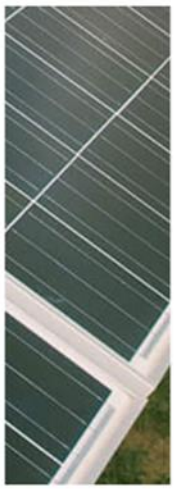
ENVIRONMENTAL IMPACT REPORT

Draft – 06 April 2023

THE PROPOSED PHALA SOLAR POWER PLANT NEAR BELA-BELA, LIMPOPO PROVINCE



ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	:	14/12/16/3/3/2/2266
Project Title	:	Proposed Phala Solar Power Plant near Bela-Bela, Limpopo Province
Authors	:	Mrs. Lisa de Lange (Opperman) Mr. Herman Alberts Ms. Christia van Dyk
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Client	:	Phala Solar Power Plant (RF) (Pty) Ltd
Report Status	:	Draft Environmental Impact Report
Submission date	:	06 April 2023

When used as a reference this report should be cited as: Environamics (2023) Draft EIR: Proposed Phala Solar Power Plant near Bela-Bela, Limpopo Province

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PLATES

APPENDICES

Appendix G: Additional Information

Figures

Plates

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 or any other programmes/opportunities to generate power in South Africa. 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, Phala 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 and identified a site located on the Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494, Registration Division KR, Limpopo Province situated within the Bela-Bela Local Municipality area of jurisdiction (refer to Figure A for the

locality map). The project entails the generation of up to 350 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 628 hectares (including supporting infrastructure on site and including the overhead power line) of the assessed 812 hectares EIA footprint. From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2059 kwh/m2.

EXECUTIVE SUMMARY

Like many other developing municipalities in the country, the Bela-Bela Local Municipality faces a number of challenges in addressing the needs of sustainable growth and improved quality of life (Draft IDP, 2022 - 2026). The Waterberg District Municipality Integrated Development Plan (2020-2021) states that the district municipality's vision is to be "*a developmental municipality dedicated to the social and economic upliftment of its communities."* The vision of the municipality can be achieved by ensuring the effective utilisation of economic resources to address the socio-economic imperatives. Bela-Bela Local Municipality's Spatial Development Framework (2018) further contributes to the vision and mission of the Waterberg District Municipality by aiming to create a conducive environment for investment and sustainable economic development within the municipality.

The Bela-Bela Local Municipality's Integrated Development Plan (IDP, 2022-23) identified that the mission of the municipality is to continually work toward the achievement of sustainable job creation opportunities for communities and the ensuring of a safe, healthy and prosperous environment.

Phala Solar Power Plant (RF) (Pty) Ltd intends to develop a 350MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494, Registration Division KR, Limpopo Province situated within the Bela-Bela Local Municipality and Waterberg District Municipality area of jurisdiction. The town of Bela-Bela is located approximately 2km north of the proposed development (refer to Figure A and B for the locality and regional map). The total development footprint of the project will approximately be 628 hectares (including supporting infrastructure on site) within the 812 hectares as assessed during the Environmental Impact Assessment process. 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 Phala 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 12(ii)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."*

- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*

- 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 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*

- 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 4 (e)(i)(ee)(gg) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*

- 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 (e) in the Limpopo province, (i) all areas."*

- Activity 12 (e)(i)(ii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (e) in the Limpopo province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans."*

- Activity 18 (e)(i)(ee)(gg) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) in the Limpopo (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*

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 of the EIA Regulations in order to obtain Environmental Authorisation. Environamics has been appointed as the independent consultant to undertake the Environmental Impact Assessment (EIA) on behalf of Phala 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 which 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. 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, as identified in this scoping phase, are briefly summarised below.

It must be noted that the EIA phase of the project will consider the impacts on a more detailed level and provide feedback on the facility layout for the proposed project.

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 and 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 temporary increase in traffic disruptions 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 and electrocutions of avifauna and visual impact of sensitive visual receptors located within a 500m radius of the proposed power line. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development 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 and the loss of permanent employment. However, skilled staff will be eminently employable, and several 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:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of forestry, Fisheries and Environment database two (2) other solar plants have been proposed in relatively close proximity to the proposed activity.

The potential for cumulative impacts may therefore exist. The Draft Environmental Impact Report includes an assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to habitat destruction and fragmentation, impact on the characteristics of the watercourse, displacement of priority avian species from important habitats, loss of important avian habitats, impacts of employment opportunities, business opportunities and skills development and impact associated with large-scale in-migration of people. Cumulative impacts during the operational phase relate to habitat destruction and fragmentation and visual intrusion. The cumulative effect of the generation of waste was identified as being potentially significant during the decommissioning phase.

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 for Environmental Authorisation and to reach a decision contemplated in Regulation 24 of the EIA Regulations. This is the Draft EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE) for review and commenting on the Application for Environmental Authorisation.

1 INTRODUCTION

This section aims to introduce the Environmental Impact Report (EIR) and specifically to address the following requirements of the regulations:

> **Appendix 3.** (3) An environmental impact assessment report contains the information that is necessary for the competent authority to consider and come to a decision on the application, and 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[1]

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 11(ii)	• *"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 since the proposed photovoltaic solar facility will transmit and distribute

[1] Please refer to Table 6.2 for detailed description of the relevant aspects of the development that will apply to each specific activity.

		electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132kV), an on-site HV/MV substation and switching station (132kV). It is expected that generation from the facility will tie in with the existing Eskom Warmbad 275/132/66kV MTS Substation.
GNR. 327 (as amended in 2017)	Activity 12(ii) (c)	• *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."* • Activity 12(ii)(c) is triggered since the proposed development will need to develop infrastructures with a physical footprint of 100 square metres or more within 32 metres from a depression wetland. The development does avoid the wetlands (watercourse) with a 15m buffer , however the development will still take place within 32m of the edge of a watercourse.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel) in containers with combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres.
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 access road will be up to 10 metres in width. The internal roads and the perimeter road will be between 4 and 6 metres in width.
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 portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 628 hectares.
GNR. 327 (as amended in 2017)	Activity 56(ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. The access road will have a width of up to 10 metres.
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 350 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 vegetation type the site falls within the Springbokvlakte Thronveld Vegetation units which is described by Mucina and Rutherford (2006) as 'Endangered'. Activity 15 is triggered since portions of the site has 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 628ha in extent.
GNR. 324 (as amended in 2017)	Activity 4 (e)(i)(ee)(gg)	• *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo province, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres*

		from any other protected area identified in terms of NEMPAA…." Activity 4 (e)(i)(ee)(gg) is triggered as the access road will have a width of up to 10 meters. The internal and perimeter roads with a width of between 6 and 12 meters will be constructed and a section of the development footprint is located within a CBA 1 and CBA 2 area. The project is located within 5 kilometres of the Rissik Private Nature Reserve and the Hetbad Nature Reserve as per the South Africa Protected Areas Database.
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 (b) in the Limpopo province, (e) in 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 containers with a capacity exceeding 30 but not exceeding 80 cubic metres. The project is located within the Limpopo Province.
GNR. 324 (as amended in 2017)	Activity 12 (e)(i)(ii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Limpopo province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans."* Activity 12 (e)(i)(ii) is triggered since the proposed development is in the Limpopo province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. In terms of vegetation type the site falls within the Springbokvlakte Thornveld Vegetation units which is described by Mucina and Rutherford (2006) as 'Endangered'. The project footprint falls within

		a CBA 1 and CBA 2. The development footprint of the solar power plant will be 628ha in extent.
GNR. 324 (as amended in 2017)	Activity 18 (e)(i)(hh)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) in the Limpopo province, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • *Activity 18 (e)(i)(ee)(gg) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The project is located within the Limpopo Province and outside urban areas. A section of the development footprint is located within a CBA 1 and CBA 2 area. The project is located within 5 kilometres of the Rissik Private Nature Reserve and the Hetbad Nature Reserve as per the South Africa Protected Areas Database.*

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 3 of Regulation 326 the objective of the Environmental Impact Report (EIR) is to, through a consultative process:

- 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 preferred location;
- Identify the location of the development footprint within the preferred site 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—
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts-
        - can be reversed;

    - may cause irreplaceable loss of resources, and
    - can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; identify, assess, and rank the impacts the activity will impose on the preferred location 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.

This report is the Draft Environmental Impact Report (EIR) that has been submitted to the Department of Environment, Forestry and Fisheries for a 30-day review and comment period. According to Regulation 326 all registered I&APs and relevant State Departments must also be allowed the opportunity to review the report. The Draft EIR has been made available to registered I&APs and all relevant State Departments for a 30-day review period from **06 April 2023 – 10 May 2023**. These stakeholders and individuals have been requested to provide written comments on the Draft EIR within the allocated timeframe. All issues identified during this review period will be documented and compiled into a Comments and Response Report as part of the Final EIR (**Appendix C7**). All comments received during the Scoping Phase of the project are available in the Comments and Response Report as referred to above, as well as Appendix C5 and C6 of this Draft EIR.

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 de Lange (Opperman)
EAPASA Registration:	2020/2150
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	084 920 3111 (Cell)
Electronic Mail:	lisa@environamics.co.za

And/or

Contact person:	Herman (Attie) Alberts
EAPASA registration:	2019/1328
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	063 685 2093 (Cell)
Electronic Mail:	herman@environamics.co.za

And/or

Contact person: Christia van Dyk

Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531

Telephone: 078 470 5252 (Cell)

Electronic Mail: christia@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 draft 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 H to this report. The expertise of the specialists is also summarised in their respective reports.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Avifaunal Assessment	The Biodiversity Company	Mahomed Desai / Andrew Husted	Unit 2, Fern Glen Suites, 420 Vale Avenue, Randburg	Cell: 081 319 1225	info@thebiodiversitycompany.com
Terrestrial Biodiversity, and Wetland Impact Assessments	The Biodiversity Company	Marnus Erasmus / Andrew Husted	Unit 2, Fern Glen Suites, 420 Vale Avenue, Randburg	Cell: 081 319 1225	info@thebiodiversitycompany.com
Agricultural and Soil Impact Assessment	The Biodiversity Company	Matthew Mamera / Andrew Husted	Unit 2, Fern Glen Suites, 420 Vale Avenue, Randburg	Cell: 081 319 1225	info@thebiodiversitycompany.com
Heritage Impact Assessment	APELSER ARCHAEOLOICAL CONSULTING - APAC	A. Pelser	P.O.BOX 73703, LYNNWOOD RIDGE, 0040	Cell: 083 459 3091	-
Palaeontological Study	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	elizebutler002@gmail.com
Visual Impact Assessment	Donaway Environmental	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	johan@donaway.co.za
Social Impact Assessment	Donaway Environmental	Johan Botha	30 Fouche Street Steynsrus, 9515	Cell: 082 493 5166	johan@donaway.co.za
Traffic Assessment Study	BVi Consulting Engineers	Liza van Zyl	Edison Square, Century City, 7441	Cell: 060 557 7467	dirkvdm@bviwc.co.za lizab@bviwc.co.za

1.4 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 was submitted to DFFE on 13 October 2022 and the DFFE confirmed no pre-application meeting was necessary per email on 20 October 2022.
- A newspaper advertisement was placed in the Die Pos /The Post on 30 September 2022, 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 26 September 2022.
- Site notices were erected on site on 26 September 2022 informing the public of the commencement of the EIA process.
- An application form and the draft Scoping Report was submitted to DFFE on
- 06 January 2023.
- The draft Scoping Report was made available for a 30-day review and comment period from 06 January 2023 to 06 February 2023.
- The final Scoping report has accepted by the DFFE on 24 March 2023.
- The Draft EIR Report was submitted to the DFFE (and registered I&APs) on 06 April 2023 for the 30-day review and comment period which will be from 06 April 2023 – 10 May 2023.

It is envisaged that the EIA process should be completed within approximately six months of submission of the Final EIR – see Table 1.3.

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

Activity	Prescribed timeframe	Timeframe
Site visit		September 2022
Public participation (BID)	30 Days	30 Sept. – 01 Nov. 2022
Submit application form and DSR	-	06 January 2023
Public participation (DSR)	30 Days	06 Jan. 2023– 06 Feb. 2023
Submit FSR	44 Days	13 February 2023

Department acknowledges receipt	10 Days	February 2023
Department approves/reject	43 Days	24 March 2023
Public participation (DEIR)	30 Days	06 April – 10 May 2023
Submission of FEIR & EMPr	-	May 2023
Department acknowledges receipt	10 Days	May 2023
Decision	107 Days	August 2023
Department notifies of decision	5 Days	August 2023
Registered I&APs notified of decision	14 Days	August 2023
Appeal	20 Days	September 2023

1.5 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 were undertaken or not and a motivation or confirmation of the studies being included or not.

Table 1.4: Specialist studies identified by the DFFE Screening tool and specialist studies conducted

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Confirmation / motivation
Agricultural Impact Assessment Sensitivity: Very High	Yes	A Soils and Agricultural Impact Assessment is included in Appendix E4. The high sensitivity is disputed by the report
Landscape / Visual Impact Assessment Sensitivity: Very High	Yes	A Visual Impact Assessment is included in Appendix E3.
Archaeological and Cultural Heritage Impact Assessment	Yes	A Heritage Impact Assessment is included in Appendix E5.

Sensitivity: High		
Palaeontological Impact Assessment Sensitivity: Medium	Yes	A Palaeontological Impact Assessment is included in Appendix E6.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Terrestrial Biodiversity Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment Sensitivity: Low	No	A Wetland / Riparian Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Civil Aviation Assessment Sensitivity: Medium	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.
Defence Assessment Sensitivity: Low	No	The sensitivity for the entire extent of the site is low and therefore no assessment has been included.
RFI Assessment Sensitivity: Low	No	The RFI theme sensitivity is low for the entire extent of the project. The South African Radio Astronomy Observatory (SARAO) 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 SARAO regarding the project. The project is

		also not located within an area considered to be of a high sensitivity.
Geotechnical Assessment Sensitivity: Not indicated	No	The Geotechnical Assessment will be included in the EIA Report to be made available for review and comment as part of the EIA Phase.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E7.
Plant species Assessment Sensitivity: Medium	Yes	Refer to Appendix E1. The Terrestrial Biodiversity Impact Assessment also includes the relevant Plant Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Animal Species Assessment Sensitivity: Medium	Yes	Refer to Appendix E1. The Terrestrial Biodiversity Impact Assessment also includes the relevant Plant Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 of Regulation No.326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.5: Structure of the report

Requirements for the contents of an EIR as specified in the Regulations	Section in report
Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, 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 as well as the associated structures and infrastructure 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 and being applied for; and	
	(ii) a description of the associated structures and infrastructure related to the development.	
(e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	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 motivation for the preferred development footprint within the approved site.	5
(h)	a full description of the process followed to reach the proposed development footprint within the approved site, including –	
	(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and	
	(x) a concluding statement indicating the preferred alternative development location within the approved site.	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the 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 determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	
	(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 full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-	
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(j)	an assessment of each identified potentially significant impact and risk, including-	
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	6
(l)	an environmental impact statement which contains-	8
	(i) a summary of the key findings of the environmental impact assessment:	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Not applicable

(o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Not applicable
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(q)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	8
(s)	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 (I&APs);	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including-	Not applicable
	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	
	(ii) a motivation for the deviation;	
(v)	any specific information that may be required by the CA; and	Not applicable
(w)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

2 ACTIVITY DESCRIPTION

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

Appendix 3. (3) An EIR (...) 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 or activities applied for as well as the associated structures and infrastructure 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 and being applied for;

(ii) a description of the associated structures and infrastructure related to the development.

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 Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494, Registration Division KR, Limpopo Province situated within the Bela-Bela Local Municipality area of jurisdiction. The proposed development is in the Limpopo Province in the northern interior of South-Africa (refer to Figure B for the regional map). The town of Bela-Bela is located approximately 2km to the north of the proposed development (refer to Figure A for the locality map).

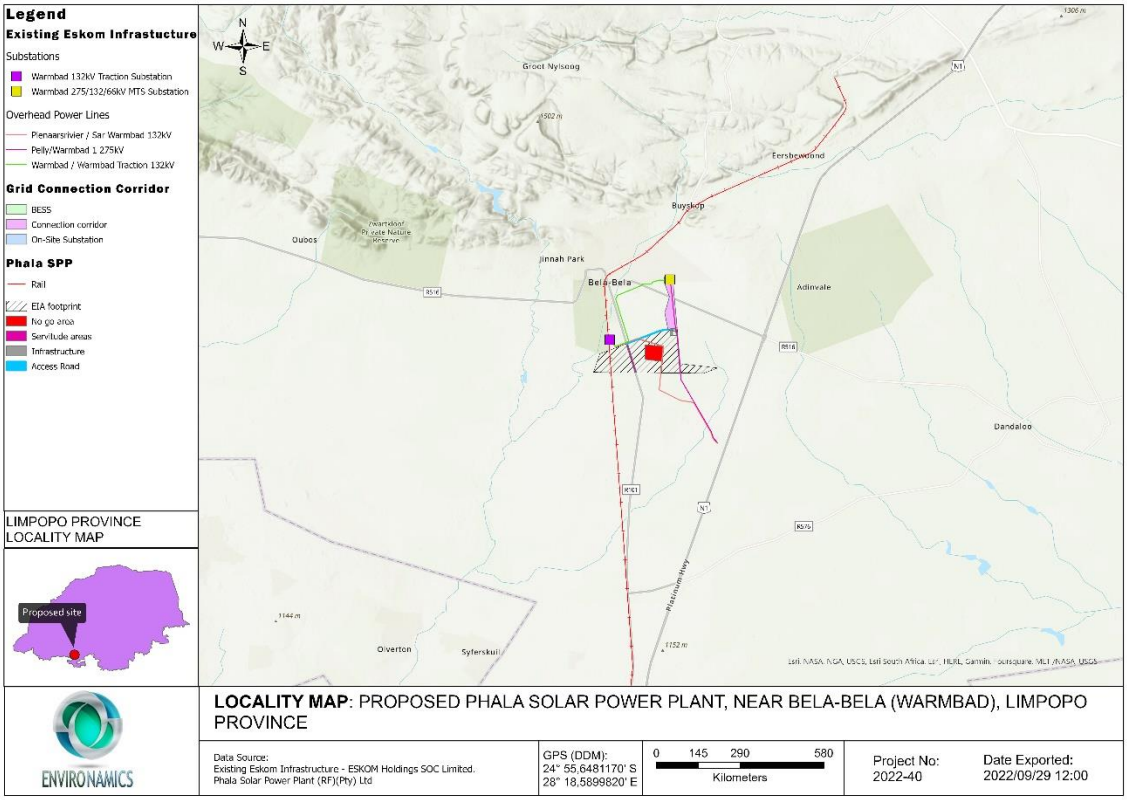


Figure A: Map indicating the location of the proposed development.

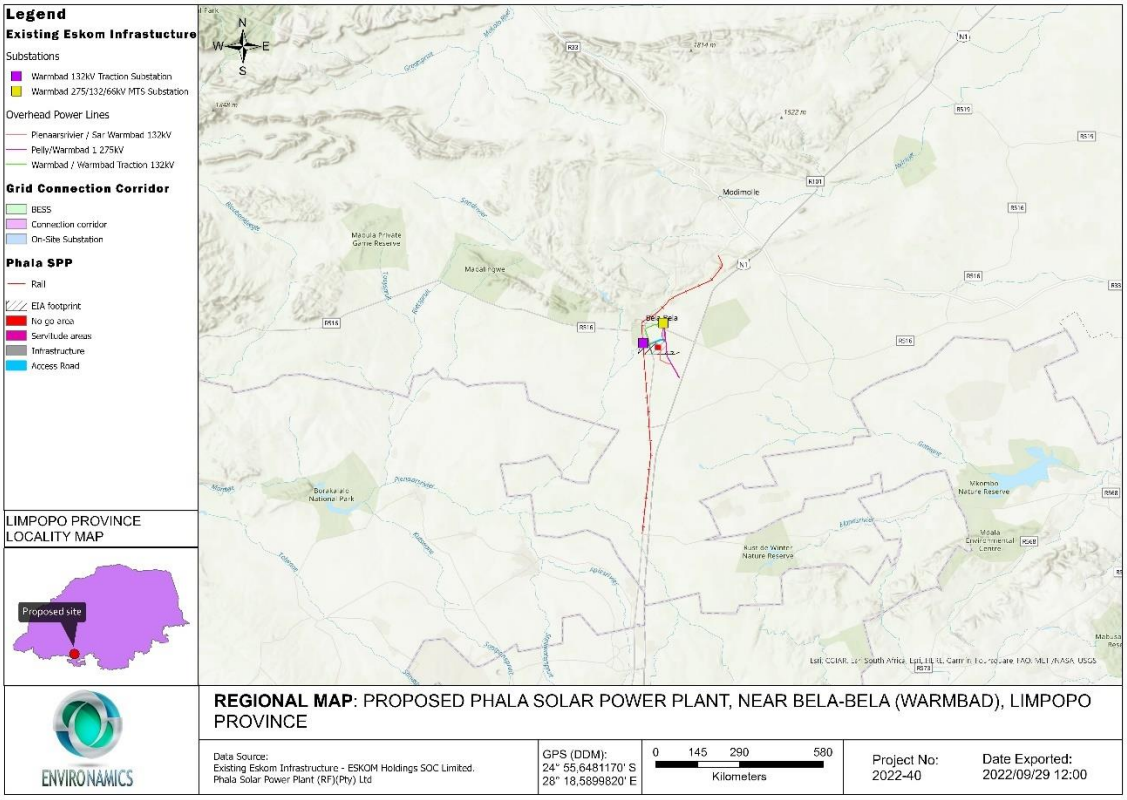


Figure B: Map indicating the regional location of the proposed development.

The project entails the generation of up to 350MW electrical power through the installation and operation of photovoltaic (PV) panels. An area of 812ha has been assessed as part of the Scoping Report, and an area of 628ha have been identified as the development footprint for the placement of the infrastructure (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 Phala Solar Power Plant (RF) (Pty) Ltd from the property owner, Kusasa Commodities 160 (Pty) Ltd for the life span of the project (minimum of 20 years).

It is expected that generation from the facility will tie in with the existing Eskom Warmbad 275/132/66kV MTS Substation. A new 132kV power line will be constructed to connect the solar power plant to the national grid. For the placement of the new power line one grid connection corridor is being assessed with a length of approximately 2.8km and 200m wide but up to 550m wide in some instances.

