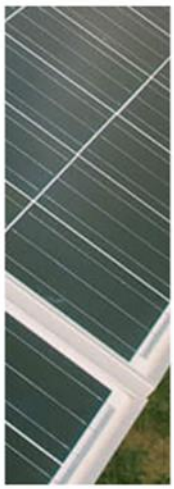
ENVIRONMENTAL IMPACT REPORT

Draft – 21 April 2023

STEENBOK SOLAR 1 AND STEENBOK SOLAR 2 NEAR BLOEMFONTEIN, FREE STATE PROVINCE



ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No. : 14/12/16/3/3/2/2235

Project Title : Steenbok Solar 1 and Steenbok Solar 2 near Bloemfontein, Free State Province

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Client : Steenbok Solar (Pty) Ltd

Report Status : Draft Environmental Impact Assessment Report

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GLOSSARY OF TERMS AND ACRONYMS

BESS	Battery Energy Storage System
BID	Background Information Document
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and the Environment
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
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SR	Scoping Report
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) facilities 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), 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 projects are intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programmes/opportunities to generate and supply power in South Africa[1]. 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 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, Steenbok Solar (Pty) Ltd is proposing the development of two individual photovoltaic solar facilities, each with its own associated infrastructure for the purpose of commercial electricity generation on the Remaining Extent of the Farm Floradale No. 15. A site has been identified for each development within the affected property by the Applicant as suitable areas for the placement of the infrastructure from a technical perspective. Two sites of approximately 160ha and

[1] Should Steenbok Solar 1 and Steenbok Solar 2 not be successful in the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) process it could also be used for private off-take. However, the Applicant confirms that the main intention is to bid the proposed developments as part of the REIPPP Programme. Government Gazette No. 44989, dated 12 August 2021, amended the threshold for self-generation facilities from 1MW to 100MW. This amendment allows an Independent Power Producer (IPP) of up to 150MW to sell electricity to an end-user customer who consumes the power itself.

158ha have been provided by the Applicant for assessment as part of the EIA process. The development footprints of each individual project will be designed within the two respective sites which will consider the placement on the project infrastructure in environmentally appropriate locations through the avoidance of sensitive environmental features which may be present. Each project entails the generation of up to 35MW electrical power through photovoltaic (PV) technology. From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2129.2 kwh/m^2.

It must be noted that a separate Basic Assessment (BA) process will be undertaken by Environamics for the grid connection infrastructure to be developed to enable the evacuation of the generated electricity. The development will be known as the Steenbok Grid Connection and will include a grid connection corridor in which the placement of a new 132kV power line and switching substation(s) will be assessed and Environmental Authorisation (EA) sought for.

EXECUTIVE SUMMARY

The Mangaung Metropolitan Municipality identified five strategic development objectives for the municipal area as part of the 2022/2027 Draft Integrated Development Plan (IDP). The objectives include spatial transformation, economic growth, service delivery improvement, financial health improvement and organisational strength. With these objectives the Municipality also identifies strategic risks to enable early warning in terms of the city's planning, implementation and monitoring to achieve the objectives. These risks include, but are not limited to climate change, pollution, drought, flooding, loss of natural resources, high unemployment rates, financial instability, financial viability, technological failure and skills shortage.

Steenbok Solar (Pty) Ltd intends to develop two individual 35MW photovoltaic solar facilities and the respective associated infrastructure for each development on the Remaining Extent of the Farm Floradale No. 15, Registration Division Bloemfontein, Free State Province situated within the Mangaung Metropolitan Municipality area of jurisdiction. The town centre of Bloemfontein is located approximately 17km south of the proposed developments (refer to Figure A and B for the locality and regional map). A site has been identified for each development within the affected property by the Applicant as suitable areas for the placement of the infrastructure from a technical perspective. Two sites of approximately 160ha and 158ha have been provided by the Applicant for assessment as part of the EIA process. The development footprints of each individual project have been designed within the two respective sites which indicates the placement on the project infrastructure in environmentally appropriate locations through the avoidance of sensitive environmental features which may be present. The two respective development footprints are therefore under assessment as part of this draft EIA Report and have also been considered by the independent specialists.

The affected property and the two respective sites proposed for the developments was identified by the Applicant 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). The desirability of the two respective sites was confirmed as part of the Scoping Phase which is based on the sites providing an opportunity for the appropriate placement of infrastructure within the affected environment.

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 Steenbok Solar 1 and Steenbok Solar 2 solar energy facilities. The following listed activities have been identified with special reference to the proposed developments 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 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*

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

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

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

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

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

- Activity 4 (b)(i)(bb)(gg) (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, (bb) within a National Protected Area Expansion Strategy Focus Area, and (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve."*

- Activity 10 (b)(i)(bb)(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,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 12 (b)(i)(iv) (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 and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."

- Activity 18 (b)(i)(bb)(gg)(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, within (bb) National Protected Area Expansion Strategy Focus areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve 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 facilities which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 and 324) implies that the developments could potentially have an impact on the environment that will require mitigation. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24 of the EIA Regulations in order to obtain Environmental Authorisation. Environamics has been appointed as the independent consultant to undertake the Environmental Impact Assessment (EIA) on behalf of Steenbok Solar (Pty) Ltd.

Environamics requested for the submission of a single Application for Environmental Authorisation for the EIA process for the two individual solar energy facilities. A request was submitted to the Department of Forestry, Fisheries and the Environment (DFFE) in terms of Regulation 11 of the EIA Regulations. According to Regulation 11(1) an Applicant that intends to undertake one or more than one activity of the same type at different locations within the area of jurisdiction of a competent authority, may submit a written request to the competent authority for the submission of a single application.

Considering that two solar energy facilities are proposed by the Applicant on the same affected property, the competent authority (DFFE) granted permission for the submission of a single Application via a letter dated 12 October 2022 (refer to Appendix H1). The Application for Environmental Authorisation is therefore being processed as a consolidated assessment process, but the potential environmental impacts of each activity will be considered in terms of the location where the activity is to be undertaken, as per the requirements of the EIA Regulations. Therefore, the following is relevant in terms of this EIA process:

- A single Application for Environmental Authorisation will be submitted to DFFE;
- A single Draft Scoping Report and a single Final Scoping Report was submitted to the DFFE during the Scoping Phase;
- A single Draft EIA Report and a single Final EIA Report will be relevant which cover both developments equally and assesses the impacts separately;
- Specialist reports have been combined into a single report per field of study;
- Separate EMPRs are submitted for the individual projects as part of this draft EIA Report; and

- Separate decisions on the Application for Environmental Authorisation will be issued (i.e. 2 decisions in total).

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 that the activity and associated structures and infrastructure will impose on the preferred sites, 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 developments will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land and provide an opportunity for the consolidation of impacts within the affected landscape based on the location of the developments directly adjacent to one another. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development, as identified and assessed, 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 12-18 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation and socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and temporary increase in traffic disruptions and movement patterns.

