ENVIRONMENTAL IMPACT REPORT

Final – 13 December 2021

THE PROPOSED SPRINGBOK SOLAR POWER PLANT NEAR WELKOM, FREE STATE PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	:	14/12/16/3/3/2/2087
Project Title	:	Proposed Springbok Solar Power Plant near Welkom, Free State Province
Authors	:	Ms. Carli van Niekerk Ms. Lisa Opperman Ms. Christia van Dyk
Client	:	Springbok Solar Power Plant (RF) (Pty) Ltd.
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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 and in any other programs/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, Springbok Solar Power Plant (RF) (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located on the farm Weltevrede No. 638, Registration Division Theunissen, Free State Province situated within the Matjhabeng Local Municipality area of jurisdiction (refer to Figure A for the locality map). The project entails the generation of up to 150 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 280 hectares (including supporting infrastructure on site). From a regional site

selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2118 kwh/m^2.

EXECUTIVE SUMMARY

A number of regional problems have surfaced over recent decades that have demanded the attention of planners and developer's in so far as economic development of small and rural towns, in the broader Free State context, is concerned. The "dying rural town syndrome" seems both the most intractable and the one that continues to capture the public's concern. Development initiatives, at large, do not focus on the plight of the Regional Free State, losing population or businesses, not thriving economically and there is widespread evidence that many urban towns are in trouble (SDF, 2020). The Matjhabeng Local Municipality's Integrated Development Plan (IDP, 2020-21) identifies the mission of the municipality as: *being a united, non-racial, non-sexist, transparent, responsible municipality. Providing municipal services in an economic, efficient, and effective way. Promoting a self-reliant community through the promotion of a culture of entrepreneurship and creating a conductive environment for growth and development*. The IDP does not explicitly deal with renewable energy development, but the Matjhabeng SDF does however have development imperatives that relate to the proposed project that will work with other spheres of Government to improve the quality of life by creating employment and ensure access to electricity to every household.

Springbok Solar Power Plant (RF) (Pty) Ltd intends to develop a 150MW photovoltaic solar facility and associated infrastructure on the farm Weltevrede No. 638, Registration Division Theunissen, Free State Province situated within the Matjhabeng Local Municipality area of jurisdiction. The town of Virginia is located approximately 10km north-northeast of the proposed development and the town of Welkom is located approximately 23km north-northwest of the proposed development (refer to Figure A and B for the locality and regional map). The total footprint of the project will approximately be 280 hectares (including supporting infrastructure on site). 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 Springbok 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)(a)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."*

- Activity 19 (GN.R. 327): "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."*

- *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 hectare or more of indigenous vegetation..."*

- Activity 4 (b)(i)(ee) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) the Free State, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."*

- 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 Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 12 (b)(i)(ii)(vi) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Free State, (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 and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 14(ii)(a)(c)(b)(i)(ff) (GN.R 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."*

- Activity 18 (b)(i)(hh) (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 Free State (i) outside urban areas and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

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

Regulation 21 of the EIA Regulations requires that an Environmental Impact Report (EIR) must contain the information set out in Appendix 3 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 3 of GNR326 requires 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 site, the scope of the assessment, and the consultation process undertaken be set out in the EIR report.

It has been determined through the EIA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically where the affected landowner is experiencing challenges and limitations in terms of the current agricultural land use. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarised below:

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 18-24 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation, impacts to surface water features, increased soil erosion and sedimentation, spread and establishment of alien invasive species, displacement of priority avian species from important habitats, displacement of resident avifauna through increased disturbance, loss of important avian habitats, visual impact of construction activities, disturbance, damage or destruction of legally-protected cultural heritage as well as socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services, in-migration of labourers in search of employment opportunities and increase in pressure on local resources and social networks, or existing services and infrastructure, temporary increase in safety and security risks, impacts on daily living and movement patterns, nuisance impact (noise and dust) and increased risk of potential veld fires.

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 impacts on the fauna and flora, habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, displacement of resident avifauna through increased disturbance, collisions with PV panels leading to injury or loss of avian life, collision when flying into power line infrastructure, electrocution when perched on power line infrastructure, impacts to surface water features and visual impacts, specifically to road users and surrounding landowners, lighting and sense of place. The operational phase will have a direct positive impact through the provision of employment opportunities and skills development for its duration, the development of non-polluting, renewable energy infrastructure and the contribution to Local Economic Development (LED) and social upliftment.

Impacts during the decommissioning phase:

The negative impacts generally associated with the decommissioning phase include: habitat destruction caused by clearance of vegetation, impacts to surface water features, increased soil erosion and sedimentation, spread and establishment of alien invasive species, continued loss of indigenous vegetation owing to poor recovery of vegetation, contamination of soil by leaving rubble/waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation and the loss of permanent employment. However, skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. It is not expected that the facility will be decommissioned, but rather that the technology used will be upgraded.

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department's (DFFE) database thirteen (13) other solar plants have been proposed in relative close proximity to the proposed activity.

Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: loss or fragmentation of indigenous natural fauna and flora, loss or fragmentation of habitats, generation of waste, temporary employment opportunities, impact of construction workers on local communities, and an influx of job seekers and traffic impacts. Cumulative impacts (negative medium) during the operational phase relate to: visual intrusion, soil erosion, generation of additional electricity, the establishment of a community trust and the development of infrastructure for the generation of clean, renewable energy. 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 must be prepared and submitted for the proposed activity after the competent authority accepts the final Scoping Report, including

the Plan of Study for the EIA phase. The EIA report evaluates and rates each identified impact and identify mitigation measures that may be required. The EIA report contains information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Appendix 3 of the EIA Regulations. This is the Final EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) for decision-making 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 electricity of 132 kilovolts outside an urban area. The

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

		proposed power line and on-site facility substation will each have a capacity of up to 132kV.
GNR. 327 (as amended in 2017)	Activity 12(ii)(a)(c)	• "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."* • Activity 12(ii)(a)(c) is triggered based on the presence of wetlands located within the grid connection corridor which will have to be crossed by the service road associated with the power line infrastructure for operation and maintenance purposes.
GNR. 327 (as amended in 2017)	Activity 19	• "T*he infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."* • Activity 19 is triggered based on the presence of wetlands located within the grid connection corridor which will have to be crossed by the service road associated with the power line infrastructure for operation and maintenance purposes. The construction of the associated service road will require the infilling of material of ~11 cubic meters into the wetlands.
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 since the internal roads will not have a reserve and will vary between 6 and 12 meters 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 since the farm has been previously used for agricultural purposes and the property will be re-zoned to "special". The development footprint of the solar power plant will be 280ha in extent.
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 does not have a reserve and will need to be widened by more than 6 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 150 megawatts electricity from solar energy.
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 Highveld Alluvial Vegetation which is described by Mucina and Rutherford (2006) as least threatened. A section of the grid connection corridor is located within the Vaal-Vet Sandy Grassland which is 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 280ha in extent.
GNR. 324 (as amended in 2017)	Activity 4 (b)(i)(ee)	• "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) the Free State, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."*

		• Activity 4 (b)(i)(ee) is triggered as a service road with a width between 4 and 5 metres associated with the power line infrastructure will be constructed and a section of the grid connection corridor is located within a CBA 1 area. .
GNR. 324 (as amended in 2017)	Activity 10 (b)(hh)	• *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 Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 10(b)(hh) 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 Free State Province and the site borders on the Doring River. Therefore, the development will take place within 100 m of the edge of a watercourse or wetland.
GNR. 324 (as amended in 2017)	Activity 12 (b)(i)(ii)(vi)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Free State, (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 and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 12 (b)(i)(ii)(vi) is triggered since the proposed development is located in the Free State 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. A section of the grid connection corridor is located within the Vaal-Vet Sandy Grassland which is endangered. The site borders on the Doring River and an exoreic depression is located in the proposed power line

		corridor. Therefore, more than 300 square meters of indigenous vegetation will be removed which is located within 100m of a watercourse and within an endangered ecosystem. The development footprint of the solar power plant will be 280 ha.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(b)(i)(ff)	• "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* • Activity 14(ii)(a)(c)(b)(i)(ff) is triggered based on the presence of wetlands located within the grid connection corridor which will have to be crossed by the service road associated with the power line infrastructure for operation and maintenance purposes. A section of the power line corridor is located within an area classified as CBA 1.
GNR. 324 (as amended in 2017)	Activity 18 (b)(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 Free State (i) outside urban areas and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 18 (b)(i)(hh) 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 Free State Province and outside urban areas. The site borders on the Doring River.

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 Final Environmental Impact Report (EIR). The Draft EIR was submitted to the Department of Forestry, Fisheries and the Environment 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 was made available to registered I&APs and all relevant State Departments for a 30-day review period from **05 November 2021 to 06 December 2021**. These stakeholders and individuals were requested to provide written comments on the Draft EIR within the allocated timeframe. All issues identified during this review period have been documented and compiled into a Comments and Response Report as part of this Final EIR (**Appendix E**). 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 F of this Final 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 Opperman
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: 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 final 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 Impact Assessment	Agreenco	ASH Haagner	PO Box 19896 Noordbrug, 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Terrestrial Biodiversity Impact Assessment	AGES Potchefstroom	Mari Van der Westhuizen	P.O. Box 19460 Noordbrug, 2522	Cell: 082 257 1715	mvdwesthuizen@ages-group.com
Wetland Impact Assessment	AGES Potchefstroom	Mari Van der Westhuizen	P.O. Box 19460 Noordbrug, 2522	Cell: 082 257 1715	mvdwesthuizen@ages-group.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Impact Assessment	NATURA VIVA CC	Dr. John Almond	PO Box 12410 Mill Street Cape Town, 8010	Cell: 021 462 3622	naturaviva@universe.co.za
Agricultural Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Phala Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus 9515	Cell: 082 316 7749	phala.env@gmail.com
Social Impact Assessment	Phala Environmental Consultants	Marelie Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	phala.env@gmail.com
Traffic Assessment Study	BVi Consulting Engineers	Liza van Zyl	Edison Square, Century City, 7441	Cell: 060 557 7467	dirkvdm@bviwc.co.za
Geotechnical Feasibility Investigation	SMEC	Richard Roberts	267 Kent Avenue, Ferndale, Randburg, 2194	Tel: 011 369 0600	johannesburg@smec.com

1.4 STATUS OF THE EIA PROCESS

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

- A pre-application meeting request and public participation plan was submitted to DFFE on 05 March 2021.
- The DFFE accepted the public participation plan in an email dated 24 March 2021.
- A newspaper advertisement was placed in the Vista, on 10 June 2021, informing the public of the EIA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 13 April 2021.
- Site notices were erected on site on 13 April 2021 informing the public of the commencement of the EIA process.
- An Application for Environmental Authorisation and the draft Scoping Report was submitted to DFFE on 25 July 2021.
- The draft Scoping Report was made available for a 30-day review and comment period from 26 July 2021 to 25 August 2021.
- The final Scoping Report was submitted to the DFFE on 31 August 2021 for decision-making and approval of the Plan of Study for the EIA.
- The DFFE accepted the Final Scoping Report (FSR) on 08 October 2021.
- The Draft EIR Report was submitted to the DFFE (and registered I&APs) on 5 November 2021 for the 30-day review and comment period which was from 05 November – 06 December 2021.

It is envisaged that the EIA process should be completed within approximately four months of submission of the Final EIR, i.e. by April 2022 – see Table 1.3.

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

Activity	Prescribed timeframe	Timeframe
Site visit		April 2021
Public participation (BID, press advert, site notice)	30 Days	June – 12/26 July 2021
Submit application form and DSR	-	By 25 July 2021

Public participation (DSR)	30 Days	25 July – 26 Aug 2021
Submit FSR	44 Days	31 Aug 2021
Department acknowledges receipt	10 Days	9 September 2021
Department approves/reject	43 Days	8 October 2021
Avifaunal Assessment (Summer Assessment)		Oct – Nov. 2021
Public participation (DEIR)	30 Days	5 Nov. 2021 – 6 Dec. 2021
Submission of FEIR & EMPr	-	13 Dec. 2021
Department acknowledges receipt	10 Days	Jan. 2022
Decision (considering the days of reckoning)	107 Days	April 2022
Department notifies of decision	5 Days	April 2022
Registered I&APs notified of decision	14 Days	April 2022
Appeal	20 Days	May 2022

1.5 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 1.4: 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.	
(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.	5
	(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;	
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	6
	(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 farm Weltevrede No. 638, Registration Division Theunissen, Free State Province situated within the Matjhabeng Local Municipality area of jurisdiction. The proposed development is located in the Free State Province in the northern central interior of South-Africa (refer to Figure B for the regional map). The town of Welkom is located approximately 23km north-northwest and Virginia is located approximately 10km north-northeast of the proposed development (refer to Figure A for the locality map).

The project entails the generation of up to 150MW electrical power through photovoltaic (PV) panels. The total footprint of the project will approximately be 280 hectares (including supporting infrastructure on site) – refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Springbok Solar Power Plant (RF) (Pty) Ltd from the property owner, Goldfields Game Ranch (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 Theseus MTS 400/132/22kV Substation. The preferred power line route is located north-northeast of the project footprint. It is proposed that from this substation one power line will be constructed to connect the project to the

Theseus MTS 400/132/22kV substation located approximately 5 kilometres north-northeast of the site. The two proposed 132kV overhead transmission line routes are the only preferred alternative for the applicant at this stage.

Table 2.1: General site information

Description of affected farm portion	Solar Power Plant: • Farm Weltevrede No. 638 Power Line Corridor • Farm Weltevrede No. 638 • Portion 5 of the farm Doorn Rivier No. 330 • Portion 21 of the farm Doorn Rivier No. 330 • Portion 6 of the farm Doorn Rivier No. 330
21 Digit Surveyor General codes	Solar Power Plant: • Farm Weltevrede No. 638 - F03300000000063800000 Power Line Corridor • Farm Weltevrede No. 638 - F03300000000063800000 • Portion 5 of the farm Doorn Rivier No. 330 - F03300000000033000005 • Portion 21 of the farm Doorn Rivier No. 330 - F03300000000033000021 • Portion 6 of the farm Doorn Rivier No. 330 - F03300000000033000006
Title Deed	T1885/2019
Photographs of the site	Refer to the Plates
Type of technology	Photovoltaic solar facility
Structure Height	• Panels ~6m, • buildings ~ 6m, • power lines ~32m and • battery storage facility ~8m
Battery storage	Within a 4ha area within the development footprint
Surface area to be covered	Approximately 280 ha

Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
Laydown area dimensions	Footprint of 280 hectares for the development of the solar power plant and a 5km long and 100 m wide corridor for the placement of the proposed power line.
Generation capacity	Up to 150MW
Expected production	165-205 GWh per annum

The site is located in a rural area and is bordered by agricultural land uses. The site survey revealed that the site currently consists of game farming and hunting – refer to plates 1-12 for photographs of the development area.

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 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 electricity of 132 kilovolts outside an urban area. The proposed power line and on-site facility substation will each have a capacity of up to 132kV.
GNR. 327 (as	Activity 12(ii)(a)(c)	• "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c)*

[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)		*within 32 meters of a watercourse measured from the edge of a watercourse."* • Activity 12(ii)(a)(c) is triggered based on the presence of wetlands located within the grid connection corridor which will have to be crossed by the service road associated with the power line infrastructure for operation and maintenance purposes.
GNR. 327 (as amended in 2017)	Activity 19	• "T*he infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."* • Activity 19 is triggered based on the presence of wetlands located within the grid connection corridor which will have to be crossed by the service road associated with the power line infrastructure for operation and maintenance purposes. The construction of the associated service road will require the infilling of material of ~11 cubic meters into the wetlands.
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 since the internal roads will not have a reserve and will vary between 6 and 12 meters 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 since the farm has been previously used for agricultural purposes and the property will be re-zoned to "special". The development footprint of the solar power plant will be 280ha in extent.
GNR. 327 (as	Activity 56 (ii):	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre*

amended in 2017)		*(ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered since the existing access does not have a reserve and will need to be widened by more than 6 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 150 megawatts electricity from solar energy.
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 Highveld Alluvial Vegetation which is described by Mucina and Rutherford (2006) as least threatened. A section of the grid connection corridor is located within the Vaal-Vet Sandy Grassland which is 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 280ha in extent.
GNR. 324 (as amended in 2017)	Activity 4 (b)(i)(ee)	• "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) the Free State, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* • Activity 4 (b)(i)(ee) is triggered as a service road with a width between 4 and 5 metres associated with the power line infrastructure will be constructed and a section of the grid connection corridor is located within a CBA 1 area. .
GNR. 324 (as	Activity 10 (b)(hh)	• *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*

amended in 2017)		*capacity of 30 but not exceeding 80 cubic metres (b) in the Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 10(b)(hh) 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 Free State Province and the site borders on the Doring River. Therefore, the development will take place within 100 m of the edge of a watercourse or wetland.
GNR. 324 (as amended in 2017)	Activity 12 (b)(i)(ii)(vi)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Free State, (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 and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 12 (b)(i)(ii)(vi) is triggered since the proposed development is located in the Free State 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. A section of the grid connection corridor is located within the Vaal-Vet Sandy Grassland which is endangered. The site borders on the Doring River and an exoreic depression is located in the proposed power line corridor. Therefore, more than 300 square meters of indigenous vegetation will be removed which is located within 100m of a watercourse and within an endangered ecosystem. The development footprint of the solar power plant will be 280 ha.
GNR. 324 (as	Activity 14(ii)(a)(c)(b)(i)(ff)	• "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs*

amended in 2017)		*(a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* • Activity 14(ii)(a)(c)(b)(i)(ff) is triggered based on the presence of wetlands located within the grid connection corridor which will have to be crossed by the service road associated with the power line infrastructure for operation and maintenance purposes. A section of the power line corridor is located within an area classified as CBA 1.
GNR. 324 (as amended in 2017)	Activity 18 (b)(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 Free State (i) outside urban areas and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • Activity 18 (b)(i)(hh) 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 Free State Province and outside urban areas. The site borders on the Doring River.

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

- <u>Site clearing and preparation:</u> Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.
- <u>Civil works to be conducted:</u>
  - 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. Access will be obtained via the S239 gravel road off the R730 Regional Route. Additionally, the turning circle for trucks will also be taken into consideration.

- Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

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

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

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

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Springbok Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with Theseus MTS 400/132/22kV Substation or to any of the existing 132Kv lines. The Project will inject up to 100MW into the National Grid. The installed capacity will be approximately 150MW.

  There are two possible connection line routes proposed to the Theseus MTS 400/132/22kV Substation. Option 1 (preferred) is approximately 5.25km and option 2 (alternative) is approximately 5.3km long. Both options are located north-east of the project footprint and follows the same route for most of the length. The proposed power line was assessed within a 100m wide corridor. The area surrounding the substation was also assessed.

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

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

  - Office (~200m²);

- Switch gear and relay room (~400m²);

- Staff lockers and changing room (~200m²); and

- Security control (~60m²)

- Battery storage – Up to 500 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m^3 of batteries and associated operational, safety and control infrastructure.

- Roads – Access will be obtained via the S239 gravel road off the R730 Regional Route. 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.

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, Figure H and Figure I.

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 associated with freshwater features (which are more related to the alternative grid connection corridor, as well as small sections within the SPP site). A final layout plan is included as Figure G. Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DEFF specifications.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	280 Hectares (Development footprint)
Number of inverters required	Minimum 50
Area occupied by inverter / transformer stations / substations / BESS	Central inverters+ LV/MV trafo: 20 m^2 HV/MV substation with switching station: 15 000 m^2 BESS: 4 000 m^2
Capacity of on-site sub- and switching station	Minimum 130MVA in HV/MV substation / 132kV
Capacity of the power line	132kV
Power Line servitude	32m
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 280ha Construction Laydown Area: ~2000 m^2

Area occupied by buildings	Security Room: ~60 m^2 Office: ~200 m^2 Staff Locker and Changing Room: ~200 m^2
Battery storage facility	Maximum height: 8 m Maximum volume: 1740 m^3 Capacity: 500MW
Length of internal roads	Approximately 20 km
Width of internal roads	Between 6 & 12 meters
Proximity to grid connection	Approximately 5 kilometers
Height of fencing	Approximately 2.5 meters

Table 2.4 and Figures 2.1 and 2.2 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	28°10'48.12"S	26°48'36.84"E
	B	28°11'40.47"S	26°49'15.45"E
	C	28°11'55.58"S	26°49'22.14"E
	D	28°11'56.51"S	26°49'19.24"E
	E	28°11'55.62"S	26°49'18.81"E
	F	28°11'56.78"S	26°49'15.42"E
	G	28°11'59.80"S	26°49'16.68"E
	H	28°11'58.70"S	26°49'20.11"E
	I	28°11'56.88"S	26°49'19.38"E
	J	28°11'55.88"S	26°49'22.30"E
	K	28°12'7.53"S	26°49'27.43"E
	L	28°12'9.06"S	26°49'27.57"E
	M	28°12'19.64"S	26°49'3.83"E
	N	28°12'17.20"S	26°48'52.95"E
	O	28°12'24.76"S	26°48'33.33"E
	P	28°11'57.66"S	26°48'17.64"E
	Q	28°11'50.10"S	26°48'28.95"E
	R	28°11'12.09"S	26°48'6.89"E
	S	28°11'10.94"S	26°48'9.48"E
Proposed Access	1	28°10'57.91"S	26°48'44.60"E
Proposed Access	2	28°11'39.99"S	26°49'15.54"E
100m wide Power Line Corridor (Option 1)	1	28°10'54.60"S	26°48'31.26"E
	2	28°10'52.96"S	26°48'29.55"E
	3	28° 9'36.42"S	26°50'0.81"E
	4	28° 9'30.51"S	26°50'4.89"E
	5	28° 9'25.57"S	26°49'48.08"E
	6	28° 9'32.57"S	26°49'45.24"E
	7	28° 9'35.73"S	26°49'56.58"E

	8	28°10'53.10"S	26°48'24.44"E
	9	28°10'56.80"S	26°48'28.73"E
100m wide Power Line Corridor (Option 2)	1	28°10'54.60"S	26°48'31.26"E
	2	28°10'52.96"S	26°48'29.55"E
	3	28°10'1.57"S	26°49'31.14"E
	4	28° 9'41.47"S	26°49'30.41"E
	5	28° 9'29.62"S	26°49'35.23"E
	6	28° 9'32.50"S	26°49'45.27"E
	7	28° 9'25.56"S	26°49'48.03"E
	8	28° 9'21.61"S	26°49'34.19"E
	9	28° 9'41.36"S	26°49'26.90"E
	10	28°10'0.24"S	26°49'27.37"E
	11	28°10'53.14"S	26°48'24.40"E
	12	28°10'56.78"S	26°48'28.82"E
Battery Energy Storage System (BESS)	A	28°10'57.22"S	26°48'28.41"E
	B	28°11'3.61"S	26°48'35.53"E
	C	28°11'3.54"S	26°48'20.75"E
Substation corner coordinates Option 1 and Option 2	A	28°10'54.60"S	26°48'31.34"E
	B	28°10'58.21"S	26°48'35.31"E
	C	28°11'0.36"S	26°48'32.78"E
	D	28°10'56.77"S	26°48'28.83"E

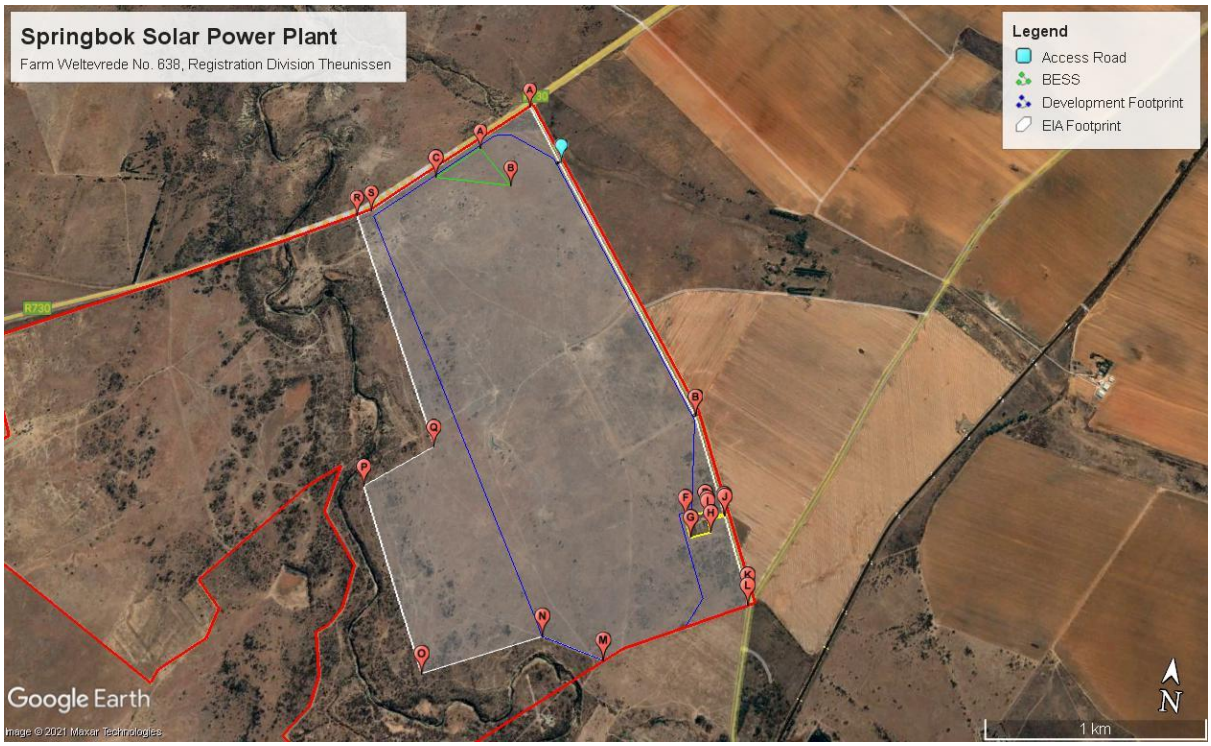


Figure 2.1: Map indicating coordinate points of the proposed Springbok Solar Power plant (including project site, BESS and access)

Figure 2.2: Map indicating coordinate points of the proposed Springbok Solar Power Plant grid connection corridor and the associated on-site substation.