Table 2.1: General site information

Description of affected farm portion	Solar Power Plant Remaining Extent of Portion 1 of the farm Turfbult No. 494 Remaining Extent of Portion 2 of the farm Turfbult No. 494 Portion 5 of the farm Turfbult No. 494 Portion 7 of the farm Turfbult No. 494 Power Line R/E of Portion 1 of the farm Roodekuil No. 498 - KR
Province	Limpopo
District Municipality	Waterberg District Municipality
Local Municipality	Bela-Bela Local Municipality
Ward numbers	09
Closest towns	Bela-Bela is located approximately 2km north of the proposed development.
21 Digit Surveyor General codes	Solar Power Plant Remaining Extent of Portion 1 of the Farm Turfbult No. 494 T0KR00000000049400001 Remaining Extent of Portion 2 of the Farm Turfbult No. 494 T0KR00000000049400002 Portion 5 of the Farm Turfbult No. 494

	T0KR00000000049400005 Portion 7 of the Farm Turfbult No. 494 T0KR00000000049400007 Power Line R/E of Portion 1 of the farm Roodekuil No. 498 - KR T0KR00000000049800001
Type of technology	Photovoltaic solar facility
Structure Height	Panels ~6m, buildings ~ 6m, power line ~32m and battery storage facility ~8m height
Battery storage	Within a 4-hectare area
Surface area to be covered (Development footprint)	Approximately 628 ha
Laydown area dimensions (EIA footprint)	Assessed 812 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.
Generation capacity	Up to 350MW

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.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities[2]

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as	Activity 11(ii)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban*

[2] Please refer to Table 6.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

amended in 2017)		*areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered since 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 power line (132kV), an on-site HV/MV substation and switching station (132kV). It is expected that generation from the facility will tie in with the existing Eskom Warmbad 275/132/66kV MTS Substation.
GNR. 327 (as amended in 2017)	Activity 12(ii) (c)	• *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."* • Activity 12(ii)(c) is triggered since the proposed development will need to develop infrastructures with a physical footprint of 100 square metres or more within 32 metres from a depression wetland. The development does avoid the watercourse with a 15m, however the development will still take place within 32m of the edge of a watercourse.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel) in containers with combined capacity of 80 cubic metres. The capacity will not exceed 500 cubic metres.
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 access road will be up to 10 metres in width. The internal roads and the perimeter road will be between 4 and 6 metres in width.
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 portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of the solar power plant will be 628 hectares
GNR. 327 (as amended in 2017)	Activity 56(ii)	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. The access road will have a width of up to 10 metres.
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 350 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 vegetation type the site falls within the Springbokvlakte Thornveld Vegetation units which is described by Mucina and Rutherford (2006) as 'Endangered'. Activity 15 is triggered since portions of the site has 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 628ha in extent.
GNR. 324 (as amended in 2017)	Activity 4 (e)(i)(ee)(gg)	• *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo province, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • Activity 4 (e)(i)(ee)(gg) is triggered as the access road will have a width of up to 10 meters. The internal and perimeter roads with a width of between 6 and 12 meters will be constructed and a section of the development footprint is located within a CBA 1 and CBA 2 area. The project is located within 5 kilometres of the Rissik Private Nature Reserve and

		the Hetbad Nature Reserve as per the South Africa Protected Areas Database.
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 (b) in the Limpopo province, (e) in 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 containers with a capacity exceeding 30 but not exceeding 80 cubic metres. The project is located within the Limpopo Province.
GNR. 324 (as amended in 2017)	Activity 12 (e)(i)(ii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Limpopo province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans."* • Activity 12 (e)(i)(ii) is triggered since the proposed development is located in the Limpopo province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. In terms of vegetation type the site falls within the Springbokvlakte Thronveld Vegetation units which is described by Mucina and Rutherford (2006) as 'Vulnerable' and 'Endangered'. The project footprint falls within a CBA 1 and CBA 2. The development footprint of the solar power plant will be 628ha in extent.
GNR. 324 (as amended in 2017)	Activity 18 (e)(i)(hh)	• *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) in the Limpopo province, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."* • Activity 18 (e)(i)(ee)(gg) is triggered since the existing access road to the site will need to be widened by more than 4

		metres. The project is located within the Limpopo Province and outside urban areas. A section of the development footprint is located within a CBA 1 and CBA 2 area. The project is located within 5 kilometres of the Rissik Private Nature Reserve and the Hetbad Nature Reserve as per the South Africa Protected Areas Database.

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 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 – existing paths will be used where reasonably possible. Access will be obtained via the R101 regional road to the traversing the site. 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 350MW, 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 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 via the proposed power line. It is expected that generation from the facility will connect to the national grid via the existing Eskom Warmbad 275/132/66kV MTS Substation. The grid connection route will be assessed within a 200m wide (up to 550m wide in some instances) corridor. The Project will inject up to 350MW into the National Grid. The installed capacity will be approximately 400MW.
- 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 supporting infrastructure such as the auxiliary buildings will be situated in an area measuring up to 1.3 ha.
- Battery Energy Storage System – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,740 m^3 of batteries and associated operational, safety and control infrastructure.
- Roads – Access will be obtained via the R101 regional road to the west of the site. 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. Access Points: coordinates 24°55'19.96"S 28°18'18.58"E.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site will be considered – refer to Figure G and Figure H. The total surface area proposed include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, transmission lines and perimeter fences). Limited features of environmental significance exist on site, with the main features of significance being wetland and riparian features. These features have been avoided by the layout of the facility. A final layout plan is included as Figure G and Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE specifications.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	628 hectares (Development footprint)
Number of inverters required	Minimum 50
Area occupied by inverter / transformer stations / substations / BESS	Central inverters+ LV/MV trafo: 750 m2

	HV/MV substation with switching station: 3,35 ha BESS: 5,5 ha
Capacity of on-site substation	132kV
Capacity of the power line	132kV
Area occupied by both permanent and construction laydown areas	Total Footprint Area: 628 hectares Construction laydown area: within ~ 5.0 ha
Area occupied by buildings	Security Room: ~150 m^2 O&M laydown: Within 5.0ha
Battery storage facility	Maximum height: 8m Maximum volume: 1740 m^3 Capacity: Up to 500MW
Length and width of access road	Length: Estimated 2,61 km; Width: 10 meters
Length and width of internal roads	Length: Estimated 11.50 km. Width: between 4 to 6 meters
Length and width of perimeter roads	Length: Estimated 24 km. Width: between 4 to 6 meters
Grid connection corridor width	200m wide but up to 550m wide in some instances
Grid connection corridor length	Up to ~2.8km
Power line servitude width	32 meters
Height of fencing	Approximately 2.5m

Table 2.4 provide and illustrate the corner coordinate points for the proposed development site as well as the coordinates for the preferred power line, access road and battery storage facility.

Table 2.4: Coordinates

Coordinates			
Project Site	A	24°56'11.29"S	28°17'17.30""E
	B	24°55'38.26"S	28°17'28.70"E
	C	24°54'57.07"S	28°19'16.01"E
	D	24°54'51.69"S	28°19'46.44"E
	E	24°55'55.85"S	28°19'51.85"E
	F	24°56'3.83"S	28°20'58.99"E
	G	24°56'13.13"S	28°20'33.66"E
Proposed Access Road 1 **A – Start, B – Middle, C - End**	A	24°55'20.13"S	28°18'17.01"E
	B	24°55'3.85"S	28°18'59.06"E
	C	24°54'52.49"S	28°19'42.82"E
	A	24°55'45.56"S	28°18'24.50"E

Access Road 2 - Access to Portion 7/494	B	24°55'45.67"S	28°18'24.02"E
	C	24°55'45.79"S	28°18'23.48"E
Battery Energy Storage System (BESS)	A	24°55'6.24"S	28°19'30.39"E
	B	24°55'3.54"S	28°19'30.36"E
	C	24°55'0.35"S	28°19'44.63"E
	D	24°55'3.49"S	28°19'45.47"E
	E	24°55'6.11"S	28°19'45.69"E
Substation corner coordinates	A	24°55'1.20"S	28°19'39.35"E
	B	24°54'53.86"S	28°19'37.38"E
	C	24°54'52.93"S	28°19'42.63"E
	D	24°55'0.04"S	28°19'44.54"E
Grid Connection Corridor	A	24°54'54.54"S	28°19'30.21"E
	B	24°54'24.46"S	28°19'24.26"E
	C	24°53'56.45"S	28°19'32.84"E
	D	24°53'31.30"S	28°19'23.63"E
	E	24°53'21.06"S	28°19'23.45"E
	F	24°53'20.84"S	28°19'39.19"E
	G	24°54'51.69"S	28°19'46.45"E

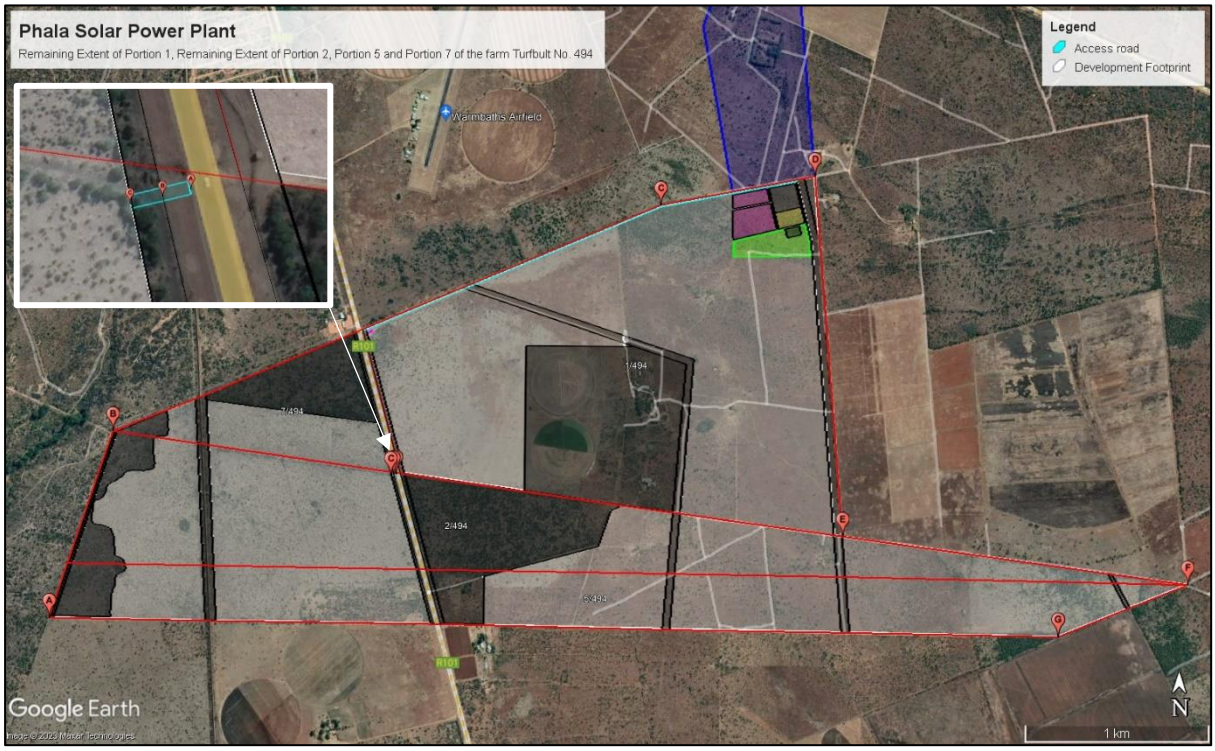


Figure 2.1: Map indicating the coordinate points for the proposed Phala Solar Power Plant (including the project footprint and access road 2).

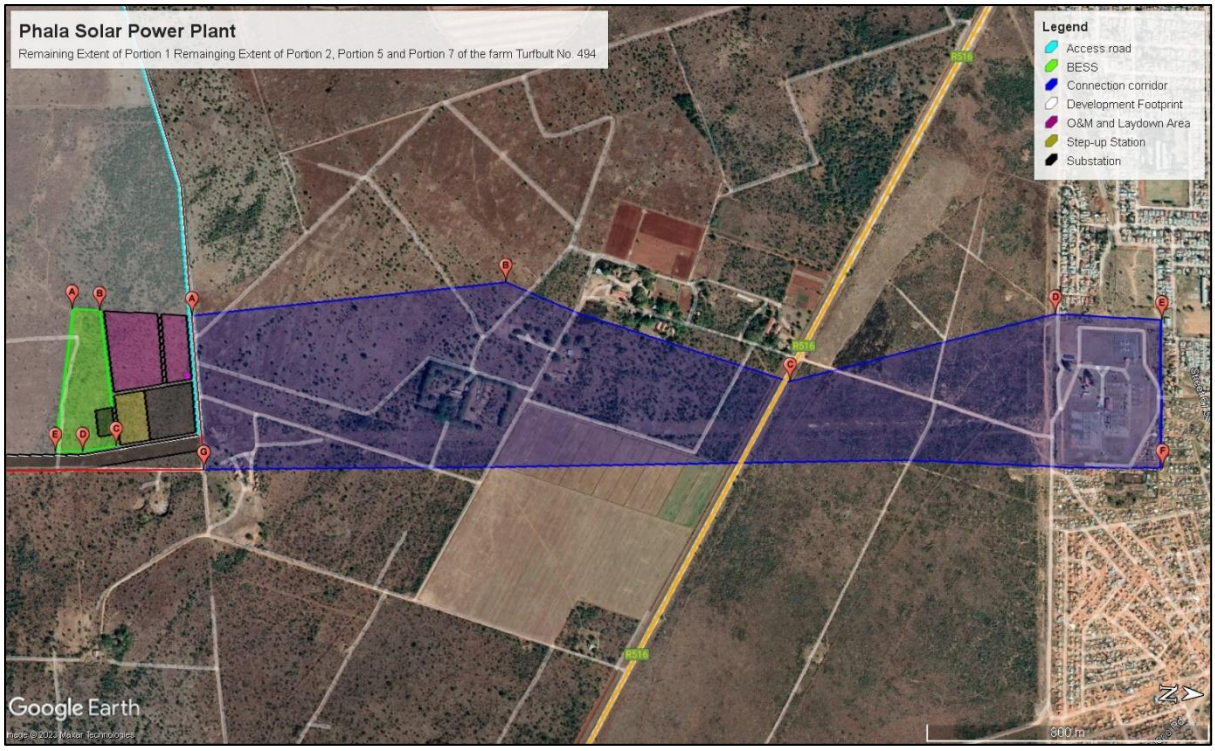


Figure 2.2: Map indicating the coordinate points for the proposed Phala Solar Power Plant (including the power line corridor and BESS).

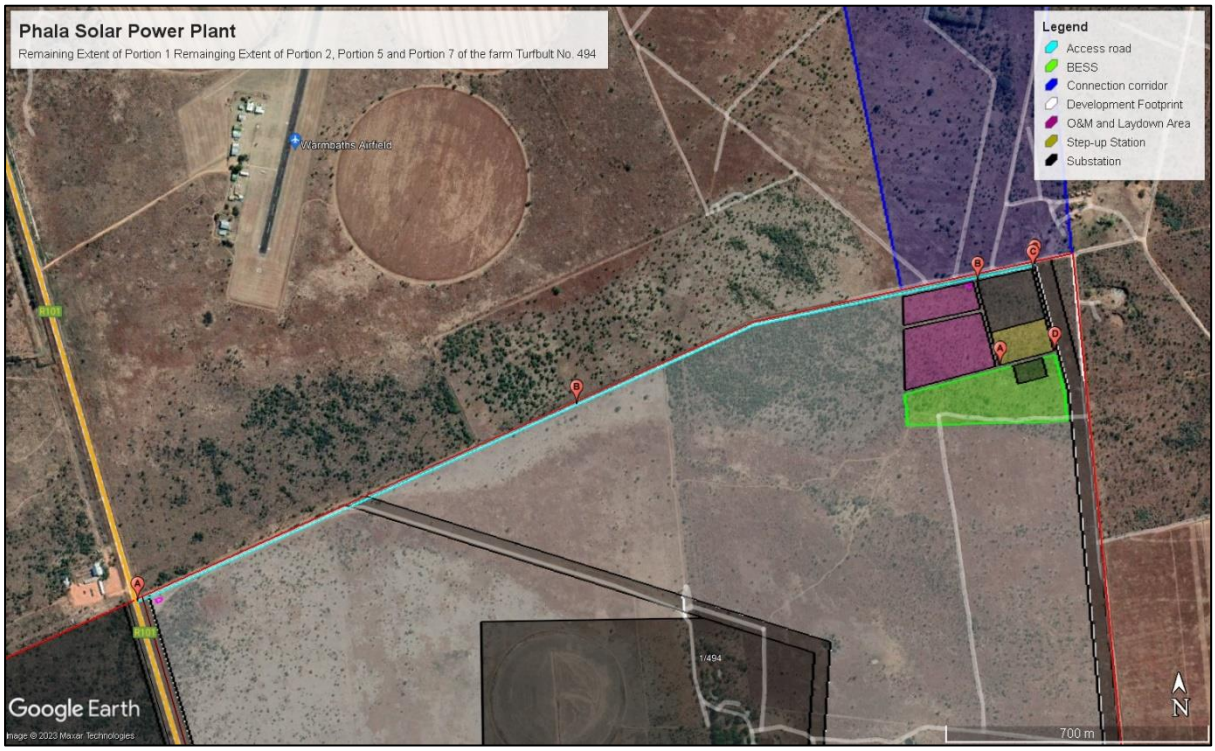


Figure 2.3: Map indicating the coordinate points for the proposed Phala Solar Power Plant (including the Substation and Access Route 1).

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 collected with water trucks from an authorized water service provider and stored on site. A full assessment of the application for water use authorisation will only be undertaken if 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 45 000 m^3 annualy during the 18 - 24 months of construction.

The estimated maximum amount of water required during the facility's 20 years of production is 7000m^3 per annum. Most of this usage is for the cleaning of the solar panels. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September). Drinking water supplied will comply with the SANS:241 quality requirements. Water quality from the borehole will be tested to confirm SANS:214 quality, if water quality is not sufficient for drinking, bottled water will be supplied to staff during construction and operational phases of the project.

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 will 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. It will also be good practice to design stormwater canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Stormwater management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F1.

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) have been 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). To date, no response has been received from the relevant Local Municipality. Refer to Appendix G.

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 affected property 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.

2.5.5 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.

<u>The decommissioning process will consist of the following steps:</u>

- 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.
- 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,
- The surface will be restored to the original contours and hydro seeding will take place.

3 LEGISLATIVE AND POLICY CONTEXT

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

Appendix 3. (3) An EIR (...) must include- (e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

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)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Limpopo Provincial Spatial Development Framework (PSDF) (2014)
- Waterberg DM Final Integrated Development Plan (IDP) 2020–2021 (2020)
- Bela-Bela Local Municipality Draft Integrated Development Plan 2020-2021 (2020)
- Bela-Bela Local Municipality Spatial Development Framework 2014 (SDF) (2014)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Table 3.1 and Table 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 Phala 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	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

	Environment) and the Limpopo Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		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 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 Phala 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 Phala 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 C42K quaternary catchment and is situated in the Middle Vaal Water Management Area. Drainage occurs as sheet-wash into the drainage channels on site that eventually drains into the major river namely the Bosluisspruit that occurs to the west of the project area. Also, 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	National Department Environmental Affairs (DEA)	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.

(Act No. 39 of 2004)	(now known as the Department of Forestry, Fisheries and the Environment)		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 Phala 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 E5, and the Palaeontological Impact Assessment is included as Appendix E6.

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. A Soils and Agricultural Assessment has been undertaken for the Phala Solar Power Plant and is included as Appendix E4.
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 Phala Solar Power Plant and is included in Appendix E3.

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 Phala 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 Phala 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 Phala Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.
Integrated Resource Plan	Department of Mineral	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

(IRP) for South Africa	Resources and Energy	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 Phala 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 Phala 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 stretch 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 Phala 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 Phala 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. Phala 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. Phala 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. Even though the Phala Solar Power Plant is not located within a REDZ, it will still contribute to the overall development of renewable energy within the country.
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 Phala 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	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".

Plan (IDP) 2020-2021			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 Phala 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 Phala 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	**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".

Development Framework	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 Phala 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 Phala 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 increased 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 Phala 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 3. (3) An EIR (...) must include-

(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;

4.1 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). In August 2021 article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (source: https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818).

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[3]. 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, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

[3] The project will also participate in other programs/opportunities to generate power in South Africa.

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. The location of the proposed development within the Bela-Bela Local Municipality is desirable since 12% of households within the Municipality have no income (Bela-Bela IDP, 2022/2024).
- 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 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 CO_2 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 non-renewable 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 - Because of predominantly the climate and soil limitations, the site is totally unsuitable for cultivated crops, and the 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 the proposed energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: According to the Bela-Bela LM IDP, the national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.
- 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 3. (3) An EIR (...) must include-

(g) A motivation for the preferred development footprint within the approved site (i) details of all the alternatives considered;

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

(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(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 alternative development location within the approved site.

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 was conducted by the developer the affected properties and the farm portions were found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. These factors were then taken into consideration and avoided as far as possible.

An initial site assessment was conducted by the developer on Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494 and the farm was found favorable due to its close proximity to grid connections, solar radiation, ecology and relative flat terrain. Some parts of the farm have been deemed not suitable for the proposed development such as areas under cultivation and watercourses. Where specific features of environmental sensitivity are identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers have been considered by the developer to ensure that the facility layout is appropriate considering the sensitive features present. The site selection also took the site geology,

land capability, water availability and land use into consideration before deciding on the specific site within the affected property. A single alternative site on the same farm has been identified (Subsolar, 2022).

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 site is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Phala Solar Power Plant (RF) (Pty) Ltd in the Bela-Bela area to potentially establish the Phala Solar Power Plant. From a local perspective Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential 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).

No alternative areas on Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494 have been considered for the development footprint. However, provision will be made in this scoping report to consider the results of the specialist studies to exclude the sensitive areas present, which includes the no-go buffer areas recommended by the specialist. The sensitive areas and associated buffers have been considered by the developer for the facility layout design to optimise the layout for avoidance of the environmental sensitivities identified.

As part of the specialist studies undertaken, areas that need to be avoided has been identified which includes surface water/wetland features and the sensitive Thornveld habitat present within the development footprint. The development footprint is however large enough to enable the avoidance of the sensitive features and the associated buffers by the facility layout and still provide an opportunity for the successful development and operation of the Phala Solar Power Plant from a technical perspective. The final layout for the facility that considers these sensitive features is included as Figure I of the Draft Environmental Impact report.

The developer has optimised the layout to avoid environmentally sensitive features that were identified by the respective specialist studies. The development footprint of the project has been reduced from 652ha to 628ha to ensure the exclusion of the majority of the sensitive Thornveld Habitat unit and to exclude all overlapping CBA 1 and CBA 2 areas as confirmed by the Terrestrial Biodiversity Report (Appendix E1). The final layout has been submitted as Figure I of the Draft Environmental Impact Report.

Therefore, a single preferred location alternative was assessed – refer to Figure 5.1.

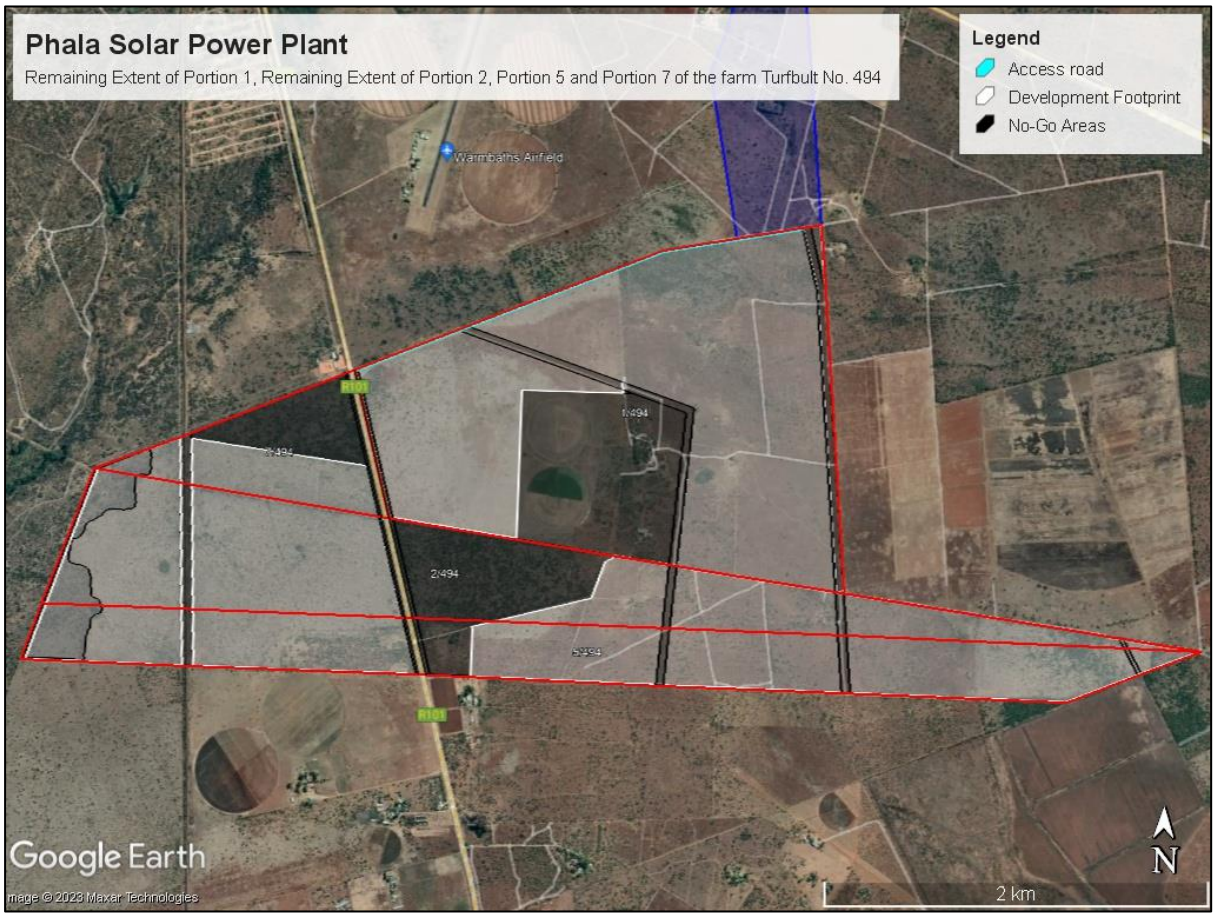


Figure 5.1: Location of the single preferred location alternative (i.e., development footprint) located within the affected property assessed.