Impacts during the operational phase:

During the operational phase the sites will serve as solar PV energy facilities and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with habitat destruction caused by clearance of vegetation, collision and electrocutions of avifauna and visual impact of sensitive visual receptors located within a 1km radius of the proposed facilities. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development and social upliftment.

Impacts during the decommissioning phase:

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

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of Forestry, Fisheries and Environment database and local knowledge provided by the Applicant eight (08) other solar plants have been proposed, however not in close proximity to the proposed activities.

The potential for cumulative impacts may therefore exist. The draft EIA Report includes an assessment of the potential cumulative impacts associated with the proposed development. No cumulative impacts of a high significance have been identified and no unacceptable change to the environment is expected to occur.

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. This EIA report evaluates and rates each identified impact and identify mitigation measures that may be required. This EIA report also 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 draft EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) for review and commenting on the Application for Environmental Authorisation. This report has also been distributed to the registered interested and affected parties (I&APs) for a 30-day review and comment period. The 30-day review and comment period is from 21 April 2023 to 23 May 2023.

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

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

- Determine the—
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

This report is the Draft Environmental Impact Report (EIR) that has been submitted to the Department of 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 be allowed the opportunity to review and provide comment the report. The Draft EIR has been made available to registered I&APs and all relevant State Departments for a 30-day review period from **21 April 2023 to 23 May 2023**. These stakeholders and individuals have been requested to provide written comments on the Draft EIR within the allocated timeframe. All issues raised and identified during this review period will be documented and compiled into a Comments and Response Report as part of the Final EIR (Appendix C6). All comments received during the Scoping Phase are available in the Comments and Response Report as referred to above, as well as Appendix C4 and C5 of this Draft EIR.

The EIA Regulations No. 324, 325 and 327 outline the activities that may be triggered and therefore require EA. The listed activities, with special reference to the respective developments, that are triggered is included in Table 1.1.

Table 1.1: Listed activities[2]

Relevant notice:	**Activity No (s)**	**Listed Activity**	**Description of each listed activity as per project description**:	
			Steenbok Solar 1	**Steenbok Solar 2**
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 infrastructure for the distribution of electricity will include an on-site facility substation with a capacity of 33kV/132kV to be located within the assessed site.	Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include an on-site facility substation with a capacity of 33kV/132kV to be located within the assessed site.
GNR. 327 (as amended in 2017)	Activity 14	*"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*	Activity 14 is triggered since the proposed BESS will contain electrolyte solutions considered to be dangerous goods. Although the BESS itself is not considered to be a facility for storage of dangerous goods, rather the function of BESS is to store energy. The total volume of electrolytes solution used in the BESS may exceed 80m^3 but will be less than 500m^3, which depending on the technology selected may be stored temporarily on-site during battery assembly.	Activity 14 is triggered since the proposed BESS will contain electrolyte solutions considered to be dangerous goods. Although the BESS itself is not considered to be a facility for storage of dangerous goods, rather the function of BESS is to store energy. The total volume of electrolytes solution used in the BESS may exceed 80m^3 but will be less than 500m^3, which depending on the technology selected may be stored temporarily on-site during battery assembly.

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

			The solar energy facility will only require the installation of a standard diesel storage tank, which will have a capacity of less than 30m^3.	The solar energy facility will only require the installation of a standard diesel storage tank, which will have a capacity of less than 30m^3.
GNR. 327 (as amended in 2017)	Activity 24(ii)	*"The development of a road (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.*	Activity 24(ii) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road with 1 m drainage on each side). The perimeter road will be up to 8m in width.	Activity 24(ii) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road with 1 m drainage on each side). The perimeter road will be up to 8m in width.
GNR. 327 (as amended in 2017)	Activity 28(ii)	*"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*	Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of Steenbok Solar 1 will be up to 86 hectares, to be placed within the 160 hectare area assessed.	Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of Steenbok Solar 2 will be up to 86 hectares, to be placed within the 158 hectare area assessed.
GNR. 327 (as amended in 2017)	Activity 56(ii)	*"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*	Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres.	Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres.
GNR. 325 (as	Activity 1	*"The development of facilities or infrastructure for the generation of electricity from a renewable resource*	Activity 1 is triggered since Steenbok Solar 1 will generate up to 35	Activity 1 is triggered since Steenbok Solar 2 will generate up to 35

amended in 2017)		*where the electricity output is 20 megawatts or more."*	megawatts electricity through the use of a renewable resource.	megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	*"The clearance of an area of 20 hectares or more of indigenous vegetation."*	In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of Steenbok Solar 1 will be up to 86 hectares, to be placed within the 160 hectare area assessed.	In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of Steenbok Solar 2 will be up to 86 hectares, to be placed within the 158 hectare area assessed.
GNR. 324 (as amended in 2017)	Activity 4 (b)(i)(bb)(gg)	"*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, (bb) within a National Protected Area Expansion Strategy Focus Area, and (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or*	Activity 4 (b)(i)(bb)(gg) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road with 1 m drainage on each side). The perimeter road will be up to 8m in width Steenbok Solar 1 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the	Activity 4 (b)(i)(bb)(gg) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road with 1 m drainage on each side). The perimeter road will be up to 8m in width Steenbok Solar 2 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of

		from the core areas of a biosphere reserve."	NPAES[3] and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.	NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.
GNR. 324 (as amended in 2017)	Activity 10 (b)(i)(bb)(gg)(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, (i) outside urban areas,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland;*	Activity 10(b)(i)(bb)(gg)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel, oils and electrolytes) in containers with a capacity just over 80 cubic metres. Steenbok Solar 1 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east	Activity 10(b)(i)(bb)(gg)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel, oils and electrolytes) in containers with a capacity just over 80 cubic metres. Steenbok Solar 2 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east

[3] National Protected Area Expansion Strategy

		or within 100 metres from the edge of a watercourse or wetland."	and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, a seasonal drainage channel is located within the site proposed for Steenbok Solar 1.	and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, two wetlands are located within the site proposed for Steenbok Solar 2.
GNR. 324 (as amended in 2017)	Activity 12 (b)(i)(iv)	*"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 and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*	Activity 12 (b)(i)(iv) 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. In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered. Furthermore, a seasonal drainage channel is located within the site proposed for Steenbok Solar 1. The development footprint of Steenbok Solar 1 will be up to 86 hectares, to be placed within the 160 hectare area assessed.	Activity 12 (b)(i)(iv) 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. In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered. Furthermore, two wetlands are located within the site proposed for Steenbok Solar 2. The development footprint of Steenbok Solar 8 will be up to 86 hectares, to be placed within the 158 hectare area assessed.