2.5 SERVICES PROVISION

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

2.5.1 Water

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

The estimated maximum amount of water required during construction is 1200m³ per month during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 4200m³ per annum. The majority of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning, the total amount of ~500 000 panels will require 1 000 000 litres per wash. 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). This totals approximately 4,000,000 litres per annum for washing, and allows 200,000 litres per annum (or 548 litres per day) for toilet use, drinking water, etc. This total to

approximately 4 200m^3 of water required per annum. Drinking water supplied will comply with the SANS: 241 quality requirements and it is noted that the Matjhabeng Local Municipality remains the Water Service Authority in the area.

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

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. 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 I1.

2.5.3 Sanitation and waste removal

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

2.5.4 Electricity

During the construction phase of the development, electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the 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.

The decommissioning process will consist of the following steps:

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

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

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

3 LEGISLATIVE AND POLICY CONTEXT

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

Appendix 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)
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Free State Provincial Spatial Development Framework (PSDF) (2012)
- Lejweleputswa DM Integrated Development Plan (IDP) 2017 – 2021 (2017)

- Matjhabeng Local Municipality Integrated Development Plan 2020/2021 (2020)
- Matjhabeng Spatial Development Framework Review 2013 (SDF) (2013)

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 Springbok Solar Power Plant and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.
The National Environmental Management Act (Act No. 107 of 1998)	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) and	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.

	the Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		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 Springbok 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 Springbok 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 Doring River, which refers to the amount of water that may be taken from the ground water resource, per hectare. 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 (Act No. 39 of 2004)	National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the

			minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
The National Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	1999	The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS for the Springbok Solar Power Plant and all relevant documents have been submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix H6.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the

			proposed development is not located on high potential agricultural land and to approve the long-term lease agreement. An Agricultural Compliance Statement has been undertaken for the Springbok Solar Power Plant and is included as Appendix H10 of this Final EIR.
The National Forest 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 Springbok Solar Power Plant and is included in Appendix H3.
Frees State Nature	Free State Province Department of	1969	The Ordinance provides for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto. The Ordinance also provides guidance on the

Conservation Ordinance (Act 8 of 1969)	Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	permitting requirements for the disturbance of species listed therein, in terms of both fauna and flora species. A Terrestrial Biodiversity Impact Assessment has been undertaken for the Springbok Solar Power Plant and is included in Appendix H3.

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 Springbok 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 Springbok 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 Springbok Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.
Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2019	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost.

		The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.25GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro, and gas. Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018. According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5. The Springbok 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 Springbok 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 Springbok 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 identified within the framework, the Springbok 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. Springbok 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 Mineral Resources and 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. Springbok 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 Springbok Solar Power Plant is not located within a REDZ, it will still contribute to the overall development of renewable energy within the country.
Free State Provincial Spatial Development Framework (PSDF)	Free State Provincial Government	2012	The Free State PSDF is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the Free State Provincial Growth and Development Strategy which has committed the Free State to 'building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development'. The PSDF includes comprehensive plans and strategies that collectively indicate which type of land-use should be promoted in the Province, where such land-use should take place, and how it should be implemented and managed. In broad terms, the PSDF: • Indicates the spatial implications of the core development objectives of the Free State Provincial Growth and Development Strategy. • Serves as a spatial plan that facilitates local economic development. • Lays down strategies, proposals and guidelines as it relates to sustainable development. • Facilitates cross-boundary co-operation between municipalities, adjoining provinces, and bordering countries. • Serves as a manual for integration and standardisation of the planning frameworks of all spheres of government in the Province. The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed is. The PSDF gives practical effect to sustainable development, which is defined as

			development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local. The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges of our time, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology. The development of the Springbok Solar Power Plant is in-line with the framework based on the contributions and opportunities presented by a development of this nature.
Lejweleputswa District Municipality Integrated Development Plan (IDP))	Lejweleputswa District Municipality	2017-2021	The long-term vision of the Lejweleputswa DM is to be: "A leader in sustainable development and service delivery to all". The above stated vision defines what Lejweleputswa District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is: "Providing sound financial management. Providing excellent, vibrant public participation and high quality local municipal support programmes, maintaining good working relations in the spirit of co-operative governance, and enhancing high staff morale, productivity and motivation". Of the eighteen (18) SIPs that are contained in the National Infrastructure Plan (NIP), there are eight which impacts on the Lejweleputswa DM and thus need to be recognized and where appropriate; 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 Springbok Solar Power Plant is in line with the plan.
Matjhabeng Local Municipality Integrated Development Plan (IDP)	Matjhabeng Local Municipality	2020 - 2021	The vision of the Matjhabeng LM is "*Being a benchmark developmental municipality in service delivery excellence."* The Mission Statement is *"being a united, non-racial, non-sexist, transparent, responsible municipality. Providing municipal services in an economic, efficient, and effective way. Promoting a self-reliant community through the promotion of a culture of entrepreneurship and creating a conductive environment for growth and development."* The vision and mission of the municipality have led to the mayoral strategic priorities of the LM: - Road maintenance, - Streetlight maintenance, - Replacement of asbestos water pipes, - Achieve housing accreditation, - Economic development.

			The development of the Springbok Solar Power Plant will contribute to the local economy of the area and therefore assist (albeit to a limited extent) to socio-economic growth.
Matjhabeng Local Municipality Spatial Development Framework (SDF)	Matjhabeng Local Municipality	2017	In order to guide the Matjhabeng LM's Vision and Mission statements, a number of themes were formulated and developed to give more direction to the priorities. The respective themes are as follows: ○ **Theme 1 – Municipal Services to all Residents** • Ensure access to water services to every household. • Ensure access to electricity to every household. • Provide sanitation to every household. • Provide refuse pick-up to every household. • To respond to existing health issues to improve and protect the health of all residents and decrease the incidence of preventable illness with public education programs. • Provide road access to property. • Ensure safe and secure environment. • Provide access to sports and recreation facilities. • To render economic information to all residents of the municipality. • To ensure maintenance of infrastructure, equipment and property. • To facilitate the provision of social and housing services. • Provision of sites and municipal services. ○ **Theme 2 – Sustainable Growth and Improved Quality of Life**

- To work with other spheres of Government to improve the quality of life by creating employment.
- Encourage strategies and alliances to promote access to quality employment opportunities in Matjhabeng.
- Develop labour intensive projects to create local employment.
- To consider the health of our citizens as part of the planning process.
- To improve and protect Matjhabeng natural environment and ensure it remains a healthy environment to live and work in.
- To protect rural land and promote the continued viability of agriculture in Matjhabeng.
- Develop policies that give preferential treatment to local business.
- Develop strategies and alliances that change the economic base of Matjhabeng.
- Dynamic Marketing of the economic potential of the area worldwide.
- To develop a land use management plan and spatial development framework.
- Provision of training and supporting services to the community.

- **Theme 3 – Accessible, Accountable and Responsible Municipality**
  - To raise public awareness and market the services available.
  - Optimal usage and selling of municipal services.
  - To optimally engage the community in the development of the Municipality Policies and Programs.

- To continue to improve in technology to achieve efficiencies and the most effective delivery of programs and services to meet the growing demand for electronic and other new service delivery channels.
- Enhance partnerships with the public and private sector organisations.
- To allow for flexibility in the municipality's endeavoured to adapt to the changing institutional changes.
- To adhere to Batho Pele principles and other relevant statutory requirements.
- To aggressively combat corruption in an endeavour to eliminate it.
- To ensure accessibility to the municipal buildings for people with disability.
- To ensure that funds allocation is activity based in all operations.
- To ensure proximity and accessibility of services to all communities.

o **Theme 4 – Resourceful and Developmental Municipality**

- To ensure that Matjhabeng Municipality develops a broad and reliable tax base that is sustainable in the long term.
- To ensure that Matjhabeng Municipality becomes fiscally accountable by providing its citizens with transparent, accurate and timely information.
- Continuously improve the quality of customer service.
- Support, promote and recognize employee's role and involvement in developing a strong Local Government and capacity building for community members.

	- Create an organisational structure that will think and act in a manner that addresses the strategic values determined by the community through the Municipal Council.

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)[3]
- 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] Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that the EPs will need to be complied with should funding for the project be required.

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 Springbok 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 Springbok 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[4]. 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.

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:

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

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 Free State 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 Matjhabeng Local Municipality is desirable since 48,4% of households within the Municipality live within the poverty level with an income of less than R38 200. (Matjhabeng IDP, 2020/2021).

- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will soon be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuels 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 contributes to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilisation of solar power and the experience gained through the

construction and operation of the power plant. In future, this experience can be employed at other similar solar installations in South Africa.

- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 800 employment opportunities will be created during the construction and operational phases.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance, and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Due to the climate limitations, the site is totally unsuitable for cultivated crops, and viable agricultural land use is limited to grazing only. The proposed development in this specific area will generate alternative land use income through rental for the energy facility, which will have a positive impact on agriculture. It will provide the landowner with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: According to the Matjhabeng LM IDP 2020/2021, 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. This Final EIR does include an assessment of the potential cumulative impacts associated with the proposed development– refer to Section 7 of the report. No potential cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of renewable energy 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. Therefore, considering the cumulative impacts associated with the development and the significance ratings of potential cumulative impacts being medium and low, the project can be considered as desirable for development.

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 (refer to Appendix G) was conducted by the developer on the farm Weltevrede No. 638 and the farm was found favorable due to its 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 surrounding the Doring River and the small exorheic depression (pan) where the proposed connection will be, which have been identified in close proximity to the preferred site. These factors were then taken into consideration and appropriate buffers were implemented to exclude them from the layout plan. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site. A single alternative site on the same farm has been identified (Subsolar, 2021).

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

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for game farm breeding and hunting purposes (refer to the photographs of the site). The area has limited agricultural potential and is unsuitable for cultivation. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Springbok Solar Power Plant (RF) (Pty) Ltd in the Virginia/Welkom area to potentially establish the Springbok Solar Power Plant. From a local perspective, the farm Weltevrede No. 638, is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

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

No alternative areas on the farm Weltevrede No. 638 have been considered as the development footprint will covers most of the farm. However, provision was made after the initial investigation and specialist studies to exclude the sensitive areas surrounding the perennial river and pan, which includes the no-go buffer areas recommended by the specialist. The location of the heritage object (burial) site will also be considered as part of the final layout plan. Therefore, a single preferred location alternative was assessed – refer to Figure 5.1. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise during the EIA proses.

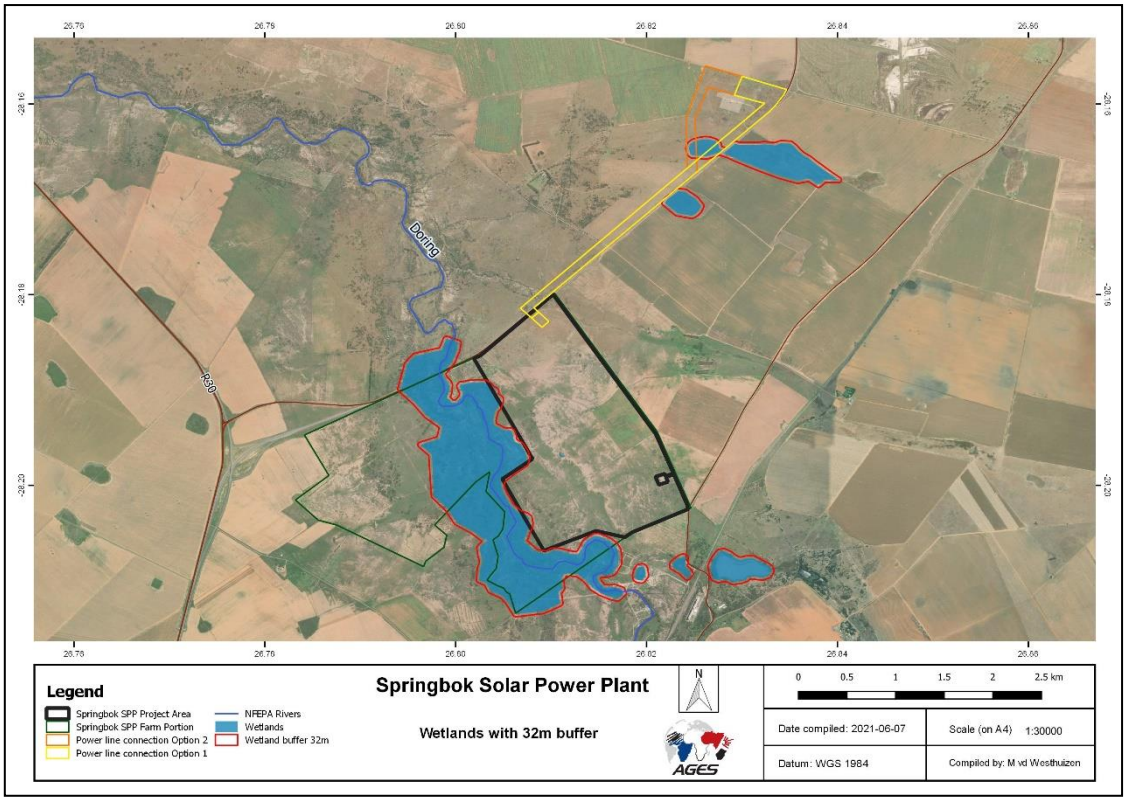


Figure 5.1: Location for the development of the Springbok Solar Power Plant on the On the Farm Weltevrede No. 638 assessed during the Scoping Phase. The area proposed to be developed, as identified by the developer, is outlined in yellow. The wetland areas / freshwater features avoided are also indicated, including the 32m buffer.

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 – Springbok Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Springbok 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 Welkom 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.

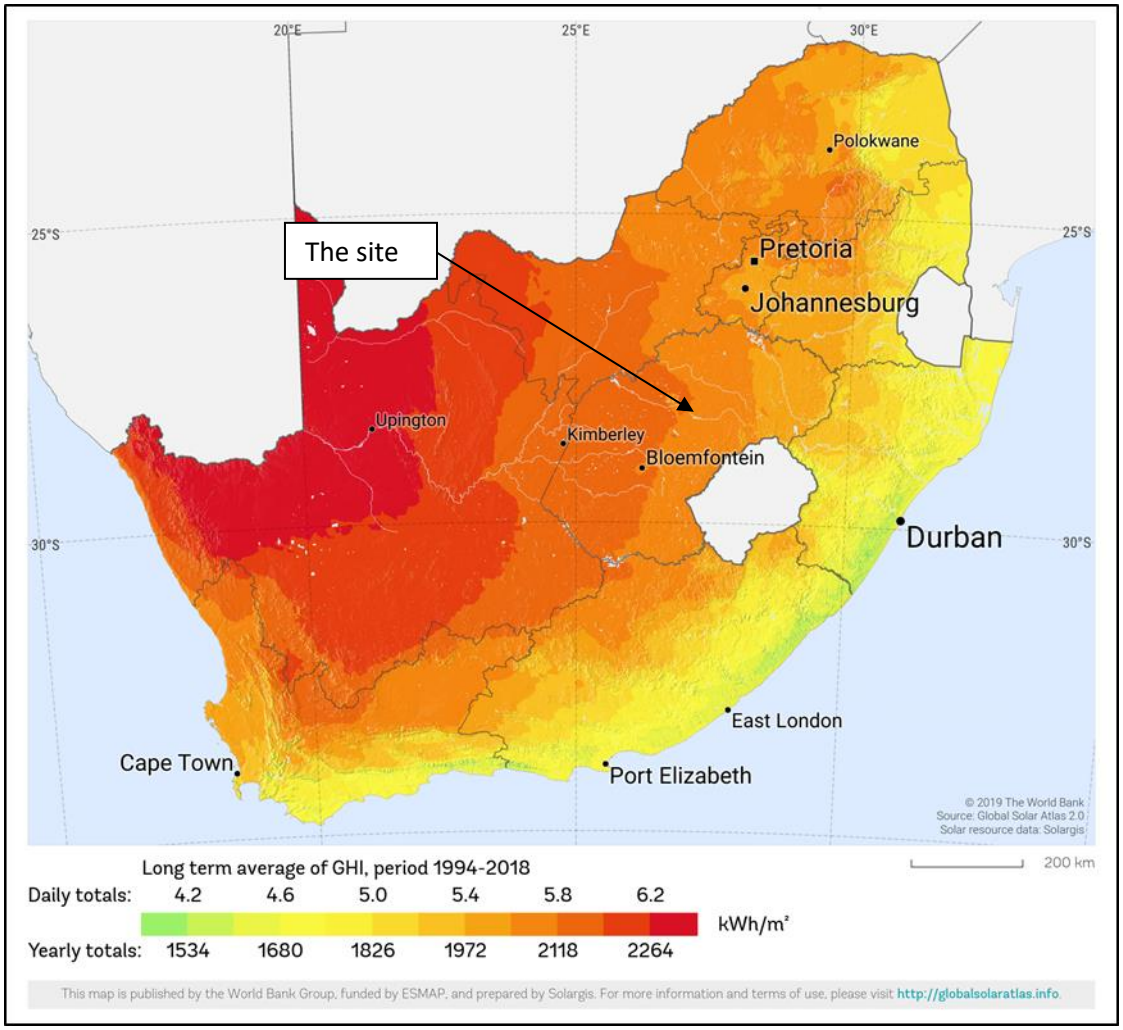


Figure 5.2: Global horizontal irradiation values for South Africa (SolarGIS, 2021).

- 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

It is expected that generation from the facility will tie in with the Theseus MTS 400/132/22kV Substation. The preferred power line route is located north-northeast of the project footprint. It is proposed that from this substation one power line will be constructed to connect the project to the Theseus MTS 400/132/22kV substation located approximately 5 kilometres north-northeast of the site. The two proposed 132kV overhead transmission line routes are the only preferred alternative for the applicant at this stage due to the following reasons:

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

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

  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, however no no-go areas have been identified for the site. A final layout plan is included as Figure G.

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

The developer has considered the limitations associated with the environmental sensitivities as identified during the Scoping Phase and have accordingly optimised the layout of the SPP facility from an environmental and technical perspective to ensure optimal operation of the facility while considering the need for conservation of certain areas and features (Figure G). This optimised layout is considered to be the final layout plan as assessed within this final EIR.

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

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

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

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

Steel monopoles:

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

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

Wood poles:

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

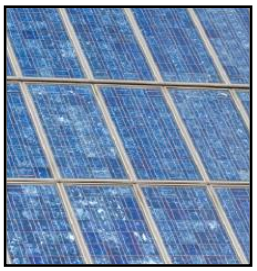
5.1.6 Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, 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.



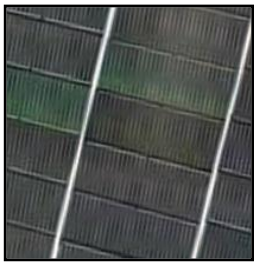
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than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

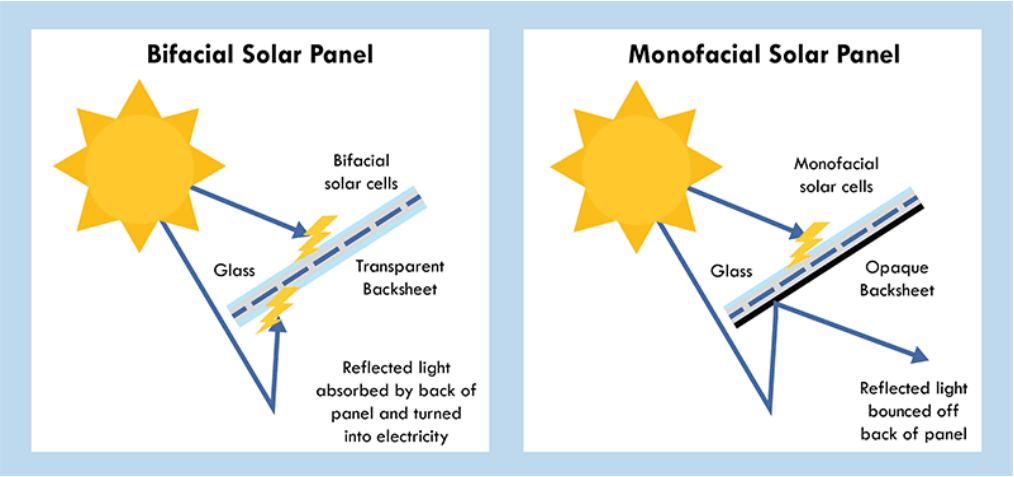


Figure 5.3: Bifacial vs Monofacial Solar Panel absorption.

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) on the 10 June 2021 (see Appendix B) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement (by 12 July 2021).

- Site notices

  Site notices were placed on site in Afrikaans, English and Sesotho on 13 April 2021 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 17 May 2021. Photographic evidence of the site notices is included in Appendix C.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, have been directly informed of the EIA process via registered post, telephone calls, WhatsApps and emails (as relevant). It was expected from I&APs to provide their inputs and comments by 5 July 2021. For a complete list of stakeholder details see Appendix D and for proof of correspondence see Appendix E.

