. These areas are however not yet protected.
III. An area that is of cultural importance		✕		None.
IV. A site of geological significance		✕		None.
V. An area of outstanding natural beauty		✕		None.
VI. Highly productive agricultural land		✕		None.
VII. A tourist resort		✕		None.
VIII. A formal or informal settlement		✕		None.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in depth assessment during the EIA process. An indication is provided of the specialist studies being conducted and which informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered less significant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor**: Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts**: Indicates the net result of the cause-effect between the stressor and receptor.

- **Mitigation**: Impacts need to be mitigated to minimise the effect on the environment.

Please refer to **Annexure E** (specialist studies) a more in-depth assessment of the potential environmental impacts.

Table 6.2: Matrix analysis

For ease of reference the significance of the impacts is colour-coded as follow:

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
Activity 11(i) (GN.R. 327): "The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts." Activity 24 (ii) (GN.R 327): "The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters" Activity 28 (ii) (GN.R. 327): "Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare." Activity 1 (GN.R 325): "The development of facilities or infrastructure for the generation of electricity from	Site clearing and preparation Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of habitat, loss of indigenous species. • Fragmentation of the landscape and loss of connectivity. • Increased soil erosion and sedimentation. • Soil, water or air pollution. • Spread and establishment of alien invader species. • Human impacts / road mortalities.		-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Terrestrial biodiversity impact assessment (Appendix E3)
			Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance. • Loss of important avian habitats.		-	S	M	Pr	PR	ML	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E4)
			Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to	L	-

a renewable resource where the electricity output is 20 megawatts or more." <u>Activity 15 (GN.R 325):</u> "The clearance of an area of 20 hectares or more of indigenous vegetation." <u>Activity 10 (e)(i) (GN.R 324):</u> "The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."	<u>Transportation and installation of PV panels into an Array</u> The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw. <u>Wiring to the Central Inverters</u> Sections of the PV array would be wired to central inverters which have a maximum rated power of 2000kW each. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency. <u>Storage of dangerous goods</u> – Storage facilities will be required for limited dangerous for the construction and operation of the solar power plant. The storage will be within SABS approved containers with a combined capacity of 80 cubic meters, which will be located on bunded surfaces within the development footprint of the facility.											transport sand and building materials are fitted with tarpaulins or covers.		
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills). • Loss of topsoil.	-		S	S	Pr	PR	ML	Yes	- See Table 6.3	L	Agricultural and Soils Compliance Statement To be provided as part of the EIR.
			Geology	• Collapsible soil. • Seepage. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity.	-	-	S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	Geotechnical Report
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality
			Groundwater	• Pollution due to construction vehicles and	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring	L	-

				the storage and handling of dangerous goods.									programme (quality and groundwater levels) should be designed and installed for the site. - Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards.		
			Surface water / channels	• Increase in stormwater run-off. • Pollution of water sources due to soil erosion. • Impacts on the characteristics of the watercourse. • Soil and water pollution		-	L	S	D	PR	ML	Yes	- See Table 6.3	L	Wetland Riparian Impact Assessment (Appendix E11)
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	P	S	D	I	N/A	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E9)
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility. • Lighting impacts. • Solar glint and glare impacts. • Visual sense of place impacts.	-		L	S	D	CR	NL	Yes	- See Table 6.3	M	Visual Impact Assessment (Appendix E5)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Delivery and construction trips will be insignificant when	L	Traffic Impact Assessment

												compared to the Average Daily Traffic (ADT) and will not affect the existing Level of Service (LOS). It can therefore be concluded that, on both routes, no mitigation measures will be necessary.		(Appendix E10)
			Health & Safety	• Air/dust pollution. • Road safety. • Impacts associated with the presence of construction workers on site and in the area. • Influx of job seekers to the area. • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. • Increased risk of veld fires.		-	L	L	Pr	PR	ML	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E9)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.	L	Social Impact Assessment (Appendix E9)
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

				area.											
			Heritage resources	• The destruction of sites, features or objects of cultural significance.	-		L	P	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E7)
			Paleontological Heritage	• Disturbance, damage or destruction of legally-protected fossil heritage* within the development footprint during the construction phase	-		S	P	U	IR	ML	Yes	N/A	L	Paleontological Impact Assessment (Appendix E8)
OPERATIONAL PHASE															
Activity 11(i) (GN.R. 327): "The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts." Activity 1 (GN.R 325): "The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more." Activity 10 (e)(i) (GN.R 324): "The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."	The key components of the proposed project are described below: • PV Panel Array - To produce 150 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun. • Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. • Connection to the grid - Connecting the array to the electrical grid requires transformation of the	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of habitat, loss of indigenous species. • Fragmentation of the landscape and loss of connectivity. • Increased soil erosion and sedimentation. • Soil, water or air pollution. • Spread and establishment of alien invader species. • Human impacts / road mortalities.		-	L	L	Po	PR	ML	Yes	- See Table 6.4	L	Terrestrial biodiversity impact assessment (Appendix E3)
			Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance. • Collisions with PV panels leading to injury or loss of avian life. • Collision when flying into power line infrastructure.		-	S	L	Pr	PR	ML	Yes	- See Table 6.4	M	Avifaunal Impact Assessment (Appendix E4)
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil		-	L	L	D	PR	SL	Yes	- See Table 6.4	L	Agricultural and Soil Compliance Statement

	voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. • <u>Supporting Infrastructure</u> – Auxiliary buildings with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 820m². Other supporting infrastructure includes voltage and current regulators and protection circuitry. • <u>Roads</u> – Access will be obtained via a gravel road of the N1. An internal site road network will also be required to provide access to the solar field and associated infrastructure. All site roads will require a width of approximately 6 m – 12 m. • <u>Fencing</u> - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. • <u>Storage of dangerous goods</u> – Storage facilities			compaction). • Loss of agricultural potential (low significance relative to agricultural potential of the site).										(to be included in the EIA Report)
			Geology	• Collapsible soil. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	L	-
			Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies. • Pollution due to maintenance vehicles and the storage and handling of dangerous goods.	-		L	L	Po	PR	ML	Yes	- All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater. - A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. - Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent	L	-

	will be required for limited dangerous for the construction and operation of the solar power plant. The storage will be within SABS approved containers with a combined capacity of 80 cubic meters, which will be located on bunded surfaces within the development footprint of the facility.											surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards.		
			Surface water / channels	• Destruction of watercourses • Compacted and exposed soils are prone to further degradation and erosion. • Alien invasive plant species infest hitherto cleared areas and occupy habitat which is then unavailable for indigenous species.		-	L	L	D	PR	ML	Yes	- See Table 6.4	L	- Wetland Riparian Impact Assessment (Appendix E11)
		SOCIAL/ECONOMIC	Visual landscape	• Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP. • Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP. • Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures.		-	L	L	D	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E5)