GNR. 324 (as amended in 2017)	Activity 18 (b)(i)(bb)(gg)(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, within (bb) National Protected Area Expansion Strategy Focus areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*	Activity 18 (b)(i)(bb)(gg)(hh) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. Steenbok Solar 1 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, a seasonal drainage channel is located within the site proposed for Steenbok Solar 1.	Activity 18 (b)(i)(bb)(gg)(hh) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. Steenbok Solar 2 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, two wetlands are located within the site proposed for Steenbok Solar 2.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

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

And/or

Contact person:	Marelie Botha
EAPASA Registration:	2021/3834
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	082 493 5166 (Cell)
Electronic Mail:	marelie@environamics.co.za

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

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix E 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	Email
Avifaunal Impact Assessment	Holland and Associates Environmental Consultants	Anja Albertyn	P O Box 31108 Tokai, 7966	Cell: 076 265 8933	anja@hollandandassociates.net
Vegetation Ecological and Wetland Assessment	Enviroguard Ecological Services cc	Prof. L.R. Brown	PO Box 703 Heidelberg 1438	Cell: 082 464 1021	envguard@telkomsa.net
Heritage Impact Assessment (including archaeology and palaeontology)	CTS Heritage	Jenna Lavin	Bon Espirance, 238 Queens Road, Simons Town	Cell: 083 619 0854	jenna.lavin@ctsheritage.com
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	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus, 9515	Tel: 082 316 7749	phala.env@gmail.com
Social Impact Assessment	Donaway Environmental Consultants	Marelie Botha	30 Fouche Street Steynsrus, 9515	Cell: 082 493 5166	phala.env@gmail.com
Transport Impact Assessment	iWink Consulting	Iris Wink	Plattekloof Glen Cape Town	-	iris@iwink.co.za

1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 326. Table 1.3 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A pre-application meeting request was submitted to the DFFE on 13 September 2022.
- The pre-application meeting was held on 12 October 2022 and the meeting notes of the pre-application meeting was accepted by the DFFE via email on 17 October 2022 (Appendix H2).
- The DFFE granted permission for a single consolidated Application for EA as per Regulation 11 of the EIA Regulations via a letter dated 12 October 2022 (Appendix H1).
- A newspaper advertisement was placed in the Bloemnuus on 29 September 2022, informing the public of the EIA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 16 September 2022.
- Site notices were erected on site for both the Steenbok Solar 1 and Steenbok Solar 2 solar energy facilities on 15 September 2022 informing the public of the commencement of the EIA process.
- The Background Information Document providing details of the proposed projects was distributed to the I&AP database on 28 September 2022.
- A single Application Form and the draft Scoping Report covering both Steenbok Solar 1 and Steenbok Solar 2 was submitted to DFFE on 14 November 2022.
- The draft Scoping Report was made available for a 30-day review and comment period from 14 November 2022 to 14 December 2022.
- The Final Scoping Report was submitted to the DFFE for decision-making on 13 January 2023.
- The DFFE accepted the Final Scoping Report (FSR) on 23 February 2023 (Appendix H3).
- The Draft EIR Report has been submitted to the DFFE (and registered I&APs) on 21 April 2023 for the 30-day review and comment period which will be from 21 April 2023 – 23 May 2023.

It is envisaged that the EIA process should be completed within approximately four months of submission of the Final EIR, i.e., by August 2023 – see Table 1.3.

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

Activity	Prescribed timeframe	Timeframe
Site visits and Site Notices	-	15 September 2022
Public participation (BID)	30 Days	28 September 2022
Conduct specialist studies	2 Months	August – mid October 2022
Submit application form and DSR	-	14 November 2022
Public participation (DSR)	30 Days	14 November – 14 December 2022
Submit FSR	44 Days	13 January 2023
Approval of Final Scoping Report	43 Days	23 February 2023
Submit Draft EIR & EMPr	106 Days	21 April 2023
Public participation (DEIR)	30 Days	21 April - 23 May 2023
Submission of FEIR & EMPr	-	End May 2023
Decision	107 Days	August/start September 2023
Department notifies of decision	5 Days	September 2023
Registered I&APs notified of decision	14 Days	September 2023
Appeal	20 Days	September 2023

1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORTS

The table included below provides an indication of the specialist studies identified by the DFFE Screening Tool Reports for both Steenbok Solar 1 and Steenbok Solar 2 (Appendix B), as well as an indication of whether the studies were undertaken or not and a motivation or confirmation of the studies being included or not. Refer to Appendix D for the Site Verification Report.

During the pre-application meeting the DFFE official indicated that separate Screening Tool Reports must be included in the Report for the two respective proposed developments. The table below therefore includes the results for both the Steenbok Solar 1 and Steenbok Solar 2 Screening Tool Reports.

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

Study identified in the DFFE Screening Tool Reports and sensitivity	Study included?	Confirmation / motivation
Agricultural Impact Assessment **Sensitivity** Steenbok Solar 1: Medium Steenbok Solar 2: Medium	Yes	An Agricultural Compliance Statement is included in Appendix E4 which confirms the medium sensitivity of the sites. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Landscape / Visual Impact Assessment **Sensitivity** Steenbok Solar 1: Very High Steenbok Solar 2: Very High	Yes	A Visual Impact Assessment is included in Appendix E3. The Zone of Theoretical Visibility (ZTV) undertaken in the Visual Impact Assessment indicates that both projects will have a negative low visual impact on the surrounding environment within a 20km radius. The sensitivity rating of very high indicated in the Screening Tool Report is therefore disputed.
Archaeological and Cultural Heritage Impact Assessment **Sensitivity**	Yes	A Heritage Impact Assessment is included in Appendix E5. The Heritage Impact Assessment includes the assessment of archaeology and cultural heritage. No archaeological remains have been

Steenbok Solar 1: Low Steenbok Solar 2: Low		documented and impacts to significant fossil heritage resources are unlikely. This confirms the low sensitivity of the sites indicated in the Screening Tool Report.
Palaeontological Impact Assessment **Sensitivity** Steenbok Solar 1: Medium Steenbok Solar 2: High	Yes	A Heritage Impact Assessment is included in Appendix E5. The Heritage Impact Assessment includes the assessment of palaeontological heritage.
Terrestrial Biodiversity Impact Assessment **Sensitivity** Steenbok Solar 1: Very High Steenbok Solar 2: Very High	Yes	A Vegetation Ecological and Wetland Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment **Sensitivity** Steenbok Solar 1: Very High Steenbok Solar 2: Very High	Yes	A Vegetation Ecological and Wetland Impact Assessment is included in Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Civil Aviation Assessment **Sensitivity** Steenbok Solar 1: Low Steenbok Solar 2: Medium	No	New Tempe Airport is located 7.5km south-west of the Steenbok Solar 2 site. Based on the location of the project within 8km of the operational airport a sensitivity of medium is indicated by the Screening Report. The EAP has undertaken a Civil Aviation Site Verification Report as required (Appendix D), which disputes the medium sensitivity rating based on the current land use of the site and the location of the proposed development adjacent to existing infrastructure such as