- 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 4 June 2021. The surrounding landowners were given the opportunity to raise comments within 30 days. Refer to Figure 5.4 for the information on the relevant surrounding landowners. For a list of surrounding landowners see Appendix D. The surrounding landowners were given the opportunity to raise comments by 5 July 2021.

- Circulation of the Draft Scoping Report

  Copies of the draft Scoping report were provided to all I&APs via courier, Dropbox and/or email. Hard copies of the report were made available on request. I&AP's and organs of state were

requested to provide their comments on the report during the 30-day review and comment period which was from 26 July 2021 until 25 August 2021. All issues identified have been recorded and documented and compiled into a Comments and Response Report included as part of the Final EIR Report (Appendix E).

- Circulation of the Draft Environmental Impact Assessment Report

  All registered I&APs and State Departments were informed of the availability of the Draft EIR on 5 November 2021 and requested to provide their comments within 30 days (refer to Appendix E). The 30-day review and comment period was from 05 November 2021 to 06 December 2021. All comments received during this period have been included in Appendix E, the Comments and Responses report (Appendix E) and Appendix F of this Final 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.

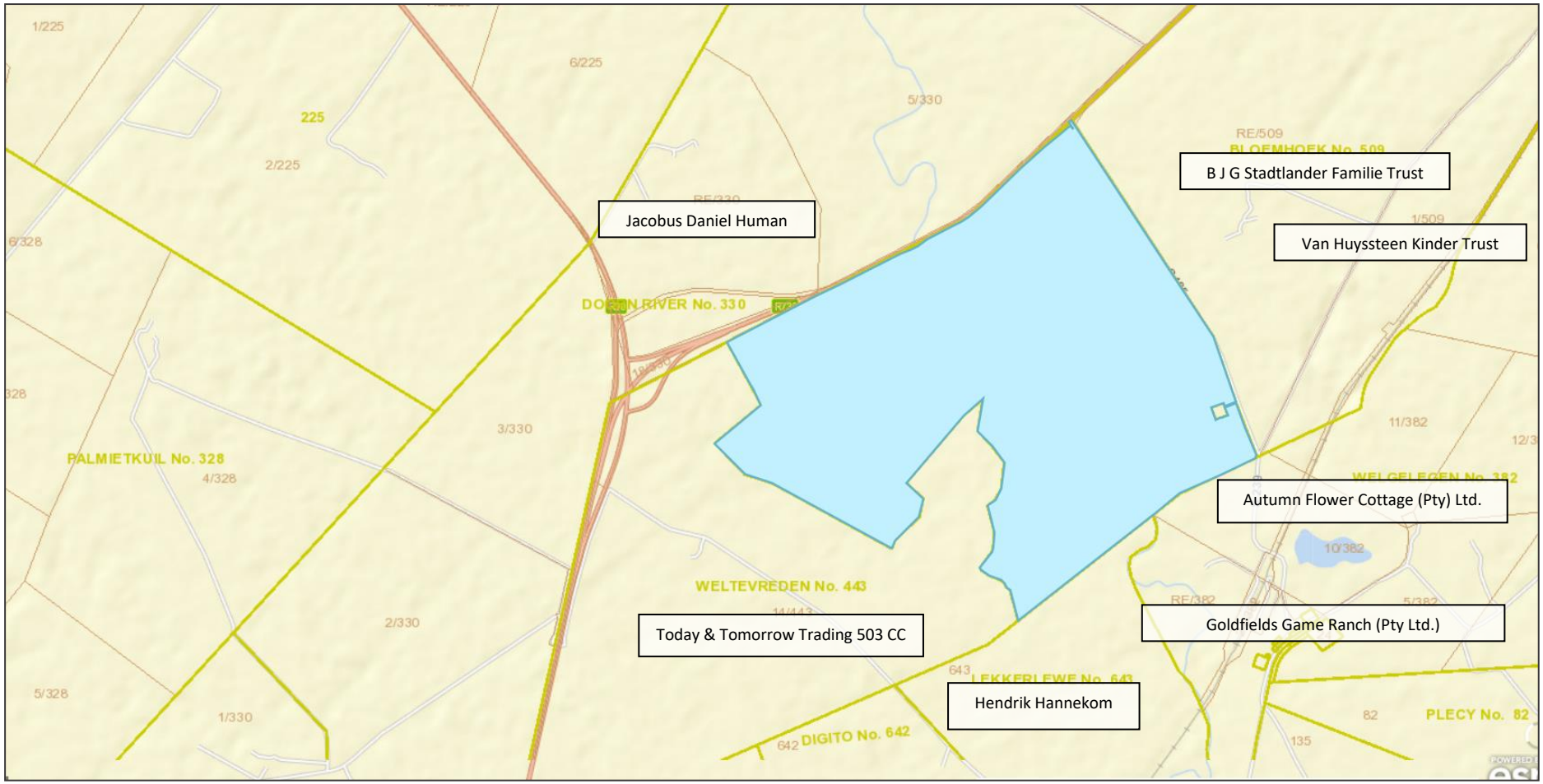


Figure 5.4: Surrounding Landowners

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 Final Environmental Impact Report. The Draft Environmental Impact Report was 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), have been documented and compiled into a Comments and Response Report included as part of this Final EIR (Appendix E).

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 report as Appendix E 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 E. All comments received during the circulation of the Draft EIR have been addressed accordingly in this Final EIR. The full wording and original correspondence are included in Appendix E and Appendix F of the Final 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.

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape. A number of specialists were consulted to assist with the compilation of this chapter of the

report – refer to the Table 1.2. However, due to the fact that the area proposed for development exclusively consists of land used for game farming and hunting purposes, four plant species that are protected according to the Free State Nature Conservation Ordinance 8 of 1969 were recorded and a non-perennial river and pan is present which is considered significant from an environmental and conservation point of view.

5.3.1.1 Geology and Landscape

The site slopes downwards from approximately 1340 mAMSL to 1320 mAMSL from east to west, i.e.towards the Doring River, and the slope flattens towards the river's floodplain. The Doring River is likely the regional drainage feature. A review of the geological map of Winburg (map series 2826, scale 1: 250 000) indicates the site to be underlain by very fine to coarse grained, buff and white sandstone, blue/grey mudstone and shale and subordinate conglomerate of the Adelaide Subgroup, Beaufort Group. This is overlain by alluvial deposits, including calcified alluvium and river gravels, in the vicinity of the Doring River.

Ground Conditions

The profile over the site generally comprises clayey sand topsoil overlying stiff transported sandy clay, observed extending to depths of between 0.5-1.0 m below EGL. This is underlain by medium dense to dense residual clayey sand, likely derived from the sandstone parent rock mass, which was observed to have a slightly pinholed structure and generally became less clayey with depth. All the trial pits were stopped within this layer at approximately 2.0 m below EGL due to slow excavation progress. At WS/T11, approximately 450 m directly west of the south eastern corner of the site, what appeared to be asbestos cement tiles were encountered within the upper 0.5 m of the trial pit profile, indicating shallow fill material which potentially has highly variable geotechnical parameters.

Groundwater Conditions

No groundwater was observed within the trial pits. However, due to generally shallow granite bedrock which is anticipated to be practically impermeable, shallow perched water tables are anticipated to format the soil/ rock interface following periods of heavy and/ or sustained rain Foundation recommendations are provided in the geotechnical study (refer to Appendix H2).

5.3.1.2 Soils and agricultural potential

Geology is directly related to soil types and plant communities that may occur in a specific area (Van Rooyen & Theron, 1996). A land type unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The land type units represented within the study area include the Dc8 and Bd20 land type (Land Type Survey Staff, 1987) (ENPAT, 2001). Most of the project area is on the DC8 land type, with the furthest part of the power line connection and power station on Bd20 (refer to Appendix H3A for the terrestrial biodiversity report). The majority of the proposed site is classified on the screening tool as less than high (medium)

sensitivity for impacts on agricultural resources (refer to figure 5.5). The fairly low annual rainfall proves that the climate of the area is a limiting factor to the land capability.

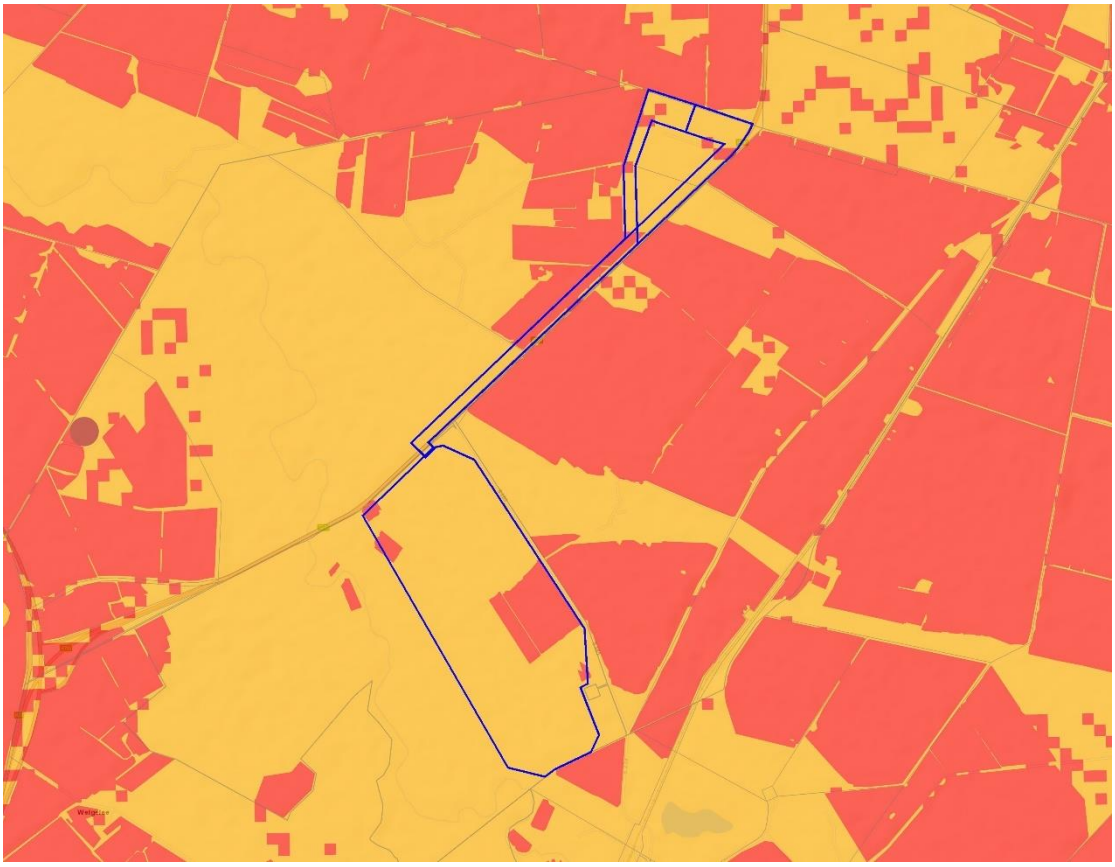


Figure 5.5: The proposed development site (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (yellow = medium; red = high; dark red = very high).

The high agricultural sensitivity, as identified by the screening tool, and resulting from the cultivation status of the five red, high sensitivity patches shown in Figure 5.5, is disputed for four of the five patches by the Agriculture Compliance Statement (refer to Appendix H10). The motivation for disputing this sensitivity is that, according to historical imagery on Google Earth, cultivation of these lands ceased before 2008 and has not happened since. These lands therefore do not have the status of cultivated lands and should not be attributed a high sensitivity for impacts on agricultural resources. The largest patch along the eastern boundary was last cultivated in 2018 and can therefore still be classified as cultivated land. The screening tool agricultural sensitivity of the grid connection corridor is high, but this is of little relevance to this assessment because agriculture is not excluded from the land underneath a power line. The agricultural impact of a power line is insignificant in this environment, regardless of the agricultural potential of the land it traverses.

The farm is located in a grain farming agricultural region, but on a land type which is not suitable for grain production. The development site is used only for grazing and the farm is part of a game operation. Surrounding land uses include maize farming, mining and cattle farming.

5.3.1.3 Vegetation and landscape features

According to the Terrestrial Biodiversity Survey (Appendix H3A) the project area falls into the Highveld Alluvial Vegetation unit which is embedded in the Vaal-Vet Sandy Grasslands vegetation unit (Mucina *et al*., 2018). The last section of the power line connection and the substation falls into the Vaal-Vet Sandy Grasslands vegetation unit. The Highveld Alluvial vegetation is described by Mucina & Rutherford (2006) as alluvial drainage lines and floodplains along rivers embedded within the Grassland Biome. Topography is typically flat supporting riparian thickets mostly dominated by Vachellia karroo, accompanied by seasonally flooded grasslands and disturbed herblands often dominated by alien plants. The conservation status of this vegetation unit is Least Threatened. The Vaal-Vet Sandy Grasslands vegetation unit is described as plains-dominated landscape with some scattered slightly irregular undulating plains and hills. Mainly low tussock grasslands with an abundant karroid element. Themeda triandra is dominant in this vegetation unit. The conservation status of this vegetation unit is Endangered.

Red Data, Protected and Endemic Plant Species

Four plant species that are protected according to Free State Nature Conservation Ordinance 8 of 1969 were recorded at the project area, namely: Euphorbia inaequilatera, Gladiolus woodi, Helichrysum aureonitens, Helichrysum rugulosum (refer to figure 5.6). The EIA screening tool lists no species of conservation concerns for the proposed development area.

Figure 5.6: *Euphorbia inaequilatera, Gladiolus woodi, Helichrysum aureonitens, Helichrysum rugulosum*.

Alien Invasive Species

Eight declared invader plant species were recorded, which reflects the disturbed state of the vegetation. Plant species diversity is relatively low. Fauna species diversity is high, but this is artificial, due to the property being managed as a game farm.

Rivers and Pans

According to the Wetland Assessment (Appendix H3B), the project area borders the Doring River and therefore the riparian area was delineated and assessed. There is also a small exoreic depression (pan) where the proposed power line connection will be (refer to figure 5.7). No other wetlands or sensitive areas was identified in the power line corridor.

The river / wetland in and next to the project area can be classified as:

- River (active channel and the riparian zone)
- Exoreic depression (pan).

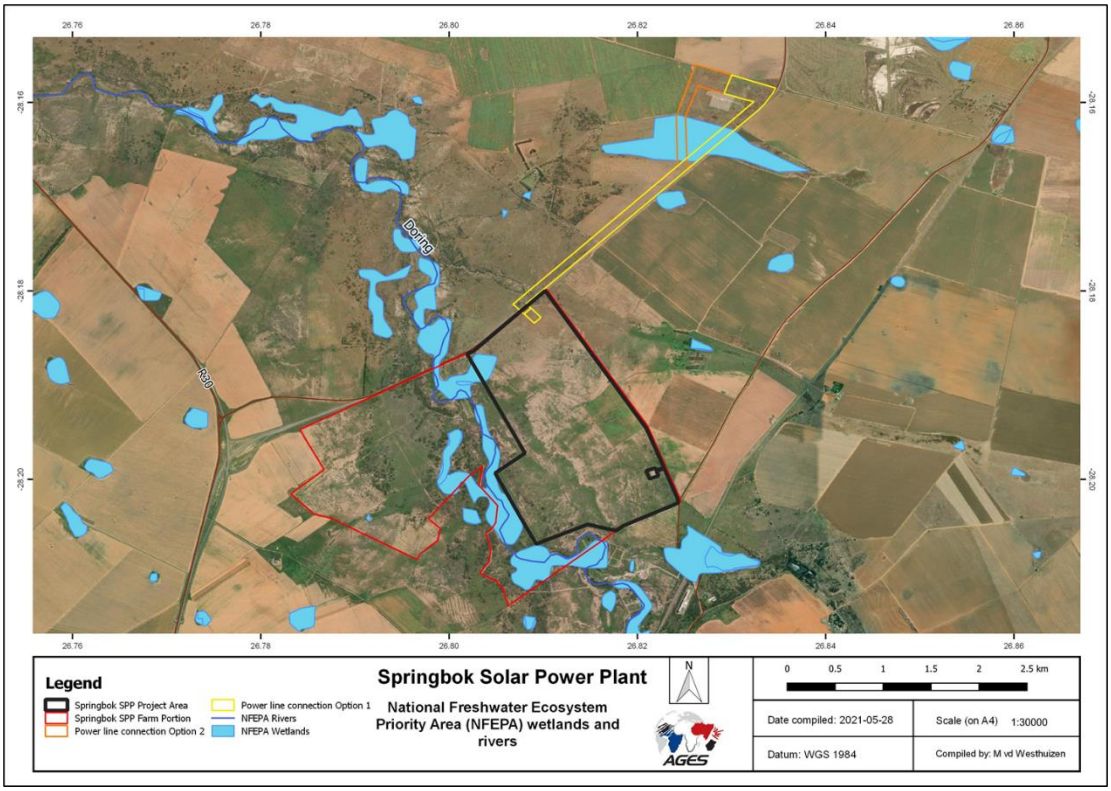


Figure 5.7: National Freshwater Ecosystem Priority Areas (NFEPA) rivers and wetlands (Appendix H3A Terrestrial Biodiversity Survey: Springbok Solar Power Plant).

River: The project area borders on the Doring River that is classified river. The perennial Vaal River floodplain is not classified as a wetland, but a river with some wetland characteristics in the channel and its banks.

There is a strip of riparian woodland next to the river consisting of trees and shrubs (mostly Vachellia karroo and Searsia pyroides). Soil was augured to confirm the distribution of the riparian area. All wetland and riparian vegetation in the project area have a high ecologically sensitivity, forming important, limited and specialised habitats for several plant and fauna species. The species composition is unique and relatively limited in distribution and coverage. These habitats also form linear corridors linking different open spaces. The riparian woodland would be an important dry season refuge area for many fauna species in their natural state. It is also a centre of floral diversity. Impacts on the sensitive riparian ecosystems, regardless of the source, need to be restricted. Existing impacts on this system include erosion, habitat loss and degradation and the associated impacts on faunal and floral diversity, dewatering of marshes and wetlands, water abstraction as well as increased sedimentation (SANParks, 2003). Continued impacts on the riverine ecosystems may also ultimately reduce the capacity of this system to absorb dramatic flooding events. The band of trees that occurs along the channel can be classified as riparian vegetation. This vegetation is very important for connectivity with adjacent vegetation as well as a migratory route for fauna associated with the riparian habitat.

The river and most of the riparian area is located next to the proposed development footprint, with only small parts inside the footprint.

Figure 5.8: Doring River (Appendix H3B Wetland Assessment: Springbok Solar Power Plant.)

Pan: A depression is a wetland or aquatic ecosystem with closed (or near-closed) elevation contours, which increases in depth from the perimeter to a central area of greatest depth and

within which water typically accumulates (Ollis *et al*., 2013). An 'exorheic' depression is outward-draining, meaning it has an outflow (Ollis *et al*., 2013).

The exoreic depression is located where the power line connection is proposed to be. Care should be taken to disturb it as little as possible during construction. The centre of the depression is a permanent wetland with sedges and *Persicaria decipiens*. The outer edge is characterised by the grass *Setaria sphacelata* var. *sericea.* The outer edge was also confirmed by the results of hand auger drilling

Figure 5.9: Centre (permanent zone) of exorheic depression (Appendix H3B Wetland Assessment: Springbok Solar Power Plant).

5.3.1.4 Climate

According to the Terrestrial Biodiversity Survey (Appendix H3A) and Avifaunal Assessment (Appendix H4), Welkom is located at an elevation of approximately 1 373 m above sea level and is influenced by the local steppe climate with rainfall mainly occurring during summer. The climate is strongly seasonal and semi-arid, with an average rainfall volume of 495 mm/annum, falling between October and May. The summers are hot and wet, with summer temperatures ranging typically between 17-31°C. The winters are cold and dry, with wintertime temperatures ranging typically between -1 to 17°C. An average of 36 frost days occurs each winter. The soils are perpetually moisture stressed, with mean annual evaporation of 2,507 mm.

With regards to the potential impact of solar panels on climate, Fthenakis and Yu (2014) published a paper on the *Analysis of the Potential for a Heat Island Effect in large Solar Farms.* The study focused on the effect on global climate due to the albedo change from widespread installations of solar panels and found that the air temperature at 2.5m of the ground in the centre of the simulated solar farm selection was 1.9°C higher than the ambient air temperature, but that it declined to the ambient temperature at the height of 5 to 18m of the ground. The data also showed a clear decline in air temperature (within 0.3°C) 300m away from the solar farm. The solar panels also cool completely at night, and it is thus unlikely that a heat island effect could occur. The simulations also showed that the access roads between the solar fields allow for substantial cooling, and therefore, it is unlikely that an increase of size of the solar farm will affect the temperature of the surroundings.

5.3.1.5 Biodiversity

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

5.3.1.5.1 Avifaunal

According to the Avifaunal Assessment (refer to Appendix H4) the proposed Springbok SPP is situated in an area of moderate avifaunal diversity, however it is adjacent to an important flyway, the Doring River, and, therefore, has the potential to impact many large, fast-flying and otherwise powerline-sensitive species. Much of the surrounding area has been transformed by agriculture. The resident avifauna is also represented by relatively high species richness and abundance, for which the total transformation of habitat will generate impacts. The total avifaunal dataset is limited, hence an Autumn and a repeat Spring repeat survey was undertaken to supplement the relatively poor SABAP2 dataset.

The habitat on site is relatively diverse, comprising a mixture of intact sweet grassland with patches of degraded and fallow croplands, and areas of riparian scrub and some farm dams. The fallow areas attract greater numbers of birds, but species present are widespread and common. The Doring River is adjacent to the proposed development site, which does act as a corridor for many species' movement and migration, however the habitat is significantly different from the open grassland on the site.

Notwithstanding the above, the DEFF screening tool outputs (Figure 5.10) provided an avifaunal risk ranking for the site as having High Sensitivity. This is due to the site being within 500 m of the Doring River, and the occurrence of the fallow cropland. Wild birds are a conspicuous part of any ecosystem, whether man-made or natural. Their diversity, presence and abundance vary greatly over time and between seasons due to their high mobility. It is because of this high mobility that birds have been the focus of much debate in their use as bio-indicators of ecosystem effects. Proponents for the use of birds as bio-indicators state that specific functional groupings of birds are particularly suitable due to their wide distribution,

relative abundance, position in the food chain, diet specificity, and the ease with which they can be sampled (Mora, 1991; Siegfried, 1971).

Detractors from the use of birds as bio-indicators state highly variable movement patterns and abundance, spatially disconnected resource-utilisation patterns, unproven sensitivity levels to many environmental pollutants, and problems with sampling (Eeva and Lehikoinen, 1995).

Notwithstanding either of the above arguments for or against the use of birds as indicators for assessing ecosystem damage as a result of development, there will be impacts on the extant avifaunal population of the immediate region by the proposed development, and this must be accurately assessed. However, in this case the avifaunal impacts are not representative of the wider ecosystem and thus no direct inferences can be drawn to other taxonomic groups. This is due to the highly mobile nature of birds and their wide geographical distributions that vary seasonally and annually, as opposed to plant populations that are rather more finite.