				• Visual impacts and sense of place impacts associated with the operation phase of Ingwe SPP.											
			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase.	-		L	L	Po	CR	NL	Yes	-	L	Traffic Impact Assessment (Appendix E10)
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• It is not foreseen that the proposed activity will impact on heritage resources during this phase.	-		S	S	U	PR	ML	Yes	- See Table 6.4	L	Heritage Impact Assessment (Appendix E7)
			Electricity supply	• Generation of additional electricity. The power line will transport generated electricity into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Poor recovery of habitat owing to clearance of site. • An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place. • Contamination of soil during decommissioning.		-	S	L	Po	N/A	N/A	Yes	- See Table 6.5	L	Terrestrial biodiversity impact assessment (Appendix E3)
			Air quality	• Air pollution due to the	-		S	S	D	CR	NL	Yes	- Regular maintenance	L	-

				increase of traffic of construction vehicles.										of equipment to ensure reduced exhaust emissions.		
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills).		-	S	S	Pr	PR	M	Yes	- See Table 6.5	L	Agriculture and Soils Compliance Statement (to be included in the EIA Report)
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in stormwater run-off. • Pollution of water sources due to soil erosion.		-	L	S	Pr	PR	ML	Yes	- See Table 6.5	M	Wetland Riparian Impact Assessment (Appendix E11)
			Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility. • The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, in the case of Ingwe SPP it is	-		L	S	D	CR	NL	Yes	- See Table 6.5	L	Visual Impact Assessment (Appendix E5)

				anticipated that the proposed facility will be refurbished and upgraded to prolong its life.											
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	L	Traffic Impact Assessment (Appendix E10)
			Health & Safety	• Air/dust pollution. • Road safety. • Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.	-		L	S	Pr	PR	ML	Yes	- See Table 6.5	L	Social Impact Assessment (Appendix E9)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		L	S	D	CR	NL	Yes	- See Table 6.5	L	Social Impact Assessment (Appendix E9)
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• It is not foreseen that the decommissioning phase will impact on any heritage resources.	-		S	S	U	PR	ML	Yes	- See Table 6.5	L	Heritage Impact Assessment (Appendix E7)

Nature of the impact:	(N/A) No impact	(+) Positive Impact (-)	Negative Impact		
Geographical extent:	(S) Site;	(L) Local/District;	(P) Province/Region;	(I) International and National	
Probability:	(U) Unlikely;	(Po) Possible;	(Pr) Probable;	(D) Definite	
Duration:	(S) Short Term;	(M) Medium Term;	(L) Long Term;	(P) Permanent	
Intensity / Magnitude:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	
Reversibility:	(CR) Completely Reversible;	(PR) Partly Reversible;	(BR) Barely Reversible;	-	
Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;	(CL) Complete Loss
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	-

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which should be addressed in more detail in the EIA report.

6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*

- Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters"*

- Activity 28 (ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*

- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*

- Activity 15 (GN.R 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*

- Activity 10 (e)(i) (GN.R 324): "*The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. Table 6.3 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

Table 6.3: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation	Negative High	Negative Medium	• The removal of indigenous trees and shrubs should be kept to a minimum necessary. Trim, rather than fell of woody species along the edges of the development site where possible. The clearing and damage of plant growth in the riparian and wetland areas should be restricted to the actual crossing where possible, and not into the sensitive adjacent areas. Where protected trees will need to be cleared or pruned, permits should be obtained from the relevant authority. • Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum, while the rehabilitation of the site should be prioritised after construction has been completed. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • An avifauna specialist should be consulted to conduct a specialist study for the project area and monitoring of the potential impact of the solar plant in the future. • All development activities should be restricted to specific

				recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted to fit natural patterns rather than imposing rigid geometries. The entire development footprint should be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development. • The Environmental Site Officer (ESO) should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. • Where holes for poles pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling during planting of the poles along the lines. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. • Monitoring should be implemented during the construction phase of the development to ensure that minimal impact is caused to the

				fauna and flora of the area. • A detailed wetland assessment should be conducted to determine the exact edges of potential wetlands and drainage channels.
	Habitat Fragmentation	Negative High	Negative Moderate	• Use existing facilities (e.g., impacted areas) to the extent possible to minimize the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive features such as surrounding woodland and riparian woodland outside the project area during construction. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Construction activities must remain within defined construction areas. No construction / disturbance will occur outside these areas.
	Increased Soil Erosion and Sedimentation	Negative High	Negative Moderate	• The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time. • Cover disturbed soils as completely as possible, using vegetation or

				other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Gravel roads to the construction sites must be well drained to limit soil erosion. • Control the flow of runoff to move the water safely off the site without destructive gully formation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.
	Dust Pollution	Negative Medium	Negative Low	• A speed limit should be enforced on dirt roads (preferably 30-40km/h). • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.
	Soil and water pollution	Negative	Negative	• Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO

		Medium	Low	should enforce this rule rigorously. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. • A speed limit should be enforced on dirt roads (preferably 30-40km/h). • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.
	Spread and establishment of alien invasive species	Negative Medium	Negative Negligible	• Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys. • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all

				materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated. • Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.
	Negative effect of human activities on fauna and road mortalities	Negative Moderate	Negative Negligible	• No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site. • The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. • Maintain proper firebreaks around the entire development footprint. • Educate construction workers regarding risks and correct disposal of cigarettes. • More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road

				accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible.
Wetland and Riparian Impact Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within flood line zone	Negative High	Negative Medium	• Clearing of vegetation should be scheduled for the drier winter months and limited to areas immediately needed for construction. Vegetation stripping should occur in parallel with the progress of construction to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Only selected plant species must be used in the re-vegetation process. • Minimize soil exposure around the solar development. Re-vegetate exposed areas surrounding the solar development and allow a sufficient buffer between the cropland development to prevent sedimentation into the wetlands / rivers. • Manage water effectively on, to, within, and from this site. • Employ sediment capture techniques and storm water attenuation techniques. • All development activities should be restricted to the footprint areas of the proposed development. The Environment Site Officer (ESO) should demarcate and control these areas. Storage of building equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted to fit natural patterns rather than imposing rigid geometries. • The Environment Control Officer (ECO) should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment and specifically wetlands. The ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to

				ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. • Rehabilitation of the development area after construction have been completed should be considered a high priority and all areas rehabilitated should be audited after construction has ceased by a suitably qualified environmentalist. • Environmental monitoring of environmental aspects should be implemented during and after the construction phase of the development to ensure that minimal impact is caused to the floodline or wetlands of the area. • Demarcate all riparian boundaries with pegs and danger tape. • Edge effects of pre-construction and construction activities, including erosion, sedimentation and alien/weed control, need to be strictly managed in wetland areas as well as their associated buffer zones. • The following general rehabilitation measures should be implemented in the disturbed riparian zone: o All disturbed surface areas will be re-shaped to resemble the surrounding natural topography. Surfaces will be ripped / scarified, and re-vegetated with indigenous grass species. o As far, as is practical, implement concurrent rehabilitation processes to limit degradation of soil biota. o Terrestrial invasive removal programs must be maintained throughout the proposed development as well as in the aftercare and maintenance phases.
	Soil compaction and increased risk of sediment	Negative	Negative	• Stringent controls must be put in place to prevent any unnecessary disturbance or compaction of alluvial soils. Compaction of soils should

	transport and erosion	Medium	Low	be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilized and any alien plants which establish should be cleared and follow up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area). Topsoil should preferably be separated from the subsoil, and topsoil sections should be kept intact as deep as possible. • Reprofiling of the banks of disturbed drainage areas to a maximum gradient of 1:3 to ensure bank stability. • Reinforce banks and drainage features where necessary with gabions, reno mattresses and geotextiles. This is especially relevant for the stormwater outlet area. • Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion. • Erosion control mechanisms must be established as soon as possible. Further financial provision should be continued over the subsequent years to allow for maintenance of the gabions, reno mattresses, and associated structures. • A stormwater plan must be developed with the aid of an engineer to ensure that water runoff is diverted off the site without pooling and stagnation or erosion. Financial provision for closure will include the estimated costs for erosion control post-construction. • If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be