5.1.3 Activity alternatives

The EIA 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 – Phala SPP is part of a portfolio of solar PV projects throughout South Africa. Phala 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 Bela-Bela 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.

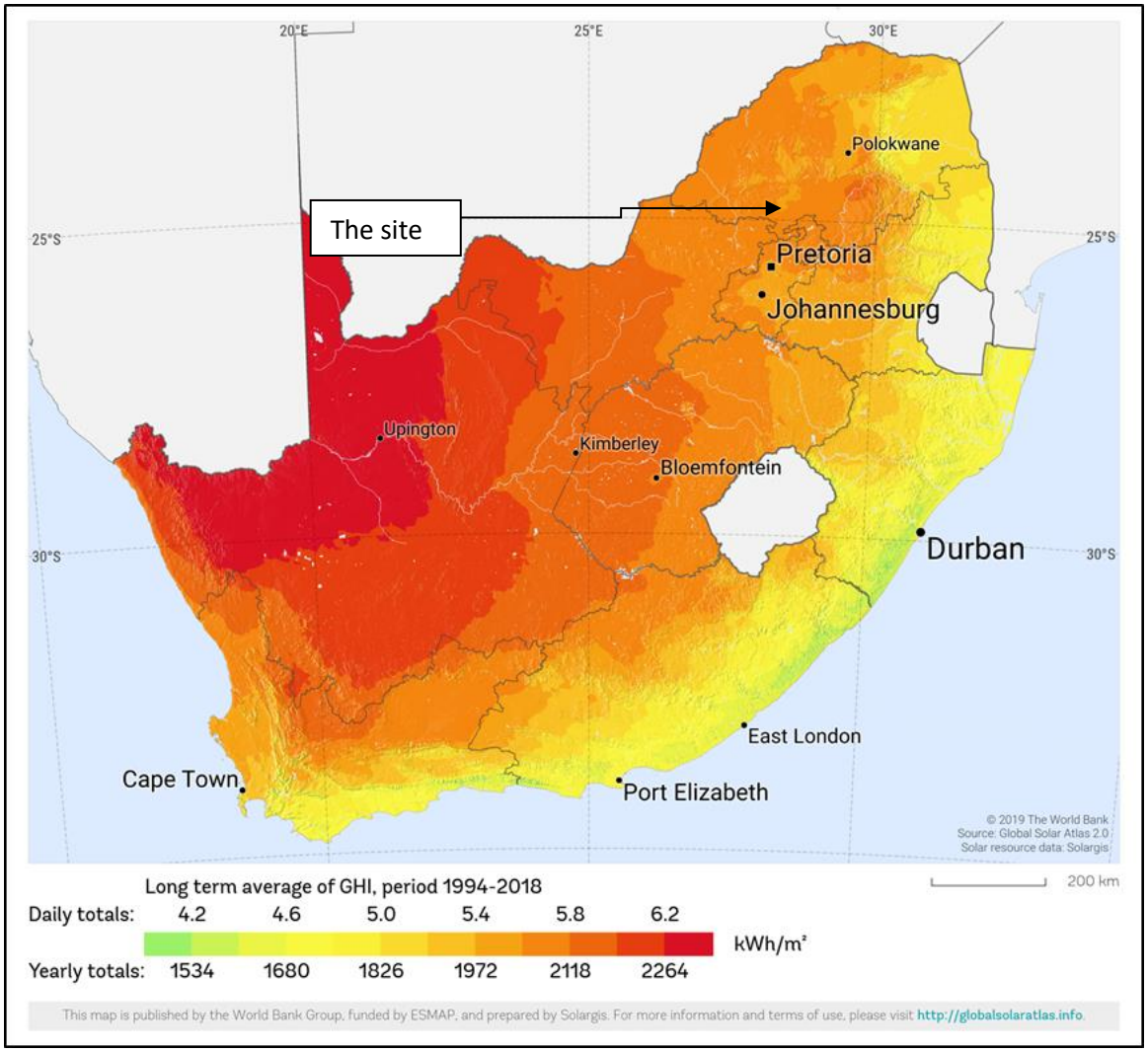


Figure 5.2: Global horizontal irradiation values for South Africa (SolarGIS, 2021).

- 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 based on the overall suitability of the site. 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

Generation from the facility will connect to a 275/132/66kV MTS Substation. The connection power line will be constructed within the limits of the grid connection. For the placement of the new power line one grid connection corridor is being assessed with a length of up to 2.8km and 200m (up to 550m wide in some instances) in width.

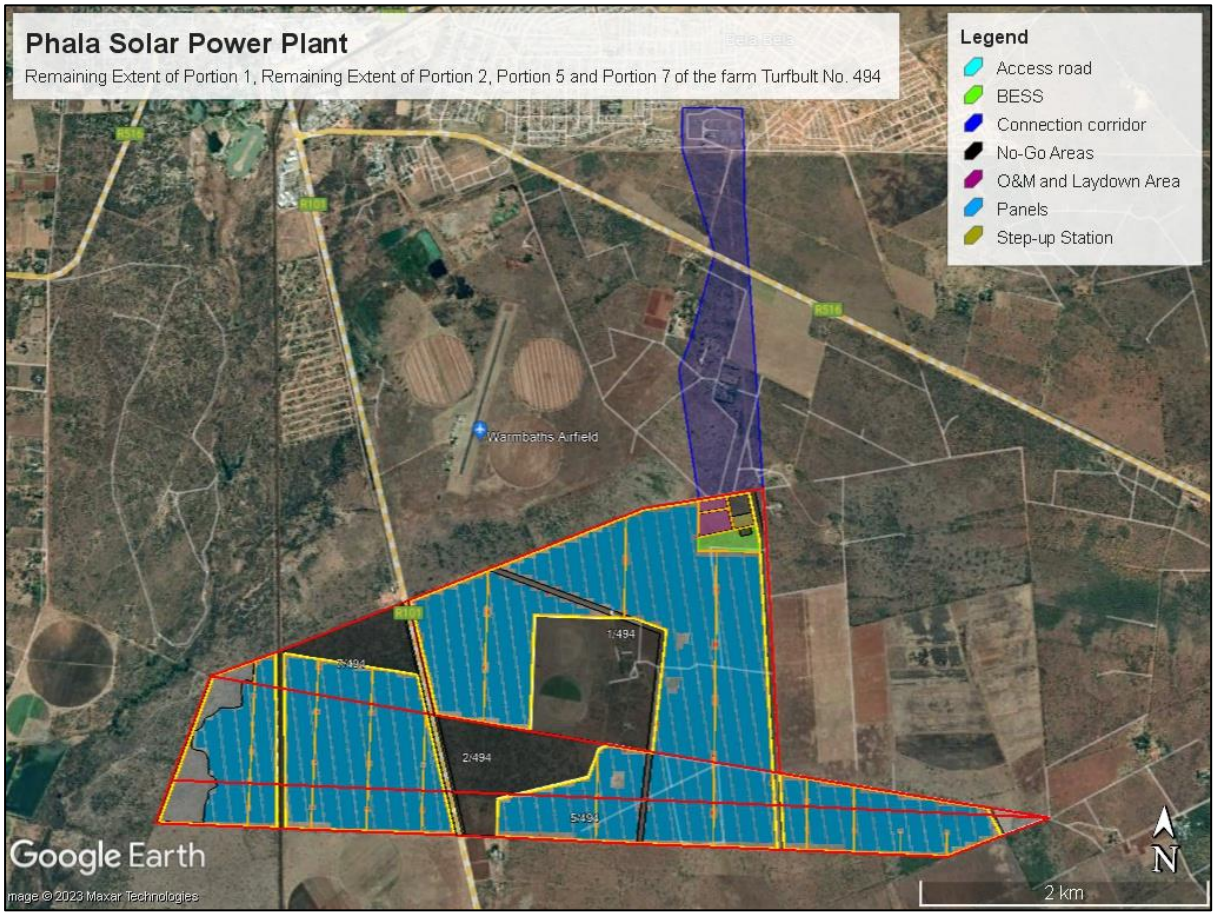


Figure 5.3: Layout Map indicating the connection corridor.

A 132kV overhead distribution line is the only preferred alternative for the applicant due to the following reasons:

- **<u>Overhead Distribution Lines</u>** - 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 is 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).

Furthermore, overhead power lines also provide an opportunity for the avoidance of sensitive environmental features as the overhead lines can span on-ground environmental features to ensure conservation, therefore providing more flexibility in terms of mitigation of the associated on-ground disturbance.

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 of the route 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, and the independent specialists, of various fields of study, have considered the development of the power line and recommended appropriate mitigation measures where required. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

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.

- **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 and will result in more disturbance to the environment based on the need for more invasive and intense construction activities into the ground.

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 a 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.

The final 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:

Steel lattice towers:
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.

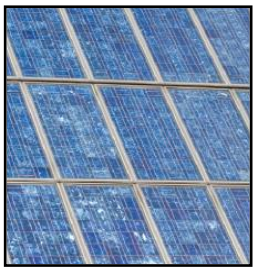
5.1.6 Technology alternatives

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, thin film or bifacial PV panels. 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.



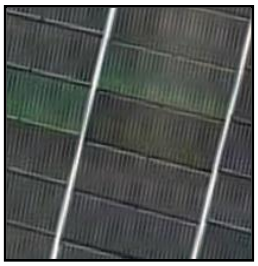
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than 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 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.

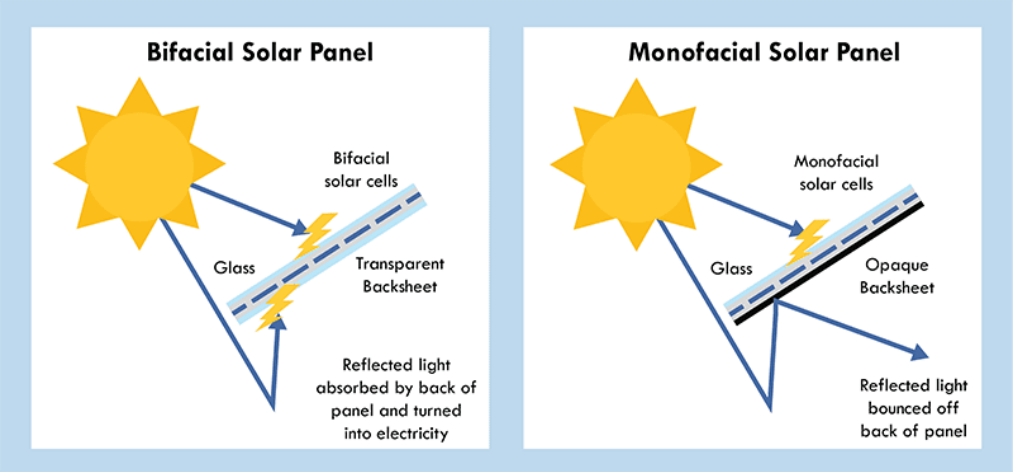


Figure 5.4: Bifacial vs Monofacial Solar Panel absorption.

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44. The approved public participation plan is also included as Appendix J to the report.

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
- 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 J):

- 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 (Vista Newspaper) on the 30 September 2022 (see Appendix C2) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and 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 31 October 2022).

- Site notices

  Site notices were placed on site in Afrikaans and English on 26 September 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 31 October 2022. Photographic evidence of the site notices is included in Appendix C3.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, has been directly informed of the EIA process on 30 September 2022 via registered post, telephone calls, WhatsApps and emails (as relevant). The Background Information Document (BID) was distributed with the notification. 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 31 October 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7).

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via registered post, WhatsApp or email (as relevant) to all surrounding landowners and occupiers on 30 September 2022. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C4. The surrounding landowners were given the opportunity to raise comments by 31 October 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7). Refer to Figure 5.6.

- Circulation of Draft Scoping Report

  Copies of the draft Scoping report have been provided to all I&APs via courier, Dropbox and/or email (as relevant). Hard copies of the report will be made available on request and where an I&AP does not have the resources to view the report on an online platform. I&AP's and organs of state were requested to provide their comments on the report from 06 January until 06 February 2023. All issues identified during the 30-day review and comment period are recorded and documented and compiled into a Comments and Response Report included as part of the Final Scoping Report or decision-making (Appendix C5 – C7).

- Circulation of the Draft Environmental Impact Assessment Report

  All registered I&APs and State Department have been informed of the availability of the Draft EIR on 31 March 2023 and requested to provide their comments within 30 days (refer to Appendix E). The 30-day review and comment period are from 31 March 2023 – 05 May 2023. All comments received during this period will be included in the final EIR. All comments received prior to the release of the Draft EIR have been included in Appendix C. The Comments and Responses report are included as Appendix C7 of this draft EIR.

- Circulation of decision and submission of appeals:

  Notice will be given to all identified and registered I&APs of the decision taken by the DFFE on the Application for EA. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations. In accordance with the provisions of Regulation 4(1) of Government Notice No. 993, an appellant must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered I&APs and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

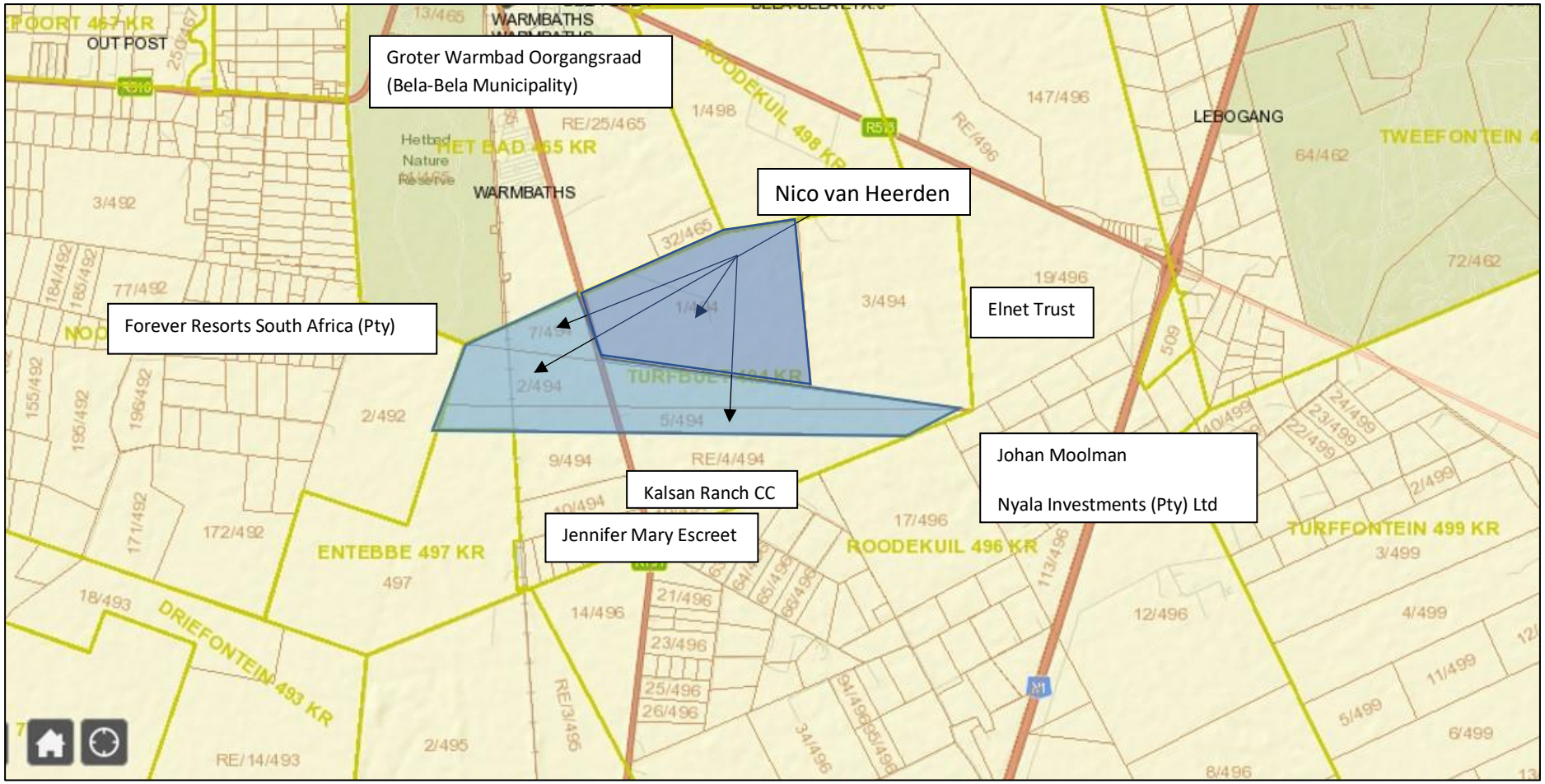


Figure 5.5: Surrounding Landowners

5.2.2 Consultation process

Regulation 41 requires that the municipality, relevant ward councillor and 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 D and E.

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 Draft Environmental Impact Report. The Draft Environmental Impact Report has been made available to all potential and/or registered I&APs and State Departments. They were provided with a copy of the Draft EIR and were requested to provide written comments on the report within 30 days. All issues identified during this review period, and previous review periods (i.e. Scoping Phase), will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR (Appendix C7).

All comments received during the Scoping Phase, and prior to the release of the Draft EIR for the 30-day review and comment period have also been included in this Draft report as Appendix C which provided I&APs an opportunity to confirm that their comments raised during the Scoping Phase have been included and considered as part of the EIA Phase.

5.2.4 Issues raised by I&APs and consultation bodies

Comments have been received from some consultation bodies and is summarised in the Comments and Response Report included in Appendix C7. All comments received during the circulation of the Draft EIR will be addressed accordingly in the Final EIR. The full wording and original correspondence are included in Appendix C5 and Appendix C6 of the Draft EIR.

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 (i.e. the location of the development footprint within the affected property).

1.1.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected. 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 (i.e. the development footprint) exclusively consists of land used for game farming, limited sensitive areas from an ecological and conservation point have been identified. These include the sensitive Thornveld Habitat. These features are described in more detail below.

5.3.1.1 Geology, soils and agricultural potential

According to the Soil and Agriculture Assessment (attached in Appendix E4), the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ae 18, Dc 1 and Ea 146 land types. The Ae 18 and Ba 13 land types mainly have Hutton and Arcadia soil forms according to the Soil classification working group, (1991), with the occurrence of other soils within the landscape. The Ae land type is dominated with red and yellow apedal soils. These soils have a high drainage potential with a high base status. The profiles are mostly deeper that 300 mm without the occurrence of dunes. The Dc 1 land type is characterised with occurrence of Sterkspruit soil forms associated to other soils occurring in the terrain. The Ea land types are characterised of vertic, melanic and red structured diagnostic horizons with are usually undifferentiated.

Most of the project area is characterised by a slope percentage between 0 and 4%, with some smaller patches within the project area characterised by a slope percentage ranging from 4 to 10%. This illustration indicates a few irregularities in the topography in scattered areas the majority of the area being characterised by a gentle slope. The DEM of the project area indicates an elevation of 1 096 to 1 140 Metres Above Sea Level (MASL).

The land capability is determined by the physical features of the landscape including the soils present. The land potential or agricultural potential is determined by combining the land capability results and the climate capability for the region. The climatic capability has been determined by means of the Smith (2006) methodology, of which the first step includes determining the climate capability of the region by means of the Mean Annual Precipitation (MAP) and annual Class A pan (potential evaporation). According to Smith (2006), the climatic capability of a region is only refined past the first step if the climatic capability is determined to be between climatic capability 1 and 6. Given the fact that the climatic capability has been determined to be “C8” for the project area, no further steps will be taken to refine the climate capability. From the two land capability classes, the land potential levels have been determined by means of the Guy and Smith (1998) methodology. Land capability II and III have been reduced to a land potential levels L4 and L5 due to climatic limitations.

The following land potential level has been determined;

- Land potential level 5 (this land potential level is characterised by a restricted potential**.** Regular and/or severe limitations due to soil, slope, temperatures or rainfall.
- Land potential level 6 (this land potential level is characterised by a very restricted potential**.** Regular and/or severe limitations due to soil, slope, temperatures or rainfall. Non arable.

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which four potential land capability classes are located within the proposed footprint area's assessment corridor, including;

- Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity) and;
- Land Capability 9 to 10 (Moderate High Sensitivity).

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is predominantly ""Moderate High" sensitivity. The other portions in the project area are characterised by sensitivities with "Moderately Low" to "Moderate" (Figure 5.6). Furthermore, various crop field boundaries were identified by means of the DEA Screening Tool (2022), which are predominantly characterised by "High" sensitivity with some areas being classified as "Very High" sensitivity. The current layout for the proposed Highveld SPP project and associated grid connection infrastructure will directly impact assigned "Very High to High" sensitive crop fields. The development within these area, and potential loss of these resources is not regarded to be a fatal flaw. In the event these "Very High to High" sensitive crop fields are to be developed, engagement must be undertaken with the relevant landowner / user for permission, and to agree on compensation, if required. It`s also worth-noting that, some sections of the project area are characterised with vertic soils characterised with high clays, swelling and shrinking properties. Such soils are usually difficult to work with and mostly not recommended for most activities.