South Africa has a rich diversity of nationally and regionally endemic species that are found nowhere else on earth and, therefore, warrant consideration for assessment of sensitivity to potential developments. The following endemic or near-endemic (most of the global range is within South Africa's borders) species were recorded either during prior SABAP2 assessments or during this SPP assessment:

- Cloud Cisticola- recorded on site at numerous transects, both in Autumn and Spring. Near-endemic.
- Fiscal Flycatcher- recorded on site at one transect, in Autumn and Spring. Near-endemic.
- Melodious Lark- recorded on site at numerous transects, in Autumn only. Near-endemic.
- Pririt Batis- - not recorded on site but recorded during SABAP2 assessments for the wider pentad(s). Near-endemic.
- Pied Starling- recorded on site at one transect, in Autumn. Endemic to South Africa, Lesotho and Swaziland.
- South African Cliff Swallow- recorded on site at numerous transects, in Autumn and Spring. Breeding Endemic to South Africa, Lesotho and Swaziland.
- Karoo Thrush- not recorded on site but recorded during SABAP2 assessments for the wider pentad(s). Near-endemic.
- Sickle-winged Chat- not recorded on site but recorded during SABAP2 assessments for the wider pentad(s). Near-endemic.

All of the endemic or near-endemic species listed above that have either been confirmed as occurring on site during this assessment or during past SABAP2 assessments have wide distributional ranges and reportedly healthy populations and should not present any substantial threats as a result of development of this site.

Many palearctic migrants were still present on the site, however, most intra-African migrants appear to have departed. Raptors were reasonably well represented, as were gamebirds.

There are Red Data species that could possibly occur on site, even as vagrants and the likelihood of their occurrence must be assessed. No Red data species were recorded during the surveys, although suitable habitat exists on site.

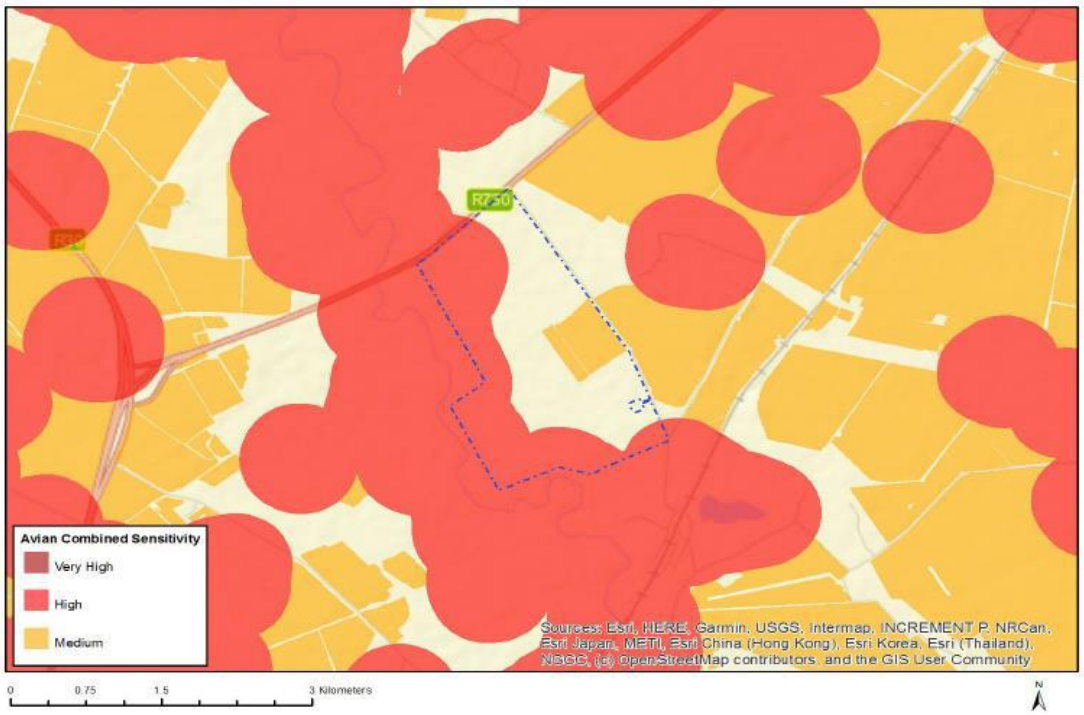


Figure 5.10: DFFE screening tool outputs of avifaunal sensitivity for the proposed Springbok SPP site.

5.3.1.5.2 Ecological

The Terrestrial Biodiversity Survey (refer to Appendix E3) confirms that the The project area falls into the Highveld Alluvial Vegetation unit which is embedded in the Vaal-Vet Sandy Grasslands vegetation unit (Mucina *et al.*, 2018) (Figure 5.11). The last section of the power line connection and the substation falls into the Vaal-Vet Sandy Grasslands vegetation unit. The Highveld Alluvial vegetation is described by Mucina & Rutherford (2006) as alluvial drainage lines and floodplains along rivers embedded within the Grassland Biome. Topography is typically flat supporting riparian thickets mostly dominated by Vachellia karroo, accompanied by seasonally flooded grasslands and disturbed herblands often dominated by alien plants. The conservation status of this vegetation unit is Least Threatened.

The Vaal-Vet Sandy Grasslands vegetation unit is described as plains-dominated landscape with some scattered slightly irregular undulating plains and hills. Mainly low tussock grasslands with an abundant karroid element. Themeda triandra is dominant in this vegetation unit. The conservation status of this vegetation unit is Endangered.

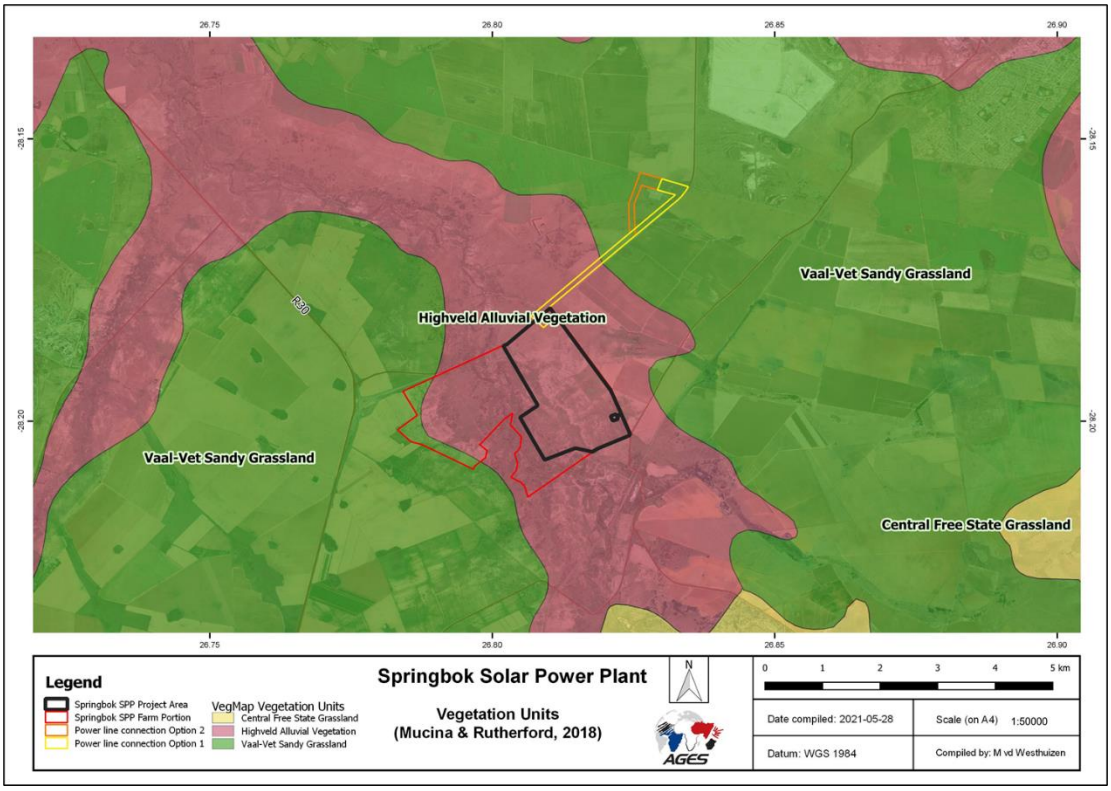


Figure 5.11: Vegetation Map (Terrestrial Biodiversity survey: Springbok Solar Power Plant.)

The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes (SANBI Biodiversity Advisor, 2017). The project area falls mostly into Ecological Support Area 1 (ESA1) and to a lesser degree in Ecological Support Area 2 (ESA2) (Collins, 2016) (refer to figure 5.12).

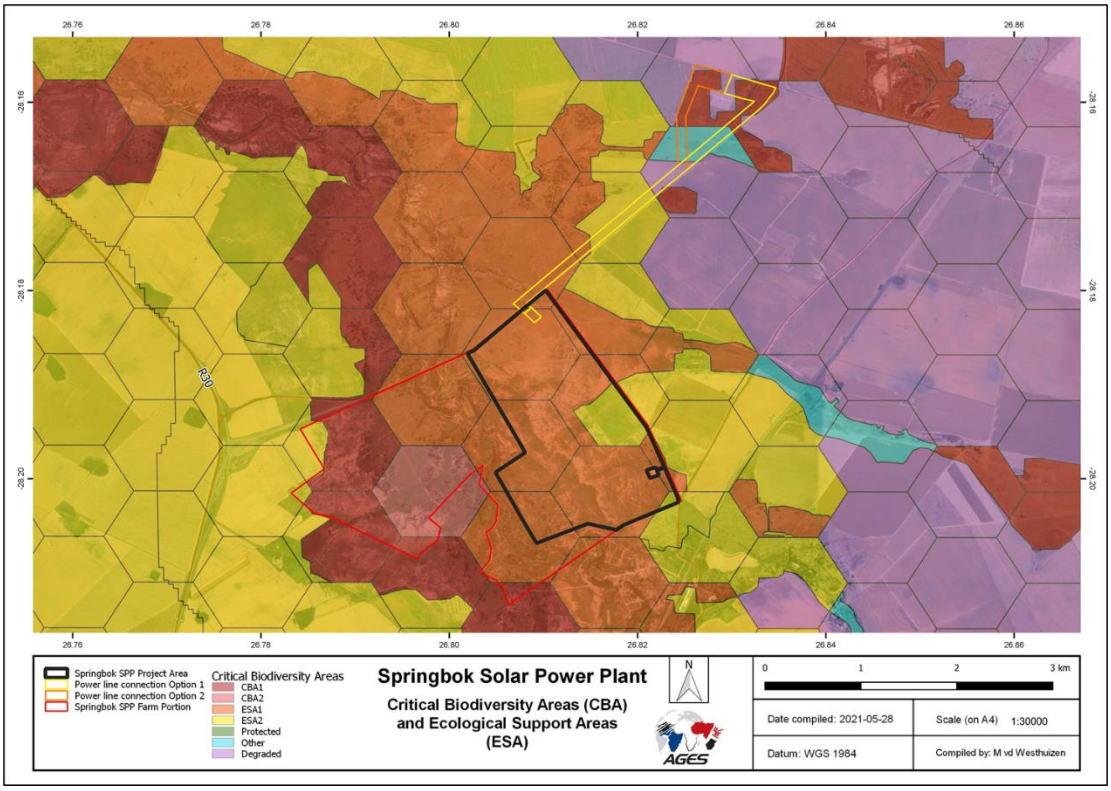


Figure 5.12: Critical Biodiversity Areas and Ecological Support Areas (Terrestrial Biodiversity survey: Springbok Solar Power Plant.)

South Africa has been recognized as having remarkable plant diversity with high levels of endemism. The major threats to plants in the study area are urban expansion, non-sustainable harvesting, collecting, overgrazing/browsing, mining and agriculture. No nationally protected plants (NEMBA listed species, 2005) were recorded on site.

The following plants that are protected according to Free State Nature Conservation Ordinance 8 of 1969 were recorded at the project area: *Euphorbia inaequilatera, Gladiolus woodii, Helichrysum aureonitens, Helichrysum rugulosum*.

All species of the genus *Euphorbia, Gladiolus* and *Helichrysum* are protected in the Free State Province (Free State Province, 1969). A permit should be obtained from authorities should any of these species be eradicated during the construction process. Two endemic species were recorded, namely: *Gymnosporia polyacantha* and *Berkheya carlinopsis*. No protected trees were recorded.

The number of mammal species supported by a plant community depends on several factors like the primary production, seasonal availability of resources, floral heterogeneity, diversity of plant structure, nature of the substratum and previous history (Delany, 1982). Each mammal species has a particular niche, which can be regarded as the sum of all ecological requirements of a species namely food, space, shelter and physical conditions. Mills & Hes (1997) stated that the distribution and abundance of animal species does not rigorously follow that of plant communities or biomes. Instead, mammal species seem to have certain

preferences for a specific habitat type (Skinner & Smithers, 1990). Several authors have shown this preference of mammals to certain habitats through analysis (Beardall *et al*. 1984).

A survey was conducted during March 2021 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid. The project area is currently managed as a game farm, with many introduces large mammal species. Smaller mammals, such as hares and rodents, reptiles and amphibians that occur naturally, are also found in the projects area.

The wetland is an important habitat and dispersal corridor for moisture-reliant small mammals. The conservation of the wetland and buffer zone act as a movement corridor for small mammals. If the proposed development is authorized, some game will be moved to other properties. Smaller mobile species will move away during construction

5.3.1.6 Visual landscape

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

<u>Landform and drainage</u>

The site is located in an area with a medium significance in elevation, meaning that the site is not located on a mountain or at the foot of a mountain, but has some significant difference in elevation. The preferred site is located at an above mean sea level (amsl) of approximately 1353m at the highest elevation and at an amsl of 1323m at the lowest elevation. The landform and drainage described above is unlikely to limit visibility, especially towards the west and south west. The proposed development is not visible from the town of Virginia, due to the elevation. Areas within 5km from the proposed development might have a clear view without taking existing screening into account.

The Zone of Theoretical Visibility (ZTV) reflects the visibility rating in term of proximity of viewers to the SPP and power line. The distances were calculated using satellite imagery, but the impact magnitude was determined by using previous experiences, assumptions and opinions, it is therefore theoretical. The ZTV maps will give a clearer understanding of areas susceptible to line of sight which means, an imaginary line from the eye to a perceived object, in this case the PV facility and power line. The ZTV assessment **did not take into account existing screening such as buildings and vegetation cover but rather the terrain's above mean sea level (AMSL) which indicates line of sight.** The receptors which were identified were subject to an impact assessment (refer to figures 5.13- 5.14).

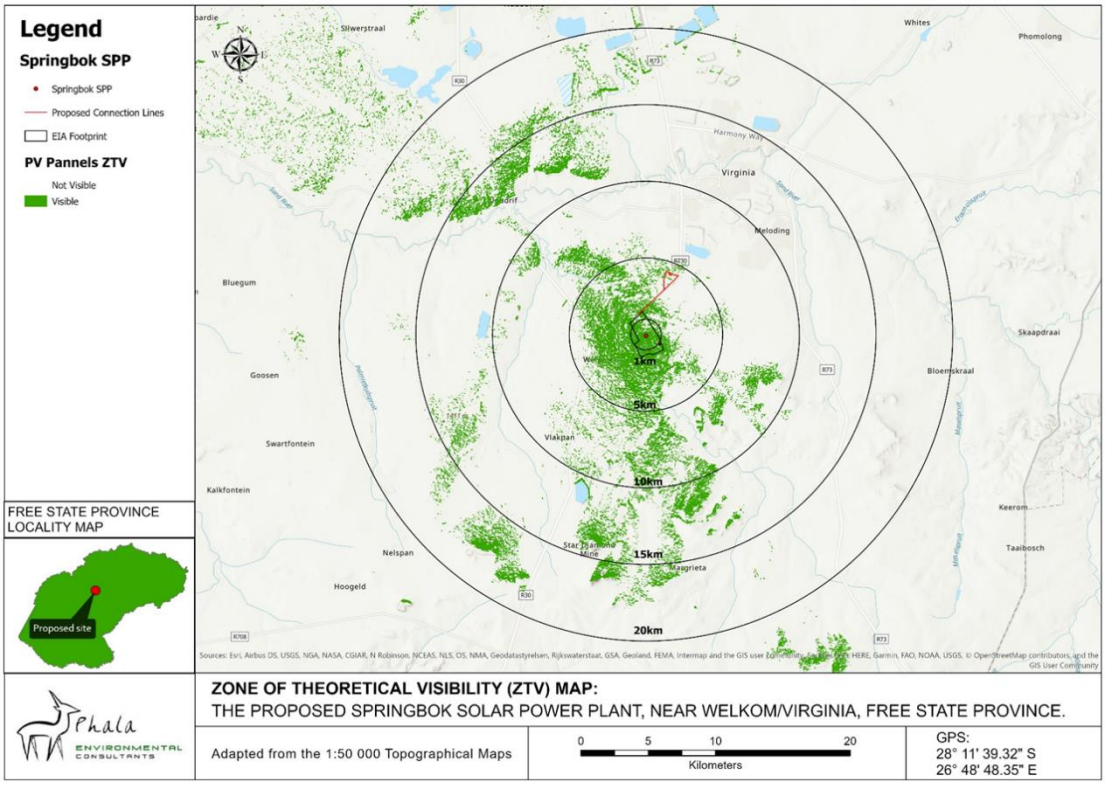


Figure 5.13: Zone of Theoretical Visibility (ZTV) for the Solar Power Plant.

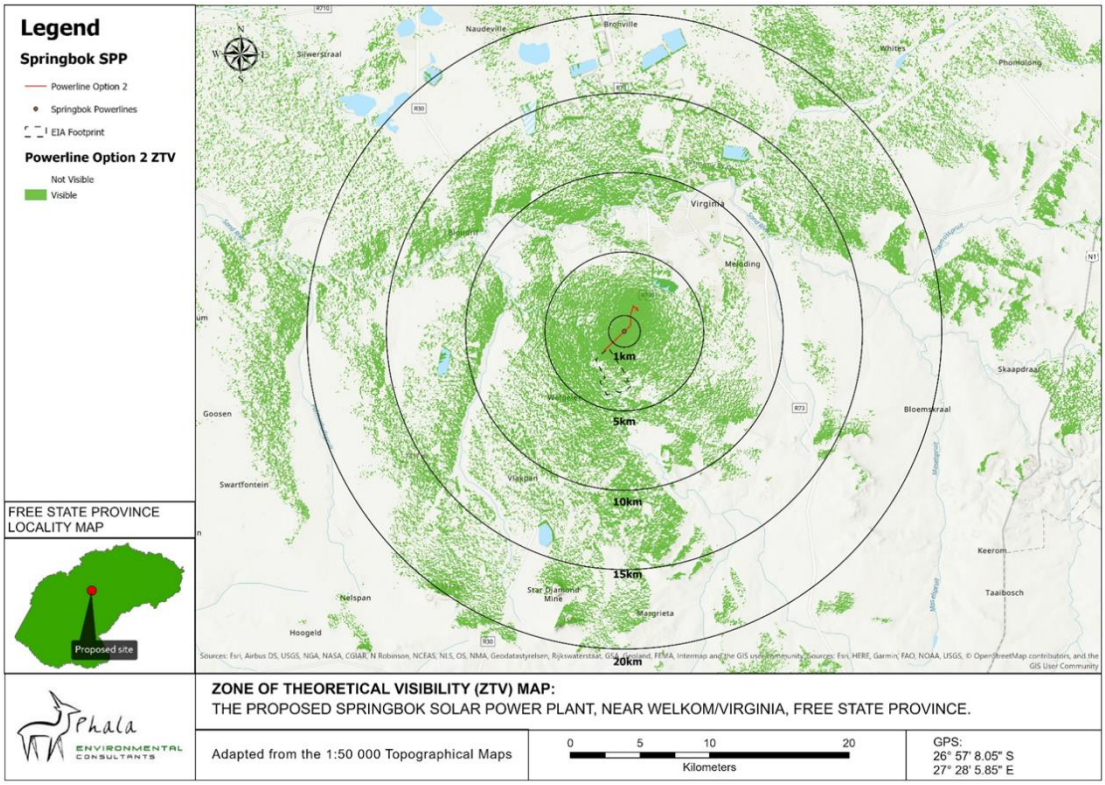


Figure 5.14: Zone of Theoretical Visibility (ZTV) for the Power Line.

5.3.1.7 Traffic consideration

According to the Traffic Impact Study (Appendix E9), access to the site will be via a proposed gravel track off the R730 of approximately 1.5 km in length. The access road will run parallel to the existing gravel road from the proposed access point to the alternative access point. This gravel road will need to be suitably maintained. Re-gravelling may be necessary as a maintenance measure, from time to time, throughout the operational life of the solar power plant. The site access road is provided in the figure 5.15 below.

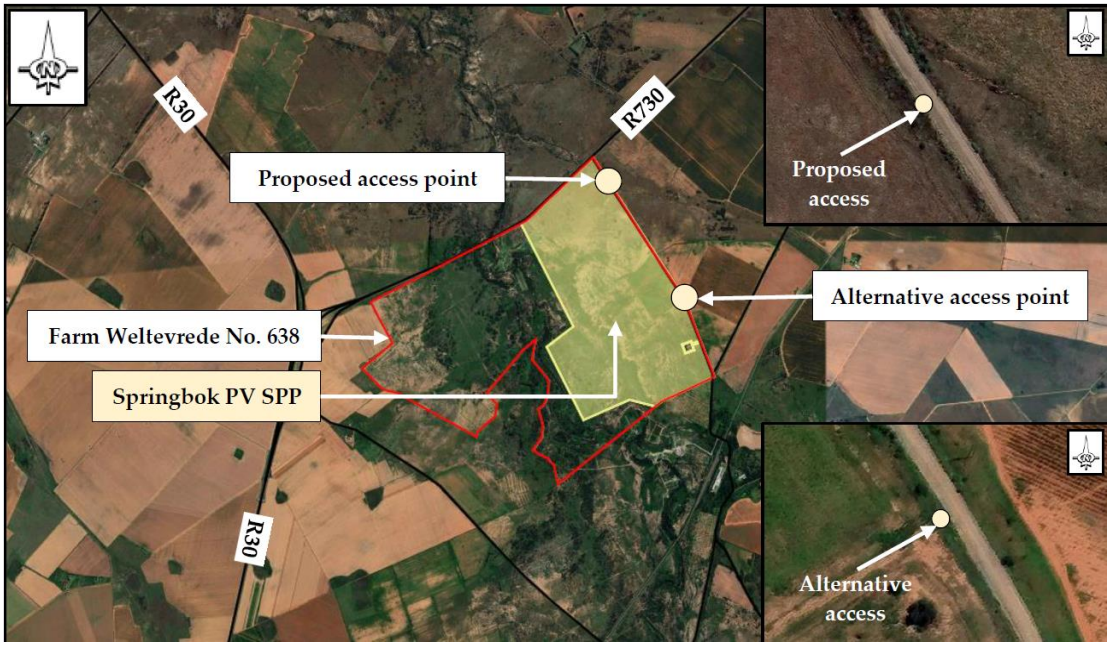


Figure 5.15: Site access road

According to the Traffic Impact Study (Appendix H9) the photovoltaic components will be delivered to site from two (2) possible locations, either from the Port of Saldanha (1470 km) or from the Port of Durban (595 km). The construction phase of the solar power plant is expected to take place over a period of twelve (12) months, during which local traffic will be affected minimally.

Cement will be sourced from local manufacturers within the towns of Welkom and Virginia. All other civil construction materials, needed for concrete and wearing course, will be obtained on-site. These trips can be classified as local trips as vehicles will not be travelling over a very long distance. It is anticipated that construction personnel and labour would originate from neighbouring towns such as Welkom and Virginia. These trips can be classified as local trips as vehicles will not be travelling over a very long distance.

The vehicles used to transport the photovoltaic (PV) equipment are standard container trucks and not abnormal load vehicles. No obstacles (e.g. low overhead services, cattle grids, narrow bridges, etc.) are expected, as these routes are travelled by the same type of vehicle throughout.