				associated with the nitrogen negative period associated with organic material that is not composted. • Vehicle traffic should not be allowed on the rehabilitated areas, except on allocated roads, must not be allowed. It will have a negative impact due to the dispersive/compaction characteristics of soils and its implications on the long term. • Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the watercourse i.e., through placement of structures/supports and to minimise turbulent flow in the watercourse. • The indiscriminate use of machinery within the in-stream and riparian habitat will lead to compaction of soils and vegetation and must therefore be strictly controlled. • A buffer zone of 32 meters should be implemented around the drainage channels and riparian zone to prevent sediment changes to the channels. • Perform scheduled maintenance to be prepared for storms. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures.
	Soil and water pollution	Negative Medium	Negative Low	• Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. • No dumping of waste should take place within the riparian zone. If any spills occur, they should be immediately cleaned up. • Contain all dirty water in the dirty water system and contain all dirty

				storm water up to a 1:50 year flood event as a minimum. Ensure that all activities impacting on ground water resources of the subject property are managed according to the relevant DWA Licensing regulations and ground water monitoring and management requirements. • Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility. • Excess waste or chemicals should be removed from site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays to capture spills. Drip trays should be emptied into a holding tank and returned to the supplier. • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. • A speed limit (preferably 40 km/hour) should be enforced on dirt roads.

				• Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
	Spread and establishment of alien invasive species	Negative Low	Negative Low	• Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. The use of indigenous plants must be encouraged in the rehabilitated areas (storm water canals), and stockpiles containing mostly exotic or weedy species should receive specialised handling and should be invasion. Control should begin prior to construction phase considering small populations of AIS occur around the sites. • Institute strict control over materials brought onto site, which should be inspected for seeds and steps taken to eradicate these before transport to the site. The contractor is responsible for the control of weeds and invader plants. • Rehabilitate disturbed areas as quickly as possible. • Institute a monitoring programme to detect alien invasive species early. • Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals), and stockpiles containing mostly exotic or weedy species should receive specialised handling and should be covered for extended periods to inhibit seedling germination of these species. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.

Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Medium	• Limit the construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), lay-down areas must be placed only on disturbed zones, construct in shortest timeframe possible, control noise to minimum.
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	• Limit construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), lay-down areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, control noise to minimum.
	Loss of important avian habitats	Negative Medium	Negative Medium	• Limit construction footprint, limit access to the remainder of the area, lay-down areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, use existing roads as far as possible, rehabilitate with indigenous vegetation.
Visual Impact Assessment	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	<u>Planning</u> • Retain and maintain natural vegetation immediately adjacent to the development footprint. <u>Construction</u> • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures.

				• Limit construction activities to between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Agricultural and Soils Compliance Statement	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	• No mitigation measures are proposed.
	Loss of agricultural potential by soil degradation	Negative Low	Negative Low	• Loss of topsoil can result from poor topsoil management during construction related excavations. Topsoil should be stored for later use. • Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. Spillage and contamination of soil should be avoided. • Due to the very low slope of the land, the site has a low susceptibility to soil degradation.
	Erosion	Negative Low	Negative Low	• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points, and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
	Topsoil loss	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during

				rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Social Impact Assessment	Creation of direct and indirect employment opportunities	Positive Low	Positive Medium	• A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Makhado LM, Vhembe DM, Limpopo Province, South Africa, or elsewhere. • Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. • As with the labour force, suppliers should also as far as possible be sourced locally. • As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
	Economic multiplier effects from the use of local goods and services	Positive Low	Positive Medium	• It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. • Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.

	Potential loss in productive farmland	Negative Medium	Negative Low	• The proposed site for the Ingwe SPP needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. • Livestock grazing on the proposed site need to be relocated. • All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO). • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.
	In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure.	Negative Medium	Negative Low	• Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers to ensure workers can easily access their place of employment and do not need to move closer to the project site. • Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Compile and implement a grievance mechanism. • Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour. • Prevent the recruitment of workers at the site. • Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process. • Establish clear rules and regulations for access to the proposed site.

				• Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase. • Establish procedures for the control and removal of loiterers from the construction site.
	Temporary increase in safety and security concerns associated with the influx of people	Negative Medium	Negative Low	• Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Provide transportation for workers to prevent loitering within or near the project site outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period. • The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. • Access in and out of the construction site should be strictly controlled by a security company appointed to the project. • A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. • The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners.

				• The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	Impacts on daily living and movement patterns	Negative Medium	Negative Medium	• All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. • Heavy vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs and control measures along the N1 and main access road to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work). • The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.

	Nuisance impact (noise and dust)	Negative Medium	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. • The use of cooking or heating implements should only be used in designated areas. • Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by

				staff during the construction phase, are borne by the contractor.
	Impacts on the sense of place	Negative Low	Negative Low	• Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. • Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the site.
Traffic Impact Assessment	Increase in traffic on the Durban or Saldanha delivery routes	Negative Low	Negative Low	• It can be seen that the delivery and construction trips will be insignificant when compared to the Average Daily Traffic (ADT) and will not affect the existing Level of Service (LOS). It can therefore be concluded that, on both routes, no mitigation measures will be necessary.
	Increase in traffic for commuter trips	Negative Low	Negative Low	• It can be concluded from the table above that the estimated additional traffic generated by the construction staff, when travelling to/ from the SPP, can be accommodated on the existing road network. Therefore, no mitigation measures will be necessary.

6.2.2 Impacts during the operational phase

During the operational phase the site will serve as a solar plant. The potential impacts will take place over a period of 20 – 25 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*

- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*

- Activity 10 (e)(i) (GN.R 324): "*The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (e) the Limpopo Province (i) all areas."*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 20-year period. Table 6.4 summarises the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

Table 6.4: Impacts and the mitigation measures during the operational phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation	Negative High	Negative Medium	• Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum. • An avifauna specialist should be consulted to conduct a specialist study for the project area and monitoring of the potential impact of the solar plant in the future. • All development activities should be restricted to specific recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. • The Environmental Site Officer (ESO) should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions

				and stipulations for terrestrial and aquatic applications.
	Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low	• Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance.
	Increased Soil Erosion and Sedimentation	Negative Low	Negative Low	• Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Control the flow of runoff to move the water safely off the site without destructive gully formation.
	Soil, Water and air Pollution	Negative Low	Negative Low	• Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. • A speed limit should be enforced on dirt roads (preferably 30-40km/h).
	Spread and establishment of alien invasive species	Negative Low	Negative Low	• Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative

				plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys. • Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated. • Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.
	Negative effect of human activities on fauna and road mortalities	Negative Low	Negative Low	• No staff should be accommodated on the site. • The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. • Maintain proper firebreaks around the entire development footprint.