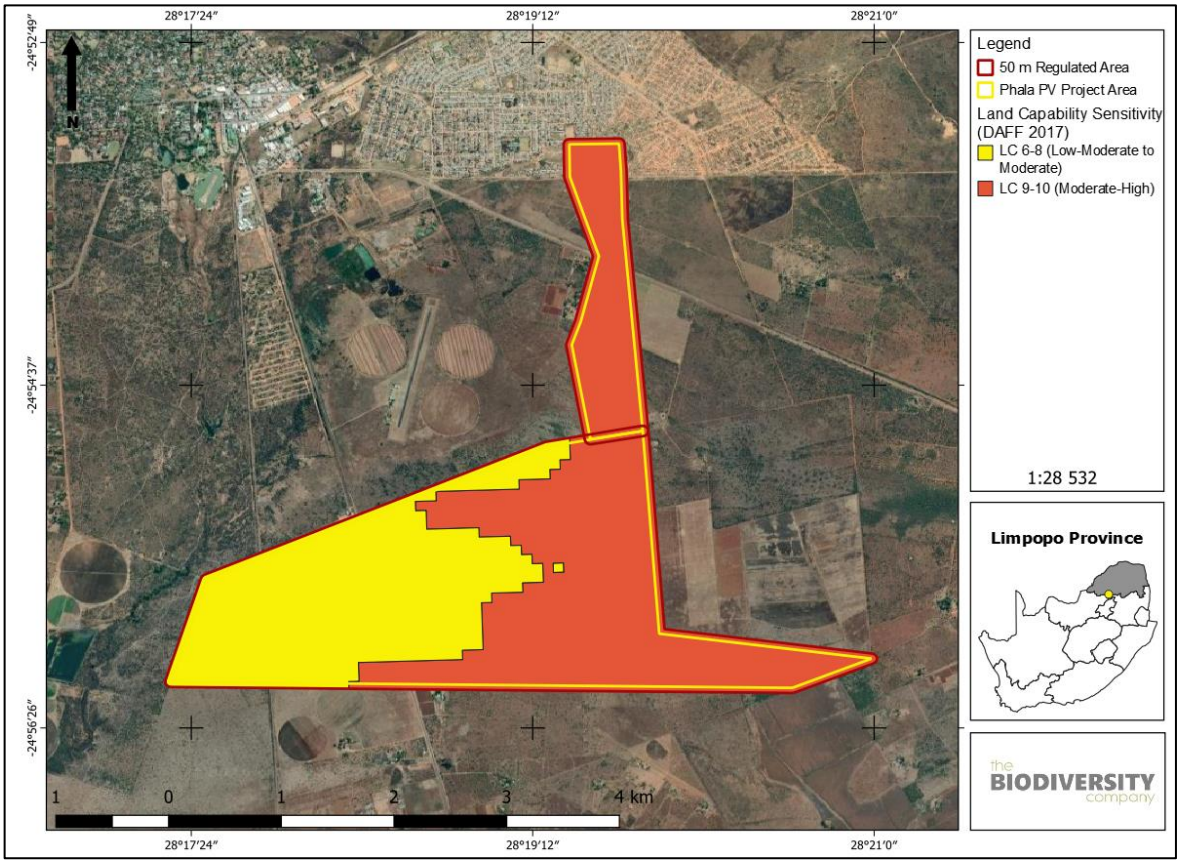


Figure 5.6: The land capability sensitivity (DAFF, 2017)

5.3.1.2 Vegetation and, topography and landscape features

According to the Terrestrial Biodiversity Assessment (Appendix E1), the table below (Table 5.1) has been produced as a result of the spatial data collected and analysed (as provided by various sources such as the national and provincial environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or project area. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 5.1: Summary of the spatial relevance of the Project Area to local ecologically important landscape features

Desktop Information Considered	Description
Provincial Conservation Plan	The proposed project is situated across an Ecological Support Area 1 (ESA 1), a No Natural Habitat Remaining (NNR), a Critical Biodiversity Area 1, and a Critical Biodiversity Area 2.
Ecosystem Threat Status	Overlaps with a Vulnerable Ecosystem.
Ecosystem Protection Level	Overlaps with a Poorly Protected Ecosystem.
Protected Areas	The closest protected area is the Rissik Private Nature reserve located 4.9 km to the east of the project area.

National Protected Areas Expansion Strategy	The project area lies adjacent to a protected area according to the NPAES dataset.
Important Bird and Biodiversity Areas	The project area is located 14 km from the Waterberg IBA.
REDZ	The project area is 71 km from the closest Renewable Energy Development Zone.
Powerline Corridor	The project area is 62 km from the International corridor.
South African Inventory of Inland Aquatic Ecosystems	The project area does not overlap with any wetlands or rivers, however, a CR river is located 120 m west of the project area.
National Freshwater Priority Area	The project area does not overlap with neither wetlands nor rivers, however, an unclassified river and wetland can be found 120 m to the west of the project area.

Critical Biodiversity Areas

According to the 2018 Limpopo Conservation Plan the proposed project is situated across an Ecological Support Area 1 (ESA 1), a No Natural Habitat Remaining (NNR), a Critical Biodiversity Area 1 and a Critical Biodiversity Area 2. The majority of the project area is classified as an ESA 1, the ESA 1 area is the most sensitive category after the CBA 1 and CBA 2 categories.

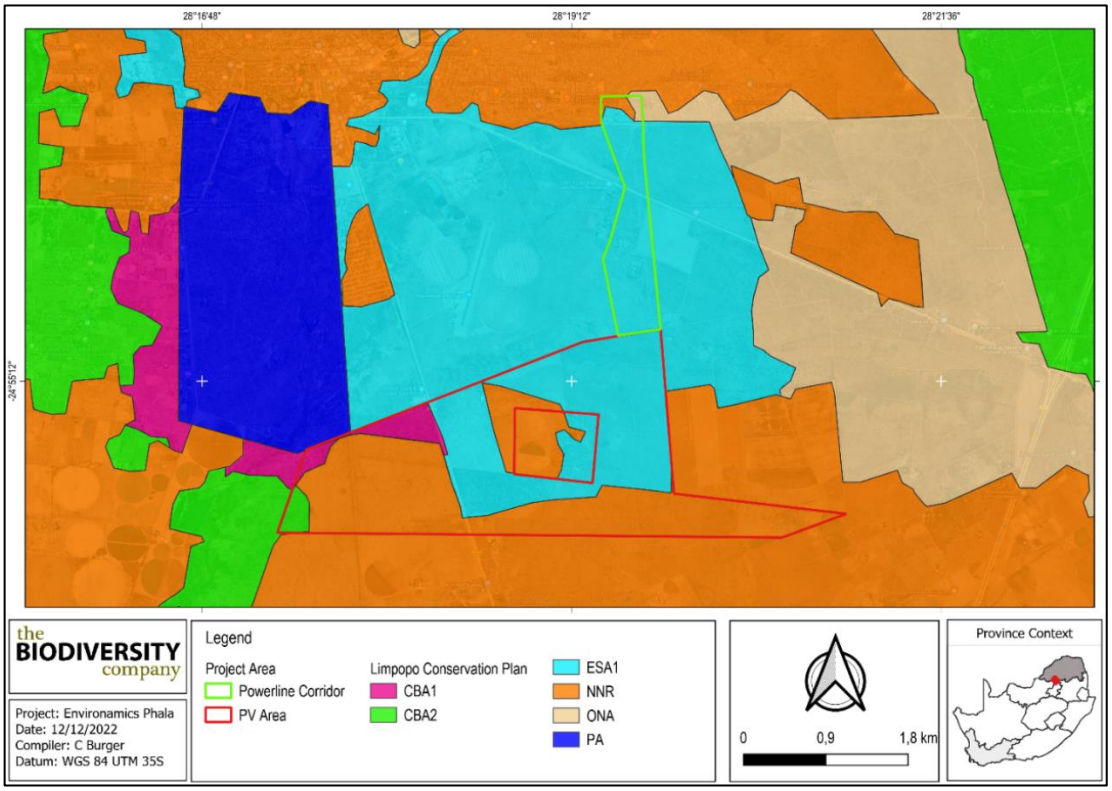


Figure 5.7: Map illustrating the Limpopo Conservation Plan relevance

Ecosystem Threat Status

According to the 2018 NBA spatial dataset the project area overlaps with a 'Vulnerable' and 'Poorly Protected' ecosystem (Figure 5.8)

A 'Vulnerable' ecosystem type is one considered to be at a high risk of collapse and a 'Poorly Protected' ecosystems are those which have between five and 50% of their biodiversity target included in one or more protected areas. (SANBI, 2019).

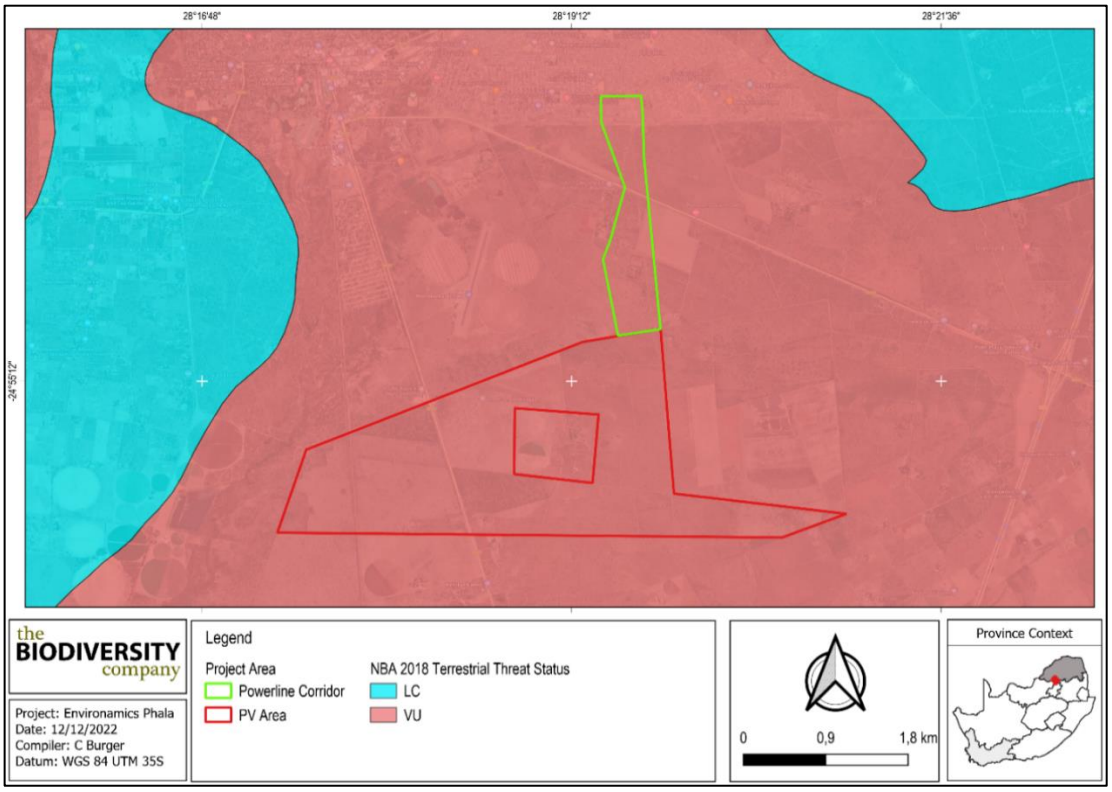


Figure 5.8: Map illustrating the Ecosystem Threat Status associated with the project area

Protected Areas and National Protected Areas Expansions Strategy (NPAES)

According to the protected area spatial datasets from SAPAD (2022) and SACAD (2022), the protected area as identified by the Limpopo Conservation Plan does not appear in this dataset. According to the SAPAD (2022) dataset the closest protected area is the Rissik Private Nature reserve located 4.9 km to the east of the project area (Figure 5.9). The Hetbad Nature Resererve is located ~1.4km northwest of the proposed development, but is not included in the SAPAD (2022) dataset.

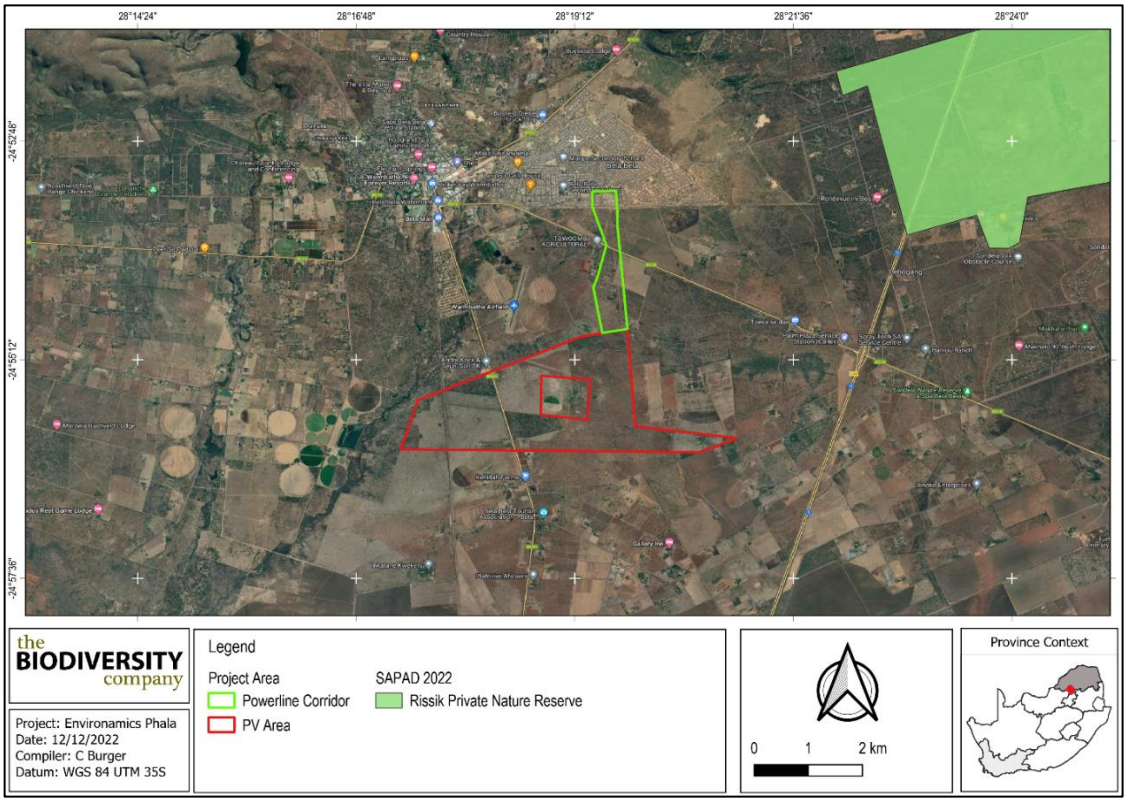


Figure 5.9: Map illustrating the project area in relation to the protected areas

National Protected Area Expansion Strategy 2016 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2016). The project area lies adjacent to a protected area according to the NPAES dataset (Figure 5.10).

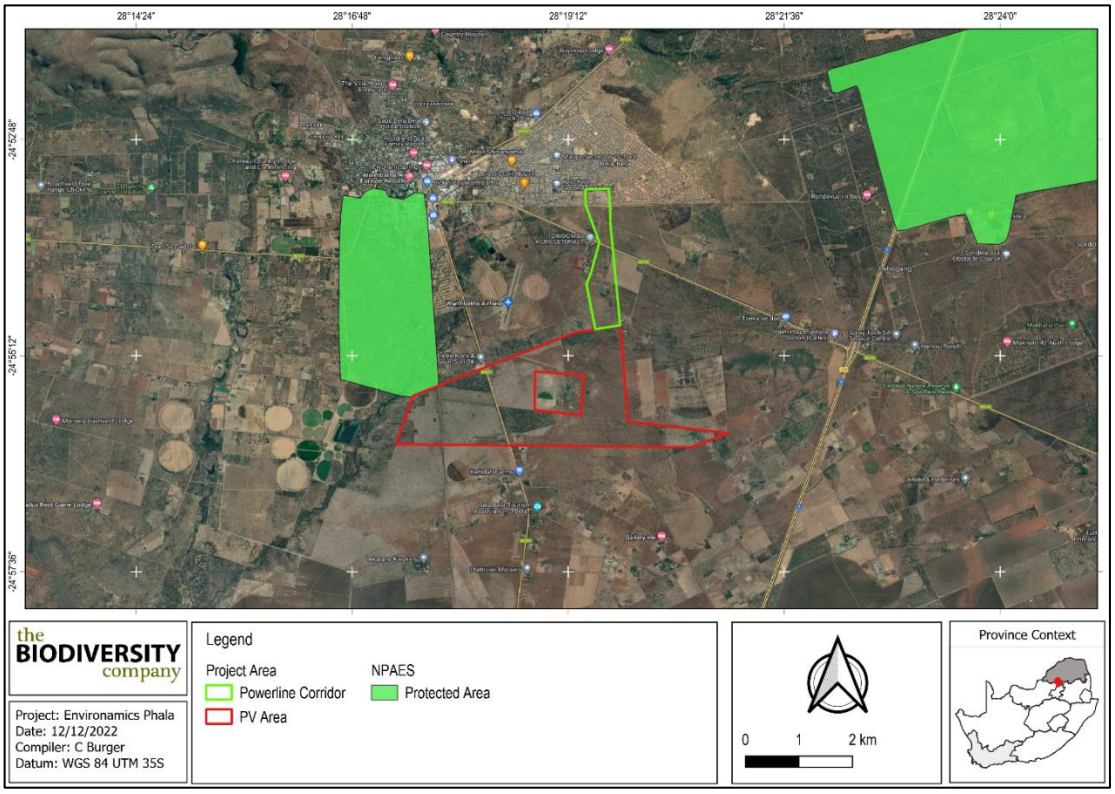


Figure 5.10: The project area in relation to the National Protected Area Expansion Strategy

Vegetation Type

The project area is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

a) Seasonal precipitation; and

b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by an herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Vachellia and Albizia*) and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the project area overlaps with the Springbokvlakte Thornveld vegetation type (Figure 5.11). This vegetation type occurs on open to dense, low thorn

savanna dominated by *Vachellia* species or shrubby grassland with a very low shrub layer and on flat to slightly undulating plains (Mucina & Rutherford, 2006). This vegetation type occurs in the Limpopo, Mpumalanga, North-West and Gauteng Provinces: Flats from Zebediela in the northeast to Hammanskraal and Assen in the southwest as well as from Bela-Bela and Mookgophong in the northwest to Marble Hall and Rust de Winter in the southeast.

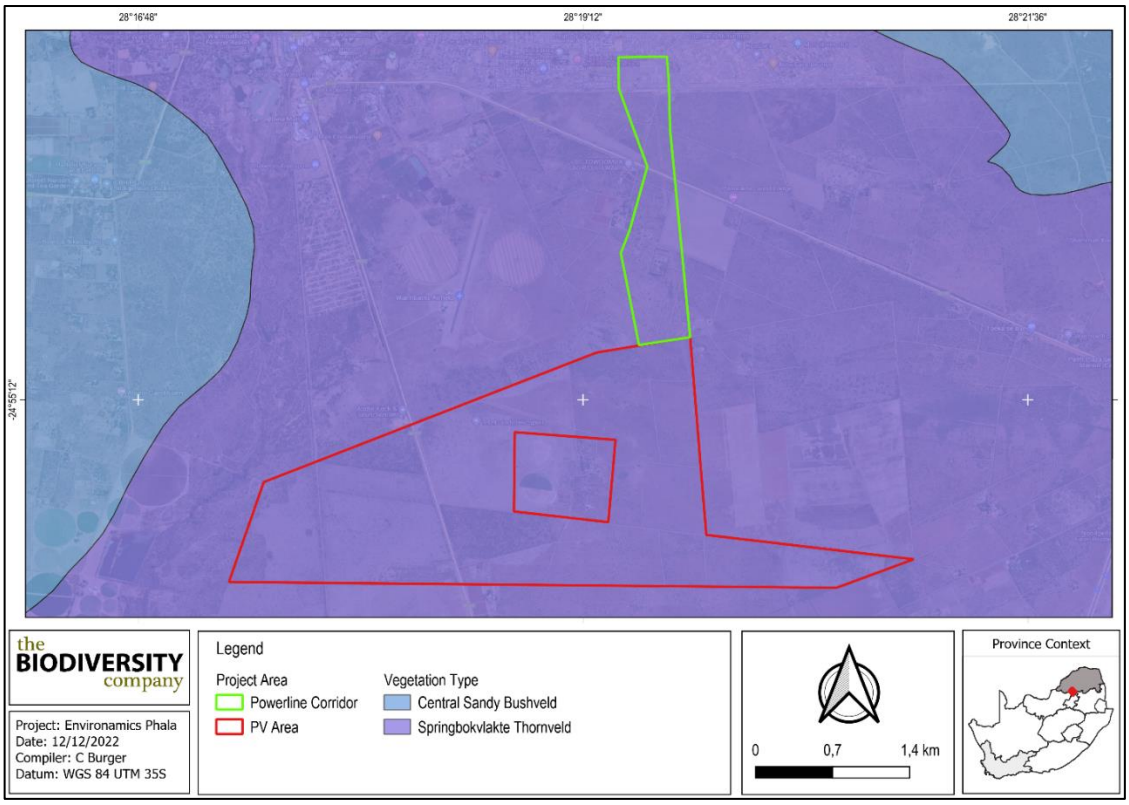


Figure 5.11: Map illustrating the vegetation types associated with the region

Indigenous and Protected Flora

The vegetation assessment was conducted throughout the extent of the project area. Various indigenous species associated with the Sprinbokvlakte Thornveld vegetation type were observed across the project area. The dominant floral species observed included *Vachellia karroo, Senegalia mellifera, Vachellia nilotica, Ziziphus mucronate, Vachellia tortilis, Grewia flava, Sclerocarya birrea* subsp. *Caffra, Euclea undulata, Combretum imberbe, Asparagus laricinus, Aristida bipartite, Senecio apiifolius* and *Nidorella hottentotica*.

The Limpopo Environmental Management Act (LEMA) (Act no 7 of 2003) provides for the consolidation and amendment of the environmental management legislation of, or assigned to the Province, and to provide for matters incidental thereto. In particular, Schedule 11 (Specially protected plants) and Schedule 12 (Protected plants) have relevance to this section. The species *Scadoxus puniceus* and *Aloe greatheadii* were found within the project area and is considered to be protected plants under Schedule 12 of LEMA.

During the field assessment 2 species of protected trees were observed: *Combretum imberbe* (Leadwood), and *Sclerocarya birrea* subsp. *caffra* (Marula). The protected trees observed are

protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA). In terms of the NFA, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence. The information only provides an overview of the protected trees recorded on site and is not a representation of all the specimens present. It is of vital importance that a search a rescue along with permit applications be done prior to the commencement of the development. Refer to the Figure 5.12 for photos of flora species observed.

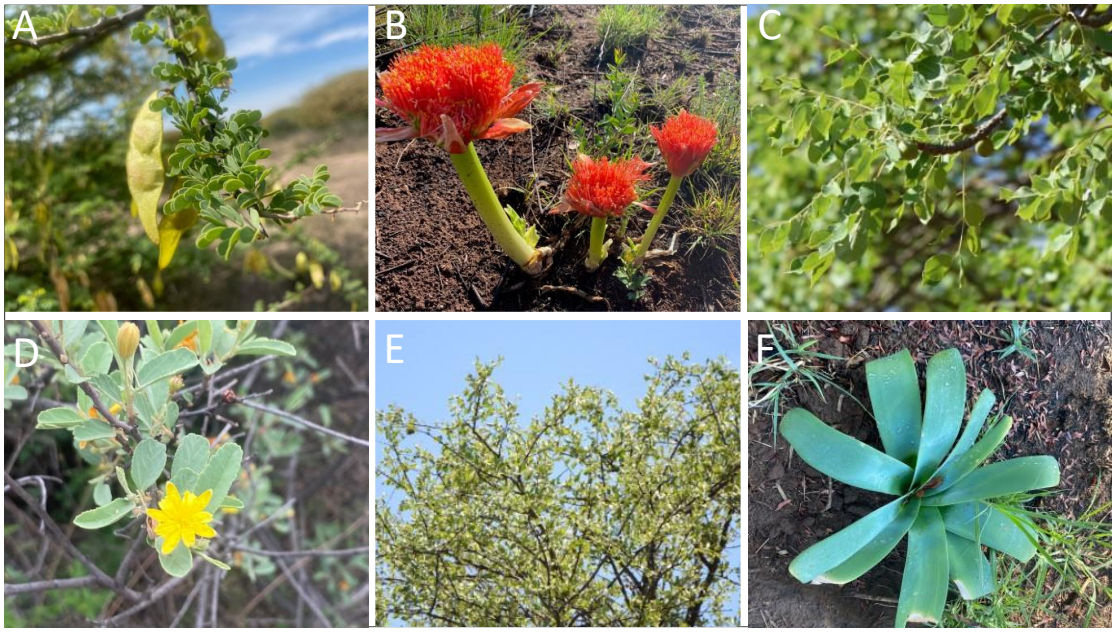


Figure 5.12: Photographs illustrating some of the flora species recorded – A) *Senegalia mellifera*; B) Scadoxus puniceus (Provincially Protected); C) Sclerocarya birrea subsp. Caffra (Protected); D) *Grewia flava*; E) *Combretum imberbe* (Protected) and F) *Ammocharis coranica*.