The proposed Springbok SPP will generate additional traffic on the surrounding road network in three (3) distinct phases, namely: *construction*, *operational* and *decommissioning*. It must be noted that these three phases will generate traffic consecutively and not simultaneously.

The impact of the construction trip generation, on the predicted 2023 traffic volumes near the towns of Welkom and Virginia and along the transportation routes, are expected to be low. No mitigation measures (upgrading of existing intersections) will be necessary.

It is expected that the communities of Welkom and Virginia will participate in the construction phase of the Springbok SPP. The development of this solar farm and other similar facilities creates an opportunity for temporary employment and economic upliftment of the surrounding communities. From a traffic point of view, it was found that the total daily construction traffic will be low and will not significantly influence the surrounding communities.

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 (attached as Appendix H8) the development of the Springbok SPP has a variety of associated socio-economic benefits. In terms of employment, at the peak of construction the project is likely to create up to 800 employment opportunities. These employment opportunities will be temporary and will last for a period of approximately 12 to 18 months (i.e., the length of construction). Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled opportunities. Solar PV projects make use of large numbers of unskilled and semi-skilled labour so there will be good opportunity to use local labour. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area. Most of the labour force is expected to be sourced from the surrounding towns. It is anticipated that the operation of the project is likely to create a maximum of approximately 60 employment opportunities, comprising approximately 42 low-skilled, approximately 15 semi-skilled, and approximately 3 skilled opportunities. Employment opportunities include safety and security staff, operation and monitoring, and maintenance crew, over a period of 20 years.

The project is proposed within the Free State Province, although is the third-largest province in South Africa, it has the second-smallest population and the second-lowest population density. It covers an area of 129 825km² and has a population of 2 834 714 – 5.1% of the national population. Languages spoken include Sesotho (64.4%), Afrikaans (11.9%) and Zulu (9.1%). The Free State Province contributes 5.4% to South Africa's total gross domestic product (2006).

District Municipality

It is reported that the Lejweleputswa District Municipality is a Category C municipality situated in the north-western part of the Free State. 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 287km2, and consists of the following five local municipalities, with approximately 18 towns distributed throughout: Masilonyana, Tokologo, Tswelopele, Matjhabeng 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 District 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.

Local Municipality

The Matjhabeng LM covers an area of 5 690km² and comprises of six towns: Allanridge, Henneman, Odedaalsrus, Ventersburg, Virginia and Welkom. Welkom is the largest of the towns within the Local Municipality and is also the administrative centre of the Municipality.

Between 2011 and 2016 the Matjhsbeng Local Municipality experienced a population increase of 5% from 407 020 to 429 113. Black Africans comprise the predominant population group within the Matjhabeng Local Municipality, the Lejweleputswa District Municipality, and the Free State Province. Of the total number of people in the Matjhabeng Local Municipality, those aged 20 years and older, 54% have completed primary school, 34,7% have some secondary education, 25,9% have completed matric and 6,4% have some form of higher education. 3,3% of those aged 20 years and older have no form of schooling.

In the Matjhabeng Local Municipality a total of 99 650 people is employed while 13 290 are discouraged work-seekers. According to Census 2011, 58 524 people are unemployed: making the unemployment rate stand at 37%. Of the youth aged 15–34, 39 442 are employed and 38 975 are unemployed. The Matjhabeng Local Municipality has a large portion of households live within the poverty level (48,4%) which has an annual income of less than R38 200. Only 3,8% of the households have an annual income of more than R307 201.

The mining sector is the dominant sector in the Matjhabeng Local Municipality with 56% of the economic activities of the LM, followed by Community Services sector at 11,9% and then finance at 10,8%. The smallest sector in the Local Municipality is Agriculture, at 0,8%.

5.3.2.2 Cultural and heritage aspects

According to the Heritage Impact Assessment (attached as Appendix H6) cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a very limited pre-colonial Stone Age and Iron Age occupation. The second and much later component is a colonial farmer one, with a very limited urban component consisting of a number of smaller towns, most of which developed during the last 100 to 120 years. Most of the towns in the region developed as a direct result of the exploitation of the Free State gold fields.

Stone Age

The larger region has probably been inhabited by humans since Early Stone Age (ESA) times, although evidence of this is very limited. Tools dating to this period are mostly, although not exclusively, found in the vicinity of watercourses. The oldest of these tools are known as choppers, crudely produced from large pebbles found in the river. Later, Homo erectus and early Homo sapiens people made tools shaped on both sides, called bifaces.

During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. Open sites were still preferred near watercourses. These people were adept at exploiting the huge herds of animals that passed through the area, on their seasonal migration. As a result, tools belonging to this period also mostly occur in the open or in erosion dongas. Similar to the ESA material, artefacts from these surface collections are viewed not to be in a primary context and have little or no significance.

Later Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. The stone artefacts they produced are much smaller than those of the Middle Stone Age and consist of a great variety of functional types. LSA people preferred, though not exclusively, to occupy rock shelters and caves and it is this type of sealed context that make it possible for us to learn much more about them than is the case with earlier periods. At present, no stratified, sealed site dating to the Stone Age is known for the immediate region.

Habitation of the larger geographical area took place since Early Stone Age times. This is confirmed by the occurrence of stone tools dating to the Early, Middle and Late Stone Age found in a number of places. However, these are mostly located in the vicinity of rivers, such as the Doringspruit north of Kroonstad and the Vals River south of Kroonstad.

Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known site at Silver Leaves south east of Tzaneen dating to AD 270. The oldest local EIA site is located at Broederstroom south of Hartebeestpoort Dam and has a radio-carbon date of AD 470.

The occupation of the larger geographical area (including the project area) did not start much before the 1500s. To understand all of this, we have to take a look at the broader picture. Towards the end of the first millennium AD, Early Iron Age communities underwent a drastic

change, brought on by increasing trade on the East African coast. This led to the rise of powerful ruling elites, for example at Mapungubwe. The abandonment of Mapungubwe (c. AD 1270) and other contemporaneous settlements show that widespread drought conditions led to the decline and eventual disintegration of this state Huffman (2005).

By the 16th century things changed again, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the Witwatersrand and the treeless, wind-swept plains of the Free State and the Mpumalanga escarpment.

This period of consistently high rainfall started in about AD 1780. At the same time, maize was introduced from Maputo and grown extensively. Given good rains, maize crops yield far more than sorghum and millets. This increase in food production probably led to increased populations in coastal area as well as the central highveld interior by the beginning of the 19th century. Due to their specific settlement requirements, Late Iron Age people preferred to settle on the steep slope of a mountain, possibly for protection, or for cultural considerations such as grazing for their enormous cattle herds. Because of the lack of trees, they built their settlements in stone.

The complexity of these communities, as is reflected in their settlement layout, has been demonstrated for example by the extensive archaeological excavations done on some of these sites by Tim Maggs (Maggs 1976).

Sites dating to the Late Iron Age are known to occur in the larger region, especially to the south, in the vicinity of the Sandrivier. These are typical stone walled sites that are linked with Sotho-speakers and date to the period after 1600.

Historic period

European hunting parties allegedly crossed the Orange River in the first two decades of the 19th century, exploring as far as the current Wepener district. On the heels of these explorers, cattle farmers from the Cape Colony started moving out of the northern Cape Colony borders from 1821 for seasonal grazing, but did not encounter any Bantu tribes. Driven by droughts in the Cape, loss of livestock during the seasonal travels and the uninhabited district of the Transgariep led to numerous farmers settling themselves permanently in the area after 1824.

Between 1825 and 1841 European settlers started to occupy the area of the Modder River between the Orange and Caledon Rivers, west of Langeberg. In 1829 Rudolph van Wyk settled on the farm Rietpoort, where the town of Smithfield was founded in 1848, and P.E. Wepener claimed the farm Zuurbult, which would become Rouxville in 1863. Roughly at the same time fifteen families occupied the farm Zevenfontein which eventually became the Beersheba Mission Station. The town of Zastron was founded on the farm named Verliesfontein, which was settled between 1836 and 1840, and by that time nearly 300 families had settled in the area currently known as the Eastern Free State. During the beginnings of the 1830's a new, organised group of European settlers, the forerunners of the Groot Trek, saw a large but

temporary influx of settlers. During this time A.H. Potgieter also bought land from the Bataung captain Makwana in 1836.

It was only after the annexation of Natal in 1843 that many Trekkers returned to the Transgariep as well as to the northern parts of the Eastern Free State's Borderbelt. Notable amongst these settlers were J.I.J.Fick, after whom Ficksburg was named, W. van de Venter - founder of Fouriesburg and P.R. Botha who settled in Rietvlei. French missionaries were the last to settle in the area, and in 1833 E. Casalis and T. Arbusset opened the Missionary Station at Morija after a request from Moshoeshoe. North of Smithfield hon. S. Rolland, accepting the jurisdiction of Moshoeshoe without any reservation, founded the Beersheba Mission Station in 1835. This meant that a part of the southeast Transgariep immediately became declared as a Basotho region, and ensured that Moshoeshoe received ownership over a region where no Basotho lived. French missionaries also founded mission stations Carmel (near Smithfield), Hebron (near Zastron) and Mequatling (in the Ladybrand district) and their influence would play a crucial role in the relationship between European settlers and the Basotho in the Transgariep future.

The historic period started with the arrival, in the late 18th century by Korana raiders in the area. They were soon followed, in the early 19th century, by traders, explorers and missionaries. By the middle of the 19th century, farms were taken up and later towns were developed – Theunessin was established in 1907 and named Smaldeel, which was changed to Theunissen in 1912. Towns such as Virginia (1954) and Welkom (1946) were only established as part of the development of the gold mining industry in the region. Infra-structural development, such as the development of roads, bridges and railway lines also took place. One of the original stations was called Virginia and was established in 1892. This makes the former town actually much older.

The Free State gold fields started in 1945 with a mining lease granted to the St Helena Gold Mine. By the end of 1992 the gold field had produced 7 360 t of gold from some 20 mines in the region. Some of these mines have now been amalgamated into larger, more cost-effective mines, which includes Loraine, Freegold North (an amalgamation of Freddies, Free State and Western Holdings), Freegold South (an amalgamation of President Brand, President Steyn, Free State Saaiplaas and Erfdeel), St Helena, Harmony, now merged with Merriespruit and Virginia, Unisel, Oryx (which now incorporates Beisa and Beatrix) and H.J. Joel (Robb & Robb 1998).

Gold was not the only mineral mined in this area. A kimberlite pipe on the farm Kaalvallei, located a few kilometres to the southeast of Welkom, was mined since 1890, but was eventually forced to close down when an aquifer was encountered, which subsequently flooded the mine.

Site specific review

From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing or the making of

agricultural fields. During the survey, the following sites, features and objects of cultural significance were identified in the project area (Figure 5.16).

No sites, features or objects of cultural significance dating to the Stone Age or Iron Age were identified in the project area. However, the following were found from the historical period:

- Burial Site (unknown number of graves): Five headstones were counted, but there seems to be a number of low stone cairns which might mark more graves. The site seems to be very old as the headstones indicate dates going back to the 1970s. Unfortunately, erosion and the fact that the site is overgrown with grass, makes it impossible to get more information from the headstones – see image below. The site has not been visited by descendants in recent years. No other signs of habitation could be detected. A review of aerial photographs dating as far back as 1944 shows no signs of habitation in the region and only vague patterns in the area of the graves, but this might just be a function of the grass cover.
- Farmstead: The remains of an extensive farmstead is located in this region. It seems to have consisted of a main house, outbuildings and cattle enclosures. The only functioning remains are watering features used by livestock. What might be interpreted as farm labourer homesteads occurred to the east of this site, but has been totally demolished, leaving no visible structures – only patterns in the grass/soil cover shows their location.

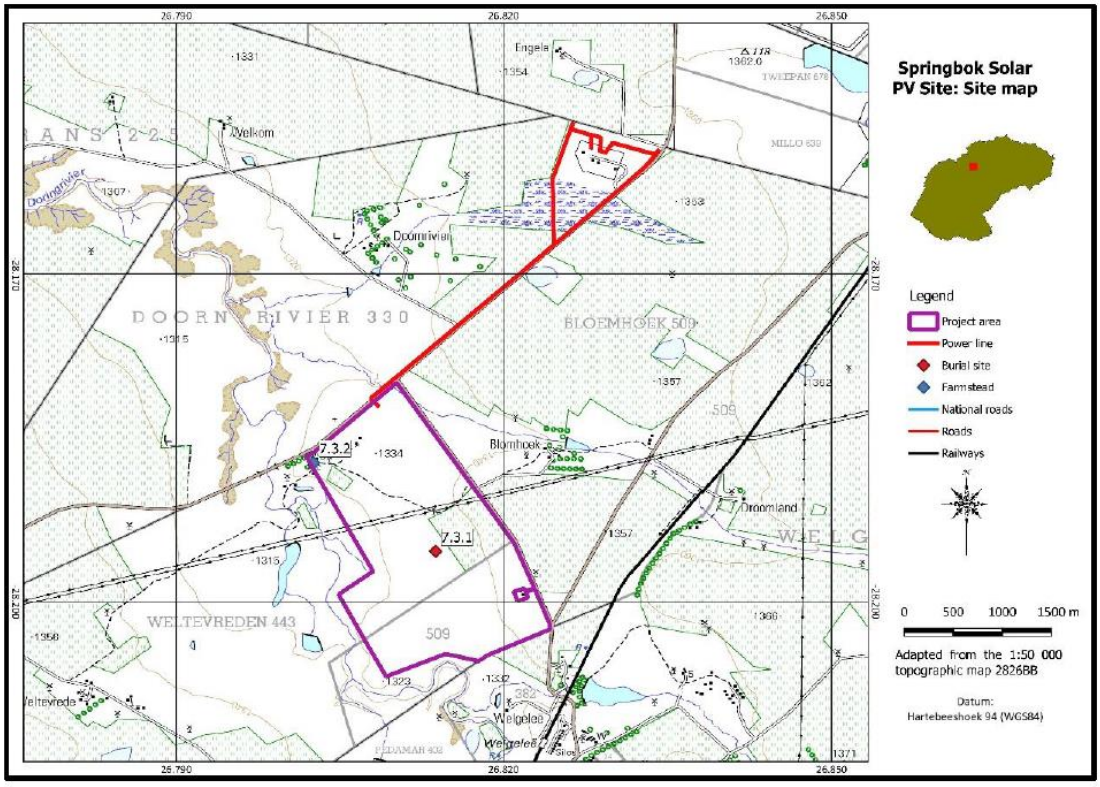


Figure 5.16: Cultural and heritage object located on the development site.

5.3.2.3 Palaeontology

The Palaeontological Impact Assessment (Appendix H7) found that the proposed development footprint is located within an area considered to be of potentially medium and very high palaeontological sensitivity and for that reason requires a phase 1 palaeontological impact assessment

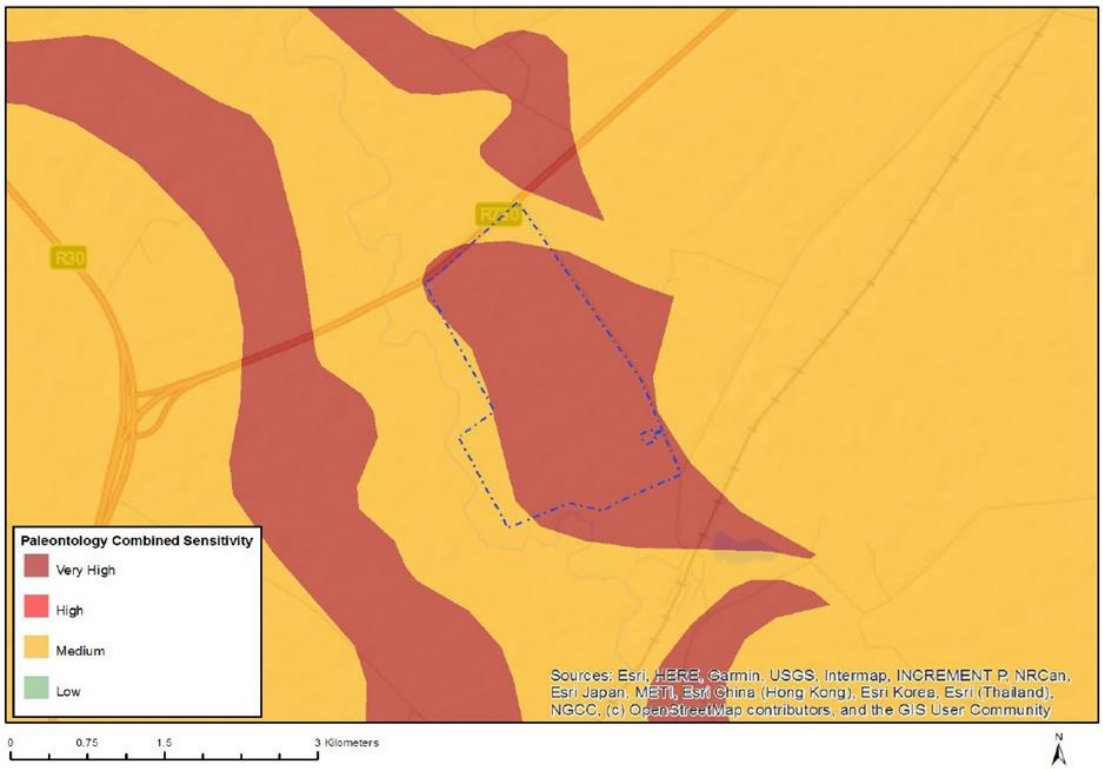


Figure 5.17: Palaeosensitivity map for the Springbok Solar Power Plant project area (blue dotted polygon).

The project area on Farm Weltevrede No. 638 as well as the associated grid connection corridor are both underlain at depth by continental sediments of the Adelaide Subgroup (Lower Beaufort Group, Karoo Supergroup) that are probably Late Permian in age (Johnson et al. 2006). Due to poor bedrock exposure, the Adelaide Subgroup has not been differentiated into formations on the Winburg 1: 250 000 sheet. A short account of the sedimentology of these tabular, pale buff to whitish arkosic channel sandstones and grey-green overbank mudrocks with horizons of ferruginous carbonate diagenetic concretions is given by Nolte (1995) who infers a braided river depositional setting. An interesting feature is the local occurrence of exotic (extra-basinal), cobble-sized clasts of granite, gneiss and quartzite suggesting a provenance to the east or southeast. The only good exposures of these rocks encountered close to (but just outside) the present study area occur in the bed and along the banks of the Doringrivier where flat-lying, pale, tabular, massive to cross-bedded sandstone bodies with locally gullied bases are interbedded with packages of weathered-looking, grey-green to khaki mudrocks and occasional thin crevasse-splay sandstones.

Several narrow dykes with rubbly weathered tops of the Karoo Dolerite Suite of Early Jurassic age intrude and bake the Karoo bedrocks in the region. They protrude above the landscape as low ridges and many of them show a NW-SE or NE-SW trend. According to the geological map and satellite imagery, the Beaufort Group bedrocks here are almost entirely covered by Quaternary aeolian (wind-blown) sands with thick (several meters) Quaternary to Holocene alluvial deposits along the banks of the Doring river and its tributaries. Thick, orange to brownish sandy soils with sparse basal or dispersed gravels - including dolerite, ferruginised sandstone, hornfels, broken ferruginous carbonate concretions and petrified wood, with occasional flaked stone artefacts - are observed along farm tracks, clearings without vegetation and in erosion gullied areas.

No fossils were recorded within Adelaide Subgroup bedrocks within the present study area since there is apparently very little or no surface exposure here. Limited exposures along the banks and bed of the Doring river outside the project area appear to be weathered, compromising fossil preservation, while dolerite intrusions may have further reduced the palaeosensitivity of the bedrocks regionally.

The mainly Pleistocene to Recent superficial deposits in the project area - viz. sandy soils, down wasted surface gravels, possible pedocretes (such as ferricretes) and alluvium – are poorly known in palaeontological terms. They are likely to be of Low to Very Low palaeosensitivity for the most part. However, these younger sediments may occasionally contain important fossil biotas, notably the bones, teeth and horn cores of mammals (e.g. Cooke 1974, Skead 1980, Klein 1984, MacRae 1999, Partridge & Scott 2000, Churchill et al. 2000, Boshoff & Kerley 2013). These may include ancient human remains of considerable palaeoanthropological significance (e.g. Grine et al., 2007). Other potential late Caenozoic fossil biotas from these superficial deposits include non-marine molluscs (bivalves, gastropods), ostrich egg shells, trace fossils (e.g. calcretised termitaria and other insect burrows or nests, coprolites, rhizoliths), and plant remains such as peats or palynomorphs (pollens) in fine-grained, organic-rich alluvial horizons. Quaternary alluvial sediments may contain reworked Stone Age artifacts that are useful for constraining their maximum age.

Numerous small to medium-sized (up to 15 cm max. diam.), angular to subrounded blocks of well-preserved petrified wood were recorded within downwasted surface gravels overlying Late Caenozoic alluvium as well as within or overlying aeolian cover sands within the Springbok Solar Power Plant project area. It is noted that these reworked fossils are of widespread occurrence within the Late Caenozoic superficial deposits and the recorded sites are only a small, albeit probably representative subsample of all possible sites within the solar power plant and grid connection project area (many or most of which are probably buried beneath the ground surface). Apart from reworked petrified wood, no further fossil remains were recorded within the superficial sediments within the project area. Since the scientific and conservation value of the fossil wood material is considered to be low, since it is out of context and of very widespread occurrence regionally, the palaeosensitivity of the solar power plant and grid connection project areas is assessed as LOW.

Figure 5.18: Angular, multi-hued and banded blocks of Beaufort Group petrified wood collected from among downwasted surface gravels at Loc. 117 (Scale in cm).

5.4 SITE SELECTION MATRIX

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

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The farm Weltevrede No. 638, where the project is proposed to be located is considered favorable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The Free State 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.

- Extent of the site: A significant portion of land is required to evacuate the prescribed 150MW 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. The farm Weltevrede No. 638 is approximately 750 hectares in extent.

- 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. Access will be easily obtained from the R730 Regional Road.

- 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.

- 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 game farming, but a perennial river and pan as well as a historical burial site are located on the site, as well as a few protected plant species.

It is evident from the discussion above that the farm Weltevrede No. 638, Registration Division Theunissen may be considered favourable and suitable in terms of these site characteristics. As mentioned previously, no alternative areas on the farm Weltevrede No. 638, Registration Division Theunissen have been considered. The development footprint of this project will cover the majority of the farm. However, provision was made after the initial investigation and specialist studies to exclude any sensitive areas that may arise.

5.5 IDENTIFICATION OF THE PREFERRED GRID CONNECTION CORRIDOR

Two grid connection corridors are being considered for the development of the new power line to connect the solar power plant to the national grid. Both grid connection options will connect to the Theseus MTS 400/132/22kV Substation located north east of the proposed site. There are two possible connection line routes proposed to the Theseus MTS 400/132/22kV Substation. Option 1 (technically preferred) is approximately 5.25km and option 2 (alternative) is approximately 5.3km long. Both options are located north-east of the project footprint. The proposed power line was assessed within a 100m wide corridor.

The independent specialists assessed the two grid connection corridor alternatives on the same level and have provided an indication of the preferred option within the various fields of study considered as part of this EIA process. The results of the specialist feedback will then

determine the environmentally preferred option in terms of the grid connection corridor to be developed.

The results of the specialist studies in this regard are included in the table below.