				• More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible.
Wetland and Riparian Impact Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within flood line zone	Negative Medium	Negative Low	• Manage water effectively on, to, within, and from this site. • Employ sediment capture techniques and storm water attenuation techniques. • All development activities should be restricted to the footprint areas of the proposed development. The Environment Site Officer (ESO) should demarcate and control these areas. Storage of building equipment, fuel and other materials should be limited to demarcated areas. • Environmental monitoring of environmental aspects should be implemented after the construction phase of the development to ensure that minimal impact is caused to the flood line or wetlands of the area.
	Soil and water pollution	Negative Low	Negative Low	• Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. • No dumping of waste should take place within the riparian zone. If any spills occur, they should be immediately cleaned

				up. • Contain all dirty water in the dirty water system and contain all dirty storm water up to a 1:50 year flood event as a minimum. Ensure that all activities impacting on ground water resources of the subject property are managed according to the relevant DWA Licensing regulations and ground water monitoring and management requirements. • Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility. • Spill kits should be on-hand to deal with spills immediately. • A speed limit (preferably 40 km/hour) should be enforced on dirt roads. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
	Spread and establishment of alien invasive species	Negative Low	Negative Low	• Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. • Institute a monitoring programme to detect alien invasive species early. • Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals), and stockpiles containing mostly

				exotic or weedy species should receive specialised handling and should be covered for extended periods to inhibit seedling germination of these species. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Medium	• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds.
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds.
	Collisions with PV panels leading to injury or loss of avian life	Negative Medium	Negative Low	• Panels to be flat at night, preferably low sheen/matt surfaces, quarterly fatality monitoring.
	Collision when flying into power line infrastructure	Negative very High	Negative Medium	• Require walk-through after power line pole positions are determined to demarcate sections requiring bird deterrents/flappers, install flappers on all required sections of power lines (as directed by avifaunal specialist) on or directly adjacent to site, quarterly fatality monitoring.
	Electrocution when perched on power line infrastructure	Negative High	Negative Medium	• Pole designs to discourage bird perching and to be signed off by avifaunal specialist, quarterly fatality monitoring.
Visual Impact Assessment	Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP.	Negative Medium	Negative Low	• Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient.

				• Operations • Maintain general appearance of the facility as a whole.
	Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.	Negative Low	Negative Low	• Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. • Operations • Maintain general appearance of the facility as a whole.
	Visual impacts of lighting at night on visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	• Shield the source of light by physical barriers (walls, vegetation etc.) • Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. • Make use of minimum lumen or wattage in fixtures. • Make use of down-lighters, or shield fixtures. • Make use of low-pressure sodium lighting or other types of low impact lighting. • Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
	Glint and glare on sensitive visual receptors in close proximity to the proposed facility.	Negative Low	N/A	• No mitigation measures applicable
	Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the	Negative Medium	Negative Medium	• Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. • Operations

	power line structures.			• Maintain the general appearance of the servitude as a whole.
	Visual impact and impacts on sense of place	Negative Medium	Negative Low	• The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area.
Agricultural and Soils Compliance Statement	Enhanced agricultural potential through increased financial security for farming operations	Positive Low	Positive Low	• No enhancement measures are proposed.
	Dust impact	Negative Low	Negative Low	• Implement dust suppression during the construction phase.
	Erosion	Negative Low	Negative Low	• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points, and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion
	Topsoil Loss	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire

				disturbed surface.
Social Impact Assessment	Creation of employment opportunities and skills development	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• No mitigation measures are proposed
	Loss of agricultural land and overall productivity	Negative Medium	Negative Low	• The proposed mitigation measures for the construction phase should have been implemented at this stage. • Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.
	Contribution to Local Economic Development (LED) and social upliftment	Positive Medium	Positive High	• A Community Needs Analysis (CNA) must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. • Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. • The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).
	Potential impacts related to	Low Positive /	Low Positive	• Due to the extent of the project no viable mitigation measures

	the impact on tourism.	Negative	/ Negative	can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a "Green Energy" awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. This could be implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which should be open to school fieldtrips, the local community, and tourists.
	Visual impact and impacts on sense of place	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed Ingwe SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.

6.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. Table 6.5 provides a summary of the impacts during the decommissioning phase. The decommissioning phase will however potentially result in impact on soils, pressure on existing service infrastructure, surface water and the loss of permanent employment. Skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.

Table 6.5: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation.	Negative High	Negative Medium	• The same mitigation measures applicable during the construction phase will apply.
	Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low	
	Increased Soil Erosion and Sedimentation	Negative Medium	Negative Low	
	Soil, Water and air Pollution	Negative Low	Negative Low	
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	
	Negative effect of human activities on fauna and road mortalities	Negative Low	Negative Low	
	Continued loss of indigenous vegetation owing to poor	Negative Medium	Negative Low	

	recovery of vegetation.			
	Contamination of soil by leaving rubble/ waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation	Negative Medium	Negative Low	
Wetland and Riparian Impact Assessment	Impact on the characteristics of the watercourse i.e. flow regime, habitat, biota, water quality and geomorphology due to construction within flood line zone	Negative High	Negative Medium	• The same mitigation measures applicable during the construction phase will apply.
	Soil compaction and increased risk of sediment transport and erosion	Negative Medium	Negative Low	
	Soil and water pollution	Negative Medium	Negative Low	
	Spread and establishment of alien invasive species	Negative Low	Negative Low	

Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Low	Negative Low	• None required due to low significance
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	• None required due to low significance
Agricultural and Soils Compliance Statement	Erosion	Negative Low	Negative Low	• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
	Top Soil	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Social Impact Assessment	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	• The same mitigation measures applicable during the construction phase will apply.

7 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the requirements of Section 2 of the NEMA to consider cumulative impacts as part of any environmental assessment process.

7.1 Introduction

The EIA Regulations (as amended in 2017) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the Project itself, and the overall effects on the ecosystem of the SPP site that can be attributed to the Project and other existing and planned future projects.

7.2 Geographic Area of Evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis

generally includes an area of a 30km radius surrounding the proposed development – refer to figure 7.1 below.

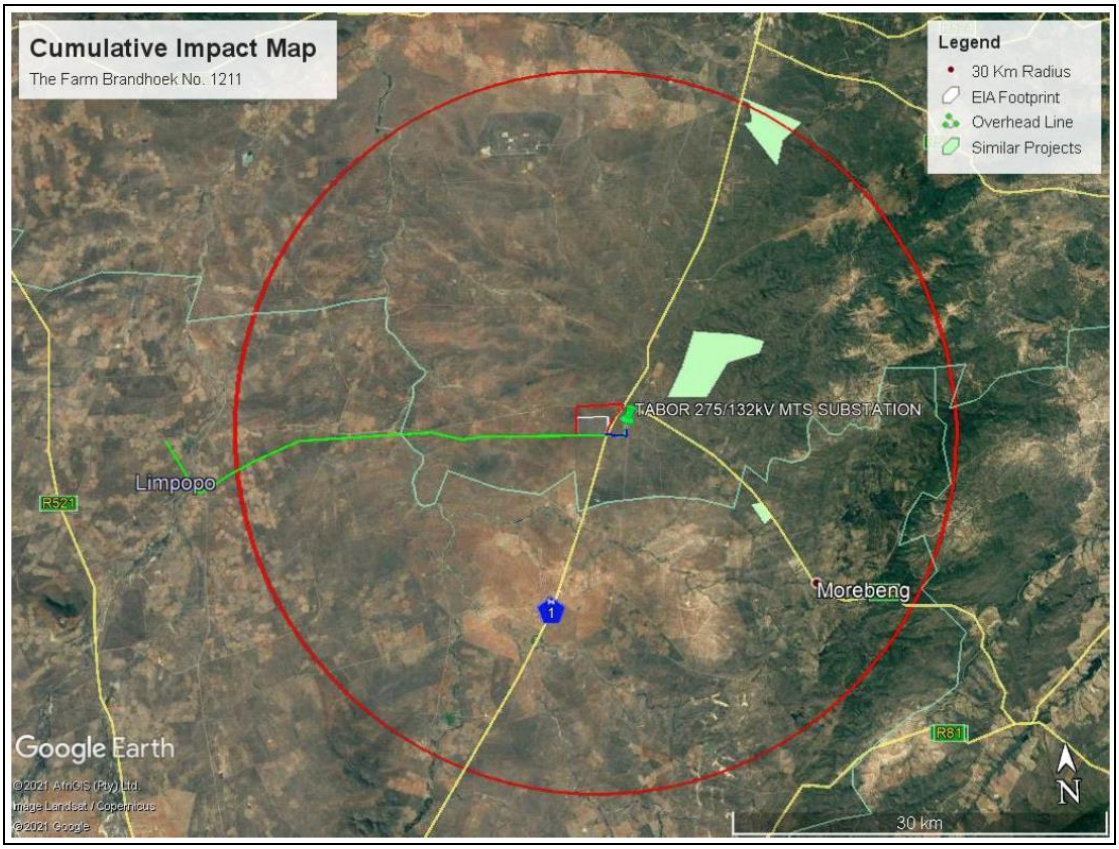


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Limpopo Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socioeconomic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the Proposed Project, beginning in 2022 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

7.4 OTHER PROJECTS IN THE AREA

The following section provides details on existing, and projects being proposed in the geographical area of evaluation.