Invasive Alien Species

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004, (NEM:BA) is the national legislation that incorporates the mandatory regulation of Invasive Alien Plant (IAP) species, and in September 2020 the most current lists of IAP Species were published in terms of NEM:BA (in Government Gazette No. 43726 of 18 September 2020). The Alien and Invasive Species Regulations serve to define and regulate the various categories of Alien and Invasive Species and were recently updated and published in terms of NEM:BA in the Government Gazette No. 43735 of 25 September 2020. The 2020 Alien and Invasive Species Regulations and Lists were recently extended as published in the Government Gazette No. 44182, 24th of February 2021.

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, no land user shall allow

Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEM:BA:

- Category 1a: Invasive species requiring compulsory eradication. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- 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. Species existing outside of a regulated area shall be classified as category 1b.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as a gift - involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones as these will be classified as category 1b species.

Eight (8) IAP species were recorded during the field survey, of which five (5) are Category 1b species which must be controlled through the implementation of an IAP Management Programme

- *Argemone Mexicana – Category 1b*
- *Bidens pilosa*
- *Cirsium vulgare - Category 1b*
- *Conyza bonariensis*
- *Opuntia ficus-indica - Category 1b*
- *Solanum sisymbriifolium - Category 1b*
- *Tagetes minuta*
- *Verbena bonariensis - Category 1b*

Habitat Assessment:

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data

collected during the survey; the delineated habitats can be seen in Figure 5.13. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC.

Thornveld

Four portions associated with the western and central section of the project area were identified to be thornveld habitat and is typically characterised by dense stands of large trees of the species Vachellia, Senegalia, and Ziziphus clustered together accompanied by tall shrubs and grass species. This habitat is considered to be in a largely natural state and still representative of the Springbokvlakte thornveld vegetation type as limited negative impacts occurred across these areas. The dominant vegetation across the habitat unit included Vachellia karroo, Senegalia mellifera, Vachellia nilotica, Ziziphus mucronate, Vachellia tortilis, Grewia flava, Sclerocarya birrea subsp. Caffra, Euclea undulata, Combretum imberbe, Asparagus laricinus, and Aristida bipartite.

This habitat unit can be regarded as important, not only within the local landscape, but also regionally. The unit functions as remaining greenfields which supports viable indigenous plant species populations and is also used for foraging. The unit also serves as a movement corridor for fauna within a fragmented landscape. The habitat sensitivity is regarded as high sensitivity due to the role of this intact habitat to biodiversity within an area being more fragmented locally, which is supported by the various ecological datasets. This habitat functions as the CBA 1, CBA 2 and ESA 1 as it is classified as well as a viable constituent of a VU ecosystem.

Degraded Thornveld Habitat

The majority of the project area comprised of degraded thornveld habitat, which is typically characterised by stands of medium size trees and shrubs and were dominated by the species Vachellia karroo, Senegalia mellifera and Grewia flava. This habitat type is regarded as semi-natural thornveld, but slightly disturbed due to the presence of roads, powerlines, and human infringement as the area is utilised for grazing by both wild game and livestock. The difference between the thornveld habitat, the degraded thornveld and the disturbed thornveld is the extent of the disturbance taken place in each habitat. With the severity of disturbance increasing from the degraded thornveld to the disturbed thornveld.

Alien and invasive species such as Bidens Pilosa, Tagetes minuta, Conyza bonariensis, and Opuntia ficus-indica were also observed within this habitat unit. As such within the habitat unit there is a difference in the condition pertaining to some areas being exposed to more invasion by alien vegetation, disturbance from grazing practises and other anthropogenic related activities than others.

During the field assessment 2 species of protected trees were observed within this habitat units: Combretum imberbe (Leadwood), and Sclerocarya birrea subsp. caffra (Marula). The protected trees observed are protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA).

This habitat unit can also be regarded as important, not only within the local landscape, but also regionally as it supports viable indigenous plant species populations and is also used for foraging by various fauna species.

Disturbed Thornveld

The disturbed habitat unit can be found along the central, eastern and northern section of the project area. This habitat is regarded as areas that have been impacted more by historic land clearing, mismanagement and land use. Historical vegetation clearing for what is assumed cultivation/agricultural practices has led to an absence of large woody plants and an area dominated by grasses and/or an infestation of alien and invasive vegetation, with current grazing activities by game also taking place within this area. In the northern portion this habitat is located in close proximity to a residential area and is used as a throughfare by local residents and as such has been exposed to impacts such as dumping of waste and harvesting of woody material.

These habitats aren't entirely transformed but in a constant disturbed state, as they can't recover to a more natural state due to ongoing disturbances and impacts received from grazing and mismanagement. These areas are considered to have a low sensitivity, as they may be used as a movement corridor and in many cases form a barrier between the thornveld and the transformed areas.

Transformed Habitat

The transformed habitat is associated with the existing substation and agricultural areas located in the northern portion of the powerline corridor area. The transformed area has little to no remaining natural vegetation due to land transformation to accommodate the substation and agricultural activities. These habitats exist in a constant disturbed state as they cannot recover to a more natural state unless through human intervention.

Wetlands

Wetlands/water resources are identified in the wetland report (TBC, 2022)(Appendix E1). The ecological integrity, importance and functioning of the wetland areas associated with the project area plays a crucial role as a water resource system and an important habitat for various fauna and flora.

5.3.1.3 Wetlands and Riparian Features

According to the Wetland Baseline and Risk Assessment Report (Appendix E1), during the site visit, four HGM units were identified within the PAOI. The wetland areas were delineated in accordance with the DWAF (2005) guidelines (See Figure 5.13). HGM units have been classified as three depression wetlands and one channelled valley bottom system. Multiple artificial wetlands, namely dams were identified to the within the PAOI. According to Ollis et al (2013) a dam is classified as 'an artificial body of water formed by the unnatural accumulation of water behind an artificial barrier that has been constructed across a river channel or an unchannelled valley bottom wetland'. Although these systems do not classify as a natural wetland system it is important to note where the dams are for any planned development in the area. No watercourses were identified within the powerline corridor. The delineation of the wetland systems and functional assessment have been completed for the natural depressions and the channelled valley bottom wetland.

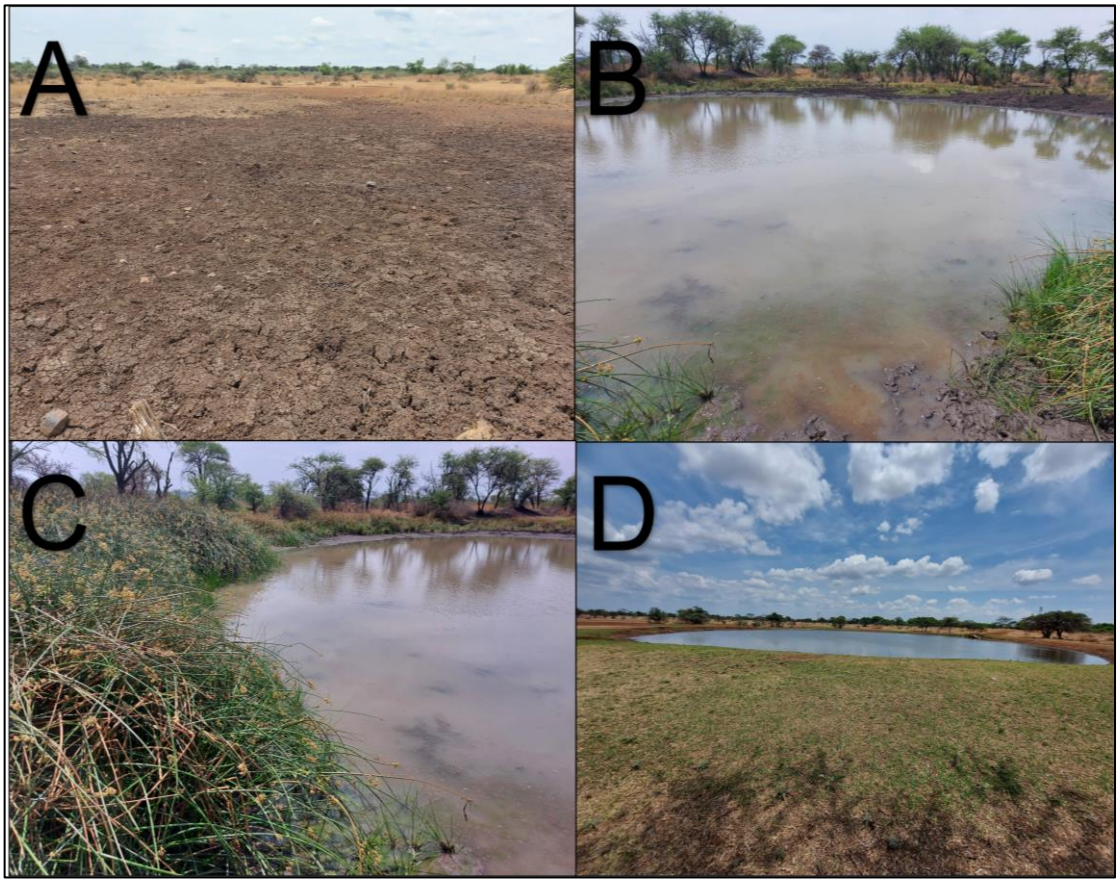


Figure 5.13: Photographical evidence of the different wetland types found within the project area of influence, A, B, & C) Depression wetlands, D) Artificial dam.

Drainage features (or lines) were also identified for the eastern catchment the study area. These features are referred to as 'A' Section channels that convey surface runoff immediately after a storm event and are not associated with a baseflow (DWAF, 2005).

5.3.1.4 Climate

The vegetation type is characterised by a summer rainfall with very dry winters. The Mean Annual Precipitation (MAP) ranged netween about 500–650 mm. Mean monthly maximum and minimum temperatures for Warmbaths–Towoomba are 35.2°C and –2.0°C for October and July, respectively. Corresponding values are 36.8°C and –1.2°C for Marble Hall for January and June.

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.

Avifaunal

According to the Avifauna Assessment (Appendix E2), the SABAP2 Data lists 357 avifauna species that could be expected to occur within the project area (The full list will be provided in the final assessment). Eighteen (18) of these expected species are regarded as threatened (Table 5.3). Three (3) of the species have a low likelihood of occurrence due to the expected lack of suitable habitat in the project area, these species can however very likely still move over the project area and can still be influenced by the development.

Priority species

According to the Avifauna Assessment (Appendix E2), the SABAP2 Data lists 357 avifauna species that could be expected to occur within the project area (The full list will be provided in the final assessment). Eighteen (18) of these expected species are regarded as threatened (Table 5.2). Three (3) of the species have a low likelihood of occurrence due to the expected lack of suitable habitat in the project area, these species can however very likely still move over the project area and can still be influenced by the development.

Table 5.2: Threatened avifauna species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Alcedo semitorquata	Kingfisher, Half-collared	NT	LC	High
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Moderate
Ciconia abdimii	Stork, Abdim's	NT	LC	Moderate
Ciconia nigra	Stork, Black	VU	LC	Moderate
Coracias garrulus	Roller, European	NT	LC	High
Falco biarmicus	Falcon, Lanner	VU	LC	High
Falco vespertinus	Falcon, Red-footed	NT	NT	High
Glareola nordmanni	Pratincole, Black-winged	NT	NT	Low
Grus paradisea	Crane, Blue	NT	VU	Low
Gyps africanus	Vulture, White-backed	CR	CR	High
Gyps coprotheres	Vulture, Cape	EN	EN	High
Leptoptilos crumenifer	Stork, Marabou	NT	LC	High
Mycteria ibis	Stork, Yellow-billed	EN	LC	Moderate
Neotis denhami	Bustard, Denham's	VU	NT	Moderate
Polemaetus bellicosus	Eagle, Martial	EN	EN	High
Sagittarius serpentarius	Secretarybird	VU	EN	High
Torgos tracheliotos	Vulture, Lappet-faced	EN	EN	High
Tyto capensis	Grass-owl, African	VU	LC	Low

Dominant Species

During the first site survey, nineteen of the recorded species accounted for more than 76% of the total number of individuals recorded (Only data from standardized point counts was considered). The most abundant species was *Quelea quelea* (Red-billed quelea) with a relative abundance of 0.093 and a frequency of 8.696%. Additional ubiquitous species included *Uraeginthus angolensis* (Blue waxbill) and *Numida meleagris* (Helmeted guineafowl) with a frequency of occurrence of 21.74 and 21.74 respectively. During the second survey nineteen of the recorded species accounted for more than 78% of the total number of individuals recorded (Only data from standardized point counts was considered). The most abundant species was *Cisticola chiniana* (Rattling cisticola) with a relative abundance of 0.146 and a frequency of 85.714%. Additional ubiquitous species included *Tricholaema leucomelas* (Acacia pied barbet) and *Numida melaegris* (Helmeted guineafowl) with a frequency of occurrence of 52.381 and 4.762 respectively.

Flight and Nest Analysis

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

No specific flight path was noted during the survey.

No SCC nest sites were recorded during the first assessment, and no additional nests were recorded from the site.

Fauna

According to the Terrestrial Biodiversity Impact Assessment (refer to Appendix E1), much of the large and medium-sized mammal fauna that previously occurred on the site is now locally extinct or occurs in small, fragmented populations in reserves. Most of the habitat types are fragmented. Therefore, the expected mammalian richness on these areas is considered low, although slightly higher richness values are expected from the more intact grassland, woodland and wetland habitats.

The Highveld Ecoregion contains a higher number of mammals, although only the orange mouse (*Mus orangiae*) is restricted to the ecoregion, and the rough-haired golden mole (*Chrysospalax villosa*) is near-endemic. The ecoregion also supports populations of several large mammal species, some of which are rare in southern Africa.

Predators that still roam freely in the area include larger predators such brown hyena, while smaller predators such as caracal, serval and honey badger are common throughout the larger area. Antelope species such as duiker and steenbok 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.

The wetlands are an important habitat and dispersal corridor for moisture-reliant small mammals. The conservation of the wetlands and buffer zones will conserve the moisture reliant African marsh rat (Near Threatened) on the site and act as a movement corridor for small mammals.

There are no threatened herpetofauna (reptiles and amphibians) species and as such the development will not have any impact on amphibian conservation within the region. The wetlands could provide habitat for the red listed giant bullfrog, and therefore the 32meter buffer zone surrounding the wetlands should be adhered to. Relatively few reptile species occur within the Highveld Ecoregion, mainly due to its cool climate.

Table 5.3: Species of concern at the study area.

English Name	Conservation Status	Probability of occurrence on site
MAMMALS		
European Roller	Near Threatened (2016)	High
Saddle-billed stork	Endangered (2016)	Low
White-bellied Korhaan	Vulnerable (2016)	Moderate
Lanner Falcon	Vulnerable (2016)	High
Black-winged Pratincole	Near Threatened (2016)	Low
Blue Crane	Near Threatened (2016)	Moderate
White-backed Vulture	Critically endangered (2016)	High
Cape Vulture	Endangered (2016)	High
Melodious Lark	Least concern	Moderate
Yellow-billed Stork	Endangered (2016)	Low
Secretarybird	Vulnerable (2016)	High

The DFFE Screening Report (Appendix B) has not identified any sensitive animal species of conservation concern.

5.3.1.6 Visual landscape

The It is possible that landscape change due to the proposed development could impact the character of an important landscape area. Importance can be derived from specific features that can relate to urban or rural settings. They might include key natural, historic or culturally significant elements. Importance might also relate to landscapes that are uncommon or under threat from development.

Generally, the most significant natural areas are afforded a degree of legal protection such as National Parks and Reserves; however, they might also have local significance and not be protected.

The proposed Phala Solar Power Plant (SPP) is located in an area with relatively low significance in elevation to the south, east and west, but approximately 6km to the north marks the start of the Waterberg Mountains. The site itself has a difference in elevation of approximately 25 meters. The SPP is located at an above mean sea level (amsl) of approximately 1122m at the highest elevation and at an amsl of 1097m at the lowest elevation. The SPP drains towards the west. The power line corridor has a difference in elevation of approximately 18 meters. The PL is located at an above mean sea level (amsl) of approximately 1138m at the highest elevation and at an amsl of 1120m at the lowest elevation. The power line drains towards the south.

The landform and drainage described above is unlikely to limit visibility to the south, east and west due to a rather level landscape, but existing screening by landform to the north might limit visibility (refer to Figure 5.14). The Zone of Theoretical Visibility (ZTV) assessment did not consider existing screening such as buildings and vegetation cover but rather the terrain's above mean sea level (AMSL) which indicates line of sight. The main visual receptors in the area are industrial developments, the mining sector and agricultural developments. For the visibility rating in terms of Proximity to the Solar Power Plant and Powerline (See Table 5.4 and 5.5).

Figure 5.14: Centre of the site taken towards the north. 32m Above Ground Level.

Table 5.4 ZTV Visibility rating in terms of Proximity to the Solar Power Plant

Table 5.4: ZTV Visibility rating in terms of Proximity to the Solar Power Plant

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- Seven homesteads on farms. - R101 regional road. - Warmbaths Airfield. **Coverage: 82%**	Very High
1-3km	- 93 homesteads on farms and smallholdings. - R101 regional road. - R516 regional road. - N1 National Road. - Warmbaths Airfield. - Bela-Bela. - Five lodging facilities. **Coverage: 47%**	High
3-5km	- 64 homesteads on farms and smallholdings. - R101 regional road. - R516 regional road. - N1 National Road. - Bela-Bela. - One townhouse complex. - Eight lodging facilities. **Coverage: 32%**	Medium
5-10km	- 123 homesteads on farms and smallholdings. - R101 regional road. - R516 regional road. - N1 National Road. - Bela-Bela. - Bothasvley Nature Reserve. - Klein Kariba holiday resort. - 19 lodging facilities. - Waterberg Mountains. - Two townhouse complexes. **Coverage: 25%**	Low

Table 5.5: ZTV Visibility Rating in terms of Proximity to the Power Line

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- Four homesteads on farms.	Very High

	- Bela-Bela. - R516 regional road. **Coverage: 98%**	
1-3km	- 19 homesteads on farms and smallholdings. - R101 regional road. - R516 regional road. - Bela-Bela. - Warmbaths Airfield. - Three lodging facilities. **Coverage: 77%**	High
3-5km	- 64 homesteads on farms and smallholdings. - N1 National Road. - R101 regional road. - R516 regional road. - Bela-Bela. - 10 lodging facilities. **Coverage: 54%**	Medium
5-10km	- 189 homesteads on farms. - 18 lodging facilities. - Bela-Bela. - N1 National Road. - R516 regional road. - R101 regional road. - Sondela Nature Reserve. - Bothasvley Nature Reserve. - Waterberg Mountains. - Two townhouse complexes. **Coverage: 29%**	Low

5.3.1.7 Traffic consideration

According to the site layout, the site is divided by the railway line. The layout indicates fencing around each parcel as affected. It should be noted that any rail crossings or distance to proposed development from the railway line will need to comply with the requirements of the relevant rail authority.

Access to the Phala SPP is proposed via an existing access road located east of the R101 and via a new access road, located to the west of the R101 (located opposite the existing access road).

Proposed Access alternative 1 has been identified by the client as the "preferred" access, to the south of the proposed site and is via an existing unsurfaced gravel road located on the northern side of the R30. Proposed Access Alternative 2 is an (additional) access route that has been identified and is located to the south of the proposed site and is via the existing Unnamed Road off of the R30 and subsequent local gravel (i.e., "farm") access roads.

A formal application for these access points will need to be lodged with the Bela-Bela Local Municipality and the Limpopo Department: Police, Roads and Transport. The formalisation of these access points to the standard, will in all probability be a requirement as part of the wayleave approval.

An internal site road network will also be required to provide access to the solar field and associated infrastructure. It is anticipated that approximately 15 km of internal roads will be required for the facility. Furthermore, an additional 15 km of smaller tracks may be required, for cleaning and maintenance of the solar modules.

Two (2) possible ports of entry have been identified from where the solar panel technology and large electrical components will be transported, namely: Durban and Richards Bay. The distance from Durban to the Phala Solar Power Plant, via road, is approximately 585 km via the N3 and N5 and from Richards Bay to the Phala Solar Power Plant is approximately 685 km via the N5.

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route.

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

According to the Social Impact Assessment (refer to Appendix E7), the project is proposed within the Limpopo Province which is South Africa's northernmost province, borders onto Mozambique, Zimbabwe and Botswana. It also borders the Mpumalanga, Gauteng and North West provinces. Named after the Limpopo River, which flows along its northern border, it is a region of contrasts, from true Bushveld country to majestic mountains, primeval indigenous forests, unspoiled wilderness and patchworks of farmland. In the eastern region lies the northern half of the magnificent Kruger National Park.

Limpopo ranks fifth in South Africa in both surface area and population, covering an area of 125 754km² and being home to a population of 5 779 090. The capital is Polokwane (previously Pietersburg). Other major cities and towns include Bela-Bela (Warmbad), Lephalale (Ellisras), Makhado (Louis Trichardt), Musina (Messina), Thabazimbi and Tzaneen.

Mining is the primary driver of economic activity. Limpopo is rich in mineral deposits, including platinum-group metals, iron ore, chromium, high and middle-grade coking coal, diamonds, antimony, phosphate and copper, as well as mineral reserves such as gold, emeralds,

scheelite, magnetite, vermiculite, silicon and mica. The province is a typical developing area, exporting primary products and importing manufactured goods and services.

The climatic conditions in the province allow for double harvesting seasons, which results in it being the largest producer of various crops in the agricultural market. Sunflowers, cotton, maize and peanuts are cultivated in the Bela-Bela–Modimolle area. Bananas, litchis, pineapples, mangoes and pawpaws, as well as a variety of nuts, are grown in the Tzaneen and Makhado areas. Extensive tea and coffee plantations create many employment opportunities in the Tzaneen area. The Bushveld is cattle country, where controlled hunting is often combined with ranching.

Limpopo is divided into five district municipalities, which are further subdivided into 22 local municipalities. The proposed development falls within Vhembe DM.

Waterberg District Municipality

The Waterberg District Municipality is a Category C municipality situated in the north-western part of the Limpopo. It borders the North West Province to the north, Fezile Dabi and Thabo Mofutsanyana to the north-east and east respectively, Mangaung and Xhariep to the south, and the Northern Cape Province to the west.

The District Municipality makes up almost a third of the province, covering an area of 32 287km^2, and consists of the following five local municipalities, with approximately 18 towns distributed throughout: Masilonyana, Tokologo, Tswelopele, Bela-Bela and Nala.

It is accessible from Johannesburg, Cape Town, Klerksdorp and Kimberley along the N1, one of the country's main national roads.

The main economic sectors include Mining (31%), construction, transport, electricity and trade.