		regional roads and existing grid connection infrastructure. The Civil Aviation Authority has also been consulted regarding the development of the project since the commencement of the EIA Process (Proof of correspondence is included in Appendix C4). No specific negative impacts or issues have been raised to date by the CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity. Furthermore, the following I&APs have also been identified in terms of the impact of the developments on Civil Aviation which includes Chute Systems, Eagle Flight Academy, Bloemfontein Flying Club and 87 Helicopter Flying School which operate in the area. Comments have been sought from these I&APs.
Defense Assessment **Sensitivity** Steenbok Solar 1: Medium Steenbok Solar 2: Medium	No	The EAP has undertaken a Defense Site Verification Report as required (Appendix D). The site verification report disputes the medium sensitivity of the Screening Reports as the closest military operations are the Tempe Military Base located ~14km south of the affected property and the Bloemspruit Airforce Base located ~17km south-east of the affected property. The South African Department of Defence has been identified as an I&AP and has been notified of the developments since commencement of the EIA process. No comments have been received to date.
RFI Assessment **Sensitivity**	No	The EAP has undertaken a RFI Site Verification Report as required (Appendix D). The site verification is inconclusive based on the sensitivity being related to a Weather

Steenbok Solar 1: High Steenbok Solar 2: High		Radar installation located between 18 and 30 km from the proposed developments. No desktop information could be sought, and no on site evidence of the high sensitivity was available / identified during the site inspection. As the sensitivity is related to the installed Weather Radar, the South African Weather Service has been included as an I&AP for the developments and comment will be sought in this regard. The South African Radio Astronomy Observatory (SARAO) has also been consulted regarding the development of the projects since the commencement of the EIA Process. No specific negative impacts or issues have been raised to date by the SARAO regarding the projects.
Geotechnical Assessment **Sensitivity** Steenbok Solar 1: Not Indicated Steenbok Solar 2: Not Indicated	No	The Geotechnical Assessment will be undertaken as part of the micro-siting of the Steenbok Solar 1 and Steenbok Solar 2 facility layouts within the respective sites. The consideration of geotechnical aspects is seen to be a technical requirement, rather than an environmental consideration.
Socio-Economic Assessment **Sensitivity** Steenbok Solar 1: Not Indicated Steenbok Solar 2: Not Indicated	Yes	A Social Impact Assessment is included in Appendix E6.
Plant species Assessment	Yes	Refer to Appendix E1.

Sensitivity Steenbok Solar 1: Low Steenbok Solar 2: Low		This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Animal Species Assessment **Sensitivity** Steenbok Solar 1: Medium Steenbok Solar 2: Medium	Yes	Refer to Appendix E1. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

It must be noted that the DFFE Screening Tool Report indicates that the avian sensitivity for the two site is of a low sensitivity, however an Avifaunal Impact Assessment is not indicated as being required for the proposed development. An Avifaunal Impact Assessment (Appendix D2) has however been undertaken for the developments to ensure that the Environmental Impact Assessment process considers the impact of the developments on avifauna as per the requirements of the BirdLife South Africa Best Practice Guidelines for the development of solar energy facilities.

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 of Regulation No. 326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.5.

Table 1.5: Structure of the report

Requirements for the contents of an EIR as specified in the Regulations		Section in report
Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a)	details of -	1
	(i) the EAP who prepared the report; and	
	ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	

(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-	
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered and being applied for; and	
	(ii) a description of the associated structures and infrastructure related to the development.	
(e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	3
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	A motivation for the preferred development footprint within the approved site.	5
(h)	a full description of the process followed to reach the proposed development footprint within the approved site, including –	
	(i) details of all the development footprint alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and	
	(x) a concluding statement indicating the preferred alternative development location within the approved site.	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	

(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-	
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(j)	an assessment of each identified potentially significant impact and risk, including-	
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	6
(l)	an environmental impact statement which contains-	8
	(i) a summary of the key findings of the environmental impact assessment:	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	
(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Not applicable
(o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Not applicable
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(q)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	

(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	8
(s)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A to the report
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs);	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including-	Not applicable
	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	
	(ii) a motivation for the deviation;	
(v)	any specific information that may be required by the CA; and	Not applicable
(w)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

1.7 EIA REPORT REQUIREMENTS

The competent authority (DFFE) accepted the Final Scoping Report and approved the Plan of Study for the Environmental Impact Assessment on 23 February 2023. As part of the Acceptance of the Final Scoping Report, the Department provided a list of amendments and additional information that needs to form part of the EIA Report. The requirements from the Department are listed in Table 1.6 below. Furthermore, Table 1.7 provides an indication of where the requirements have been considered and met in the draft EIA Report.

Table 1.6: DFFE requirements for the draft EIA Report

Requirement	Section/Appendix where requirement has been met
(a) Listed Activities	
(i) The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	This draft EIA Report identifies and assesses all potential impacts expected to be associated with the development of Steenbok Solar 1 and Steenbok Solar 2. Separate assessments have been undertaken for each proposed development and each assessment includes the consideration of the listed activities triggered for each proposed development. Furthermore, appropriate mitigation measures have been recommended by the independent specialists to mitigate and reduce the impact significance of the negative impacts and enhance the significance and benefits of the positive impacts. Refer to the following sections in this report where the requirement has been complied with: • Table 6.3 • Table 6.4 • Section 6.2.1 • Section 6.2.2 • Section 6.2.3
(ii) The listed activities represented in the EIAr and the application form must be the same and correct.	The listed activities included in the combined Application Form, that was submitted to the DFFE at the commencement of the Scoping Phase and lodging of the Application for Environmental Authorisation, are correct as per the project descriptions and project components proposed to be developed as part of the Steenbok Solar 1 and Steenbok Solar 2 projects. The Application Form submitted to the DFFE on 14 November 2022 is therefore considered to be correct.

(b) Public Participation	
(i) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to the Eskom, the provincial Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs, Mangaung Metropolitan Municipality, the South African Heritage Resources Agency (SAHRA), The South African Civil Aviation Authority (SACAA), The Department of Transport, The Department of Water and Sanitation (DWS), The South African National Roads Agency Limited (SANRAL), The Endangered Wildlife Trust (EWT), The Endangered Wildlife Trust (EWT), Square Kilometre Array (SKA),The South African Astronomy Observation (SAAO) and the Department of Environment, Forestry and Fisheries: Directorate Biodiversity and Conservation.	Comments have been sought from various stakeholders since the commencement of the EIA process as well as this draft EIA Report currently available for a 30-day review and comment period from 21 April to 23 May 2023. All registered I&APs have been notified of the availability of the draft EIA Report and access to the relevant documents for review and comment has been provided. It is further confirmed that the stakeholders listed by the Department in the requirement are registered on the I&AP database included in Appendix C3 of this draft Report and have therefore all received notification and an opportunity to review and comment on the respective documentation. This requirement is therefore complied with.
(ii) Please ensure that all issues raised, and comments received during the circulation of the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAr. Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	All issues raised as part of the Scoping Phase and based on the draft Scoping Report have been addressed in this draft EIA Report that has been made available to I&APs and Organs of State for a 30-day review and comment period. All comments received and raised during the 30-day review and comment period of the draft EIA Report will be recorded, considered, and addressed as part of the final EIA Report to be submitted to the Department for decision-making on the Application for Environmental authorisation. Proof of correspondence will be included in the final EIA Report. All proof of correspondence undertaken during the Scoping Phase has been included in this draft Report under Appendix C4 and is also documented in the Comments and Responses Report included as Appendix C6. During the 30-day review and comment period of the draft EIA Report, reminders of the report availability will be distributed to I&APs to attempt to obtain comment where comment is not submitted.