Table 5.1: Specialist feedback on the two grid connection corridor alternatives

Field of Study	**Option 1 (Technically Preferred)**	**Option 2**
Terrestrial Biodiversity	Preferred • Shorter route • Less disturbance	Least Preferred, but still considered to be acceptable
Aquatic Biodiversity (wetlands)	Preferred • Shorter route • Less disturbance	Least Preferred, but still considered to be acceptable
Agriculture	There will effectively be absolutely no material difference to the significance of the agricultural impacts associated with the alternatives. There are therefore no preferred alternatives from an agricultural impact perspective. All alternatives are considered acceptable. As both alternatives are acceptable, the technically preferred option (Option 1) is put forward as being preferred for development.	
Avifauna	Preferred • Follows the existing road • Within the roads ecological edge • Expected to have a marginally lower impact than Option 2.	Least Preferred
Archaeology	From a heritage point of view, both these alternatives are equally acceptable for development. As both alternatives are acceptable, the technically preferred option (Option 1) is put forward as being preferred for development.	
Palaeontology	No palaeontological no-go areas or fossil sites have been identified in either of the options. Therefore, both options are considered to be acceptable and there is no preference between the two options.	

	As both alternatives are acceptable, the technically preferred option (Option 1) is put forward as being preferred for development.
Social	No preferred alternative from a social impact perspective. As both alternatives are acceptable, the technically preferred option (Option 1) is put forward as being preferred for development.
Visual	No preferred alternative from a visual impact perspective. As both alternatives are acceptable, the technically preferred option (Option 1) is put forward as being preferred for development.
Traffic	No preferred alternative from a traffic impact perspective. As both alternatives are acceptable, the technically preferred option (Option 1) is put forward as being preferred for development.

From the above it can be concluded that grid connection corridor Option 1 is the preferred alternative from an overall environmental perspective. This is mainly due to the route being the shortest possible route and thereby also represents the least disturbance to the environment.

5.6 CONCLUDING STATEMENT ON ALTERNATIVES

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

Therefore, development of the 150 MW Springbok Solar Power Plant on the farm Weltevrede No. 638, Registration Division Theunissen, is the preferred option. The final layout is included as part of this Final EIR (refer to Figure G). It may be concluded that this is the only location that will be assessed in further detail within sections 6 and 7.

Section 5.5 above provides an indication of which of the two grid connection corridor alternatives are preferred from an environmental perspective based on the feedback received from the respective independent specialists. Based on the results it is confirmed that Option 1 if the preferred grid connection corridor alternative for the development of the power line to connect the SPP to the Theseus MTS 400/132/22kV Substation.

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 14 April 2021. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the site. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	X			The Doring River, which is a perennial river and a pan is located on the site earmarked for the SPP and Power Line.
II. A conservation or open space area		X		A portion of the site falls within an Ecological Support Area 1 as described in bioregional plans.
III. An area that is of cultural importance	X			An old farmstead and a historic burial site are located on the site.
IV. Site of geological significance		X		None.
V. Areas of outstanding natural beauty		X		None.

VI. Highly productive agricultural land		X		None.
VII. Floodplain		X		None.
VIII. Indigenous Forest		X		None.
IX. Grass land	X			The site is situated within the grassland biome.
X. Bird nesting sites		X		The Avifaunal Impact Assessment (refer to Appendix H4) does not make any reference to nesting sites on the area earmarked for the development.
XI. Red data species		X		The Avifaunal Assessment (refer to Appendix H4) did not record any Red Data Species on site but indicated that they could possibly occur on site.
XII. Tourist resort	X			The proposed site is located on the Goldfields Game Ranch, which is used form game hunting by tourists.
2. Will the project potentially result in potential?				
I. Removal of people		X		None.
II. Visual Impacts	X			The VIA (refer to Appendix H5) 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		X		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		X		Access will be obtained via a gravel road off the R730.

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
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	×			The Doring River, which is a perennial river and a pan is located on the site earmarked for the SPP and Power Line.

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		✕		
VIII. A formal or informal settlement	✕			Welkom (located approximately 23 km north-northwest of the proposed development). Virginia (located approximately 10km north-northeast 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 6.3 below, as well as the key issues identified as included in sections 6.2.1-6.2.3. The table included on the overleaf includes reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained (table 6.2).

Table 6.2: Sections in the respective specialist studies

Specialist Study	Impact Assessment (pg.)	Cumulative Impacts (pg.)	Mitigation Measures (pg.)
Terrestrial Biodiversity Impact Assessment (Appendix H3)	32 – 48	51 - 75	49 - 51
Wetland Impact Assessment (Appendix H3)	24 – 32	36 – 49	33 – 35
Avifauna Impact Assessment (Appendix H4)	28 - 33	45 – 47 PV Panels 49 – 50 PL 53 – 55 Description	47– 48 PV Panels 50 – 52 PL
Agriculture Compliance Statement (Appendix H10)	6- 8 Sensitivity Verification 10 – 15 Baseline	15 – 25	17 – 18
Heritage Impact Assessment (Appendix H6)	12 - 17	17 – 21 Site survey 21 – 23	21 – 22
Palaeontological Impact Assessment (Appendix H7)	14 – 23	25 – 26	27 – 29
Social Impact Assessment (Appendix H8)	32 – 61	65 – 94	89 – 93
Visual Impact Assessment (Appendix H5)	23 – 32 Existing Landscape 33 – 41 Visual Receptors & ZTV	42 – 59	55 – 58
Traffic Impact Assessment (Appendix H9)	11 – 14 Background 14 – 17 Trip Generation	17 - 19	19 – 20

Table 6.3: 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)(a)(c) (GN.R. 327): *"The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."* Activity 19 (GN.R. 327): *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil,*	Site clearing and preparation Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning circle for trucks will also	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of habitat, loss of indigenous species. • Fragmentation of the landscape and loss of connectivity. • Increased soil erosion and sedimentation. • Soil, water or air pollution. • Spread and establishment of alien invader species. • Human impacts / road mortalities.		-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Terrestrial Biodiversity Impact Assessment (Appendix H3A)
			Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance. • Loss of important avian habitats.		-	S	M	Pr	PR	ML	Yes	- See Table 6.3	L	Avifaunal Impact Assessment (Appendix H4)
			Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to	L	-

sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse." *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..."*	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.											transport sand and building materials are fitted with tarpaulins or covers.		
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Dust Impact. • Erosion. • Loss of topsoil.	-		S	S	Pr	PR	ML	Yes	- See Table 6.3	L	Agricultural and Soils Compliance Statement (Appendix H10)
			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. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity.	-		S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	Geotechnical Report (Appendix H2)
			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 (see Appendix F)
			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring program (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	L	-

Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectare or more of indigenous vegetation..."* Activity 4 (b)(i)(ee) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) the Free State, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* 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 Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* Activity 12 (b)(i)(ii)(vi) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Free State, (i) within any critically endangered or endangered*													- 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 recognized standards.		
			Surface water	• Compaction, soil erosion and sedimentation transport and erosion in the wetland. • Soil and water pollution in the wetland. • Spread and establishment of alien invasive species in the wetland.		-	L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Wetland Impact Assessment (Appendix H3)
			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,		-	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.	L	-

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 and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland." <u>Activity 14(ii)(a)(c)(b)(i)(ff) (GN.R 324):</u> "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."* <u>Activity 18 (b)(i)(hh) (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 (b) in*				streams, etc) as a primary source of water. • Generation of hazardous waste								- 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 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 harzardous 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		

the Free State (i) outside urban areas and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."													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	• Creation of direct and indirect employment and skills development opportunities. • Economic multiplier effects • Business opportunities		+	P	S	D	I	N/A	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix H8)
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility due to the construction activities. • Lighting impacts. • Visual sense of place impacts.	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix H5)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Delivery and construction trips will be insignificant when compared to the Average Daily Traffic (ADT) and will not affect the existing Level of Service (LOS). It can therefore be concluded that, on both routes, no mitigation measures will be necessary.	L	Traffic Impact Assessment (Appendix H9)
			Health & Safety	• Air/dust pollution. • Road safety. • Impacts associated with the presence of construction workers on site and in the area. • In-migration of people (non-local workforce and jobseekers) • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. • Impacts on daily living and movement patterns. • Nuisance impacts.		-	L	L	Pr	PR	ML	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix H8)

				• Increased risk of veld fires.										
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.	L	Social Impact Assessment (Appendix H8)
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the 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	• Disturbance, destruction or damage to cultural or heritage objects.		-	L	P	D	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix H6)
			Paleontological Heritage	• Disturbance, destruction or damage to fossils preserved at or below surface through surface clearance and excavations during construction phase.	-		S	P	U	IR	ML	Yes	- See Table 6.3	L	Paleontological Impact Assessment (Appendix H7)
OPERATIONAL PHASE															
<u>Activity 11(i) (GN.R. 327):</u> *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a*	The key components of the proposed project are described below: • <u>PV Panel Array</u> - To produce 150 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of habitat, loss of indigenous species. • Fragmentation of the landscape and loss of connectivity. • Increased soil erosion and sedimentation. • Soil, water or air pollution. • Spread and establishment of alien invader species.		-	S	L	Po	PR	ML	Yes	- See Table 6.3	L	Terrestrial Biodiversity Impact Assessment (Appendix H3)

capacity of more than 33 but less than 275 kilovolts." Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* Activity 10 (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 Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*	form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun. • Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. • Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. 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. • Supporting Infrastructure – Auxiliary buildings with basic services such as water and electricity will be constructed on the site and will have an													
				• Human impacts / road mortalities.											
			Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance. • Collisions with PV panels leading to injury or loss of avian life. • Collision and electrocution when flying into power line infrastructure.		-	L	L	Pr	PR	ML	Yes	- See Table 6.3	M	Avifaunal Impact Assessment (Appendix H4)
			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	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Dust Impact. • Erosion. • Loss of topsoil.		-	L	L	D	PR	SL	Yes	- See Table 6.4	L	Agricultural and Soil Compliance Statement (Appendix H10)
			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	-

	approximate footprint 820m². Other supporting infrastructure includes voltage and current regulators and protection circuitry. • Roads – Access will be obtained via gravel road off the R730. 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. • Battery Energy Storage System – Up to 500 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m^3 of batteries and associated operational, safety and control infrastructure. • Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding properties. Fencing with a height of 2.5 meters will be used	SOCIAL/ECONOMIC	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	• Compaction, soil erosion and sedimentation transport and erosion in the wetland. • Soil and water pollution in the wetland. • Spread and establishment of alien invasive species in the wetland.		-	L	L	Pr	PR	ML	Yes	- See Table 6.3	L	Wetland Impact Assessment (Appendix H3)
			Visual landscape	• Visual impact on observers travelling along the roads and residents at homesteads (sensitive visual receptors) within a 5km radius of the SPP. • Visual impact on observers travelling along the roads and residents at homesteads (sensitive visual receptors) within a 5-10km radius of the SPP. • Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility. • Visual impacts on observers travelling along the roads and residents at homesteads (sensitive visual receptors)		-	L	L	D	PR	ML	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix H5)

				within 500m of the power line structures. • Visual impacts and sense of place impacts associated with the operation phase of SPP.											
			Social aspects (contributions)	• Direct and indirect employment and skills development opportunities. • Development of non-polluting, renewable energy infrastructure. • Contribution to local economic development and social development. • Potential impacts on tourism.		+	P	L	D	N/A	N/A	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix H8)
			Social aspects	• Potential impacts on tourism. • Impacts associated with the loss of agricultural land. • Visual and sense of place impact.	-		L	L	Po	PR	ML	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix H8)
			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase.	-		L	L	U	CR	NL	Yes	-	L	Traffic Impact Assessment (Appendix H9)
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• It is not foreseen that the proposed activity will impact on heritage resources during this phase.	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix H6)
			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	+		I	L	D	I	N/A	Yes	-	N/A	-

				existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.											
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	• Poor recovery of habitat owing to clearance of site. • An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place. • Contamination of soil during decommissioning. • Direct habitat destruction. • Habitat fragmentation. • Increased soil erosion and sedimentation. • Soil and water pollution. • Air pollution • Spread and establishment of alien invasive species. • Negative effect of human activities on fauna and road fatalities.		-	S	L	Po	N/A	N/A	Yes	- See Table 6.3	L	Terrestrial Biodiversity Impact Assessment (Appendix H3)
			Avifauna	• Displacement of priority avian species from important habitats. • Displacement of resident avifauna through increased disturbance		-	S	S	Po	N/A	N/A	Yes	- - See Table 6.3	L	Avifaunal Impact Assessment (Appendix H4)
			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	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Dust Impact. • Erosion. • Loss of topsoil.		-	S	S	Pr	PR	M	Yes	- See Table 6.3	L	Agriculture and Soils Compliance Statement (Appendix H10)

			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Compaction, soil erosion and sedimentation transport and erosion in the wetland. • Soil and water pollution in the wetland. • Spread and establishment of alien invasive species in the wetland.		-	L	S	Pr	PR	ML	Yes	- See Table 6.3	M	Wetland Impact Assessment (Appendix H3)
			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 Springbok 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 H5)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Delivery and construction trips will be insignificant when compared to the Average Daily Traffic	L	Traffic Impact Assessment (Appendix H9)

													(ADT) and will not affect the existing Level of Service (LOS). It can therefore be concluded that, on both routes, no mitigation measures will be necessary.		
			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 H8)
			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 H8)
			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	• Disturbance, destruction or damage to cultural or heritage objects.		-	L	P	D	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix H6)

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 I1. The EMPr for the power line is included in Appendix I2 and the EMPr for the substation is included in Appendix I3.

The Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix I4.

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 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)(a)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."*
- Activity 19 (GN.R. 327): "T*he infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse."*
- *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 hectare or more of indigenous vegetation..."*
- Activity 4 (b)(i)(ee) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (b) the Free State, (i) outside urban areas, (ee) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."*
- 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 Free State (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."

- Activity 12 (b)(i)(ii)(vi) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (b) in the Free State, (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 and (vi) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 14(ii)(a)(c)(b)(i)(ff) (GN.R 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans."*

- Activity 18 (b)(i)(hh) (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 Free State (i) outside urban areas and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. Table 6.4 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation.	Negative Medium	Negative Medium	• The riparian and wetland areas with its associated 32 m buffer zone must not be disturbed as far as possible. • A search, rescue and relocation report should be compiled and then 30 - 50% of the *Gladiolus woodii* plants on site should be relocated. • Carrying capacity should be calculated for the remainder of the farm and care should be taken not to overstock it. • Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum, while the rehabilitation of the site should be prioritised after construction has been completed. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • An avifauna specialist should be consulted to conduct a specialist study for the project area and monitoring of the potential impact of the solar plant in the future.

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

				• Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. • Monitoring should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area.
	Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low	• Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance as possible to the sensitive features such as the wetland and rocky outcrop outside the project area during construction. • During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place. • Construction activities must remain within defined construction areas. No construction / disturbance will occur outside these areas.
	Increased Soil Erosion and Sedimentation	Negative Medium	Negative Low	• The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time.

				• Cover disturbed soils as completely as possible, using vegetation or other materials. • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Gravel roads to the construction sites must be well drained to limit soil erosion. • Control the flow of runoff to move the water safely off the site without destructive gully formation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.
	Soil, Water and air Pollution	Negative High	Negative Low	• Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately.

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

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

				disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible.
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Low	• Limit the construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), laydown areas must be placed only on disturbed zones, construct in shortest timeframe possible, and control noise to minimum.
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	• Limit construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), laydown areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, control noise to minimum.
	Loss of important avian habitats	Negative Medium	Negative Low	• Limit construction footprint, limit access to the remainder of the area, laydown areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, use existing roads as far as possible, rehabilitate with indigenous vegetation.

Wetland Assessment	Soil compaction and increased risk of sediment transport and erosion in the wetland	Negative Medium	Negative Low	• Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish should be cleared and follow-up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area). • Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion. • Erosion control mechanisms must be established as soon as possible. • A stormwater plan must be developed with the aid of an engineer to ensure that water runoff is diverted off the site without pooling and stagnation or erosion. Financial provision for closure will include the estimated costs for erosion control post-construction and post-decommissioning. • Where the power line connection crosses the wetlands, disturbance must be kept to a minimum. Care must be taken not to change the hydrology of the wetlands and rehabilitation of vegetation might be required. • If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be

				associated with the nitrogen negative period associated with organic material that is not composted. • Vehicle traffic should not be allowed on the rehabilitated areas, except on allocated roads. It will have a negative impact due to the dispersive/compaction characteristics of soils and its implications on the long term. • Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the watercourse i.e., through placement of structures/supports and to minimise turbulent flow in the watercourse. • The indiscriminate use of machinery within the wetland area will lead to compaction of soils and destruction of vegetation and must therefore be strictly controlled. • A buffer zone of 32 m should be implemented around the wetland as a no-go area, to prevent sediment changes. The power line connection and service roads will cross two wetlands. This can be supported if disturbance is kept to a minimum. • Perform scheduled maintenance to be prepared for storm events. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures.

	Soil and water pollution in the wetland	Negative High	Negative Low	• Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil. • No dumping of waste should take place within the riparian zone. If any spills occur, they should be cleaned up immediately. • Contain all dirty water in the dirty water system and contain all dirty stormwater up to a 1:50 year flood line event as a minimum. Ensure that all activities impacting on groundwater resources of the subject property are managed according to the relevant DWS Licensing regulations and groundwater monitoring and management requirements. • Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility. • Excess waste or chemicals should be removed from site and discarded in an environmentally friendly way. The Environmental Control Officer (ECO) should enforce this rule rigorously. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and stormwater run-off. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for

				drip trays to capture spills. Drip trays should be emptied into a holding tank and returned to the supplier. • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. • A speed limit (preferably 40 km/hour) should be enforced on dirt roads. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with the label and application permit directions and stipulations for terrestrial and aquatic applications.

	Spread and establishment of alien invasive species in the wetland	Negative Medium	Negative Low	• Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals). Control should begin prior to construction phase considering small populations of invader plant species occur around the project area. • Institute strict control over materials brought onto site, which should be inspected for seeds and steps taken to eradicate these before transport to the site. The contractor is responsible for the control of weeds and invader plants. • Rehabilitate disturbed areas as quickly as possible. • Institute a monitoring programme to detect alien invasive species early. • Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.
Visual Impact Assessment	Visual impact of construction activities on sensitive visual receptors	Negative Medium	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint.

	in close proximity to the Springbok SPP.			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.
Agricultural and Soils Compliance Statement	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	• No mitigation measures are proposed.

	Loss of agricultural potential by soil degradation	Negative Low	Negative Low	• Loss of topsoil can result from poor topsoil management during construction related excavations. Topsoil should be stored for later use. • Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. Spillage and contamination of soil should be avoided. • Due to the very low slope of the land, the site has a low susceptibility to soil degradation.
	Dust impact	Negative Low	Negative Low	• Implement dust suppression during the construction phase.
	Erosion	Negative Low	Negative Low	• Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points, and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
	Topsoil loss	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during

				rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	Negative Medium	Negative Low	<u>Burial site:</u> • Due to the dense grass cover it was impossible to determine the exact extent of the burial site, making the creation of a buffer zone very difficult. It is therefore recommended that once the developer has decided on a final layout, the vegetation cover is manually removed from the burial site in order to determine its exact size and the number of graves located in it. • Due to its locality close to the centre of the proposed project area, the following mitigation measure is proposed: • (2) Relocation of graves: This option can be implemented with additional design and construction inputs. This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated. Mitigation is to excavate the site by archaeological techniques, document the site (map and photograph) and analyse the recovered material to acceptable standards. This can only be done by a suitably qualified archaeologist. • This option should be implemented when it is impossible to avoid impacting on an identified site or feature. • (1) Avoidance/Preserve: If it is decided to retain the burial site, and its exact size has been determined it should be fenced off

				permanently by means of a wire fence or brick wall, with a buffer zone of at least 100m. • In the event of an impact occurring on the identified site or feature, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out. The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5. <u>Farmstead/Settlement site:</u> • Due to its current state of preservation, the following mitigation measure is proposed: • (5) No further action required: This is applicable only where sites or features have been rated to be of such low significance that it does not warrant further documentation, as it is viewed to be fully documented after inclusion in this report. • • Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation to ensure that no undetected heritage/remains are destroyed. • In the event of an impact occurring on the identified site or feature, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out. The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5.

Palaeontological Impact Assessment	Disturbance, destruction or damage to fossils preserved at or below surface through surface clearance and excavations during construction phase.	Negative Low	Negative Low	• The ECO responsible for the construction phase of the solar plant and power line developments should be aware of the potential for important fossil finds – notably fossil mammalian remains, land snails, freshwater mussels and trace fossils (e.g. termite nests) within older superficial deposits - and the necessity to conserve them for possible professional mitigation. • The ECO should monitor all substantial surface clearance operations and excavations into sedimentary rocks for fossil remains on an on-going basis during the construction phase. • Implementation of the Chance Fossil Finds Procedure (as required in the Palaeontological Impact Assessment). • Recommended mitigation of chance fossil finds during the construction phase of the solar facility and associated grid connection involves safeguarding of the fossils (preferably in situ) by the responsible ECO and reporting of finds to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). Where appropriate, judicious sampling and recording of fossil material and associated geological data by a qualified palaeontologist, appointed by the developer, may be required by the relevant heritage regulatory authorities. Any fossil material collected should be curated within an approved repository (museum / university fossil collection) by a qualified palaeontologist.

Social Impact Assessment	Creation of direct and indirect employment opportunities.	Positive Low	Positive Medium	• A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Matjhabeng LM, Lejweleputswa DM, Free State 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 Springbok 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	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 local’s first procurement policy.

	services and infrastructure.			• Provide transportation for workers (from Welkom, Virginia 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, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • 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 R723 and the public 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 impacts (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 whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	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 Medium	Negative Low	• Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays.

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

6.2.2 Impacts during the operational phase

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*
- Activity 10 (b)(i)(gg)(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 Free State, (i) outside urban areas, in (gg) areas within 10 kilometres form national parks or world heritage sites and (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 6.5 summarises the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment	Habitat destruction caused by clearance of vegetation.	Negative Medium	Negative Medium	• Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum. • An avifauna specialist should be consulted to conduct a specialist study for the project area and monitoring of the potential impact of the solar plant in the future. • Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
	Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low	• Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance. • Ensure protection of important resources by establishing protective buffers to exclude unintentional disturbance. All possible efforts must be made to ensure as little disturbance

				as possible to the sensitive features such as the wetland and rocky outcrop outside the project area.
	Increased Soil Erosion and Sedimentation	Negative Low	Negative Low	• Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. • Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth. • Control the flow of runoff to move the water safely off the site without destructive gully formation. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion.
	Soil, Water and air Pollution	Negative Medium	Negative Low	• Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately. • All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. • A speed limit should be enforced on dirt roads (preferably 30-40km/h).

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

				• Regular inspection of the site is required, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. • Maintain proper firebreaks around the entire development footprint. • Educate workers / visitors regarding risks and correct disposal of cigarettes. • More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). • Travelling at night should be avoided or limited as much as possible.
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Medium	• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, and limit roadways and vehicle speeds.
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, and limit roadways and vehicle speeds.