7.4.1 Existing projects in the area

According to the DFFE's database three PV solar plant applications have been submitted to the Department within the geographic area of investigation – refer to table 7.1.

Table 7.1: A summary of related facilities, that may have a cumulative impact, in a 30 km radius of the site.

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Droogeloop	14.3 km	65 MW	12/12/20/2619	BAR	Approved
Boschoek 428	10 km	50 MW	14/12/16/3/3/2/306	Scoping and EIA	In Process
Makhado Solar ENergy	29 km	75 MW	14/12/16/3/3/2/757	Scoping and EIA	In Process

It is unclear whether other projects not related to renewable energy is or has been or will be constructed in this area. In general, development activity in the area is focused on industrial development and agriculture. Agriculture in the area is primarily associated with cattle grazing. The next section of this report will aim to evaluate the potential for solar projects for this area in the foreseeable future.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area – refer to Figure 7.2 for process flow. The following sections present their findings.

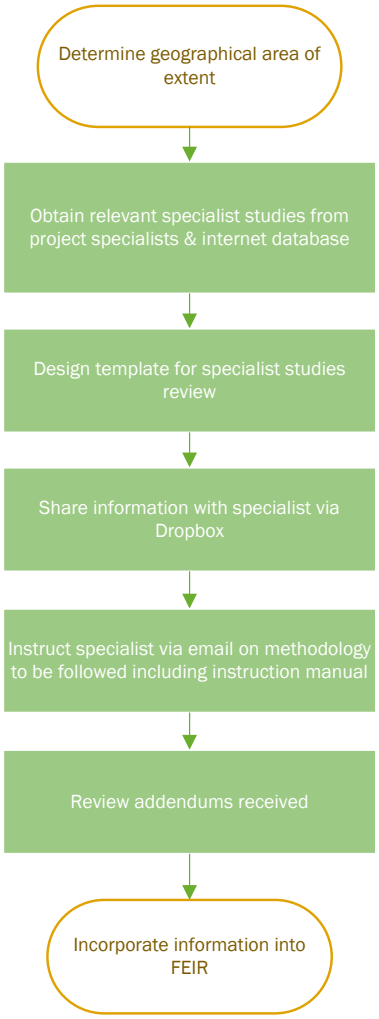


Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Soil, Land Capability and Agricultural Potential

In quantifying the cumulative impact, the area of land taken out of grazing as a result of the above nine projects plus this one (total generation capacity of ~340 MW) will amount to a total of approximately 850 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Fisheries, Forestry and the Environment (DFFE) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to 0.003% of the surface area. That is considered to be within an acceptable limit in terms of loss of agricultural land that is only suitable for grazing, of which there is no scarcity in the country. This is particularly so when considered within the context of the following point:

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has very little cultivation potential, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The

limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential.

Furthermore, there are no significant other land uses, apart from renewable energy, that are competing for agricultural land in the area, and so the total cumulative loss of agricultural land from all competing land uses is not significantly higher than what has been considered above. Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved.

7.5.2 Ecology

The Terrestrial and Biodiversity Survey (refer to Appendix E3) states that corridors and linkages of areas with similar habitat are present in the local district where a number of solar power plants are planned. No particular habitats of threatened species that could easily be isolated (for example beetles with flightless females) are known to be impacted locally in the larger site. Overall because most of the area appears to be ideal to avoid very sensitive habitats such as larger pristine wetlands and also avoid highly sensitive habitat pockets of threatened species, the development of a number of solar plants appear to be more ideal on a national scale than at many other areas. Therefore, an important mitigation measure is to leave corridors with indigenous vegetation in between solar plants and their associated infrastructure.

Overall, because of the restricted nature of solar plants and few or no emissions and pollutants into air when operational, soil and water cumulative impacts to the environment are limited (if compared for example to emissions from fossil fuel burning). Ultimately power plants could reprieve the pressures to use fossil fuels that are associated with numerous cumulative impacts and habitat losses.

7.5.3 Avifauna

The area is not within an IBA, however it has been identified as ‘High Avian Sensitivity’ by DFFE’s screening tool. The resident avifaunal community is diverse, with moderate-low species richness and abundances. Some priority and endemic species are expected to be recorded on the site. The panels are reported to either be built with fixed inclinations or to be built with variable inclination so as to track the sun movement. At times, these panels will be horizontal, potentially attracting birds through the ‘lake effect’. At other times, the panels may be horizontal, and, during the day, they may create a mirror effect and result in bird collisions, or, at night, may result in collisions with migrating birds. The displacement of priority or resident avifauna through increased disturbance. Loss of avian habitat and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.

The proposed 132 kV power line section is expected to be short but quite high (32m) and some species that are sensitive to power line collisions either occur on site or have been recorded during SABAP2 assessments or have a reasonable chance of occurring on site. Electrocutions when perched on power line infrastructure and collisions with power line infrastructure leading to injury or loss of avian life are considered to be cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.

Rated High-Negative to Medium-Negative but cumulative displacement of resident avifauna can be reduced to Low-Negative with effective implementation and ongoing monitoring of required mitigations as specified. However, cumulative displacement of priority avifauna remains Medium-Negative even after reasonable mitigation controls can be implemented and are thus a lasting anticipated impact of the development of this project.

7.5.4 Social Impact Assessment

Ingwe SPP and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Ingwe SPP alone.

While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.

It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

7.5.5 Visual Impact Assessment

The anticipated cumulative visual impact of the proposed SPP is expected to include the change in sense of place, as well as the precedent being set for SPP in the area where currently there is only a precedent predominantly for agricultural. Due to the abundance of natural vegetation in the area, the scenic quality of the region is high, further construction and operation of the SPP in the area is likely to have a negative impact. The potential for cumulative impacts to occur as a result of the projects is therefore likely.

7.5.6 Heritage

It was determined that the Ingwe project is located in an area with a very low presence of heritage sites and features. The cultural heritage profile of the larger region is very limited. Most frequently found are farmsteads, formal and informal burial sites and site relating to diamond mining activities. For this review, heritage sites located in urban areas have been excluded.

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the proposed for development and the generally low

density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

7.5.7 Paleontology

Combined desktop and field-based studies have been conducted for the proposed development and it was found that the palaeosensitivity of the project area is Low to very low. In the author's opinion:

- Palaeontological impact significances inferred for renewable energy projects, where these are assessed at all, may well reflect different assessment approaches rather than contrasting palaeontological sensitivities and impact levels;
- Meaningful cumulative impact assessments require comprehensive data on all major developments within a region, not just those involving renewable energy, as well as an understanding of the extent to which recommended mitigation measures are followed through;
- Trying to assess cumulative impacts on different fossil assemblages from different stratigraphic units (for example, Precambrian stromatolites from 2.6 billion years ago versus Pleistocene alluvial deposits less than 2.5 million years old) has limited value.