(iii) A Comments and Response trail report (C&R) must be submitted with the final EIAr. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Appendix 1 of this comments letter. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	The Comments and Responses Report is included as Appendix C6 of this draft EIA Report, which includes all comments and responses relevant to the EIA process as received to date (i.e., since the commencement of the EIA process in November 2022). All comments received during the 30-day review and comment period of the draft EIA Report will be recorded and responded to in the Comments and Responses Report (Appendix C6). The Comments and Responses Report will be a separate document and will be in table format. All comments will be included verbatim, and appropriate and detailed responses will be provided.
(iv) Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	Comments received will not be split into categories in the Comments and Responses Report. Individual responses to each comment, query or issue raised will be provided for each respective comment.
(v) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended.	The Public Participation Process has been conducted as per the requirements of the EIA Regulations, 2014, as amended. The tasks completed and undertaken as part of the Public Participation process are detailed in section 5.2 of this draft EIA Report. Proof of all tasks completed is included in Appendix C of this draft EIA Report.
(vi) The EAP is requested to contact the Department to make the necessary arrangements to conduct a site inspection prior to the submission of the final EIAr.	The EAP has made contact with the Department on 13 April 2023 via email to make the necessary arrangements for the site inspection. No feedback has been received as yet. Refer to Appendix H4.
(c) Layout & Sensitivity Maps	
(i) The EIAr must provide the four corner coordinate points for the proposed development sites (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	The relevant coordinates for each facility layout associated with Steenbok Solar 1 and Steenbok Solar 2 are included in section 2.4, Tables 2.5 and 2.6. The coordinates provided include the project site, access road, Battery Energy Storage System and on-site facility substation.

(ii) The EIAr must provide the following: – Clear indication of the envisioned area for the proposed facility.	The development footprints for each facility, illustrating the infrastructure to be placed within the respective development footprints are included in Figures I1 and I2. As the projects are being assessed under one Application for Environmental Authorisation a combined Layout map is included as Figure J to provide an indication of the location of the two individual projects situated directly adjacent to one another.
– Clear description of all associated infrastructure. This description must include, but is not limited to the following: ➢ Internal road infrastructure. ➢ All supporting onsite infrastructure such as laydown area, guard house and control room etc. ➢ All necessary details regarding all possible locations and sizes of the proposed satellite substation and the main substation.	All detail relating to the associated infrastructure proposed for Steenbok Solar 1 and Steenbok Solar 2 is included in Table 2.3 and Table 2.4 respectively.
(iii) A copy of the final preferred route layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads.	It must be noted that the power line associated with Steenbok Solar 1 and Steenbok Solar 2 is under assessment as part of a separate Basic Assessment process, known as Steenbok Grid Connection. The preferred layout maps for Steenbok Solar 1 and Steenbok Solar 2 solar energy facilities have been designed by the Applicant to ensure avoidance of all environmental sensitivities and sensitive areas that are not appropriate for the placement of infrastructure (Figure I1 and I2). The layout and sensitivity maps are included as Figure H3A and H3B. Existing infrastructure has been used as far as possible.
(iv) The layout map must indicate the following: ➢ PV positions and its associated infrastructure; ➢ Permanent laydown area footprint;	The preferred layout maps proposed for Steenbok Solar 1 and Steenbok Solar 2, included in Figure I1 and Figure I2, comply with the requirements indicated by the Department. Layout and Sensitivity maps for the respective projects, showing all environmental sensitivities and associated buffers, as included as Figures H3A and H3B respectively.

➢ Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); ➢ Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; ➢ The location of sensitive environmental features on site e.g. CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; ➢ Substation(s) and/or transformer(s) sites including their entire footprint; ➢ Location of access and service roads; ➢ Connection routes (including pylon positions) to the distribution/transmission network; ➢ All existing infrastructure on the site, especially railway lines and roads; ➢ Buffer Areas; ➢ Buildings, including accommodation; and ➢ All "no-go" areas.	
(v) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	Environmental sensitivity maps for Steenbok Solar 1 and Steenbok Solar 2 are included as Figures H1 and H2 respectively.
(vi) A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Layout and sensitivity maps for each individual proposed development are included as Figure H3A and Figure H3B respectively.

(d) Cumulative Assessment	
(i) Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following:	Chapter 7 of this draft EIA Report considers existing, authorised and in process similar developments which may contribute to cumulative impacts within the geographic area of evaluation.
➢ Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land.	Cumulative impacts have been defined and the size of impacts quantified as per the impact assessments undertaken as part of the respective independent specialist studies (Appendix E of this draft EIA Report).
➢ Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.	A detailed process flow is included in section 7.5 and Figure 7.2 of this draft EIA Report. It must be noted that not all information on other developments is readily available and therefore only information that could be obtained for the area has been considered as part of the cumulative impact assessment.
➢ The cumulative impacts significance rating must also inform the need and desirability of the proposed development.	Sections 4.2 and 7.7 of this draft EIA Report provides an indication of the need and desirability of the proposed development in terms of the cumulative impact assessment.
➢ A cumulative impact environmental statement on whether the proposed development must proceed.	Section 7.7 of this draft EIA Report provides a cumulative impact environmental statement on whether the development must proceed or not considering the cumulative impact assessment.
(e) Specialist assessments	
(i) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following:	The terms of reference for all specialist studies are relevant and correct, as per the studies included in Appendix E.
➢ A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and	Each specialist study includes the methodology followed, as well as the descriptions associated with the proposed developments, including technical details, and the preferred layout maps.