In 2011 the Municipality had a population of 624 746 with a dependency ratio of 51.3. By 2016 the population has increased to 646 920 and the dependency ratio was reduced to 46.2.

Bela-Bela Local Municipality

The Bela-Bela Local Municipality is a Category B municipality situated in the Waterberg District in the Limpopo. It is bound by Nala to the north, Masilonyana to the south, Tswelopele to the east and Moqhaka to the west and covers an area of 5 690km^2. It is one of five municipalities in the district. Bela-Bela represents the hub of mining activity in the Limpopo Province.

There is one formal land-based protected area in the municipality, being the Willem Pretorius Nature Reserve. There are no Ramsar sites.

There are six towns in the municipality, namely, Allanridge, Henneman, Odedaalsrus, Ventersburg, Bela-Bela and Welkom.

The main economic sectors in the municipality are mining and manufacturing.

5.3.2.2 Cultural and heritage aspects

According to the Cultural Heritage Impact Assessment Report (refer to Appendix E5) the According to the Heritage Impact Assessment (Appendix E5), the proposed development area is located close to the town of Bela-Bela in the Limpopo Province. The topography of the project area is for the most part relatively flat and open, with no rocky outcrops, ridges or hills present. The project area has been fairly extensively impacted in the recent past by agricultural activities that included ploughing of lands and crop growing, as well as livestock (cattle) breeding/herding and grazing. A portion of the area is also currently used for game. The grid connection corridor (through which the project will connect to the existing Eskom Warmbaths Substation) has been heavily impacted by the existing power lines and servitudes, as well as formal and informal settlements and urban-related activities. The following section discusses the cultural and heritage landscape related to the project area.

Stone age

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided into three periods as listed below. It is important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

- Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago
- Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
- Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

There are no known Stone Age sites in the specific study and development area, with the closest ones found east of Bela-Bela and north of Nylstroom. These sites date to between the Middle and Later Stone Ages (Bergh 1999: 4).

Some Stone Age sites and scatters of Stone Age material (stone tools) were identified in the study area during the November 2022 field assessment.

Iron age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts. In South Africa it can be divided in two separate phases (Bergh1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

Again, for the Iron Age, none is known in the area (Bergh 1999: 7), and none was found during the assessment. The closest Early Iron Age site is located at Broederstroom near Brits (Bergh 1999: 6). An early (prehistoric) trade route passed by Buyskop near Bela-Bela to the Rooiberg/Thabazimbi area (Bergh 1999: 9). At the start of the 19th century the Kgatla group was living in the general geographical area (p.10). According to the work done by Huffman on Iron Age pottery, it is possible that Iron Age sites related to the following industries could be present in the larger area. This is the Uitkomst facies of the Urewe Tradition dating to between AD1650 & 1820; the Rooiberg facies of the same dating to between AD1650 & 1750; the Madikwe facies also of Urewe (AD1500 – AD1700) and finally the Buispoort facies of Urewe dating to between AD1700 & 1840 (Huffman 2007: 171; 175; 199 & 203).

No Iron Age sites, features or material were identified in the area during the November 2022 assessment. With no rocky ridges or hills present in the area, and therefore little or no building material available for the construction of the typical Late Iron Age stone-walled settlements, it is unlikely that LIA sites would be present here. Large parts of the study and development area is also characterized by turf-soils, and this would also have inhibited building. Areas like these could rather have been favoured for livestock grazing and agricultural purposes as is the case in recent historical times.

Historic age

The historical age started with the first recorded oral histories in the area. It includes people moving into the area that were able to read and write. The first Europeans to travel to and in the area were travellers, hunters and missionaries such as Hume in 1825; Schoon in 1836 and Livingstone in 1847 (Berg 1999: 12-13). Warmbaths (Bela-Bela today) was established in 1882 as Hartingsburg initially and was formally given township recognition in December 1903 (Bergh 1999: 143; 150). The larger area around Warmbaths also saw some action during the Anglo-Boer War (or South African War) of 1899-1902, with a small battle taking place at Pienaarsrivier south of area on the 27th of September 1900, while a Concentration Camp was situated to the west of Nylstroom (Bergh 1999: 54).

No historical sites and features were identified and recorded in the project area during the field assessment undertaken in November 2022. The only structures (homesteads and related features) are situated on a section of Portion 1 of the farm that will not be affected by the proposed development actions.

Relatively dense vegetation in some sections of the project area hampered access and visibility on the ground to some extent this was not a big limitation during the fieldwork. The area has been fairly extensively impacted in the recent historic past through agricultural activities, and if any significant sites, features or material of cultural heritage (archaeological and/or historical) origin did exist here it would have been severely impacted or even destroyed. The small likelihood of Iron Age sites being present here has been established, however none were identified during the field assessment.

Palaeontology

The proposed Phala Solar Power Plant is underlain by Quaternary superficial sediments, a very small portion is underlain by the Karoo Dolerite Suite, while Permian aged sandstone and shale of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) is also present in the development footprint. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of Quaternary sediments is Moderate, that of the Karoo Dolerite is Zero, while that of the Adelaide Subgroup (Beaufort Group) is Very High (Almond and Pether, 2009; Almond et al., 2013, Groenewald et al 2014). Updated Geology (Council of Geosciences) indicates that the proposed development is mainly underlain by alluvium, colluvium, eluvium and gravel, while the Adelaide Subgroup is represented by the Balfour Formation.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 13 August 2022. No fossiliferous outcrop was detected in the proposed development area. The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a Low significance in palaeontological terms. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the solar power plant 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 Province has a high 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 (i.e., the grid connection points are located within the affected property which minimizes the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494, 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 power plant is directly dependent on the annual direct solar irradiation values of a particular area. The Limpopo receives high averages 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 ~2118 kWh/m^2/year is relevant in the area.

- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur. The topographic conditions, which are favourable, minimizes the significance of the impact that will occur during the clearing and leveling of the site for the construction activities.

- Extent of the site: A significant portion of land is required to evacuate the prescribed 350MW and space is a constraining factor in PV facility installations. Provision was made to assess a larger area than is required for the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494, and the development footprint assessed therein is considered to provide an opportunity for the successful construction and operation of a solar power plant with a capacity of 150MW, as well as opportunities for the avoidance and mitigation of impacts on the affected environment and sensitive environmental features.

- Site availability and access: The land is available for lease by the developer. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Two access routes are proposed to access the site since the project site is divided by the R101. Access 1 is proposed to enable access the eastern portion of the site and Access 2 is proposed to enable access to the western portion of the site. Both access routes are off of the R101 and are required to be authorised.

- Grid connection: In order for the PV facility to connect to the national grid the facility will have to construct an on-site substation, Eskom switching station and a power line from the project site to connect to the Eskom grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site. Three grid connection options are available and all three are located within the same grid connection corridor which presents an opportunity for the consolidation of infrastructure and disturbance within the affected landscape.

- 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. The area proposed for development exclusively consists of land used for agriculture, but wetland features, and a historical burial site are located on the development footprint, as well as a few protected plant species, that will need to be considered by the developer for the placement of the facility infrastructure within the development footprint.

It is evident from the discussion above that Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494 may be considered favourable and suitable in terms of the site and environmental characteristics. As mentioned previously, no alternative areas on the property have been considered for the placement of the development footprint. The development footprint of this project will cover a significant portion of the farm; however, provision have been made to exclude any sensitive areas from the facility layout to be developed within the development footprint.

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 350 MW Phala Solar Power Plant on Remaining Extent of Portion 1, Remaining Extent of Portion 2, Portion 5 and Portion 7 of the farm Turfbult No. 494 is the preferred option.

Considering the environmental sensitive features present within the development footprint, the Applicant has proposed a final facility layout which considers these features, and thereby aim to avoid any direct impact on these features. The final layout will be further assessed as part of the EIA Phase of the project. Refer to Figure I for the final layout proposed for development.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 3. (3)(h) An EIR (...) must include-

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

(v) the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the 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 determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;

(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; and

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

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) a description of all environmental issues and risks that were identified during the EIA process; and

(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

(j) an assessment of each identified potentially significant impact and risk, including-

(i) cumulative impacts;

(ii) the nature, significance and consequences of the impact and risk;

(iii) the extent and duration of the impact and risk;

(iv) the probability of the impact and risk occurring;

(v) the degree to which the impact and risk can be reversed;

(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and

(vii) the degree to which the impact and risk can be mitigated;

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;

6.1 SCOPING METHODOLOGY

The contents and methodology of the Environmental Impact Report aimed 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 27 September 2022. 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	✕			Four wetland types were identified within the Project Area of Influence (PAOI) namely Channelled Valley Bottom, Hillslope Seep, Unchannelled Valley Bottom and Depressions.

II. A conservation or open space area		×		Most of the proposed development footprint represents Ecological Support Areas (ESA), including ESA1 and ESA2 areas. Areas overlapping with the Critical Biodiversity Area 1 have been excluded from the development footprint.
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	×			Springbokvlakte Thornveld Vegetation units which is described by Mucina and Rutherford (2006) as 'Endangered'
X. Bird nesting sites		×		The Avifaunal Assessment (refer to Appendix E2) indicated that no nests of SCC or priority species were recorded
XI. Red data species		×		The Avifauna Impact Assessment (refer to Appendix E2) did not record any Red Data Species on site but indicated that they could possibly occur on site.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.

II. Visual Impacts	×			The VIA (refer to Appendix E3) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads. The visual landscape is already degraded due to the large number of mines and Eskom electricity infrastructure in the area.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of 12-18 months. The noise impact is unlikely to be significant.
IV. Construction of an access road		×		Access will be obtained via a gravel road off the connecting R101.
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 4200m³ 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 72 trips per day will be generated over the 12–18-month construction period for the SPP.
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	×			Four wetland types were identified in the project area of influence namely Channelled Valley Bottom, Hillslope Seep, Unchannelled Valley Bottom and Depressions
II. A conservation or open space area		×		None.
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	×			Ithabiseng Guest Farm is located approximately 3km west of the project site.

VIII. A formal or informal settlement	×			Bela-Bela (located approximately 4km north-northwest of the proposed development).

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 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 insignificant 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.

Detailed impact assessments have been undertaken by each of the respective specialists which has informed the matrix analysis as included in Table 6.2 below, as well as the key issues identified as included in sections 6.2.1-6.2.3.

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 12(ii)(c) (GN.R. 327): *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."* Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or*	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	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community. • Introduction of IAP species and invasive fauna. • Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).		-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Terrestrial Biodiversity, Assessment (Appendix E1)
			Avifauna	• Habitat destruction • Destruction, degradation and fragmentation of surrounding habitats • Displacement of avifauna community • Direct mortality from persecution or poaching of avifauna species and collection of eggs • Direct mortality from increased vehicle and heavy machinery traffic		-	S	M	Pr	PR	ML	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E2)

more but not exceeding 500 cubic metres." *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 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* 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..."*	circle for trucks will also be taken into consideration. Transportation and installation of PV panels into an Array 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. Wiring to the Central Inverters 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.		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 transport sand and building materials are fitted with tarpaulins or covers.	L	-
			Soil	• Loss of land capability	-		S	S	Pr	PR	ML	Yes	- See Table 6.3	L	Soil and Agricultural Assessment (Appendix E4)
			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	-
			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

<u>Activity 4 (e)(i)(ee)(gg) (GN.R 324):</u> *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) the Limpopo, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."."* <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 (be) in the Limpopo, (i) all areas.* <u>Activity 12 (e)(i)(ii) (GN.R 324):</u> *"The clearance of an area of 300 square metres or more of indigenous vegetation (e) in the Limpopo, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within*			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	- 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 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.	L	-
			Surface water	• Altered surface flow dynamics; • Erosion; • Alteration of sub-surface flow dynamics; • Sedimentation of the water resource; • Direct and indirect loss of wetland areas; • Water quality impairment; • Compaction; • Decrease in vegetation; • Change of drainage patterns; • Altering hydromorphic properties; and		-	L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Wetland Baseline and Risk Assessment (Appendix E1)

critical biodiversity areas identified in bioregional plans." <u>Activity 18 (e)(i)(ee)(gg) (GN.R 324):</u> *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (e) in the Limpopo (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*				• Indirect loss of wetland areas											
			General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. • Generation of hazardous waste		-	S	M	Pr	PR	ML	Yes	- Operators are trained and competent to operate the BESS. Training should include the discussion of the following: - Potential impact of electrolyte spills on groundwater; - Suitable disposal of waste and effluent; - Key measures in the EMPr relevant to worker's activities; - How incidents and suggestions for improvement can be reported. - Training records should be kept on file and be made available during audits. - Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. - Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and	L	-

													replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. - Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). - Firefighting equipment should readily be available at the BESS area and within the site. - Maintain strict access control to the BESS area. - Ensure all maintenance contractors / staff are familiar with the supplier's specifications. - Undertake daily risk assessment prior to the commencement of daily tasks at the		

														BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. - Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. - Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. - The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. - Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the		

													supplier where relevant. - The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. - Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS. - Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. - The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.		

		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 E7)
			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 E3)
			Traffic volumes	• Construction and maintenance of gravel roads in vicinity of the site • Increased traffic on haulage routes • Increased traffic on local routes	-		L	S	Pr	CR	NL	Yes	- See Table 6.3	L	Traffic Impact Assessment (Appendix E8)
			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 E7)
			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	L	Social Impact Assessment (Appendix E7)

													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.		
			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the site, the proposed 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	• Loss or damage to sites, features or objects of cultural heritage significance	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E5)
			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 E6)
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*	The key components of the proposed project are described below: • PV Panel Array - To produce 350 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	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Continued fragmentation and degradation of natural habitats and ecosystems. • Continuing spread of IAP and weed species. • Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).		-	L	L	Po	PR	ML	Yes	- See Table 6.4	L	Terrestrial Biodiversity, Animal and Plant Species Assessment (Appendix E1)
			Avifauna	• Collisions with infrastructure associated with the PV Facility		-	S	L	Pr	PR	ML	Yes	- See Table 6.4	L	Avifaunal Assessment

electricity output is 20 megawatts or more." <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 (e) in the Limpopo province, (i) all areas."*	be tilted at a northern angle in order to capture the most sun. • <u>Wiring to Central Inverters</u> - 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. • <u>Connection to the grid</u> - 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. • <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			• Electrocution due to infrastructure associated with the PV Facility • Direct mortality from persecution or poaching of avifauna species and collection of eggs • Direct mortality by roadkill during maintenance procedures • Encroachment of Invasive Alien Plants into disturbed areas										(Appendix E2)
			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 compaction). • Loss of agricultural potential (low significance relative to agricultural potential of the site).		-	L	L	D	PR	SL	Yes	- See Table 6.4	L	Agricultural and Soil Compliance Statement (Appendix E4)
			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	-

	current regulators and protection circuitry. • Roads – Access will be obtained via gravel road off the R101. 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. • Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.		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.	-		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.	L	-
			Surface water	• Impact on the characteristics of the watercourse • Soil compaction and increased risk of sediment transport and erosion • Soil and water pollution • Spread and establishment of alien invasive species	-		L	L	Pr	PR	ML	Yes	- See Table 6.4	L	Wetland baseline and Risk Assessment (Appendix E1)
		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		-	L	L	D	PR	ML	Yes	- See Table 6.4	L	Visual Impact Assessment (Appendix E3)

				• the roads and residents at homesteads in close proximity to the power line structures. • Visual impacts and sense of place impacts associated with the operation phase of 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 E8)
			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	• Loss or damage to sites, features or objects of cultural heritage significance	-		S	S	U	PR	ML	Yes	- See Table 6.4	L	Heritage Impact Assessment (Appendix E5)
			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															

-	Dismantlement of infrastructure During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled. Rehabilitation of biophysical environment The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Improvement of habitat through revegetation / succession over time • Soil erosion and sedimentation. • Spreading and establishment of alien invasive species • Habitat degradation due to dust • Spillages of harmful substances • Road mortalities of fauna / impact of human activities on site.		-	S	L	Po	N/A	N/A	Yes	- See Table 6.5	L	Terrestrial Biodiversity, Assessment (Appendix E1)
			Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-
			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 6.3	L	Agricultural and Soil Compliance Statement (Appendix E4)
			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.	-		L	S	D	I	NL	Yes	-	L	-

				• Increase in construction vehicles.											
			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	- Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater (or surface water) contamination.	M	-
			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 Phala SPP it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E3)
			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	L	Traffic Impact Assessment (Appendix E8)

													periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.		
			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 6.3	L	Social Impact Assessment (Appendix E7)
			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 6.3	L	Social Impact Assessment (Appendix E7)
			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 6.3	L	Heritage Impact Assessment (Appendix E5)

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	-

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPr for the Solar Power Plant is included in Appendix F1. The EMPr for the power line is included in Appendix F2 and the EMPr for the substation is included in Appendix F3.

The Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F4.

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 are addressed in more detail in this Final EIR.

6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on 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 12(ii)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."*
- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- 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 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- 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 4 (e)(i)(ee)(gg) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (e) the Limpopo, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*

- 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 (e) in the Limpopo province, (i) all areas."*

- Activity 12 (e)(i)(ii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (e) in the Limpopo province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment of 2004, (ii) within critical biodiversity areas identified in bioregional plans."*

- Activity 18 (e)(i)(ee)(gg) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (e) in the Limpopo (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) areas within… 5 kilometres from any other protected area identified in terms of NEMPAA…."*

During the construction phase temporary negative impacts are foreseen over the short term. Table 6.3 summarizes 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 Assessment (Appendix E1)	Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.	Negative High	Negative Medium	• Brush cutting should be implemented beneath the panels, no vegetation clearing should be permitted as far as possible. • Areas rated as High sensitivity in proximity to the development areas must be avoided as much is feasible. Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery. Mitigated development in medium sensitivity areas is permissible. • Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon. • All laydown, chemical toilets etc. should be restricted to Low and Very Low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials where possible. No storage of vehicles or equipment will be allowed outside of the designated project areas.

				• Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual to be removed or destroyed due to the development. High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. All protected plants should be relocated where feasible. If the plants cannot be relocated seed must be collected and utilised as part of the rehabilitation process. • Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion. • Existing access routes, especially roads, must be made use of. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.

				• Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. • A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas. • All construction waste must be removed from site at the closure of the construction phase.
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	• An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the

				site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests.
	Destruction of protected plant species	Negative High	Negative Medium	• Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. • No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. • Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan. • Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site. • A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.

				• Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days. • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of sensitive flora and fauna species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr. • Contractors and employees must all undergo the induction and must be made aware of the sensitive areas to be avoided • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • Only existing access routes and walking paths may be made use of. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc. • A stormwater management plan must be compiled and implemented.
	Displacement of the indigenous faunal	Negative High	Negative Medium	• A qualified Environmental Control Officer must be on site when construction begins. A site walk through is recommended by a suitably

	community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).			qualified ecologist prior to any construction activities, preferably during the wet season. Should any SCC be noted and/or the animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • Clearing and disturbance activities must be conducted in a progressive linear manner, from the north to the south of the project area and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and • signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road kills and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.

				• Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in, and subsequently inspected prior to backfilling. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed every 50 m, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed.
Avifaunal Assessment (Appendix E2)	Habitat destruction within the project footprint	Negative High	Negative Medium	• Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigeic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas;

				• Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents; • Vegetation clearing to commence only after the necessary permits have been obtained; and • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
	Destruction, degradation and fragmentation of surrounding habitats	Negative High	Negative Low	• Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc. • All solid waste must be managed in accordance with the Solid Waste Management Plan. Recycling is encouraged. • All construction activity and roads to be within the clearly defined and demarcated areas. • Temporary laydown areas should be clearly demarcated and rehabilitated subsequent to end of use. • Appropriate dust control measures to be implemented. • Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act. • All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.
	Displacement/emigration of avifauna community	Negative Medium	Negative Low	• Noise pollution is difficult to mitigate against.

	(including SCC) due to noise pollution			• No construction activity is to occur at night, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes. • If generators are to be used these must be soundproofed.
	Direct mortality from persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	• All personnel should undergo environmental awareness training that includes educating on not poaching/persecuting species and collecting eggs. • Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area. • Any avifauna threatened by the construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist.
	Direct mortality from increased vehicle and heavy machinery traffic	Negative Medium	Negative Low	• All personnel should undergo environmental induction with regards to awareness about speed limits and roadkill. • All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
Wetland Baseline and Risk Assessment (Appendix E1)	Altered surface flow dynamics; Erosion; Alteration of sub-surface flow dynamics; Sedimentation of the water resource;	Negative Medium	Negative Low	• The wetland and buffer areas must be avoided; • Avoid clearance of vegetation beneath the panels; • Clear vegetation in line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead powerline servitudes". • Make use of existing access routes as much as possible, before new routes are considered. Any selected “new” route must not encroach into the wetland areas;

	Direct and indirect loss of wetland areas; Water quality impairment; Compaction; Decrease in vegetation; Change of drainage patterns; Altering hydromorphic properties; and Indirect loss of wetland areas			• Limit construction activities to the dry season when storms are least likely to wash concrete and sand into wetlands. This is only where towers are within 30 m of wetland buffer areas; • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash; • Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished; • Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs). In line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead powerline servitudes" all alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. By this Eskom is obliged to control category 1, 2 and 3 plants to the extent necessary to prevent or to contain the occurrence, establishment, growth, multiplication, propagation, regeneration and spreading such plants within servitude areas; • Limit soil disturbance; • The use of herbicides is not recommended in or near wetlands (opt for mechanical removal); • Appropriately stockpile topsoil cleared from the transmission line footprint; • Clearly demarcate the transmission line construction footprint, and limit all activities to within this corridor; • Minimize unnecessary clearing of vegetation beyond the tower footprints and transmission line corridors;

				• Lightly till any disturbed soil around the tower footprint to avoid compaction; • A stormwater management plan must be compiled and implemented for the project, facilitating the diversion of clean water to the delineated resources; • The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access; • Laydown yards, camps and storage areas must be within project area; • The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly; • Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility; • It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces; • Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility; • All chemicals and toxicants to be used for the construction must be stored within the drilling site and in a bunded area; • All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site; • All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”; • Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these

				facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); • Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems; • Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil; • No dumping of material on-site may take place; and • All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.
Visual Impact Assessment (Appendix E3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction • 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.
Soil and Agricultural Assessment (Appendix E4)	Loss of Land Capability	Negative Low	Negative Low	• Vegetate or cover all stockpiles after stripping/removing soils • Storage of potential contaminants should be undertaken in bunded areas • All contractors must have spill kits available and be trained in the correct use thereof. • All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping". • No cleaning or servicing of vehicles, machines and equipment may be undertaken in water resources. • Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems.
Heritage Impact Assessment (Appendix E5)	Loss or damage to sites, features or objects of cultural heritage significance	Negative Moderate	Negative Low	• It is recommended that Phase 2 Archaeological mitigation be undertaken for the Stone Age sites/finds in the area that will be impacted by the Phala SPP development. This will entail the surface sampling of representative material from the sites in the area, as well as the detailed mapping of the sites before destruction. A Sampling Permit from SAHRA will be required for this purpose • Known sites should be clearly marked, so that they can be avoided during construction activities; • The contractors and workers should be notified that archaeological sites might be exposed during the construction activities; • Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately

				and the Environmental Control Officer (ECO) shall be notified as soon as possible; • All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken; • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1). • A person or entity, e.g. the ECO, should be tasked to take responsibility for the maintenance heritage sites. • In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures. • This option should be implemented when it is impossible to avoid impacting on an identified site or feature.
Palaeontological Impact Assessment (Appendix E6)	Disturbance, damage or destruction of legally protected fossil heritage within the development footprint during the construction phase	Negative Low	Negative Low	• The ECO for this project must be informed that the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) has a Very High Palaeontological Sensitivity. • If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance Find Protocol, attached, should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel:

				021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out. • Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012).
Social Impact Assessment (Appendix E7)	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 Bela-Bela LM, Waterberg 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 Phala 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 (from Welkom, Bela-Bela and surrounds) 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 R730, R30 and gravel 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 (Appendix E8)	Construction and maintenance of gravel roads in vicinity of the site:	Negative Low	Negative Low	• Maintenance to lower order roads can be incorporated into the schedule, especially the maintenance of the road accessing the site. The site access road would require construction at the start of the construction project to safely transport the sensitive cargo through the site. A gravel roads maintenance programme for the gravel roads on site is recommended.
	Increased traffic on haulage routes:	Negative Low	Negative Low	• The impact of the increased traffic on regional routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic.
	Increased traffic on local routes:	Negative Low	Negative Low	• The impact of the increased traffic on local routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic.