Given (1) the comparatively small combined footprint of the renewable energy projects under consideration and the low palaeosensitivity of the area, the cumulative impact of the proposed development on Farm Brandhoek No. 1211 - is assessed as Low (negative) without mitigation and to Low (negative) with full mitigation. There are therefore no objections on palaeontological grounds to authorization of this project.

7.5.8 Traffic

The construction of the PV solar power plants proposed within the 30 km radius will not only have an impact on transportation routes but will also affect the local traffic and surrounding communities. The Traffic Impact Study summarised the expected trips generated by the development of the above-mentioned solar PV plants, along with the background traffic on each of the major roadways. It was found that the cumulative additional trips will not greatly influence the immediate or wider road network. On both transportation routes, the maximum ADT of the major roadways are not exceeded and the cumulative additional trips will not initiate a change in the LOS. It must be noted, however, that on the Durban route the LOS of the N5 (near Bethlehem) is likely to change from LOS B to LOS C. However, the roadway will still continue to operate at an acceptable level of service and therefore no mitigation measures are required due to the short period of impact.

7.6 IMPACT ASSESSMENT

Following the definitions of the term, the "residual effects on the environment", i.e. effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also,

a “combination of different individual environmental effects of the project acting on the same environmental component” can result in cumulative effects.

7.6.1 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented in Section 6 (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects discussed are summarized in Table 7.2. There have been 22 specific VECs identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.2 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.2: Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial Biodiversity IA	Habitat loss owing to clearing of vegetation	Clearing of vegetation at the proposed Solar Plant footprint. This will entail the partial destruction of habitat of low or medium sensitivity.	- Medium
	Fragmentation of corridors of particular conservation concern	Owing to the possibility of a number of solar plants to be developed in the local area the possible impact to fragmentation of the landscape and loss of corridors are real. Otherwise, there are no indications of any particular linked or stepping stone corridors of particular conservation importance at the site.	- Negligible
Avifaunal Impact Assessment	Displacement of priority avian species	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Medium
	Displacement of resident avifauna	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Low
	Loss of important avian habitats	The displacement of priority avifauna through increased disturbance and possible collisions	- Medium

		with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	
Agricultural and Soils Impact Assessment	Loss of agricultural land	It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has very little cultivation potential, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential. Furthermore, there are no significant other land uses, apart from renewable energy, that are competing for agricultural land in the area, and so the total cumulative loss of agricultural land from all competing land uses is not significantly higher than what has been considered above.	- Low
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	It was determined that the Ingwe project is located in an area with a very low presence of heritage sites and features. Because of the low likelihood of finding further significant heritage resources in the area of the proposed for development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.	- Low
Palaeontological Impact Assessment	Disturbance, damage or destruction of legally-protected fossil heritage within the development footprints during the construction phase (impacts on well-preserved and / or rare fossils of scientific and conservation value)	The cumulative impact of the proposed development on Farm Brandhoek No. 1211 is assessed as Low (negative) without mitigation.	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Ingwe SPP and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to	+ Medium

		the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Ingwe SPP alone.	
	Impact with large-scale in-migration of people	The development of several projects may have a cumulative impact on the in-migration and movement of people. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.	- Medium
Traffic Impact Study	Increase in construction vehicles	The construction of the solar power plants will have a minimal impact on the current traffic volumes for long distance transportation routes. The chances of local traffic being adversely affected by the construction traffic is considered extremely low. The construction of the solar power plants will have a definite positive impact on communities of the surrounding towns. As the construction of the solar power plants is of short-term duration, the impacts on the surrounding area will only be temporary. All of the impacts are completely reversible, as the project is of short duration. The significance of the above-mentioned impacts is low, as they are only temporary and extend over a short time period.	- Low
Operational Phase			
Ecological Fauna and Flora Habitat Survey	Emissions and pollutants into air, water and soil	Overall emissions and pollutants from solar plants are limited when operational. During the operational phase cumulative impacts to the pollution of soils could happen. Rubble or waste could lead to infiltration of unwanted pollutants into the soil. Spilling of petroleum fuels and unwanted chemicals onto the soils that infiltrate these soils could lead to pollution of soils and if this happens at a number of solar plants in an area, the cumulative effect could be detrimental to the local environment.	- Low

Avifaunal Impact Assessment	Collisions when flying into power line infrastructure	Collisions with power line infrastructure leading to injury or loss of avian life are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Medium
	Electrocutions when perched on power line infrastructure	Electrocutions when perched on power line infrastructure are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Medium
Visual Impact Assessment	Visual impacts related to the SPP and power line	The anticipated cumulative visual impact of the proposed SPP is expected to include the change in sense of place, as well as the precedent being set for SPP in the area where currently there is only a precedent predominantly for agricultural. Due to the abundance of natural vegetation in the area, the scenic quality of the region is high, further construction and operation of the SPP in the area is likely to have a negative impact.	- Medium
Decommissioning Phase			
Visual Impact Assessment	Visual Intrusion	The decommissioning of the PV plant and 132kV power line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads Ingwe PV adjacent to site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to take into account.	- Low
Other	Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

This chapter of the DSR addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- <u>Cumulative effects during construction phase:</u>
  - Habitat loss owing to clearing of vegetation (- Medium)

- Displacement of resident avifauna (- Medium)
- Loss of important avian habitats (- Medium)
- Impacts of employment opportunities, business opportunities and skills development (+ Medium)
- Impact with large-scale in-migration of people (- Medium)

➢ Cumulative effects during the operational phase:
- Collisions when flying into power line infrastructure (- Medium)
- Electrocutions when perched on power line infrastructure (- Medium)
- Visual impacts related to the Ingwe SPP and power line (- Medium)

➢ Cumulative effects during the decommissioning phase:
- Generation of waste (- Medium)

The cumulative impacts for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Limpopo Province. No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

8 PLAN OF STUDY FOR EIA

This section aims to address the following requirements of the regulations:

Appendix 2. (2) A scoping report (...) must include -

(i) a plan of study for undertaking the EIA process to be undertaken, including-

(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;

(ii) a description of the aspects to be assessed as part of the EIA process;

(iii) aspects to be assessed by specialists;

(iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists;

(v) a description of the proposed method of assessing duration and significance;

(vi) an indication of the stages at which the competent authority will be consulted;

(vii) particulars of the public participation process that will be conducted during the EIA process; and

(viii) a description of the tasks that will be undertaken as part of the EIA process;

(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

8.1 INTRODUCTION

This section gives a brief outline of the Plan of Study for EIA (PoSEIA) and the tasks that will be undertaken and the anticipated process to meet the objectives for the EIA phase. The approach to the EIA is to focus on those key issues identified for the preferred alternative. This will ensure that the EIA focus on the most significant impacts and in the process save time and resources.

8.2 ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE

The purpose of the EIA phase is to assess issues identified in the scoping phase and will include an environmental management programme (EMPr). The EMPr will provide information on the proposed activity and the manner in which potential impacts will be minimised or mitigated. The EIA report will comply with Appendix 3 and will:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;
- Identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the—
    - (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - (ii) degree to which these impacts-
        - (aa) can be reversed;
        - (bb) may cause irreplaceable loss of resources, and
        - (cc) can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;
- Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

8.3 TASKS TO BE UNDERTAKEN

The following sections describe the tasks that will be undertaken as part of the EIA process.

8.3.1 Project Description

Further technical and supporting information will be gathered to provide a more detailed project description. This will include a detailed site layout plan that will be compiled once the low – medium areas of sensitivity have been indicated by the specialists.