all other associated infrastructures that they have assessed and are recommending for authorisations.	
➢ Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed.	Each specialist study includes a description of limitations and gaps associated with the study, where relevant.
➢ Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	The definition of a "no-go" area is noted. The preferred layout maps (Figures I1 and I2) have been designed to avoid all environmental sensitivities and no-go areas to ensure that the layouts are appropriate from an environmental perspective. This is also as per the recommendations made by the independent specialists.
➢ Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.	The definition of "no-go" area is the same for the Department and specialists. Only no-go buffers are related to the wetlands associated with Steenbok Solar 2, which have been avoided by the preferred layout map (refer to Figure H3B and I2).
➢ All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.	All specialist studies are final and consider the preferred layout maps proposed by the Applicant for Steenbok Solar 1 and Steenbok Solar 2. Practical mitigation and management measures and recommendations have been provided by the respective specialists for all impacts identified and assessed Refer to the respective specialist studies included in Appendix E, as well as section 6.2.
➢ Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Practical mitigation and management measures and recommendations have been provided by the respective specialists for all impacts identified and assessed Refer to the respective specialist studies included in Appendix E, as well as section 6.2.
➢ Regarding cumulative impacts: – Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated,	Each respective specialist has undertaken and considered the cumulative impacts that will potentially occur with the development of the proposed facilities. The information provided by the independent specialists in this

i.e. hectares of cumulatively transformed land. – A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. – Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process. – The significance rating must also inform the need and desirability of the proposed development. – A cumulative impact environmental statement on whether the proposed development must proceed.	regard has informed the cumulative impacts assessment undertaken in section 7 of this draft EIA Report.
(ii) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	No contradicting recommendations have been provided at this time by the specialists.
(iii) Please include a table in the EIAr summarising the specialist studies required by the Screening Tool, a column indicating whether these studies were conducted or not, and a column with motivation for any studies not conducted.	Table 1.4 of section 1.5 of this draft EIA Report provides an indication of the specialist studies listed in the DFFE Screening Tool Report (Appendix B), an indication of the sensitivity allocated in the Screening Tool Report and an indication of whether the respective study is included or not and confirmation or motivation therefore.
(iv) It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation, which were promulgated in Government	The protocols have been considered and adhered to by the relevant specialists, as per the content of the specialist reports included in Appendix E. Also refer to Section 1.5 for an indication of the specialist studies undertaken as per the results of the DFFE Screening Tool Report (Appendix B). The relevant independent specialists have the correct

Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species), have come into effect. Should this study be required, the specialist assessments must be conducted in accordance with these protocols. Please note further that the Protocols require the specialists to be SACNASP registered.	registrations as required by the protocols. Refer to Appendix E8 of this draft EIA Report.
(v) Please be reminded that section 2(3) of NEMA requires developments to be socially, environmentally and economically sustainable, while section 2(4)(i) of NEMA requires the social, economic and environmental impacts of activities, including disadvantages and benefits, to be considered, assessed and evaluated.	Section 6 as a whole considers the impacts, both positive and negative, that the respective developments will potentially have on the affected environment.
(vi) Specialist findings and recommendations must be separated per project.	The specialist findings and recommendations have been separated for the respective developments in both section 6 and 7 of the draft EIA Report. It must however be noted that the recommendations and findings are primarily similar as the environments within which the developments are proposed are similar in nature.
(vii) The following Specialist Assessments will form part of the EIAr: – Heritage Impact Assessment (including archaeology and palaeontology) – Vegetation Ecological and Wetland Impact Assessment – Avifauna Impact Assessment – Visual Impact Assessment – Soil and Agricultural Compliance Statement – Social Impact Assessment – Transport Impact Assessment	The specialist assessments recommended by the Department are included in this draft EIA Report. Refer to the list below: • Appendix E1: Ecology and Wetland Impact Assessment • Appendix E2: Avifaunal Impact Assessment • Appendix E3: Visual Impact Assessment • Appendix E4: Agricultural Compliance Statement • Appendix E5: Heritage Impact Assessment • Appendix E6: Social Impact Assessment • Appendix E7: Transport Impact Assessment
(f) Environmental Management Programme (EMPr)	

(i) Please ensure that two EMPrs are submitted.	Separate EMPrs have been drafted for Steenbok Solar 1 and Steenbok Solar 2. These are included as separate appendices to this draft EIA Report as Appendix F and Appendix G.
(ii) Please ensure that the mitigation measures specified in the EIAr and specialist reports are also incorporated into the EMPr.	Mitigation measures included and recommended in the EIA Report and specialist studies have been included in the respective EMPrs for the two developments. Refer to Appendix F and Appendix G.
(iii) In addition, ensure that the EMPr complies with the content of the EMPr in terms of Appendix 4 of the EIA Regulations, 2014, as amended.	Both EMPrs that have been compiled for the two solar energy facilities are in line with Appendix 4 of the EIA Regulations, 2014, as amended.
(iv) Please also include in the EMPr, a recommended frequency for the auditing of compliance with the conditions of the EA and EMPr, and for the submission of such compliance reports to the competent authority.	Section 4 of the EMPrs (Appendix F1 and G1) provides the details in terms of auditing and compliance.
(v) EMPr must include an environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	Figure 2 included in the respective EMPrs for Steenbok Solar 1 and Steenbok Solar 2 (Appendix F1 and G1) provides the environmental sensitivity map, which also indicates the preferred layout.
(vi) A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	Figure 2 included in the respective EMPrs for Steenbok Solar 1 and Steenbok Solar 2 (Appendix F1 and G1) provides the environmental sensitivity map, which also indicates the preferred layout.
(vii) EMPr must include measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.	Specific measures have been included in the respective EMPrs for spillages or pollutants. Specific mitigation measures have been recommended by the wetland specialist for Steenbok Solar 2 due to the presence of wetlands within the site under assessment. It must be noted that all wetlands, and associated buffers, are avoided by the development footprint.
(g) Generic EMPr	

(i) It is drawn to your attention that for overhead electricity transmission and distribution infrastructure, when such facilities trigger activity 11 or 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and any other listed and specified activities necessary for the realization of such facilities, the generic Environmental Management Programme, contemplated in Regulations 19(4) must be used and submitted with the the EIAr over and above the EMPr to be submitted with the EIAr.	Generic EMPrs have been compiled for the on-site facility substation for each respective solar energy facility. These Generic EMPrs are included as Appendix F2 and G2 of the draft EIA Report. It must be noted that the power line for the proposed developments will be assessed as part of the Basic Assessment process underway for the Steenbok Grid Connection and therefore no Generic EMPrs for overhead power line infrastructure are relevant or included in this draft EIA Report.
(ii) Generic EMPrs must be submitted for each project.	Generic EMPrs have been compiled for the on-site facility substation for each respective solar energy facility. These Generic EMPrs are included as Appendix F2 and G2 of the draft EIA Report.
(iii) Please ensure that Part B, Section 2 are completed.	Part B, Section 2 of each respective Generic EMPr have been completed, including the signed declaration by the Applicant. Refer to Appendix F2 and G2 of the draft EIA Report.
(iv) Please ensure that any specific mitigation measures identified in the EIAr and specialist reports for the proposed project are incorporated into the generic EMPr.	No specific mitigation measures relating to the on-site facility substations for the respective projects have been recommended by the specialists and therefore the generic measures included in Part B, Section 1 are considered sufficient for the management and mitigation of impacts associated with the respective substations. Part C of the Generic EMPrs has therefore not been completed. Refer to Appendix F2 and G2 of the draft EIA Report.
(h) General	