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 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- 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 (b)(hh) (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 (b) in the Limpopo (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

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 summarizes 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, Animal and Plant Species Assessment (Appendix E1)	Continued fragmentation and degradation of natural habitats and ecosystems.	Negative Medium	Negative Low	• Refer to Construction Phase mitigation.
	Continuing spread of IAP and weed species.	Negative High	Negative Low	
	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).	Negative High	Negative Low	
Avifaunal Assessment (Appendix E2)	Collisions with infrastructure associated with the PV Facility	Negative High	Negative Medium	• The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.

				This would involve using existing/approved pylons and associated infrastructure for different lines. • Non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun et al, 2021). This is especially pertinent to waders and aquatic species that may recognise the panel array as water bodies (lake effect as described above) and collide with the panels, causing mortality. • Overhead cables/lines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites. • Fencing mitigations: o Top 2 strands must be smooth wire; o Routinely retention loose wires; o Minimum distance between wires is 300 mm; and o Place markers on fences.
	Electrocution due to infrastructure associated with the PV Facility	Negative Medium	Negative Low	• The design of the proposed solar plant and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.

				• Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered. • Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts (Prinsen et al, 2012).
	Direct mortality from roadkill, persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	• All personnel should undergo environmental awareness training that includes educating on not poaching/persecuting avifauna species and collecting eggs. • Signs must be put up to enforce this, should someone be caught a R1000 fine must be enforced. • All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and • All vehicles must adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
	Pollution of water sources and surrounding habitat due to cleaning products of the PV panels	Negative High	Negative Low	• Only environmentally friendly chemicals are to be used for cleaning of the panels.
	Heat radiation form the BESS and PV panels	Negative Medium	Negative Low	• The BESS must be enclosed in a structure with a non-reflective surface; • A fire management plan needs to be put in place; and

				• Grass must be kept under the panels to ensure that additional reflection is not taking place from the surface below the panels.
	Encroachment of Invasive Alien Plants into disturbed areas	Negative Medium	Negative Low	• An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation. • Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project. • All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.
	Collisions with the Gridline	Negative High	Negative Medium	• The design of the proposed solar plant must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa; • Overhead cables/lines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its

				visibility under low light conditions when most species move from roosting to feeding sites;
	Electrocution with the Gridlines	Negative High	Negative Medium	• The design of the proposed solar plant and grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa; • Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; and • Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts (Prinsen et al, 2012).
Wetland Baseline and Risk Assessment (Appendix E1)	Traffic	Negative Medium	Negative Low	• Refer to Construction Phase mitigation.
	Overland flow contamination	Negative Medium	Negative Low	
	Increased anthropogenic activities in wetland	Negative Medium	Negative Low	
	Loss of sub-surface flows	Negative Medium	Negative Low	
	Visual impact on observers travelling along the roads and residents at	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.

Visual Impact Assessment (Appendix E3)	homesteads within a 1km radius of the SPP.			• 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 1-5km 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 impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.			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 impact of sensitive visual receptors of the proposed power line.	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. Operations • 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. • Implement good housekeeping measures
Soil and Agricultural	Loss of Land Capability	Negative Low	Negative Low	• Continuously monitor erosion on site • Monitor compaction on site

Assessment (Appendix E4)				
Heritage Impact Assessment (Appendix E5)	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	• Refer to construction phase mitigation.
Social Impact Assessment (Appendix E7)	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 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 the impact on tourism.	Low Positive	Low Positive	• Due to the extent of the project no viable mitigation measures 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 Phala 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 impacts on soils, pressure on existing service infrastructure 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 Assessment (Appendix E1)	Improvement of habitat through revegetation / succession over time	Positive Low	Positive Medium	• Plant vegetation species for rehabilitation that will effectively bind the loose material, and which can absorb run-off from the mining areas. • Rehabilitate all the land where infrastructure has been demolished. • Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. • Protect rehabilitation areas until the area is self-sustaining. • Diversion trenches and storm water measures must be maintained • Water management facilities must stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. • The mining areas must be shaped to make it safe. • All the monitoring and reporting on the management and rehabilitation issues to the authorities must continue till closure of the mine is approved. • Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. • Refer to mitigation measures for the construction phase needed during the closure phase that are relevant.

Avifauna Assessment (Appendix E2)	Direct mortality due to earthworks, vehicle collisions and persecution	Negative Medium	Negative Low	• All personnel should undergo environmental awareness training including educating about not harming or collecting species; • Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate; • Any fauna threatened by the construction activities must be removed safely by an appropriately qualified environmental officer or removal specialist; • All construction vehicles must adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected; • All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner; • Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter; • All infrastructure must be removed if the facility is decommissioned; and • The project area must be rehabilitated, and a management plan must be in place to ensure that it is done successfully

	Continued habitat degradation due to Invasive Alien Plant encroachment and erosion	Negative High	Negative Low	• Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase; • Monitoring of the rehabilitated area must be undertaken at quarterly intervals for 3 years after the decommissioning phase; • All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques; and • There must be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora
Wetland Baseline and Risk Assessment (Appendix E1)	Removal of structures, machinery and equipment	Negative Low	Negative Low	• Refer to construction phase mitigation measures
	Rehabilitation of site to agreed land use	Negative Low	Negative Low	
Social Impact Assessment (Appendix E7)	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.

6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

- Terrestrial Biodiversity Assessment – The Biodiversity Company (see Appendix E1)
- Wetland and Risk Assessment – The Biodiversity Company (see Appendix E1)
- Avifaunal Impact Assessment – The Biodiversity Company (see Appendix E2)
- Visual Impact Assessment – Donaway Environmental (see Appendix E3)
- Heritage Impact Assessment – Apelser Archaeological Consulting (see Appendix E5)
- Palaeontological Impact Assessment – Banzai Environmental (see Appendix E6)
- Social Impact Assessment – Donaway Environmental (see Appendix E7)
- Traffic Impact Assessment – Bvi Consulting Engineers (see Appendix E8)
- Agricultural and Soil Impact Assessment – The Biodiversity Company (see Appendix E4)
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by Environamics, in conjunction with the project specialists (refer to Section 7 of this report).

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

6.3.1 Heritage and archaeological impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such sites. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

"Will the proposed development impact on any heritage or archaeological artefacts?"

The Heritage Impact Assessment (Refer to Appendix E5) confirmed the following:

A number of known cultural heritage sites (archaeological and/or historical) exist in the larger geographical area within which the study area falls. There were no known sites in the specific

study and development area footprint, but a number were identified in the study area during the assessment. The report will discuss the results of the desktop and field assessment and provide recommendations on the way forward at the end of the document.

From a Cultural Heritage point of view the proposed development actions can continue, taking into consideration the mitigation measures proposed in the report.

6.3.2 Ecological Impacts

The potential impact of the proposed development on threatened flora and fauna known to occur in the Limpopo Province had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the ecology?"

The Terrestrial Biodiversity Impact Assessment (refer to Appendix E1) confirmed that the project area has been altered both currently and historically. The present land use had a direct impact on both the fauna and the flora in the area, which is evident in the disturbed and transformed habitats. Historically, land clearing and the subsequent mismanagement has led to the deterioration of most of the area to a disturbed habitat that has not recovered since.

However, the Thornveld habitat in the wider project area can be regarded as important, not only within the local landscape, but also regionally; as it remains functional and serves as an important greenfields area that supports indigenous flora and fauna, including fauna SCC and protected tree species. The Thornveld habitat in the project area have a High ecological theme sensitivity.

Present Impacts to Biodiversity

Considering the fact that anthropogenic activities have historically taken place throughout most of the region, and continue to do so, several significantly negative impacts to biodiversity were observed within and adjacent to the project area. These include:

- Historic land modification largely in the form of road and powerline infrastructure, and the associated land clearing and edge effects;
- Livestock grazing;
- Minor and major gravel roads (and associated vehicle traffic and the possibility of wildlife road mortalities);
- Invasive Alien Plant infestations; and
- Fences and the associated infrastructure.

Loss of Irreplaceable Resources

The proposed activities are likely to be of a high impact and relatively large footprint, and the careful placement of certain developments is therefore important so as to minimise the damage to natural resources.

The proposed activities will be conducted over portions of the project area that are comprised of degraded bushveld, disturbed bushveld and wetland areas and these sections encompass indigenous vegetation that may be considered functional in nature. Thus, any irresponsible and/or medium to high impact activities will likely result in the loss of the following resources:

- Ecological Support Areas;
- Wetland areas providing important foraging resources;
- Protected flora;
- SCC fauna species (through direct mortality during clearing and construction activities, or through indirect mortality via the inappropriate control of waste material); and
- Foraging and traversing routes, and/or burrowing sites, relevant to the wide diversity of fauna that will occasionally make use of the areas.

As the majority of the areas are in a functional state, the loss of these resources would be considered significant. Therefore, mitigations must be put in place and implemented to prevent the total and widespread destruction of valuable natural resources.

Anticipated Impacts

The project activities will lead to several significant impacts to terrestrial biodiversity. It is important to predict and quantify these impacts so as to assess the magnitude and effect that each may have on the local terrestrial biodiversity and ecology. These impacts have been quantified in Table 6.2 – 6.4.

The main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of CBA 1, CBA 2 through edge effects as well as ESA 1 areas);
- Degradation of surrounding habitat;
- Destruction of protected flora;
- Disturbance and displacement of SCC fauna (including direct mortality of fauna); and
- Introduction and further spreading of IAP and weed species.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from 'Medium' – 'High' to 'Medium-Low'). Considering that this area that has been identified as being of significance for

biodiversity maintenance and ecological processes (Moderate and High sensitivity), development may proceed in Medium, Low and Very Low areas but with caution and only with the implementation of mitigation measures.

As per the latest proposed development layout the project will avoid CBA 1 and CBA 2 areas, which included the majority of the areas considered to have a 'High' sensitivity. This follows the guideline for interpreting the Site Ecological Importance as recommended in the report.

It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

6.3.3 Wetland Impacts

The potential impact of the proposed development on wetlands and riparian areas had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on wetlands?"

According to the Wetland/Riparian Impact Assessment (Appendix E1), the impact assessment considered both direct and indirect impacts, if any, to the wetland systems. In accordance with the mitigation hierarchy, the preferred mitigatory measure is to avoid impacts by considering options in project location, sitting, scale, layout, technology and phasing to avoid impacts.

Four HGM units were identified and assessed within the project area of influence. These have been classified as three depression wetlands and one channelled valley bottom system. Multiple artificial wetlands, namely dams were identified to the within the PAOI. Although these systems do not classify as a natural wetland system it is important to note where the dams are for any planned development in the area. No watercourses were identified within the powerline corridor. The delineation of the wetland systems and functional assessment have been completed for the natural depressions and the channelled valley bottom wetland.

Two separate risk assessments were completed for the project, the first one being for the PV area and the second one for the powerline route. Three levels of risk have been considered and determined for the overall risk assessment, these include low, moderate and high risk. No high risks are expected for either the PV area or the powerline route since depressions within the development area are in a largely modified state, and no watercourses are located within the powerline corridor.

For the PV area avoidance will not be achieved and the risk assessment will thus focus on the second step of the mitigation hierarchy namely minimisation of the impacts. Since direct impacts to the wetlands (and buffers) cannot be avoided, the risk assessment will consider both the direct and indirect risks posed to these systems because of the project. For the powerline avoidance of watercourses can be achieved. No watercourses were identified within the powerline corridor.

6.3.4 Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in Limpopo Province had to be determined. The main question which needs to be addressed is:

"How will the proposed development impact on the avifauna?"

According to the Avifaunal Impact Assessment (Appendix E2), The project area overlaps with an ESA1, CBA1 and CBA2 area. A total of 357 avifauna species that could be expected to occur within the PAOI of which eighteen (18) are regarded as threatened. It can be said that the project area is sensitive with a moderate to high likelihood of species of conservation concern occurring. This assumption is based on the CBA1 and CBA 2 classification of the area as well as the CR river within 120 m from the PAOI.

The development of the area could result in the loss or degradation of the habitat and vegetation, most of which is still likely in a natural condition and is expected to support a number of avifauna species. The construction of the solar facility could also lead to the displacement/mortalities of the avifauna and more specifically SCC avifauna species. The operation could also result in collisions and electrocutions.

There are anthropogenic activities and influences are present within the landscape, there are several negative impacts to biodiversity, including avifauna. These include:

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

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

The principal impacts of the operational phase are electrocution, collisions, fencing, chemical pollution due to chemical cleaning of the PV panels and habitat loss. Solar panels have been implicated as a potential risk for bird collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the "lake effect" (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This "lake-effect" hypothesis has not been

substantiated or refuted to date (Visser et al, 2019). It can however be said that the combination of powerlines, fencing and large infrastructure will influence avifauna species. Visser et al (2019) performed a study at a utility-scale PV SEF in the Northern Cape and found that most of the species affected by the facility were passerine species. This is due to collisions with solar panels from underneath. During a predator attack while foraging under the panels, individuals may alight and then collide with the panel. Larger species were said to be more influenced by the facilities when they were found foraging close by and were disturbed by predators which resulted in collisions with infrastructure.

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

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

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

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

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

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

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable residual risk level. It is the opinion of the specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented.

6.3.5 Visual Impacts

Due to the extent of the proposed photovoltaic solar plant it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed is:

"To what extent will the proposed development be visible to observers and to will the landscape provides any significant visual absorption capacity"

The Visual Impact Assessment (Refer to Appendix E3) indicated the proposed SPP is located in an area with relatively low significance in elevation to the south, east and west, but approximately 6km to the north marks the start of the Waterberg Mountains. The site itself has a difference in elevation of approximately 25 meters. The SPP is located at an above mean sea level (amsl) of approximately 1122m at the highest elevation and at an amsl of 1097m at the lowest elevation. The SPP drains towards the west. The power line corridor has a difference in elevation of approximately 18 meters. The PL is located at an above mean sea level (amsl) of approximately 1138m at the highest elevation and at an amsl of 1120m at the lowest elevation. The PL drains towards the south.

The report highlighted possible receptors within the 10km radius landscape which due to use could be sensitive to landscape change. They include:

- Area Receptors which include:
  - Bela-Bela and surrounding suburbs.
  - Sondela Nature Reserve.
  - Bothasvley Nature Reserve.
- Linear Receptors which include:
  - R101 regional road.
  - R516 regional road.
  - N1 National Road.
  - Warmbaths Airfield.
- Point Receptors which include:
  - Homesteads on farms.
  - Lodging and tourism facilities.

Referring to the assessment score of this VIA report review, the significance of the visual impact will be a "Negative Medium Impact". Receptors likely to be impacted by the proposed development are the nearby property owners, people travelling on the R101 regional road, R516 regional road, Bela-Bela, tourists and Warmbaths Airfield. A large part of the visual landscape is reflecting a farming and "Bushveld" tourism landscape with a very good visual appearance.

Considering all positive factors of such a development including economic factors, social factors and sustainability factors, especially in a semi-arid country, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view.

6.3.6 Agricultural / impacts on the soil

In order to determine the potential impacts that the proposed development will have on agricultural production, the soil forms and current land capability of the area where the proposed project will be situated a soil survey has been conducted. The main question which needs to be addressed is:

"How will the proposed development impact on agricultural resources and the soil?"

The Agricultural and Soil Assessment (Appendix E4) determined that three main sensitive soil forms were identified within the assessment area, namely the Vaalbos, Nkonkoni and Hutton soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Moderate" to "Moderate high" sensitivities, which correlates with the findings from the baseline assessment. There are isolated discrepancies when comparing the desktop (screening) sensitivities with the baseline findings, but the overall agricultural theme sensitivity for the area was determined to be "Moderate".

The assessment area is associated with arable and non-arable soils. However, the available climatic conditions of low annual rainfall and high evapotranspiration potential limits crop production resulting in land capabilities with "Moderate" and "Moderate high" sensitivities. The land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which aligns to the current land use in the area.

It is the specialist's opinion that the proposed Phala Solar Power Plant project and associated grid connection infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed activities will result in the segregation of some high and very high production agricultural land. However, the grid connection for the proposed development will occur on already established infrastructure powerlines with negligible impacts to the land potential of crop fields. In areas where these crop fields are still under production, engagement must be undertaken with the relevant landowner / user for permission, and to agree on compensation, if required. The development within these area, and potential loss of these resources is not regarded to be a fatal flaw.

It is, therefore, the specialist`s recommendation that the proposed Phala Solar Power Plant project and associate infrastructure may be favourably considered for development with implementation of mitigation measures in place to ensure low expected significant impacts occurrence.

6.3.7 Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix H8). The main question which needs to be addressed is:

"How will the proposed development impact on the socio-economic environment?"

The findings of the Social Impact Assessment (Refer to Appendix E7) indicate that There are some vulnerable communities within the project area that may be affected by the development of Phala SPP and its associated infrastructure. These communities include the people living in the town of Bela-Bela or in close rural developments next to the proposed project. Traditionally, the construction phase of a SPP development is associated with most social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as "fatal flaws".

Based on the social impact assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of Power Plant projects (these relate to an influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks) and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of four other solar facilities within the surrounding area, and because of the project's location within an area which is characterised by high levels of solar irradiation and which is therefore well suited to the development of commercial solar energy facilities.

- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.
- When considering Phala Solar Power Plant, it is also important to consider the cumulative social impacts that may arise with other proposed Power Plant projects in the area.
- It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

The following recommendations are made based on the SIA. The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts associated with the project. Based on the social assessment, the following recommendations are made:

- The appointment of a CLO to assist with the management of social impacts and to deal with community issues, if feasible.
- It is imperative that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction activities. where possible. Local procurement of labour and services / products would greatly benefit the community during the construction and operational phases of the project.
- Local procurement of services and equipment is required where possible in order to enhance the multiplier effect.
- Involve the community in the process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.
- The local fire association should be joined as a third-party insurance to cover any possible fire damages caused by the project. The project will only be covered if all necessary fire prevention requirements and laws are adhered to. Details of the local fire association can be obtained from the local farmers union.

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

6.3.8 Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

"How will the proposed development impact on the Palaeontological resources?"

According to the Palaeontological Impact Assessment (Appendix E6) indicates that The Phala Solar Power Plant is underlain by the Letaba Formation (Lebombo Group, Karoo Igneous Province) while the most northern portion of the connection corridor and Eskom Power lines are underlain by the Clarens Formation (Karoo Supergroup). The Palaeotechnical Report of the Limpopo Province (Groenewald et al, 2014) as well as the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) (Almond et al, 2013; SAHRIS website) allocates a High Palaeontological Sensitivity to the Clarens Formation and a Low Palaeontological Sensitivity the Letaba Subgroup. However, the Palaeotechnical report of the Limpopo Province (Groenewald et al, 2014) indicates "very poor levels of surface exposure" and that most data were obtained from borehole cores.

A Low Palaeontological Significance has been allocated to the proposed Phala SPP development. It is therefore considered that the proposed development will not lead to detrimental impacts on the palaeontological resources of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

However, if fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

6.3.9 Traffic Impacts

Large developments are normally associated with an increase in construction vehicle traffic. The main question which needs to be addressed is:

"How will the proposed development impact on the traffic on main delivery routes to the site?"

According to the Traffic Impact Assessment (Appendix E8) the major traffic impact occurs during the construction phase of the project. The impact of the construction trip generation, on the predicted 2026 (estimated time of construction) traffic volumes on the local and the regional transportation routes are expected to be low. No mitigation measures for these routes will be necessary.

The photovoltaic (PV) components will be delivered to site from the recommended Durban Harbour over a distance of 720 km along the N3 and N1. The regional routes indicated in the analysis would, however, need to be confirmed by freight carriers as suitable for the sensitive normal loads. The final decision on the selected route would be based on a combination of cost, distance and road condition at the time of transport.

The preferred access point to the site will be via the eastern and western sides of the R101, along the proposed northern site boundary. The formalisation of this access point, to the standard, might be a requirement as part of the wayleave approval of the Limpopo Department: Transport and Community Safety and/or South African National Roads Agency Ltd.

In terms of impact on traffic the regional construction trips will be insignificant when compared to the existing Average Daily Traffic (ADT) and projected ADT without the development. It has been noted that the N1 and R101 in the region of the site is already at a low level of service, without the addition of the proposed development. Mitigation measures, such as staggered trips and reduced peak time travel are proposed if needed.

With the consideration of the recommendations of this report, the development of the Phala SPP, located on the Remaining Extent of Portions 1 and 2 of the Farm Turfbult No. 494, and Portions 5 and 7 of the Farm Turfbult No. 494, Waterberg District Municipality (Limpopo Province) is supported from a traffic and transportation perspective.

6.3.10 Risk Assessment for battery storage system

Battery storage facilities are a relatively new technology, particularly in South Africa. Batteries, as with most electrical equipment, can be dangerous and may catch fire, explode or leak dangerous pollutants if damaged, possibly injuring people working at the facility or polluting the environment. Common failure scenarios of Li-ion batteries include electrical, mechanical, and thermal. The potential hazards associated with them are fire with consequent emission of gas and explosion. The major risks include thermal runaway, difficulty of fighting battery fires, failure of control systems and the sensitivity of Li-ion batteries to mechanical damage and electrical transients.

As with any fire or explosion, a potential consequence of Li-ion battery fires is the endangerment of life and property. These consequences are assessed based on their severity and likelihood. First, the severity of this consequence changes based on the quantity of cells in a system, as well as the system's proximity to people and property. Therefore, the size and location of the installation should be taken into consideration. For the Phala SPP the location

of the BESS and the fact that the area is sparsely populated will reduce the risk associated with toxic chemicals, flammability and overpressure from explosions. The risk level is seen to be of a low risk that is unlikely to occur with the proper safety measures taken as mitigation. Provided that the facility is designed and managed properly, and the batteries are handled in the manner prescribed by the manufacturer, an incident is unlikely to happen. However, because of the risk special management actions are recommended in the EMPr to reduce the risk of an incident and manage an incident should one ever occur.

6.4 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 6.6.

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.

6.4.1 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 6.6: 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.

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 Draft EIR 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 the cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 7.1 below.