	Collisions with PV panels leading to injury or loss of avian life	Negative Medium	Negative Low	• Panels to be flat at night, preferably low sheen/matt surfaces, quarterly fatality monitoring.
	Collision when flying into power line infrastructure	Negative High	Negative Low	• Require walk-through after power line pole positions are determined to demarcate sections requiring bird deterrents/flappers, install flappers on all required sections of power lines (as directed by avifaunal specialist) on or directly adjacent to site, quarterly fatality monitoring.
	Electrocution when perched on power line infrastructure	Negative High	Negative Low	• Pole designs to discourage bird perching and to be signed off by avifaunal specialist, quarterly fatality monitoring.
Wetland Impact Assessment	Soils compaction and increased risk of sediment transport and erosion in the wetland and exorheic depression (pan)	Negative Medium	Negative Low	• Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish should be cleared and follow-up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., “ripping” the affected area). • Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion. • A stormwater plan must be developed with the aid of an engineer to ensure that water runoff is diverted off the site without pooling and stagnation or erosion. Financial provision for closure will include the estimated costs for erosion control

				post-construction and post-decommissioning. • If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted. • Vehicle traffic should not be allowed on the rehabilitated areas, except on allocated roads, due to adverse impacts of dispersive/compaction characteristics of soils and its implications on the long term. • Perform scheduled maintenance to be prepared for storm events. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures.
	Soil and water pollution in the wetland	Negative Low	Negative Low	• Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil • No dumping of waste should take place within the riparian zone. If any spills occur, they should be cleaned up immediately. • Contain all dirty water in the dirty water system and contain all dirty stormwater up to a 1:50 year flood event as a minimum. Ensure that all activities impacting on groundwater resources of the subject property are managed according to

				the relevant DWS Licensing regulations and groundwater monitoring and management requirements. • Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility. • Excess waste or chemicals should be removed from site and discarded in an environmentally friendly way. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and stormwater run-off. • Spill kits should be on-hand to deal with spills immediately. • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. • A speed limit (preferably 40 km/hour) should be enforced on dirt roads. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with the label and application permit directions and stipulations for terrestrial and aquatic applications

	Spread and establishment of alien invasive species in the wetland	Negative Medium	Negative Low	• Alien and invader vegetation must not be allowed to colonise the area. Control involves killing alien invasive plants present, seedlings and establishing an alternative plant cover to limit re-growth. The use of indigenous plants must be encouraged in the rehabilitated areas (stormwater canals). Control should begin prior to construction phase considering small populations of invader plant species occur around the project area. • Institute strict control over materials brought onto site, which should be inspected for seeds and steps taken to eradicate these before transport to the site. The contractor is responsible for the control of weeds and invader plants. • Rehabilitate disturbed areas as quickly as possible. • Institute a monitoring programme to detect alien invasive species early. • Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.
Visual Impact Assessment	Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP.	Negative Medium	Negative Low	• 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. • Maintain general appearance of the facility as a whole.
	Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.	Negative Low	Negative Low	• 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. • 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 on sensitive visual receptors located within a 500m radius of the proposed power line.	Negative Medium	Negative Medium	• Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. • 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.
Agricultural and Soils Compliance Statement	Enhanced agricultural potential through increased financial security for farming operations	Positive Low	Positive Low	• No enhancement measures are proposed.
	Erosion	Negative Low	Negative Low	• Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and

				safely disseminate any run-off water from all accumulation points, and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion
	Topsoil Loss	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	• No sites, features or objects of cultural significance were identified, no mitigation measures are proposed.
Social Impact Assessment	Creation of employment opportunities and skills development	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.

	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• No enhancement 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.	Positive Low	Positive Low	• 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 Medium	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed Springbok 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 6.6 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 6.6: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Survey	An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place.	Negative Medium	Negative Low	• Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as *Prosopis glandulosa* (Honey Mesquite) that should not be allowed to establish.
	Continued loss of indigenous vegetation owing to poor recovery of vegetation.	Negative Medium	Negative Low	• A monitoring and rehabilitation plan for vegetation at the site are to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where possible.
	Contamination of soil by leaving rubble/ waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation	Negative Medium	Negative Low	• Rubble or waste that could accompany the construction effort, should be removed during and after decommissioning. Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil.

Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Low	Negative Low	• None required due to low significance
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	• None required due to low significance
Wetland Assessment	Soils compaction and increased risk of sediment transport and erosion in the river/riparian and exorheic depression (pan).	Negative Medium	Negative Low	• Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish should be cleared and follow-up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area). • Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion.
	Soil and water pollution in the river/riparian and exorheic depression (pan).	Negative Medium	Negative Low	• Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil

				• No dumping of waste should take place within the riparian zone. If any spills occur, they should be cleaned up immediately. • Contain all dirty water in the dirty water system and contain all dirty stormwater up to a 1:50 year flood event as a minimum. Ensure that all activities impacting on groundwater resources of the subject property are managed according to the relevant DWS Licensing regulations and groundwater monitoring and management requirements. • Appropriate sanitary facilities must be provided for the duration of the decommissioning phase and all waste removed to an appropriate waste facility. • Excess waste or chemicals should be removed from site and discarded in an environmentally friendly manner. • Hazardous chemicals to be stored on an impervious surface protected from rainfall and stormwater run-off. • Spill kits should be on-hand to deal with spills immediately. • Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.

				• A speed limit (preferably 40 km/hour) should be enforced on dirt roads. • Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with the label and application permit directions and stipulations for terrestrial and aquatic applications
	Spread and establishment of alien invasive species in the river/riparian and exorheic depression (pan).	Negative Medium	Negative Low	• Institute an eradication/control programme for early intervention if invasive species are detected. The use of indigenous plants must be encouraged in the rehabilitated areas. Active management and eradication of exotic / alien plant species should also occur when seedlings are found.
Agricultural and Soils Compliance Statement	Erosion	Negative Low	Negative Low	• Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
	Top Soil	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading

				during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Social Impact Assessment	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.

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:

- Geotechnical Report – SMEC (see Appendix H2)
- Terrestrial Biodiversity, Plant and Animal Impact Assessment – AGES (see Appendix H3A)
- Wetland Impact Assessment – AGES (see Appendix H3B)
- Avifaunal Impact Assessment – Agreenco Environmental Projects (see Appendix H4)
- Visual Impact Assessment – Phala Environmental Consultants (see Appendix H5)
- Heritage Impact Assessment – JA van Schalkwyk (see Appendix H6)
- Palaeontological Impact Assessment – Natura Viva CC (see Appendix H7)
- Social Impact Assessment – Phala Environmental Consultants (see Appendix H8)
- Traffic Impact Assessment – Bvi Consulting Engineers (see Appendix H9)
- Agricultural Compliance Statement – Johann Lanz (see Appendix H10)
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, 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, and assessed in detail as part of this EIA phase.

6.3.1 Geotechnical suitability

The geotechnical suitability of the site for the proposed development needed to be determined. The main question which needs to be addressed is:

"Are the geotechnical conditions favourable for the development of a PV solar plant?"

According to the Geotechnical Study (Appendix H2) The profiles observed within the trial pits generally comprised a thin cover of topsoil overlying stiff, sandy clay to depths of between 0.5 m and 1.0 m below EGL. Medium dense to dense residual clayey sand was observed underlying the clay, becoming less clayey with depth, which became too dense to economically excavate beyond an average depth of 2.0 m below EGL. No groundwater was observed within the trial pits.

The clayey sand soils classify as >G9 and it is anticipated that the clay soils will also classify as the same. Therefore, construction materials for both gravel access roads and service and cable bedding will have to be imported from commercial sources. "Soft Excavation" conditions are anticipated within the soils, tending to "Intermediate Excavation" from say 2.0 m below EGL (SANS 1200D). The results of the chemical analyses indicate the soils to be generally pH neutral to slightly alkaline, and the conductivity tests show the soils to be generally mildly corrosive towards buried steel.

It would appear that the preferred driven pile founding method is potentially achievable over the site, however, the piles should be designed to resist any expansion/ shrinkage from the upper clay soils and potential collapse, and subsequent loss of strength, of the underlying clayey sands. These parameters should be defined during the detailed geotechnical investigation phase and incorporated into the final design. Suitable mitigation may involve sleeving the piles within the upper clay soils to prevent movement associated with clay heave and relatively deep penetration of the piles into the underlying clayey sands. It is possible that weathered rock mass may be within the piled depth and sufficient penetration into which may somewhat mitigate deeper pile installation. Whilst the rock mass was not encountered during this investigation, dense residual soils indicative of in-situ weathering of the parent rock mass were encountered and may indicate the presence of shallow rock. Alternatively, concrete plinths may be considered, bearing on soil rafts.

It is imperative that a Competent Person inspects all excavations and earthworks materials to ensure that conditions at variance with those predicted are exposed and accommodated in the structural design and to undertake reinterpretation of the facts supplied in this report where necessary.

6.3.2 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 H6) confirmed the following:

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a very limited pre-colonial Stone Age and Iron Age occupation. The second and much later component is a colonial farmer one, with a very limited urban component consisting of a number of smaller towns, most of which developed during the last 100 to 120 years. Most of the towns in the region developed as a direct result of the exploitation of the Free State gold fields.

During the survey no sites, features or objects of cultural significance from the Stone Age nor the Iron Age were identified in the project area. However, the following sites, features or objects of cultural significance were identified from the Historic Period:

- 7.3.1 An informal burial site with probably more than 5 graves. Most are only marked with stone cairns. Those with dated headstones date to the 1970s. No other signs of habitation could be detected.
- 7.3.2 The remains of an extensive farmstead. It seems to have consisted of a main house, outbuildings and cattle enclosures. What might be interpreted as farm labourer homesteads

occurred to the east of this site, but has been totally demolished, leaving no visible structures – only patterns in the grass/soil cover shows their location.

The specialist has indicated that from a heritage point of view, it is recommended that the project be allowed to continue on acceptance of the conditions proposed below:

- Once the developer has decided on a final layout, the vegetation cover should manually be removed from the identified burial site in order to determine it exact size and significance.
- 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. Refer to Section 9 of the Heritage Impact Assessment (Appendix H6), as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5 of Appendix H6.

It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

6.3.3 Ecological and Wetland Impacts

The potential impact of the proposed development on threatened flora and fauna known to occur in the Free State Province had to be determined, as well as the impact on freshwater features located within and within the surrounding area of the project. 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 H3A) confirmed that the most significant impact will be the soils and water pollution, habitat destruction, soil erosion and spread of alien invasive species. The desktop study indicated that the conservation status of the Highveld Alluvial Vegetation unit in which the project area is located, classifies as Least Concern (Mucina & Rutherford, 2006). This vegetation unit is imbedded in the Vaal-Vet Sandy Grassland vegetation unit which is considered Endangered (Mucina & Rutherford, 2006), and classifies as being an Endangered ecosystem (SANBI, 2011). The Doring River that flows past the project area is a NFEPA river with some surrounding NFEPA wetlands. There is one NFEPA wetland in the project area and the grid connection corridor crosses another one. A section of the Springbok SPP project area falls into the Free State Highveld Grassland National Protected Area Expansion Strategy (NPAES) area (Government of South Africa, 2008).

Four plant species that are protected according to Free State Nature Conservation Ordinance 8 of 1969 were recorded at the project area, namely: *Euphorbia inaequilatera, Gladiolus woodi, Helichrysum aureonitens, Helichrysum rugulosum*. A search, rescue and relocation report should be compiled and then 30 - 50% of the *Gladiolus woodii* plants on site should be relocated.

Areas of high sensitivity were identified which are related to the wetlands surrounding the SPP that have a higher connectivity to other systems. These features are considered to be no-go areas for

development. These impacts can be successfully mitigated as per the recommendations and mitigation measures provided by the specialist.

The specialist also confirms that if the mitigation measures are implemented and strictly adhered to the development can be supported from a biodiversity point of view.

The Wetland Impact Assessment (refer to Appendix H3B) states that soils and vegetation associated with wetlands and landscape were all used as parameters in identifying the wetlands.

Rivers and wetlands were classified as a river (active channel and riparian area) and an exorheic depression. The river and riparian area are mostly located outside the proposed development site, with small sections inside it. The exorheic depression is located in the area where the proposed power line connection will be. Both Alternative 1 and 2 cross the wetland. Development should not take place within the active channel and the riparian area of the river and its buffer areas (32m), which is therefore considered to be no-go to development. Care should be taken to disturb the exorheic depression as little as possible when the proposed power line connection is erected.

Due to the fact that a part of the proposed development site is located within the 100 m buffer from the riparian area and the exorheic depression, a Water User Licence application should be submitted to the DWS as part of the proposed development according to the national Water Act Section 21 C and I regulations. Baseline soil information, landscape profile and vegetation were used to confirm wetland and terrestrial properties within the study area. The river has a Class C Present Ecological State (PES): Moderately Modified and a moderate Ecological Importance and Sensitivity (EIS). The exorheic depression has a class B PES: Largely natural with few modifications and a moderate EIS

The impacts identified from a wetland perspective include soil erosion and sedimentation, water pollution from spillages, vehicles emissions and dust and the spread and establishment of alien invasive species in wetlands. Specific mitigation measures have been recommended by the specialist that need to be implemented in the areas surrounding the wetlands to prevent negative impacts.

The specialist also confirms that if the mitigation measures are implemented and strictly adhered to the development can be supported from a wetland perspective.

6.3.4 Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in the Free State 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 H4) the proposed Springbok SPP is situated in an area of moderate avifaunal diversity, however it is adjacent to an important flyway, the Doring River, and, therefore, has the potential to impact many large, fast-flying and otherwise powerline-sensitive species. Much of the surrounding area has been transformed by agriculture. The resident avifauna is also represented by relatively high species richness and abundance, for which the total transformation of habitat will generate impacts.

The total avifaunal dataset is limited; hence an Autumn and a repeat Spring repeat survey was undertaken to supplement the relatively poor SABAP2 dataset.

Avifaunal impacts are expected to occur during the construction, operation and decommissioning phases. These impacts include displacement of priority and resident species, loss of important avian habitats, collision with PV panels leading to avian injury/mortality, collisions with power line infrastructure and electrocution when perched on power line infrastructure

Despite some residual and cumulative impacts, there is no objection, from an avifaunal perspective, to the development of the proposed SPP development. The overall impact of the project on avifauna can be effectively mitigated, should the controls prescribed in this report be adequately followed, with sufficient monitoring of mitigation effectiveness.

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 H5) concluded that the post mitigation impact is a "*Negative Low"* impact during the construction, decommissioning and operational phases. 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.

The construction and operational phases of the Springbok SPP and its associated infrastructure, may have a visual impact on the area, especially within (but not restricted to) a 5km radius of the proposed SPP. The visual impact will differ amongst places, depending on the distance of the SPP. The proposed development is located in a close proximity of existing Eskom power infrastructure and numerous mines. 10 other SPPs are currently proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore likely.

Due to the height of the power line (32m) and extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the PV facility and power lines, but the possible visual impacts can be reduced. A number of mitigation measures have however been proposed regardless of whether or not mitigation measures will reduce the significance of the of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the project.

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

Taking into account all positive factors of such a development including economic factors, social factors and sustainability factors, especially in an arid country, and the industrialised and degraded landscape, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. The specialist recommends that the details of the power line be submitted with the South African Civil Aviation Authority (SACAA).

The specialist recommends that the project be approved from a visual perspective.

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 compliance statement has been undertaken. The main question which needs to be addressed is:

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

The Agricultural Compliance Statement (Appendix H10) indicated that the majority of land within the development area is of medium agricultural sensitivity on the screening tool. The screening tool indicates land on the site with high sensitivity as a result of it being classified as cultivated land. However, most of the areas indicated as high have not been cultivated for more than 10 years and should therefore no longer be classified as cultivated land or have high sensitivity. One area of 25 hectares has been cultivated more recently. However, this land has been assessed as having very limited viability for the production of cultivated crops. It's limited potential means that the site is not a priority for the conservation of agricultural land use.

Soils on site are dominated by soils with limited depth and drainage due to clay rich subsoils. These soils are of the Arcadia, Valsrivier, and Rensburg soil forms and are not used for cultivation. A small proportion of the site comprises better soils of the Oakleaf soil form, but they have limited water holding capacity.

Three potential negative agricultural impacts were identified, loss of agriculture al land use, land degradation, and the impact of dust, but none are of high significance. The recommended mitigation measures are implementation of an effective system of stormwater runoff control; maintenance of vegetation cover; and stripping, stockpiling and re spreading of topsoil.

The conclusion of the agriculture assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the fact that the land is of limited agricultural potential and is not currently utilised for, or viable for, the production of cultivated crops, the proposed development offers positive impact by way of income generation and wider, societal benefits, and that the proposed development poses a low risk in terms of causing soil degradation.

From an agricultural impact point of view, it is recommended that the development be approved.

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 SIA (Refer to Appendix H8) indicate that there are some vulnerable communities within the area that may be affected by the development of the Springbok SPP and its associated infrastructure. Traditionally, the construction phase of a SPP 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.

The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of solar PV 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.

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.

It should be noted that the perceived benefits associated with the project, which include Renewable Energy generation and local economic and social development, outweigh the perceived negative impacts associated with the project.

The specialist concludes that the project, and its associated infrastructure, will be unlikely to result in permanent damaging social impacts, and therefore from a social perspective the project can be developed subject to the implementation of the recommended mitigation measures.

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 H7), the Springbok Solar Power Plant project site and power line corridor is located in a region that is underlain by fossiliferous sedimentary rocks of Palaeozoic and younger, Pleistocene to Holocene age. Existing impacts to palaeontological heritage within the project site are likely to be minimal, largely comprising occasional damage to fossilized wood exposed at the ground surface through game ranching activities, including vehicle use along farm tracks. These on-going impacts are offset by the slow exposure of fresh blocks of fossil wood through bedrock weathering.

The construction phase of the proposed solar energy facility and grid connection will entail substantial excavations into the superficial sediment cover and locally into the underlying bedrock as well. These include, for example, surface clearance and excavations for the PV panel footings, laydown areas, internal and access roads, underground cables, power line pylon footings, on-site electrical substation and battery storage facility, auxiliary buildings and construction camp. All these activities may adversely affect potential legally-protected fossil heritage within the project footprint as a result of excavations and surface disturbance (e.g. surface clearing and vehicle activity) during the construction phase by destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

The impact significance of the proposed development in terms of palaeontological heritage is assessed as Low (Negative) without mitigation. Should the recommended mitigation measures for the construction phase of the solar facility development and be consistently followed-through, the impact significance would remain Low (Negative) but would entail both positive and negative impacts. Residual negative impacts from inevitable loss of some valuable fossil heritage would be partially offset by an improved palaeontological database for the study region as a direct result of appropriate mitigation. The latter is a positive outcome because any new, well-recorded and suitably-curated fossil material from this palaeontologically little-known region would constitute a useful addition to our scientific understanding of the fossil heritage of the Beaufort Group in the Free State. The No-Go option would probably have a neutral impact significance; protection of local fossils from damage or destruction would be partially offset by natural surface weathering processes as well as lost opportunities to improve the palaeontological database through professional mitigation of chance fossil finds.

There are no fatal flaws associated with the proposed solar PV project from a palaeontological heritage viewpoint and no objects to authorisation of the development, provided that the recommended mitigation measures are fully implemented.

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 H9) The impact of the construction trip generation, on the predicted 2023 traffic volumes near the towns of Welkom and Virginia and along the transportation routes, are expected to be low. No mitigation measures (upgrading of existing intersections) will be necessary.

However, the formalisation of this access point, to the standard, will in all probability be a requirement as part of the wayleave approval of Matjhabeng Local Municipality and the Free State Department: Police, Roads and Transport. This will mitigate the destructive impact of repetitive heavy turning vehicles on the public road pavement. Adequate traffic accommodation signage must be erected and maintained on either side of the access, throughout the construction period of the project.

Considering the above, the direct impact and significance of the Springbok SPP is considered to be low negative and low positive (associated opportunities and benefits of the project) for the traffic and community parameters, respectively.

Therefore, the development of the Springbok Solar Power Plant can be supported from a traffic 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 Springbok SPP the location of the BESS within the development footprint will be considered to 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 SENSITIVITY ANALYSIS

The sensitivity analysis undertaken as part of the EIA Report focusses on providing an understanding of the environmentally sensitive areas and features identified within the SPP site, as well as the grid connection corridor alternatives. This section considers the findings of each of the independent specialist studies undertaken for the development and describes the sensitive features and areas identified, including the location, the sensitivity rating of the features or areas as well as the associated buffers recommended by the specialist (where a buffer is considered to be relevant). The sensitive areas and features identified are also displayed on the sensitivity map included as Figure H1-H4 of this EIA Report.

The following points below provide the sensitivity analysis for the Springbok SPP:

The sensitivity analysis undertaken as part of the EIA Report focusses on providing an understanding of the environmentally sensitive areas and features identified within the project site, as well as the grid connection corridor alternatives. This section considers the findings of each of the independent specialist studies undertaken for the development and describes the sensitive features and areas identified, including the location, the sensitivity rating of the features or areas as well as the associated buffers recommended by the specialist (where a buffer is considered to be relevant). The sensitive areas and features identified are also displayed on the sensitivity map included as Figure H1 of this EIA Report.

The following points below provide the sensitivity analysis for the Springbok SPP:

<u>Terrestrial Biodiversity:</u>

From a terrestrial biodiversity perspective (Terrestrial Biodiversity Impact Assessment, Appendix H3) three factors have been identified that plays a role in the sensitivity of the site. Firstly, is the consideration of the conservation status of the vegetation type present. The SPP site is located within the highveld Alluvial Vegetation, which is classified as Least Threatened, however the northern sections of the two grid connection corridor alternatives are located within the threatened Vaal-Vet Sandy Grassland, which is listed as an Endangered ecosystem. Secondly, disturbance has been undertaken within the areas proposed for development, which includes crop cultivation or grazing, that has resulted in a relatively low species diversity. And lastly, wetlands have been confirmed to be present adjacent to the SPP site, with small sections of the wetlands and river infringing into the SPP site as well as the grid connection corridors. These freshwater features have a higher connectivity to other systems.

The grassland areas cultivated lands and previously cultivated lands make up the majority of the site. Based on the site conditions recorded, a sensitivity rating of **low** has been applied.

Wetlands and a river are located within the surrounding area which have been identified by the specialist as being of a **high** sensitivity due to the higher connectivity to other systems. Small sections of the wetlands and the river infringes into the SPP site, mainly along the western boundary and within

the northern corner. The specialist has recommended a 32m buffer around the features within which no disturbance must take place. These areas associated with the features (including the recommended 32m buffer) are therefore considered to be no-go to development. The developer has taken these no-go areas into consideration for the placement of infrastructure and have avoided these areas as required by the specialist (refer to Figure G).

When considering the two grid connection corridor alternatives, both options are located within grassland and disturbed areas. Therefore, majority of the two corridors are considered to be of a **low** sensitivity. The wetlands surrounding the site also crosses the grid connection corridor alternatives in three places, once near the SPP, once in the centre and once near the existing Eskom substation which is proposed to be the connection point into the national grid. The specialist indicates that both alternatives can be supported from a terrestrial biodiversity perspective and that disturbance must be kept to a minimum and mitigation measures must be adhered to.

Overall from a terrestrial biodiversity perspective, areas have been identified as no-go for the development of the SPP and the associated infrastructure, however these areas have been avoided by the developer through the careful placement of infrastructure outside of these areas (and associated buffers) considered to be of a high sensitivity. It must be noted that even though the grid connection will cross the existing wetlands, the specialist has indicated that the power line infrastructure (for either of the alternatives) will be acceptable but that disturbance must be kept to a minimum.

<u>Wetlands (aquatic biodiversity)</u>:

From a wetland perspective (Wetland Impact Assessment, Appendix H3), the specialist has identified wetlands and a river located within the surrounding areas of the site. Small sections of the wetlands and river infringe into the SPP site, mainly along the western boundary and within the northern corner. The wetlands surrounding the site also crosses the grid connection corridor alternatives in three places, once near the SPP, once in the centre and once near the existing Eskom substation which is proposed to be the connection point into the national grid. The freshwater features identified can be classified as a river (including an active channel and the associated riparian zone), a channeled valley bottom wetland and an exorheic depression (pan).