(i) The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under Annexure 2 below. This must be done for each project.	The technical details of each facility have been included in the draft EIA Report in table format as per the requirement and sample provided by the Department. Refer to Table 2.3 and Table 2.4 of this draft EIA Report.
(ii) Recommendations of conditions to be included in the EA, must be done per project.	The final recommendation of the EAP and conditions for the EA has been undertaken for each project and is included under section 8.4 of this draft EIA Report.
(iii) Details of the future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the proposed infrastructure to more advanced technologies must be indicated.	The consideration of upgrading the facilities and decommissioning phase are included under section 2.5.5 of this draft EIA Report.
(iv) Should a Water Use License be required, proof of application for a license needs to be submitted.	The Water Use License process will be undertaken, as relevant, prior to commencement of construction.
(v) The EAP must provide landowner consent for all farm portions affected by the proposed project, whether the project component is linear or not, i.e. all farm portions where the access road, solar panels and associated infrastructure is to be located.	Landowners consent for the affected property was provided to the Department with the Application for Environmental Authorisation that was lodged in November 2022. This requirement has therefore already be complied with.
(vi) Please also ensure that the EIAr includes the period for which the Environmental Authorisation is required and the date on which the activity will be concluded as per Appendix 3 of the NEMA EIA Regulations, 2014, as amended.	The final recommendation of the EAP and conditions for the EA, for each respective development, included under section 8.4 of this draft EIA Report, provides the period for which the Environmental Authorisation is required. The date on which the activity will be concluded is not available at this time as the project has not yet received preferred bidder status.

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 activities entail two individual 35MW photovoltaic solar facilities and the respective associated infrastructure for each development on the Remaining Extent of the Farm Floradale No. 15, Registration Division Bloemfontein, Free State Province situated within the Mangaung Metropolitan Municipality area of jurisdiction. The town centre of Bloemfontein is located approximately 17km south of the proposed developments (refer to Figure A for the locality map).

Two individual sites of approximately 160ha and 158ha have been identified and assessed within the affected property for the development of Steenbok Solar 1 and Steenbok Solar 2. These two areas are deemed as technically feasible for the development of the two solar photovoltaic projects. The Applicant has designed an environmentally appropriate facility layout for each development within the two respective sites through an optimisation process which aims to comply with all the recommendations of the independent specialists in terms of the placement of the respective development footprints (including all associated infrastructure). These proposed and optimised development footprints are assessed as part of this draft EIA Report and included in Figures I1 and I2.

The property on which the facilities is to be constructed will be leased by Steenbok Solar (Pty) Ltd from the property owner, Advitrust (Pty) Ltd, for the life span of the projects (minimum of 20 years).

It is expected that the energy generated from the facilities will be evacuated into the national grid via a new 132kV overhead power line and Eskom Switching Substation. This is considered to be the grid connection solution for Steenbok Solar 1 and Steenbok Solar 2 and will be known as Steenbok Grid Connection. A separate Basic Assessment process will be undertaken to obtain Environmental Authorisation for the required grid connection infrastructure.

Refer to Table 2.1 for general site information associated with the two developments.

Table 2.1: General site information for Steenbok Solar 1 and Steenbok Solar 2

Project	**Steenbok Solar 1**	**Steenbok Solar 2**
Description of affected farm portion	Remaining Extent of the Farm Floradale No. 15	Remaining Extent of the Farm Floradale No. 15
Province	Free State Province	Free State Province
Municipality	Mangaung Metropolitan Municipality	Mangaung Metropolitan Municipality
Ward numbers	44	44
Closest towns	The site is located 17km north from the centre of Bloemfontein.	The site is located 17km north from the centre of Bloemfontein.
21 Digit Surveyor General codes	Remaining Extent of the Farm Floradale No. 15 - F00300000000001500000	Remaining Extent of the Farm Floradale No. 15 - F00300000000001500000
Photographs of the site	Refer to the plates provided as part of the draft EIA Report	Refer to the plates provided as part of the draft EIA Report
Type of technology	Photovoltaic	Photovoltaic
Structure Height	PV Panels: up to 4.5m Battery Energy Storage System (BESS): ≤ 8m Buildings: up to 4m On-site Facility Substation: < 30m	PV Panels: up to 4.5m Battery Energy Storage System (BESS): ≤ 8m Buildings: up to 4m On-site Facility Substation: < 30m
EIA footprint (area assessed for the placement of the	Up to 160ha	Up to 158ha

development footprint)		
Development footprint (area that will be associated with the infrastructure)	Approximately 86ha	Approximately 86ha
Structure orientation	Tracking PV with mono- or bi-facial panels. Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE). The preference for single axis tracking is also based on the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel mounting types. The development of the PV facility will take into consideration during the final design phase the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed- tilt mounting structures. Both options are considered feasible for the site.	
Generation capacity	Up to 35MW	Up to 35MW

The affected property is located in a rural area, outside of the urban edge, and is bordered by agricultural land uses, with mining activities being undertaken to the north. The site survey revealed that the affected property currently consists of agricultural activities – refer to the plates for photographs of the affected property within which the Steenbok Solar 1 and Steenbok Solar 2 will be placed.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Listed Activity**	**Description of each listed activity as per project description**:	
			Steenbok Solar 1	**Steenbok Solar 2**
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 infrastructure for the distribution of electricity will include an on-site facility substation with a capacity of 33kV/132kV to be located within the assessed site.	Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include an on-site facility substation with a capacity of 33kV/132kV to be located within the assessed site.
GNR. 327 (as amended in 2017)	Activity 14	*"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*	Activity 14 is triggered since the proposed BESS will contain electrolyte solutions considered to be dangerous goods. Although the BESS itself is not considered to be a facility for storage of dangerous goods, rather the function of BESS is to store energy. The total volume of electrolytes solution used in the BESS may exceed 80m^3 but will be less than 500m^3, which depending on	Activity 14 is triggered since the proposed BESS will contain electrolyte solutions considered to be dangerous goods. Although the BESS itself is not considered to be a facility for storage of dangerous goods, rather the function of BESS is to store energy. The total volume of electrolytes solution used in the BESS may exceed 80m^3 but will be less than 500m^3, which depending on

			the technology selected may be stored temporarily on-site during battery assembly. The solar energy facility will only require the installation of a standard diesel storage tank, which will have a capacity of less than 30m^3.	the technology selected may be stored temporarily on-site during battery assembly. The solar energy facility will only require the installation of a standard diesel storage tank, which will have a capacity of less than 30m^3.
GNR. 327 (as amended in 2017)	Activity 24(ii)	*"The development of a road (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.*	Activity 24(ii) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road with 1 m drainage on each side). The perimeter road will be up to 8m in width.	Activity 24(ii) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road with 1 m drainage on each side). The perimeter road will be up to 8m in width.
GNR. 327 (as amended in 2017)	Activity 28(ii)	*"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*	Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of Steenbok Solar 1 will be up to 86 hectares, to be placed within the 160 hectare area assessed.	Activity 28(ii) is triggered as portions of the affected property have been used for grazing and the property will be re-zoned to "special" use for the proposed development. The development footprint of Steenbok Solar 2 will be up to 86 hectares, to be placed within the 158 hectare area assessed.
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*	Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres.	Activity 56 (ii) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres.