8.3.2 Consideration of alternatives

The following project alternatives will be investigated in the EIR:

- Design/Layout alternatives: In terms of the actual layout of the proposed PV plant which will only be assessed for the preferred site alternative.

8.3.3 Compilation of Environmental Impact Report

A Draft EIR will be compiled to meet the content requirements as per Appendix 3 of GNR326 of the EIA Regulations (as amended in 2017) and will also include a draft Environmental Management Programme containing the aspects contemplated in Appendix 4 of GNR326.

8.3.4 Public participation

All registered I&APs and relevant State Departments will be given the opportunity to review the Draft Environmental Impact Report in accordance with Regulation R326. A minimum of 30 days commenting period will be allowed and all stakeholders and I&APs will be given an opportunity to forward their written comments within that period. All issues identified during this public review period will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR to be submitted to the DFFE.

8.4 ASPECTS ASSESSED

Table 8.1 below provides a summary of the aspects that have been assessed. The aspects are also linked to specialist information obtained.

Table 8.1: Aspects assessed

Aspects	Potential impacts	Specialist studies / technical information
Construction of the PV Solar facility and associated infrastructure	Impacts on the fauna and flora	Terrestrial biodiversity impact assessment & Avifauna Study
	Impacts on man-made dam (exorheic depression), non-perennial channels and riparian woodlands	Wetland Riparian Impact Assessment
	Soil and water pollution (development of facilities for the storage of dangerous goods)	Terrestrial biodiversity impact assessment and Wetland Riparian Impact Assessment
	Visual Impact	Visual Impact Assessment
	Impacts on agricultural potential (soils)	Soil and Agricultural Compliance statement
	Impacts associated with the geology of	Geotechnical Report

	the site	
	Impacts on existing services infrastructure	Confirmation from the Local Municipality
	Temporary employment, impacts on health and safety	Social Impact Assessment
	Impacts on heritage resources	Heritage Impact Assessment & Palaeontological Impact Assessment
Operation of the PV Solar facility and associated infrastructure	Impacts on the fauna and flora	Terrestrial biodiversity impact assessment& Avifauna study
	Impacts on man-made dam (exorheic depression), non-perennial channels and riparian woodlands	Wetland Riparian Impact Assessment
	Soil and water pollution (development of facilities for the storage of dangerous goods)	Terrestrial biodiversity impact assessment and Wetland Riparian Impact Assessment
	Impacts on agricultural potential (soils)	Soil Agricultural Compliance Statement
	Impacts associated with the geology of the site	Geotechnical Report
	Increased consumption of water	EAP assessment
	Pressure on existing services infrastructure	Confirmation from the Local Municipality
	Visual Impact	Visual Impact Assessment
	Provision of employment & generation of income for the local community	Social Impact Assessment
Decommissioning of the PV Solar facility	Impacts on the fauna and flora	Terrestrial biodiversity impact assessment
	Impacts on man-made dam (exorheic depression), non-perennial channels and riparian woodlands	Wetland Riparian Impact Assessment
	Socio-economic impacts (loss of employment)	Social Impact Assessment
Cumulative Impacts	Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity.	EAP assessment

8.4.1 Specialist studies

Based on the initial descriptions of potential environmental impacts or aspects (refer to Table 7.1), specialists have been subcontracted to assess the potential impacts that may be significant. The specialist studies assess impacts on both the social and the biophysical environment and also help in identifying ways that can help to mitigate the envisaged impacts. The following specialist studies have been included to address the potentially most significant impact as identified during the scoping phase – refer to Table 6.2:

- Geotechnical report: To determine whether the geotechnical conditions at the site are favorable for the development and construction of a solar PV plant.
- Heritage report: To determine whether the proposed activity will impact on any heritage or archeological artifacts.
- Terrestrial biodiversity impact assessment: To determine what the impact of the proposed activity will be on the ecology (fauna and flora) in the area.
- Wetland Riparian Impact Assessment: To determine what the impact of the proposed development will be on man-made dam (exorheic depression), non-perennial channels and riparian woodlands.
- Avifaunal Study: To determine what the impacts of the proposed activity will have on the bird (Avifauna) in the area.
- Visual Impact Assessment: To determine to what extent the proposed activity will be visually intrusive to the surrounding communities or other receptors.
- Soil and Agricultural Compliance Statement: To determine how the proposed activity will impact on soil and agricultural resources.
- Social Impact Assessment: To determine how the proposed activity will impact on the socio-economic environment.
- Palaeontological Impact Assessment: To determine the impacts on palaeontological resources.

8.4.2 Terms of reference for specialist studies

Specialists in their field of expertise will consider baseline data and identify and assess impacts according to predefined rating scales – refer to attached method of assessment. Specialists will also suggest optional or essential ways in which to mitigate negative impacts and enhance positive impacts. Further, specialists will, where possible, take into consideration the cumulative effects associated with this and other projects which are either developed or in the process of being developed in the local area. The specialist is reminded to follow the latest DFFE protocols.

The results of these specialist studies were integrated into the Draft Scoping Report (DSR), which was made available for a 30-day review and comment period. The general requirements

proposed for the inputs are presented below and specialists are encouraged to comment and provide input on these. The Terms of Reference (ToR) for each specialist study are include as Appendix E to the report.

8.4.2.1 General Requirements

Specialists' reports must comply with Appendix 6 of GNR326 published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and whereby the following are to be included:

- The details of-
  - the specialist who prepared the report; and
  - the expertise of that specialist to compile a specialist report including a curriculum vitae;
- A declaration that the specialist is independent in a form as may be specified by the competent authority;
- An indication of the scope of, and the purpose for which, the report was prepared;
  - An indication of the quality and age of base data used for the specialist report;
  - A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
- The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
- A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
- 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;
- An identification of any areas to be avoided, including buffers;
- 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;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;
- Any mitigation measures for inclusion in the EMPr;
- Any conditions for inclusion in the environmental authorisation;
- Any monitoring requirements for inclusion in the EMPr or environmental authorisation;
- A reasoned opinion-
  - whether the proposed activity, activities or portions thereof should be authorised;

    - regarding the acceptability of the proposed activity or activities; and
  - 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;
- A description of any consultation process that was undertaken during the course of preparing the specialist report;
- A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- Any other information requested by the competent authority.

In addition to the above, specialists are expected to:

- Review the Scoping Report, with specific reference to the Comments and Response Report to familiarize with all relevant issues or concerns relevant to their field of expertise;
- In addition to the impacts listed in the Scoping Report, identify any issue or aspect that needs to be assessed and provide expert opinion on any issue in their field of expertise that they deem necessary in order to avoid potential detrimental impacts;
- Assess the degree and extent of all identified impacts (including cumulative impacts) that the preferred project activity and its proposed alternatives, including that of the no-go alternative, may have;
- Identify and list all legislation and permit requirements that are relevant to the development proposal in context of the study;
- Reference all sources of information and literature consulted; and
- Include an executive summary to the report.

8.5 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 8.2.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

8.5.1 Impact Rating System

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 project phases:

- planning
- construction
- operation
- 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 8.2: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
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. 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 effects.

8.6 CONSULTATION WITH THE COMPETENT AUTHORITY

Consultation with the competent and commenting authorities will continue throughout the duration of impact assessment phase. The authorities will also comment on whether they deem it necessary to conduct additional specialist studies other than what is proposed already in this PoSEIA. On-going consultation will include:

- Submission of the Final EIR following a 30-day public review period (and consideration of comments received).
- Arrangements will be made to discuss the report with the Environmental Officer responsible for the project during the review period (if required).