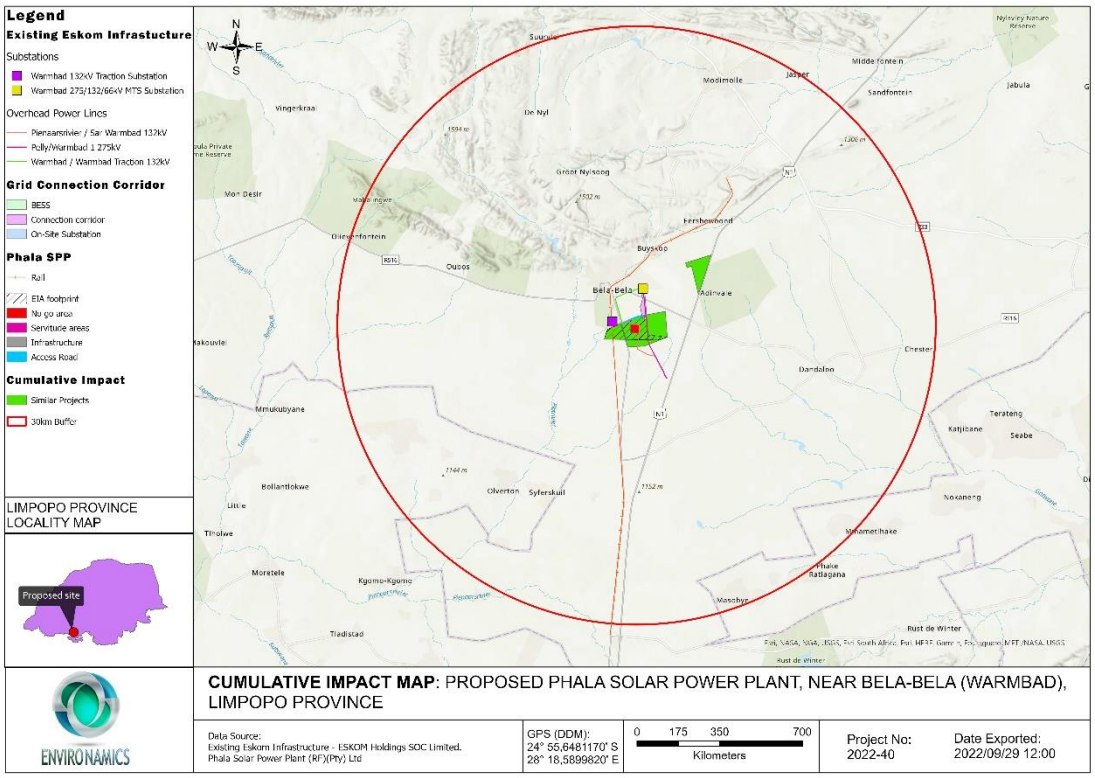


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

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 these cumulative effects analysis are the

anticipated lifespan of the proposed project, beginning in 2024 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 proposed projects 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 and one project where Environamics was the EAP– refer to table 7.1.

Table 7.1: A summary of related projects, that may have a cumulative impact, in a 30 km radius of the study area

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Portion 67 of Tweefontein Farm 462 KR	9km	30 MW	12/12/20/2130	Scoping and EIA	Approved
Gihon Solar Energy Facility	0km	75 MW	14/12/16/3/3/2/576	Scoping and EIA	Approved
Portion 67 of Tweefontein Farm 462 KR	9km	75 MW	14/12/16/3/3/2/6	Scoping and EIA	Approved

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, mining 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.

As part of the SEA for Wind and Solar Energy in South Africa, the CSIR and the DFFE mapped the location of all EIA applications submitted within South Africa. According to this database approximately 3 applications have been submitted for renewable energy projects within the geographical area of investigation. The majority of these projects are located in close proximity to Bela-Bela.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) specialists were requested 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.

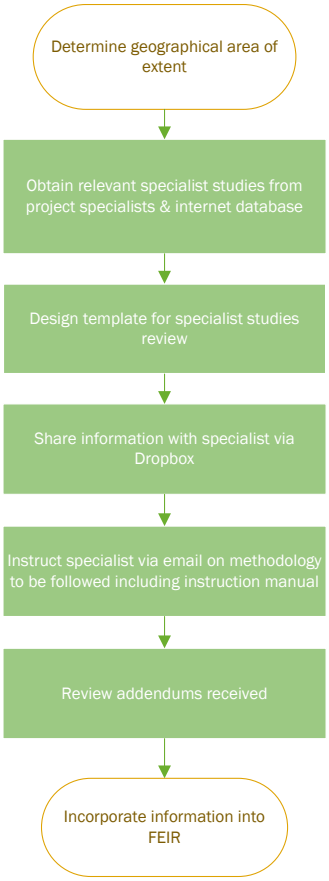


Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Soil, Land Capability and Agricultural Potential

According to the Soil and Agriculture Impact assessment (Appendix E4), the cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project, but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact. But it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

What level of loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

Department of Forestry, Fisheries and the Environment (DFFE) requires compliance with a specified methodology for the assessment of cumulative impacts. This is positive in that it ensures engagement with the important issue of cumulative impacts. However, the required compliance has some limitations and can, in the opinion of this author, result in an over-focus on methodological compliance, while missing the more important task of effectively answering the above defining question.

All of these projects have the same agricultural impacts in a similar agricultural environment, and therefore the same mitigation measures apply to all.

As previously indicated, the proposed development poses a low risk in terms of causing soil degradation because it can be fairly easily and effectively prevented by standard best practice soil degradation control measures, as recommended and included in the EMPr of the EIA Report. If the risk for each individual development is low, then the cumulative risk is also low.

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. The transformation that has taken place.

7.5.2 Ecology

The Terrestrial Biodiversity Assessment (refer to Appendix E1) confirmed that cumulative impacts, from an ecological point of view, are those that will impact the natural faunal and floristic communities and habitats surrounding the proposed solar development, mainly by other similar developments and their associated infrastructure in its direct vicinity. As more and more similar developments occur in the direct vicinity of the currently proposed development, habitat losses and fragmentation will occur more frequently and populations of

threatened, protected or other habitat specific species (both faunal and floral) will be put under increasing pressure through competition for suitable habitat. Fragmentation of habitats prevent the natural flow of ecosystem services and may have a detrimental effect on the gene pool of a species, which may lead to the loss of a population of such a species on fragmented portions. Through a development, such as the one proposed for the study area, natural habitat is totally transformed and although some vegetation cover generally returns to these areas, microhabitats are totally destroyed, and the area will probably never again be able to function without some human maintenance and management.

The cumulative impact of the solar project in the project area should all the projects be approved and developed are as follows:

The cumulative impact on the natural ecosystems (fauna and flora) would be moderate considering that large sections of the area for development has already been degraded through agricultural activities (crop cultivation, overgrazing etc.).

The moderate cumulative impacts are however dependent on the strict implementation of mitigation measures and monitoring during the construction, operational and decommissioning phases of the solar developments.

7.5.3 Avifauna Impact Assessment

The Avifauna Impact Assessment (refer to Appendix E2) states It is the cumulative impacts, when considering the existing transformation of the threatened habitats to croplands and mining, in addition to the prevalence of planned solar developments, that increase the cumulative risks and, therefore, warrant mitigations. Mitigating the cumulative impacts would require limiting the impact of Phala SPP to an absolute minimum, which is not necessarily feasible but should be pursued. The mitigations to reduce cumulative impacts involve limiting the disturbance footprint (overall size), limiting human activity and noise throughout the project life, disturbing as little natural vegetation as possible, retaining the natural vegetation beneath the panels and around infrastructure, limiting the extent and width of roadways, reducing the speeds that vehicles travel, and then thoroughly rehabilitating the entire footprint back to natural grassland after decommissioning. Despite some residual and cumulative impacts, there is no objection, from an avifaunal perspective to the development of the proposed SPP development.

7.5.4 Social Impact Assessment

The Social Impact Assessment (refer to Appendix E7) indicate that from a social impact point of view the project represents an important development opportunity for the communities surrounding Phala SPP. Should it be approved, it will not only supply the national grid with much needed clean power but will also provide a number of opportunities for social upliftment. The cumulative impacts for each of the potential social impacts were assessed throughout the report. The most significant cumulative social impacts are both positive and negative: the community will have an opportunity to better their social and economic well-

being, since they will have the opportunity to upgrade and improve skills levels in the area, but impacts on family and community relations may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

7.5.5 Visual

The Visual Impact Assessment (refer to Appendix E3) confirmed that the construction and operation of the PV facility may increase the cumulative visual impact together with farming activities, dust on gravel roads, existing Eskom power line infrastructure and new projects, mines in the area and other proposed solar power facilities in the area. The significance of the visual impacts can only be determined once projects have been awarded preferred bidder status. However, taking into account the already disturbed visual surrounds due to extensive mining activities in the area and all the positive factors of such a development including economic factors, social factors and sustainability factors, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view.

7.5.6 Heritage

The Heritage Impact Assessment (Refer to Appendix E5) concluded that from a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Phala SPP is in an area with a very low presence of heritage sites and features.

The cultural heritage profile of the larger region is very low. Most frequently found are farmsteads, formal and informal burial sites. 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 proposed for development and the generally low density of sites in the wider landscape the overall cumulative impacts to heritage are expected to be of generally low significance before mitigation.

7.5.7 Paleontology

According to the Palaeontological Impact Assessment (refer to Appendix E6), based on the SAHRIS website, the only palaeontological heritage assessments (PIAs) available for this region (Almond 2015, Brink undated, Groenewald 2013b, Millsteed 2013b) are all at desktop level with no field data. The cumulative Impacts of the area will include approved electrical facilities within a 30 km radius of the project site. As the mentioned MTS and Powerlines and corridors are all underlain by similar geology the Impact on these developments will be similar. The

Palaeontological Significance of the proposed Phala SPP is rated as Low and the cumulative Impacts will thus also be Low Negative.

7.5.8 Traffic

According to the Traffic Impact Assessment (refer to Appendix E8) depending on the timing of the other nearby renewable energy projects, where construction in particular could overlap, traffic impact will increase accordingly. It should be noted that the volume of traffic is related to the specific development stage, logistics planning and development size.

The construction period for other renewable energy projects is relatively short (between 12 and 18 months), where traffic flow will vary during the construction period. It is assumed that 50% of these projects' construction periods would likely coincide with the Phala SPP construction period. This additional traffic, however, will be widely dispersed and easily accommodated on the surrounding road network. In addition, the traffic impact of the operational and maintenance periods will be low/ negligible, and it is also unlikely that the decommissioning of these projects will coincide with each other.

In conclusion, the cumulative impact and significance of the various nearby renewable energy projects is considered to have a low/ negligible impact and therefore no corrective measures will be required.

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 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 Assessment	Habitat destruction & Fragmentation	The construction phase of the development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- Medium
	Soil erosion and sedimentation	The construction activities associated with the development may result in widespread soil disturbance and is usually associated with accelerated soil erosion. Soil erosion promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora. The impact is considered as cumulative as it will influence the vegetation communities in the area.	- Low
	Dust pollution	The environmental impacts of wind-borne dust, gases and particulates from the construction activities associated with the proposed development are primarily related to human health and ecosystem damage. Poor air quality results in deterioration of visibility and aesthetic landscape quality of the region, particularly in winter due to atmospheric inversions. The impact is considered to be cumulative as dust pollution has an impact on the surrounding environment and as the surrounding area is already impacted by mining and agricultural activities.	- Low
	Spillages of harmful substances	Construction work for the proposed development will always carry a risk of soil and water pollution, with large construction vehicles contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or ground water, leading to potential medium/long-term impacts on fauna and flora. During the construction phase heavy machinery and vehicles would be the main contributors to potential pollution problems. The impact is considered to be cumulative as the spillages of harmful substances can have indirect impacts to the surrounding environment.	- Low

	Spreading of alien invasive species	Continued movement of vehicles on and off the site during the construction phase will result in a risk of importation of alien species. Vehicles often transport many seeds, and some may be of invader species, which may become established along the access road, especially where the area is disturbed. The construction carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites.	- Low
	Negative effect of human activities on fauna and flora and road mortalities on fauna	Continued movement of vehicles on and off the site during the construction phase will result in a risk of importation of alien species. Vehicles often transport many seeds, and some may be of invader species, which may become established along the access road, especially where the area is disturbed. The construction carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Low
Wetland Baseline and Risk Assessment	Impact on the characteristics of the watercourse	The construction activities associated with the proposed solar power plant will potentially have an impact on the wetland areas and water levels, whether it is through direct or indirect impacts. The clearance of vegetation for the solar power plant will either have a direct or indirect impact on the wetlands and smaller drainage channels. Loss of the riparian and instream habitat will also result in permanent loss or displacement of the invertebrates, birds and small mammals' dependant on the wetland vegetation for feeding, shelter and breeding purposes. All functions associated with the	- Medium

		wetland zones and the surrounding landscape will be compromised if mitigation measures are not applied correctly. Other indirect impacts of the construction of the solar power plant on the characteristics of the water course include impacts on water quality and changes to the geomorphology should the development cause impacts on downstream areas. The impact is considered to be cumulative due to proposed development impacting on the characteristics of the watercourse.	
	Soil erosion and sedimentation	The use of heavy machinery during the construction and decommissioning phases of the development will result in the compaction of soil, resulting in decreased infiltration of rainwater and increased surface run-off volumes and velocities leading to a greater erosion risk. The hardened surfaces of the road and compacted soils of the proposed development area will also lead to an increase in surface run-off during storm events which will likely be discharged via stormwater outlet points, concentrating flows leaving the exposed areas. This can lead to erosion in the cleared areas and channel forming where culverts concentrate water on the side of the road where the river and riverine area are located. It can lead to sedimentation, in the river. The impact is considered to be cumulative due to proposed development contributing to the risk of sediment transport and erosion in the area.	- Low
	Soil and water pollution (Spillages of harmful substances)	Construction work will also carry a risk of soil and water pollution, with large construction vehicles contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface- or groundwater, leading to potential medium/long-term impacts on fauna and flora. The impact is considered to be cumulative due to proposed development contributing to the risk of soil and water pollution in the area.	- Low
	Spread and establishment of alien invasive species	The construction almost certainly carries by far the greatest risk of alien invasive species being imported to the site, and the high levels of habitat disturbance also provide the greatest opportunities for such species to establish themselves, since most indigenous species are less tolerant of disturbance. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that	- Low

		have been stockpiled elsewhere at already invaded sites. Continued movement of personnel and vehicles on and off the site, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project. Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	
Avifaunal Impact Assessment	Displacement of priority avian species from important habitats	The proposed Phala Solar Power Plant in isolation has a Negative Low impact significance. In consideration of the aforementioned information, the cumulative impact was determined to be of a Negative High significance. It is important to note that this also accounts for the relative importance of the habitats within and adjacent to the project area, in the context of the value of the regional habitat. Considering the anthropogenic activities and influences within the 30 km radius, approximately 55% of natural habitat has been lost, and as discussed above, the proposed solar developments will result in a further loss of approximately 13.9%. It is also important to consider that this projected habitat loss is only due to renewable energy developments, and further loss is a possibility with additional types of anthropogenic developments. Apart from habitat loss, one also needs to consider additional potential impacts such as light pollution, vibration, noise pollution and resource exploitation. This means that the careful spatial management and planning of the	- High

		entire region must be a priority, and existing large infrastructure projects must be carefully monitored over the long term.	
Soil and Agricultural Assessment	Loss of agricultural land	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. Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact is also assessed as negligible.	- Low
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. To this review, heritage sites located in urban areas have been excluded. Because of the low likelihood of finding further significant heritage resources in the relevant area proposed for development and the generally low density of sites in the wider landscape the cumulative impacts to the heritage are expected to be of low significance.	- 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)	A low palaeontological significance has been allocated to the proposed development. It is therefore considered that the development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Phala 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,	+ Medium

		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 Phala SPP alone.	
	Impact with large-scale in-migration of people	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.	- Medium
Traffic Impact Study	Increase in construction vehicles	The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e. the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.	- Low
Operational Phase			

Terrestrial Biodiversity Impact Assessment	Habitat destruction & Fragmentation	The development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- Medium
	Soil erosion and sedimentation	The development may result in widespread soil disturbance and is usually associated with accelerated soil erosion. Soil erosion promotes a variety of terrestrial ecological changes associated with disturbed areas, including the establishment of alien invasive plant species, altered plant community species composition and loss of habitat for indigenous flora. The impact is considered as cumulative as it will influence the vegetation communities in the area.	- Low
	Dust pollution	The environmental impacts of wind-borne dust, gases and particulates from the operation and maintenance activities associated with the proposed development are primarily related to human health and ecosystem damage. Poor air quality results in deterioration of visibility and aesthetic landscape quality of the region, particularly in winter due to atmospheric inversions. The impact is considered to be cumulative as dust pollution has an impact on the surrounding environment and as the surrounding area is already impacted by mining and agricultural activities.	- Low
	Spillages of harmful substances	Maintenance work for the proposed development will always carry a risk of soil and water pollution. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface or ground water, leading to potential medium/long-term impacts on fauna and flora. The impact is considered to be cumulative as the spillages of harmful substances can have indirect impacts to the surrounding environment.	- Low
	Spreading of alien invasive species	Continued movement of vehicles on and off the site will result in a risk of importation of alien species. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. Movement of vehicles will however be reduced during operation and maintenance of the facility.	- Low

	Negative effect of human activities on fauna and flora and road mortalities on fauna	Continued movement of vehicles on and off the site will result in a risk of importation of alien species. The biggest risk is that seeds of noxious plants may be carried onto the site along with materials that have been stockpiled elsewhere at already invaded sites. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Low
Wetland/Riparian Assessment	Impact on the characteristics of the watercourse	The operation and maintenance activities associated with the proposed solar power plant will potentially have an impact on the wetland areas and water levels, whether it is through direct or indirect impacts. All functions associated with the wetland zones and the surrounding landscape will be compromised if mitigation measures are not applied correctly. Other indirect impacts o include impacts on water quality and changes to the geomorphology should the development cause impacts on downstream areas. The impact is considered to be cumulative due to proposed development impacting on the characteristics of the watercourse.	- Medium
	Soil erosion and sedimentation	The hardened surfaces of the road and compacted soils of the proposed development area will lead to an increase in surface run-off during storm events which will likely be discharged via stormwater outlet points, concentrating flows leaving the exposed areas. This can lead to erosion in the cleared areas and channel forming where culverts concentrate water on the side of the road where the river and riverine area are located. It can lead to sedimentation, in the river. The impact is considered to be cumulative due to proposed development contributing to the risk of sediment transport and erosion in the area.	- Low
	Soil and water pollution (Spillages of harmful substances)	Maintenance work will also carry a risk of soil and water pollution, with large construction vehicles (where used) contributing substantially due to oil and fuel spillages. If not promptly dealt with, spillages or accumulation of waste matter can contaminate the soil and surface- or groundwater, leading to potential medium/long-term impacts on fauna and flora. The impact is considered to be cumulative due to proposed development	- Low

		contributing to the risk of soil and water pollution in the area.	
	Spread and establishment of alien invasive species	Continued movement of personnel and vehicles on and off the site, as well as occasional delivery of materials required for maintenance, will result in a risk of importation of alien species throughout the life of the project. Furthermore, the spread of the alien invasive species through the area will be accelerated when seeds are carried by stormwater into the drainage features on the site that will cause environmental degradation and indigenous species to be displaced. The wider area is already impacted by the spread of alien invasive species due to agricultural and mining activities. Therefore, the development will contribute towards the cumulative impact of spread of alien invasive species. The impact will be low as the mitigation measures proposed will reduce the overall impact of the development.	- Low
Visual Impact Assessment	Visual intrusion of the development on observers within the area	The operation and maintenance of the facility will create visual instruction on observers that utilise and travel through the area, including travellers using the local roads	- Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium

7.7 CONCLUSION

This chapter of the EIA Report addressed the cumulative environmental effects of the construction, operation and decommissioning project phases to be further assessed as part of the EIA Phase. 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 destruction and fragmentation (- Medium)

- Impact on the characteristics of the watercourse (- 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:

- Habitat destruction and fragmentation (- Medium)
- Impacts on the characteristics of the watercourse (- Medium)
- Visual intrusion (- Medium)

➢ Cumulative effects during the decommissioning phase:

- Generation of waste (- Medium)

The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project are 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 (where the landscape has already been modified), than to lose land with a higher environmental value elsewhere in the country.

8 ENVIRONMENTAL IMPACT STATEMENT

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

Appendix 3. (3) An EIR (...) must include-

(l) an environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:

(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which were addressed in this EIA report:

- Impacts during construction phase:
  - Direct habitat destruction (- Medium)
  - Habitat Fragmentation (- Medium)
  - Impact on the characteristics of the watercourse (- Medium)
  - Creation of direct and indirect employment opportunities (+ Medium)
  - Economic multiplier effects from the use of local goods and services (+ Medium)
  - Impacts on daily living patterns (- Medium)
- Impacts during the operational phase:
  - Habitat destruction and fragmentation (- Medium)

- Displacement of priority avian species from important habitats (- Medium)
- Impact on the characteristics of the watercourse (- 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:

- Improvement of habitat through revegetation / succession over time (+ Medium)

➢ Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.

No fatal flaws or impacts of a high significance has been identified to be associated with the proposed development.

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity are expected to occur, however the cumulative impact assessment included in Section 7 of this report has indicated that all cumulative impacts will be of a medium or low significance, with no impacts expected to be of a high and unacceptable significance.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the layout of the Phala Solar Power Plant through identifying specific environmental areas and features present within the site which needs to be avoided through the careful placement of infrastructure as part of the development footprint. Refer to Section 6.4 for the complete sensitivity analysis and Figure G for the final layout map which avoids the areas required to be conserved.

The main features to be avoided are related to wetlands. Three Hydrogeomorphic Units (HGM) have been identified for the project, which comprises of three depression wetlands. The specialist has recommended a 15m buffer surrounding the wetlands. These areas have been avoided by the proposed layout as per Figure G.

Further mitigation measures for the development, as recommended by the independent specialists, have been included in the EMPr(s) for the project as per Appendix I1-I4.

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- To produce up to 350MW, 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 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 via the proposed power line. It is expected that generation from the facility will connect to the national grid via the existing Eskom Warmbad 275/132/66kV MTS Substation. The grid connection route will be assessed within a 200m wide (up to 550m wide in some instances) corridor. The Project will inject up to 350MW into the National Grid. The installed capacity will be approximately400MW.
- 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 supporting infrastructure such as the auxiliary buildings will be situated in an area measuring up to 1.3 ha.
- Battery Energy Storage System – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,740 m^3 of batteries and associated operational, safety and control infrastructure.
- Roads – Access will be obtained via the R101 regional road to that traverses the site. Two access roads are proposed, Access Road 1 to provide access to the eastern side of the project site and Access Road 2 to provide access to the western side of the project site. Both access road 1 and 2 are required to be authorised. 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 farm. Fencing with a height of 2.5 meters will be used.

8.4 RECOMMENDATION OF EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the Final EIA report. In terms of the legal requirements it is concluded that:

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 EIA Regulations (as amended in 2017) – already approved by the environmental authority.

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017) and the public participation plant - already approved by the environmental authority.
- The EIA process has been conducted as required by the EIA Regulations (as amended in 2017), Regulations 23 and Appendix 3.
- The EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations (as amended in 2017).
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and therefore, no terms of reference are provided for such studies.

In terms of the contents and substance of the EIA report the EAP is confident that:

- All key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures and avoidance of certain areas within the site as recommended by the specialists. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Phala Solar Power Plant and associated infrastructure, Registration Division LS, Limpopo Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPrs (Appendix I1-I4).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPr should not be neglected and a copy of the EMPr should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- The required biodiversity walk-throughs must be undertaken prior to construction.
- It is recommended that Phase 2 Archaeological mitigation be undertaken for the Stone Age sites/finds in the area that will be impacted by the Phala SPP development. This will entail

the surface sampling of representative material from the sites in the area, as well as the detailed mapping of the sites before destruction. A Sampling Permit from SAHRA will be required for this purpose

- The period for which the Environmental Authorisation is required is between 7 and 10 years. This is based on the fact that the project is proposed to be bid as part of the DMRE REIPPP Programme, with there being uncertainty regarding the announcement of the next bidding rounds, and the need for a valid Environmental Authorisation. It must however be noted that the project will also participate in other programs/opportunities to generate power in South Africa, as available.

We trust that the department find the report in order and await your comments in this regard.

Ms. Christia van Dyk

Environamics Environmental Consultants

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