The freshwater features have been identified as no-go areas for development and disturbance. The specialist has recommended a 32m buffer around the wetlands and river within which no disturbance must take place. The developer has taken these no-go areas into consideration for the placement of infrastructure and have avoided these areas as required by the specialist (refer to Figure H2).

The development of either of the grid connection corridor alternatives will result in the power line (and the associated service road) crossing the wetland features. The specialist indicates that this infringement is considered appropriate as long as the disturbance within the features are kept to a minimum.

Furthermore, the wetlands are located within 500m of the proposed development and therefore a Water Use License Application will need to be lodged with the Department of Water and Sanitation in accordance with the National Water Act, Section 21.

Considering the above, no-go areas have been identified for the development of the SPP and associated infrastructure from an aquatic biodiversity perspective, however these areas have been avoided by the developer through the careful placement of infrastructure outside of these areas (and associated buffers) considered to be no-go for development. It must be noted that even though the grid connection will cross the existing wetlands, the specialist has indicated that the power line infrastructure (for either of the alternatives) will be acceptable but that disturbance must be kept to a minimum.

Avifauna:

No specific areas of sensitivity have been identified from an avifauna perspective (Avifauna Impact Assessment, Appendix H4). Therefore, from an avifauna perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Visual:

No specific areas of sensitivity have been identified from a visual perspective (Visual Impact Assessment, Appendix H5). Therefore, from a visual perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Heritage:

From a heritage (archaeological) perspective (Heritage Impact Assessment, Appendix H6), two heritage resources were identified within the SPP site (none were recorded along the two grid connection corridor alternatives). These resources are considered to be of cultural significance, and include:

- An informal burial site with probably more than 5 graves, with most of the graves only marked with stone cairns (referred to as site 7.3.1 in the Heritage Impact Assessment Report). The graves with dated headstones date to the 1970s. No other signs of habitation could be detected. This site is located within the central portion of the SPP site.
- The remains of an extensive farmstead, which seems to have consisted of a main house, outbuildings and cattle enclosures (referred to as site 7.3.2 in the Heritage Impact Assessment Report). This site is located within the north-western corner of the SPP site.

Considering the cultural significance of the two identified sites, specific measures for the protection of the resources have been put forward by the heritage specialist for implementation. These include:

- Site 7.3.1 Burial sites and graves – Avoidance and preservation of the burial must be undertaken, and its exact size must be determined. Furthermore, the site must be fenced off permanently by means of a wire fence or brick wall, with a buffer zone of at least 100m. The site and the associated buffer area is considered to be a no-go area for development and will need to be avoided. As the site is located within the area proposed for development of the

SPP, the layout/development footprint of the SPP will have to adhere to the required avoidance / preservation of this heritage resource. Should it not be possible avoid the burial site the developer can consider undertaking the relocation of the graves. This would entail additional design and construction inputs, excavation of the site through archaeological techniques, documenting of the site (map and photograph) and analyse the recovered material to acceptable standards.

- Site 7.3.2 Structures older than 60 years (Farmstead) – The specialist indicates that no further action is required due to the fact that the site/features have been rated to be of such low significance that it does not warrant further documentation as it is considered to be fully documented after inclusion in this report.

Based on the recommendations made by the heritage specialist, the developer has amended the SPP layout (i.e. the placement of infrastructure has shifted) in order to avoid the sites of cultural significance (i.e. the burial site) as recommended by the specialist. This will ensure that the layout of the placement of infrastructure is appropriate from a heritage perspective. Refer to Figure G for the layout map.

Palaeontology:

The palaeontological sensitivity of the SPP, and the two grid connection corridor alternatives have been confirmed as being of a **low** sensitivity (Palaeontological Impact Assessment, Appendix H7). The only fossils recorded for the project comprise locally common, small blocks of petrified wood with downwasted surface gravels and gully-eroded aeolianites (wind-blown sands). These fossil wood blocks have been reworked from the underlying Adelaide Subgroup bedrocks and are of widespread occurrence in the region. Their scientific and conservation value is assessed as low and therefore no special mitigation measures are proposed. Therefore, from a palaeontological perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Social:

No specific areas of sensitivity have been identified from a social perspective (Social Impact Assessment, Appendix H8). Therefore, from a social perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

Traffic:

No specific areas of sensitivity have been identified from a traffic perspective (Traffic Impact Assessment, Appendix H9). Therefore, from a traffic perspective, no areas/road aspects have been identified as no-go for the development of the SPP and associated infrastructure.

Agriculture:

The agricultural sensitivity of the SPP, and the two grid connection corridor options have been confirmed as being of a **medium** sensitivity (Agricultural Compliance Statement, Appendix H10). The DFFE Screening tool indicates land on site with a high sensitivity as a result of it being classified as cultivated land. However, most of the areas indicated as high have not been cultivated for more than 10 years and should therefore no longer be classified as cultivated land or have high sensitivity. One

area of 25 hectares has been cultivated more recently. However, this land has been assessed as having very limited viability for the production of cultivated crops. Its limited potential means that the site is not a priority for the conservation of agricultural land use. Considering the characteristics of the site, no specific areas of sensitivity have been identified by the specialist that needs to be considered for the placement of infrastructure. Therefore, from an agricultural perspective, no areas have been identified as no-go for the development of the SPP and associated infrastructure.

6.5 METHOD OF ENVIRONMENTAL ASSESSMENT

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

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

6.5.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 6.7: The impact 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 Final 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 this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 7.1 below.

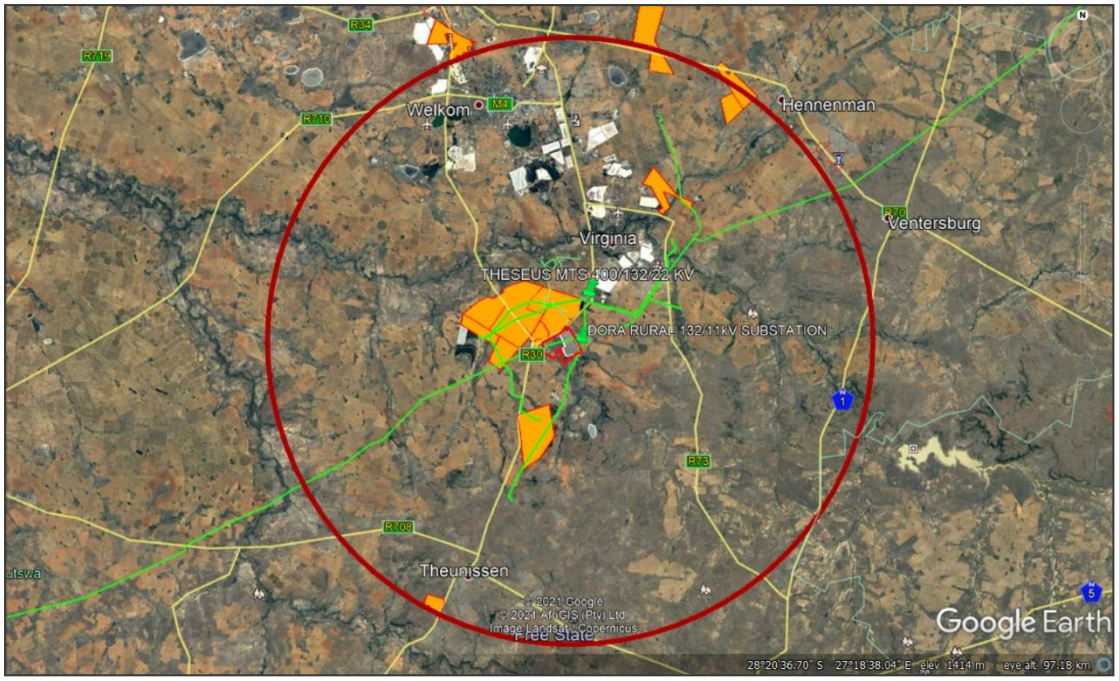


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

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

7.3 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2023 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 DEFF's database 10 solar PV plant applications have been submitted to the Department within the geographic area of investigation - refer to Table 7.1.

Table 7.1: A summary of related 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
Kalkoenkrans	2.6km	19 MW	12/12/20/2669	BAR	Approved
Palmietkuil No. 328	4.7km	19.9 MW	12/12/20/2666/A	BAR	Approved
Leeubult No. 52	5.7km	19.9 MW	12/12/20/2668	BAR	Approved
Palmietkuil No. 328	4.7km	19 MW	12/12/20/2666	BAR	Approved
Leeubult	5.7km	14 MW	12/12/20/2667	BAR	Approved
Onverwag No. 728 and PTN 2 of the farm Vaalkranz No. 220	17km	75 MW	14/12/16/3/3/2/580	Scoping and EIA	In Process
Oryx solar energy facility	2km	75 MW	14/12/16/3/3/2/526	Scoping and EIA	In Process
Sonvanger PV	28km	75 MW	14/12/16/3/3/2/672	Scoping and EIA	Approved
Everest Solar PV	29km	75 MW	14/12/16/3/3/2/512	Scoping and EIA	In Process
Uitkyk RE/509, Helderwater RE/494 and	29km	75 MW	14/12/16/3/3/2/581	Scoping and EIA	In Process

Doornpan 1/426					

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

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) 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.

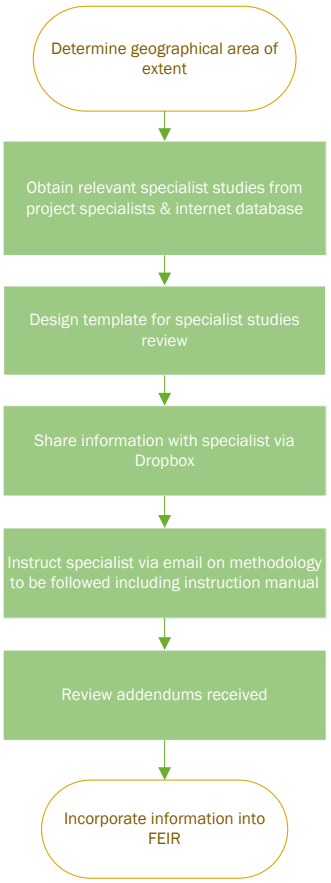


Figure 7.2: Process flow diagram for determining cumulative effects

7.5.1 Geology

No specific cumualtive impacts have been identified from a geological perspective for the development of the Springbok Solar Power Plant. Therefore, no further consideration is given to geology considering potential cumualtive impacts. Refer to Appendix H2.

7.5.2 Soil, Land Capability and Agricultural Potential

In quantifying the cumulative impact, the area of land taken out of grazing as a result of these nine projects plus this one (total generation capacity of 598 MW) will amount to a total of approximately 1,495 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to only 0.53% of the surface area. That is considered to be within an acceptable limit in terms of loss of agricultural land that is only suitable for grazing, of which there is no scarcity in the country. This is particularly so when considered within the context of the following point:

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has very little cultivation potential, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of accept able agricultural land loss are far higher in this region than in regions with higher agricultural potential. As discussed above, the risk of a loss of agricultural potential by soil degradation is low and can effectively be mitigated for renewable energy developments. If the risk for each individual development is low, then the cumulative risk is also low.

It should be noted that, apart from renewable energy, mining also competes for agricultural land in the area, and so the total cumulative loss of agricultural land from all competing land uses will be slightly higher than what has been considered above. Nevertheless, the overall loss is still considered to be small and acceptable. 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.

Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact is also assessed as negligible.

7.5.3 Ecology and Wetlands

The Terrestrial Biodiversity Impact Assessment (refer to Appendix H3) and the Wetland Impact Assessment (Appendix H3) 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.

If for instance 250 ha of natural habitat for a protected tree species is locally destroyed and in the process 2,000 individual specimens of this species is destroyed, looking at this scenario from a cumulative impact perspective, if another five such developments take place in similar habitat within a short distance from each other, an estimated 12,000 specimens of this species will be cumulatively lost, which may then have a regional detrimental impact on the gene pool of that particular species as well as other species that are dependent on its presence in the ecosystem.

Currently limited data exists to measure and monitor the cumulative impact that the proposed type of development will have on a local and/or regional scale. Research in this regard is therefore urgently proposed. As mitigation for any cumulative impact this development may have, it is also proposed that where practically possible, a buffer of at least 100m (preferably more) of natural vegetation be left undisturbed surrounding this type of development in order to promote and preserve the flow of ecosystem services and gene pools along these corridors as well as the necessary habitat for threatened, protected or other habitat sensitive species.

7.5.4 Avifaunal

The Avifaunal Study (refer to Appendix H4) states that 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 Springbok 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), focussing the development on already disturbed zones (or favouring the eastern half of the site), 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.

Implementing successful mitigations would reduce the cumulative impacts of displacement of priority species by 32% to Medium-Negative, would reduce the cumulative impacts of displacement of resident avifauna by 24% to an acceptable Low-Negative score, and would reduce the cumulative impacts of loss of important avian habitats by 28% to Medium-Negative.

To reduce some of the anticipated cumulative impacts associated with powerline collisions, it is recommended that the powerline owners of the existing 132 kV and 88 kV lines that cross and border the site be fitted with bird flight diverters, at sections as directed by an avifaunal specialist. Implementing this mitigation should reduce the collision impact by 49% and achieve an anticipated Medium-Negative impact rating. Implementing successful mitigations along the powerline should reduce the impact rating for cumulative displacement resident avifauna by 13% down to an acceptable Low-Negative score, however cumulative displacement of priority avian species would reduce by 24% but would still be in the Medium-Negative category.

7.5.5 Social Impact Assessment

The Social Impact Assessment (refer to Appendix H8) indicate that from a social impact point of view the project represents an important development opportunity for the communities surrounding Springbok 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.

7.5.6 Visual Impact Assessment

The Visual Impact Assessment (refer to Appendix H5) 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 surround 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.

7.5.7 Heritage Impact Assessment

The Heritage Impact Assessment (Appendix H6) 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 Springbok project is located in an area with a very low presence of heritage sites and features. The cultural heritage profile of the larger region is very 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 area of the proposed for development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

7.5.8 Palaeontology

According to the Palaeontological Impact Assessment (Refer to Appendix H7), 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. While the potential for fossils within the Beaufort Group bedrocks is noted, a LOW palaeontological impact significance is inferred for most the projects concerned, given the extensive coverage by low sensitivity superficial sediments.

In the author's opinion:

- Palaeontological impact significances inferred for renewable energy projects, where these are assessed at all, may well reflect different assessment approaches rather than contrasting palaeontological sensitivities and impact levels;

- Meaningful cumulative impact assessments require comprehensive data on *all* major developments within a region, not just those involving renewable energy, as well as an understanding of the extent to which recommended mitigation measures are followed through;

- Trying to assess cumulative impacts on different fossil assemblages from different stratigraphic units (for example, Precambrian stromatolites from 2.6 billion years ago *versus* Pleistocene alluvial deposits less than 2.5 million years old) has limited value.

- Field-based (or even desktop) palaeontological data is not available for many or most of the relevant renewable energy projects, seriously limiting the value of any cumulative impact analysis.

7.5.9 Traffic Impact Assessment

The impact of the construction traffic on the general traffic and the surrounding communities along the haulage route is considered to be low. All the components will be transported by truck from Durban or Saldanha the site using the routes as defined. Both these routes are of acceptable standard and should not impede travel from a riding quality perspective, both these routes should also be able to accommodate the additional traffic. No abnormal loads will be transported to the site. The access to the site will be obtained via the road R730. The development of a solar farm on the farm Weltevrede No. 638 in the Free State Province is therefore supported from a traffic engineering perspective but

may result in a slight cumulative impact if other projects in the area are approved, it is however unlikely that construction for PV projects will kick off simultaneously. Refer to the Traffic Impact Assessment (Appendix H9).

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. Numerous specific VECs have been identified with reference to the Springbok Solar Power Plant (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 of the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial and Biodiversity Survey	Habitat loss owing to clearing of vegetation	Clearing of vegetation at the proposed Solar Plant footprint. This will entail the partial destruction of habitat of low or medium sensitivity.	- Medium
	Removal of sensitive species	Cumulative impacts could have an amplified effect on the loss of sensitive species. Sensitive species: Presence of Threatened or Near Threatened Mammals, Reptiles, Amphibians and Invertebrates at the site appear to be unlikely. This means by avoidance highly sensitive species are not impacted by the proposed development and therefore do not contribute to the cumulative impacts on highly sensitive species such as threatened species.	- Low

	Fragmentation of corridors of particular conservation concern	Owing to the possibility of a number of solar plants to be developed in the local area the possible impact to fragmentation of the landscape and loss of corridors are real. Otherwise, there are no indications of any particular linked or stepping stone corridors of particular conservation importance at the site.	- Low
Wetland Assessment	Loss of vegetation within 500 m from the wetlands outside the footprint proposed for the developments.	The riparian area and pan at the site and in the vicinity site, all with their buffer zones (32 m) excluded from the proposed footprint are important as part of a stepping stone biodiversity corridor system in the larger area	- Low
Avifaunal Impact Assessment	Displacement of resident avifauna	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Low
	Loss of important avian habitats	The displacement of priority avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Low

Agricultural and Soils Impact Assessment	Loss of agricultural land	It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has very little cultivation potential, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential. Furthermore, there are no significant other land uses, apart from renewable energy, that are competing for agricultural land in the area, and so the total cumulative loss of agricultural land from all competing land uses is not significantly higher than what has been considered above.	- Low
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	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. For the purpose of 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)	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. While the potential for fossils within the Beaufort Group bedrocks is noted, a LOW palaeontological impact significance is inferred for most the projects concerned, given the extensive coverage by low sensitivity superficial sediments.	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Springbok SPP and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Springbok SPP alone.	+ Medium
	Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.	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.	- Medium

		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.	
Traffic Impact Study	Increase in construction vehicles	The construction of the solar power plants will have a minimal impact on the current traffic volumes for long distance transportation routes. The chances of local traffic being adversely affected by the construction traffic is considered extremely low. The construction of the solar power plants will have a definite positive impact on communities of the surrounding towns. As the construction of the solar power plants is of short-term duration, the impacts on the surrounding area will only be temporary. All of the impacts are completely reversible, as the project is of short duration. The significance of the above-mentioned impacts is low, as they are only temporary and extend over a short time period.	- Low
Operational Phase			
Terrestrial Biodiversity Survey	Emissions and pollutants into air, water and soil	Overall emissions and pollutants from solar plants are limited when operational. During the operational phase cumulative impacts to the pollution of soils could happen. Rubble or waste could lead to infiltration of unwanted pollutants into the soil. Spilling of petroleum fuels and unwanted chemicals onto the soils that infiltrate these soils could lead to pollution of soils and if this happens at a number of solar plants in an area, the cumulative effect could be detrimental to the local environment.	- Low
	Fragmentation of corridors of particular conservation concern	Owing to the possibility of a number of solar plants to be developed in the local area the possible impact to fragmentation of the landscape and loss of corridors are real. At the site there are two small wetland depressions	- Low

		(pans) and their buffer zones which are set aside as no-go area for developments in the proposed lay-out of the development. Otherwise, there are no indications of any particular linked or steppingstone corridors of particular conservation importance at the site.	
Wetland Assessment	Establishment of alien invasive plant species at cleared areas.	At the site there is a riparian area and pan and their buffer zones which are set aside as no-go area for developments in the proposed lay-out of the development. Alien invasive plant species infest hitherto cleared areas and occupy habitat which is then unavailable for indigenous species. Alien invasive species could then spread from these "source" areas to nearby wetlands.	- Low
Avifaunal Impact Assessment	Collisions when flying into power line infrastructure	Collisions with power line infrastructure leading to injury or loss of avian life are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Medium
	Electrocutions when perched on power line infrastructure	Electrocutions when perched on power line infrastructure are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Low
Visual Impact Assessment	Visual impacts related to the SPP and power line	The anticipated cumulative visual impact of the proposed SPP is expected to include the change in sense of place, as well as the precedent being set for SPP in the area where currently there is only a precedent for agricultural and mining related activities. Due to the number of mines in the area, the scenic quality of the region is low, further construction and operation of the SPP in the area is likely to have a negative impact.	- Medium

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. For the purpose of 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
Decommissioning Phase			
Visual Impact Assessment	Visual Intrusion	The decommissioning of the PV plant and 132kV power line may increase the cumulative visual impact together with farming activities and mines and people using the existing gravel roads adjacent to site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to take into account.	- Low
Other	Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

This chapter of the Final EIR addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area, however none are currently proposed within a 30km radius from the Springbok SPP site.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
    - Habitat loss owing to clearing of vegetation (- Medium)
    - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
    - Impact with large-scale in-migration of people (- Medium)
- Cumulative effects during the operational phase:
    - Collisions when flying into power line infrastructure (- Medium)
    - Visual impacts related to the Springbok SPP and power line (- 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 Free State Province. No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of renewable energy, 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. Also, the low acceptable cumulative impacts expected will not result in a whole-scale change of the environment and therefore are considered to be acceptable, and considering the associated positive impacts associated with the development of solar energy facilities the proposed facility is considered desirable.

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 Final EIA report:

- Impacts during construction phase:
  - Habitat destruction caused by clearance of vegetation (- Medium)
  - Creation of direct and indirect employment opportunities (+ Medium)
  - Economic multiplier effects from the use of local goods and services (+ Medium)
  - Temporary increase in traffic disruptions and movement patterns (- Medium)
- Impacts during the operational phase:
  - Habitat destruction caused by clearance of vegetation (- Medium)
  - Displacement of priority avian species from important habitats (- Medium)
  - Collision when flying into power line infrastructure (- Medium)
  - Electrocution when perched on power line infrastructure (- Medium)

- Visual impact of sensitive visual receptors located within a 500m radius of the proposed power line (- Medium)
- Creation of employment opportunities and skills development. (+ Medium)
- Development of non-polluting, renewable energy infrastructure. (+ Medium)
- Contribution to LED and social upliftment (+ High)

➢ Impacts during the decommissioning phase:

- Habitat destruction caused by clearance of vegetation (- Medium)

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity are expected to occur should projects be proposed within a 30km radius from the Springbok SPP site, 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 final layout of the Springbok 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 developer has optimised the facility layout to ensure avoidance of the no-go areas, and the associated buffers, so that the development is effective and appropriate from an environmental suitability perspective.

However, 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

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

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

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required

on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Springbok Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with Theseus MTS 400/132/22kV Substation or to any of the existing 132Kv lines. The Project will inject up to 100MW into the National Grid. The installed capacity will be approximately 150MW.

There are two possible connection line routes proposed to the Theseus MTS 400/132/22kV Substation. Option 1 (preferred) is approximately 5.25km and option 2 (alternative) is approximately 5.3km long. Both options are located north-east of the project footprint. The proposed power line was assessed within a 100m wide corridor.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.
- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:

  - Office (~200m²);
  - Switch gear and relay room (~400m²);
  - Staff lockers and changing room (~200m²); and
  - Security control (~60m²)

- Battery storage – Up to 500 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m^3 of batteries and associated operational, safety and control infrastructure.
- Roads – Access will be obtained via the S239 gravel road off the R730 Regional Route. 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 competent authority.

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017) and the public participation plan - 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.
- Option 1 of the grid connection alternatives is preferred from an environmental perspective and is therefore recommended for approval as part of the EA.

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 and appropriate mitigation measures recommended 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 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 Springbok Solar Plant and associated infrastructure, Registration Division Welkom, Free State 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 power plant (and associated infrastructure) 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 and obtaining of the relevant fauna and flora permits must be undertaken prior to construction.
- A search, rescue and relocation report should be compiled and then 30 - 50% of the *Gladiolus woodii* plants on site should be relocated.
- 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 final decision in this regard.

Ms Lisa Opperman
Environamics Environmental Consultants

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