9 CONCLUSION

This Final Scoping Report is aimed at identifying the 'scope' of the EIA that will be conducted in respect of the activity for which authorisation is being applied for. It can be concluded that:

- The scoping phase complied with the specifications set out in Regulations 21 and Appendix 2 of GNR326.
- All key consultees have been consulted as required by the Regulations 39 to 44.

Based on the contents of the report the following key environmental issues were identified which need to be addressed in the EIA report:

- **Impacts during construction phase:**
    - Habitat destruction caused by clearance of vegetation (- Medium)
    - Habitat Fragmentation (- Medium)
    - Increased soil erosion and sedimentation (- Medium)
    - Impact on the characteristics of the watercourse (- Medium)
    - Displacement of priority avian species from important habitats (- Medium)
    - Displacement of resident avifauna through increased disturbance (- Medium)
    - Creation of direct and indirect employment opportunities (+ Medium)
    - Economic multiplier effects from the use of local goods and services (+ Medium)
    - Temporary increase in traffic disruptions and movement patterns (- Medium)
- **Impacts during the operational phase:**
    - Habitat destruction caused by clearance of vegetation (- Medium)
    - Displacement of priority avian species from important habitats (- Medium)
    - Collision when flying into power line infrastructure (- Medium)
    - Electrocution when perched on power line infrastructure (- Medium)
    - Visual impact of sensitive visual receptors located within a 500m radius of the proposed power line. (- Medium)
    - Creation of employment opportunities and skills development. (+ Medium)
    - Development of non-polluting, renewable energy infrastructure. (+ Medium)
    - Contribution to LED and social upliftment (+ High)
- **Impacts during the decommissioning phase:**
    - Habitat destruction caused by clearance of vegetation (- Medium)
    - Impact on the characteristics of the watercourse (- Medium)

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity is Negative Medium to Low.

The latter issues will be addressed in more detail in the EIA report. The EAP thus recommended that:

The scoping report be approved after which the EIA process, as required by Regulations 23 to 24 may commence.

We trust that the department find the report in order and eagerly await your final decision in this regard.

Mrs. Carli van Niekerk
Environamics Environmental Consultants

10 REFERENCES

ACTS see SOUTH AFRICA

AGES. 2021. Terrestrial Biodiversity Impact Assessment (Including Plant and Animal Species Assessment) for the Proposed Ingwe Solar Power Plant on Farm Brandhoek No. 1211, near Polokwane, Limpopo Province.

AGREENCO. 2021. Proposed Ingwe Solar Power Plant - Specialist Avifaunal Assessment.

ALMOND, J. E. 2021. Proposed Ingwe Solar Power Plant on Farm Brandhoek No. 1211, Makhado Local Municipality, Limpopo Province.

ANON. nd. Guidelines for Environmental Impact Assessments. http://redlist.sanbi.org/eiaguidelines.php

BODEN, T.A., G. MARLAND, and R.J. ANDRES. 2011. Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A.

BOTHA, A. J. 2021. The proposed Ingwe Solar Power Plant near Polokwane, Limpopo Province. Visual Impact Assessment.

BOTHA, A. J. 2021. The proposed Ingwe Solar Power Plant near Polokwane, Limpopo Province. Social Impact Assessment.

BVI. 2021. Traffic Impact Study for the Transportation of Solar Energy Equipment to the Ingwe Solar Power Plant Near Polokwane, Limpopo Province.

CONSTITUTION *see* SOUTH AFRICA. 1996.

DEPARTMENT OF ENERGY (DoE). Integrated Resource Plan 2010-2030

DEPARTMENT OF MINERALS AND ENERGY (DME). 2003. White Paper on Renewable Energy.

MAKHADO LOCAL MUNICIPALITY MUNICIPALITY. Makhado Local Municipality Integrated Development Plan for 2010-2021.

DIVYA, K.C. AND ØSTERGAARD, J., 2009. Battery energy storage technology for power systems—An overview. Electric power systems research, 79(4), pp.511-520.

ENERGY BLOG. 2015. Energy Blog – Project Database. [Web:] http://www.energy.org.za/knowledge-tools/project-database?search=project lookup&task=search [Date of assess: 28 September 2015].

FIRST SOLAR. 2011. PV Technology comparison.

LANZ, J. 2021. Agricultural and Soils Impact Assessment for proposed Ingwe Solar Power Plant near Polokwane, Limpopo Province.

MUCINA, L. AND RUTHERFORD, M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

NATIONAL DEPARTMENT OF AGRICULTURE. 2006. Development and Application of a Land Capability Classification System for South Africa.

NERSA. 2009. South Africa Renewable Energy Feed-in Tariff (REFIT) – Regulatory Guidelines.

NGAKA MODIRI MOLEMA DISTRICT MUNICIPALITY. Ngaka Modiri Molema District Local Municipality Integrated Development Plan for 2020 – 2021.

NW PROVINCIAL GOVERNMENT. 2012. Limpopo Provincial Development and Resource Management Plan. Pretoria: Government Printer.

SANBI. 2016. Guidelines for Environmental Impact Assessments. [Web:] http://redlist.sanbi.org/eiaguidelines.php. Date of access: 26 April 2016.

SMEC. 2021. Feasibility Geotechnical Investigation Report - Watershed 1-3 Solar PV Projects, Polokwane.

SOLARGIS. 2011. Global Horizontal Irradiation (GHI). [Web:] http://solargis.info/doc/71 [Date of access: 7 May 2014].

SOUTH AFRICA(a). 1998. The Conservation of Agricultural Resources Act, No. 85 of 1983. Pretoria: Government Printer.

SOUTH AFRICA. 1996. Constitution of the Republic of South Africa as adopted by the Constitutional Assembly on 8 May 1996 and as amended on 11 October 1996. (B34B-96.) (ISBN: 0-260-20716-7.)

SOUTH AFRICA(a). 1998. The National Environmental Management Act, No. 107 of 1998. Pretoria: Government Printer.

SOUTH AFRICA(b). 1998. The National Water Act, No. 36 of 1998. Pretoria: Government Printer.

SOUTH AFRICA. 1999. The National Heritage Resources Act, No. 25 of 1999. Pretoria: Government Printer.

SOUTH AFRICA. 2004. The National Environment Management: Air Quality Act, No. 39 of 2004. Pretoria: Government Printer.

SOUTH AFRICA(a). 2008. The National Energy Act, No. 34 of 2008. Pretoria: Government Printer.

SOUTH AFRICA(b). 2008. The National Environmental Management: Waste Act, No. 59 of 2008. Pretoria: Government Printer.

SOUTH AFRICA. 2010. Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998. (GNR. 543, 544 and 545. 2010.). Pretoria: Government Printer.

SOUTH AFRICA. Minister in the Presidence: Planning (2009). *Medium Term Strategic Framework. – A Framework to guide Governments Programme in the Electoral Mandate Period 2009-2014*.

SWINGLER, S. 2006. Statistics on Underground Cable in Transmission networks, Final Report of CIGRE Working Group B1.07.

THE MESOTHELIOMA CENTRE. 2016. Mesothelioma in South Africa. [Web:] http://www.asbestos.com/mesothelioma/south-africa/. [Date of access: 27 June 2016].

VAN SCHALKWYK, J. 2021. Cultural heritage impact assessment for the development of the proposed Ingwe Solar Power Plant (Pty) Ltd near Polokwane, on the Farm Brandhoek No. 1211, Limpopo Province.

WORLD BANK GROUP. 2006. The Equator Principles.