		reserve exists, where the existing road is wider than 8 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 Steenbok Solar 1 will generate up to 35 megawatts electricity through the use of a renewable resource.	Activity 1 is triggered since Steenbok Solar 2 will generate up to 35 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	*"The clearance of an area of 20 hectares or more of indigenous vegetation."*	In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of Steenbok Solar 1 will be up to 86 hectares, to be placed within the 160 hectare area assessed.	In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of Steenbok Solar 2 will be up to 86 hectares, to be placed within the 158 hectare area assessed.
GNR. 324 (as amended in 2017)	Activity 4 (b)(i)(bb)(gg)	"*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, (bb) within a National Protected Area Expansion*	Activity 4 (b)(i)(bb)(gg) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road	Activity 4 (b)(i)(bb)(gg) is triggered as the internal roads will vary between 6 and 8 meters in width (6 m service road

		Strategy Focus Area, and (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve."	with 1 m drainage on each side). The perimeter road will be up to 8m in width Steenbok Solar 1 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES[4] and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.	with 1 m drainage on each side). The perimeter road will be up to 8m in width Steenbok Solar 2 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.
GNR. 324 (as amended in 2017)	Activity 10 (b)(i)(bb)(gg) (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, (i) outside urban areas,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas*	Activity 10(b)(i)(bb)(gg)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel, oils and electrolytes) in containers with a capacity just over 80 cubic metres. Steenbok Solar 1 is located in the Free State Province and outside urban areas.	Activity 10(b)(i)(bb)(gg)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel, oils and electrolytes) in containers with a capacity just over 80 cubic metres. Steenbok Solar 2 is located in the Free State Province and outside urban areas.

[4] National Protected Area Expansion Strategy

		within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."	The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, a seasonal drainage channel is located within the site proposed for Steenbok Solar 1.	The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, two wetlands are located within the site proposed for Steenbok Solar 2.
GNR. 324 (as amended in 2017)	Activity 12 (b)(i)(iv)	*"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 and (iv) areas within a watercourse or wetland;*	Activity 12 (b)(i)(iv) 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. In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered.	Activity 12 (b)(i)(iv) 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. In terms of vegetation type the site falls within the Bloemfontein Grassland Vegetation type which is described by Mucina and Rutherford as Endangered.

		or within 100 metres from the edge of a watercourse or wetland."	Furthermore, a seasonal drainage channel is located within the site proposed for Steenbok Solar 1. The development footprint of Steenbok Solar 1 will be up to 86 hectares, to be placed within the 160 hectare area assessed.	Furthermore, two wetlands are located within the site proposed for Steenbok Solar 2. The development footprint of Steenbok Solar 8 will be up to 86 hectares, to be placed within the 158 hectare area assessed.
GNR. 324 (as amended in 2017)	Activity 18 (b)(i)(bb)(gg)(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, within (bb) National Protected Area Expansion Strategy Focus areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*	Activity 18 (b)(i)(bb)(gg)(hh) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. Steenbok Solar 1 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.	Activity 18 (b)(i)(bb)(gg)(hh) is triggered since the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. Steenbok Solar 2 is located in the Free State Province and outside urban areas. The site is located within the Free State Highveld Grassland Focus Area of the NPAES and is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.

			Furthermore, a seasonal drainage channel is located within the site proposed for Steenbok Solar 1.	Furthermore, two wetlands are located within the site proposed for Steenbok Solar 2.

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

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

- Civil works to be conducted:

  - Terrain levelling if necessary– Levelling will be minimal as the potential sites chosen are 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 to be undertaken as part of the micro-siting process.
  - Construction of access and inside roads/paths – existing paths will be used where reasonably possible. Access will be obtained to the sites via the R700 regional road that traverses the western section of the affected property. 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 plants will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layers 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 projects are described below. *The details provided below are relevant to both Steenbok Solar 1 and Steenbok Solar 2.*

- PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules 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 with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 35MW electricity.

- Battery Energy Storage System (BESS) - The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 3 ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems.

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

- Connection to the grid and electrical reticulation - 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 via the Steenbok Grid Connection to be assessed under a separate Basic Assessment process.

  Furthermore, 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:

  - Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office;
  - Site Administration Office (~500m^2);
  - Switch gear and relay room (~400m^2);
  - Staff lockers and changing room (~200m^2);
  - Security control (~60m^2);
  - Operations & Maintenance (O&M) building (~ 500 m^2); and
  - Warehouse (350 m^2).

- Roads – Access will be obtained via the R700 regional road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side). Perimeter roads may be up to 8m wide.

- Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2.4m in height.

2.4 LAYOUT DESCRIPTION

The layout plan / development footprint for each facility considers and adheres to the limitations of the respective sites and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site – refer to Figures H3 and I. The total surface area proposed for the layouts of the facilities includes the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, battery energy storage system, on-site substation and perimeter fences). Limited features of environmental significance exist on both sites, however the sensitivities that do exist have been avoided in the layouts of the respective solar facilities. Table 2.3 and Table 2.4 below provides detailed information regarding the layouts for the proposed facilities as per DFFE requirements.

Table 2.3: Technical details for the proposed Steenbok Solar 1

Component	Description / dimensions
Total development footprint	86 hectares
Height of PV panels	Up to 4.5 meters
Area of PV Array	Up to 75 hectares
Number of inverters required	To be determined at the layout design stage (engineering). Technological advancements play a role in determination.
Area occupied by inverter / transformer stations / substations	On-site Facility Substation: up to 4ha BESS: approximately 3ha
Capacity of the on-site substation	33kV / 132kV
Area occupied by both permanent and construction laydown areas	Up to 4 hectares. Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office.
Area occupied by buildings	Up to a total permanent area of 1 ha: • Site Administration Office (~500m^2); • Switch gear and relay room (~400m^2); • Staff lockers and changing room (~200m^2); • Security control (~60m^2); • Operations & Maintenance (O&M) building (~ 500 m^2); and • Warehouse (350 m^2).
Length of internal roads	~ 6.30 km
Width of internal roads	Between 6 and 8 meters, with perimeter road of up to 8 meters wide
Height of fencing	Approximately 2.4 meters
Type of fencing	The type of fencing could be galvanized palisade fencing and/or mesh and/or fully electrified.

Table 2.4: Technical details for the proposed Steenbok Solar 2

Component	Description / dimensions
Total development footprint	86 hectares
Height of PV panels	Up to 4.5 meters
Area of PV Array	Up to 75 hectares
Number of inverters required	To be determined at the layout design stage (engineering). Technological advancements play a role in determination
Area occupied by inverter / transformer stations / substations	On-site Facility Substation: up to 4ha BESS: approximately 3ha

Capacity of the on-site substation	33kV / 132kV
Area occupied by both permanent and construction laydown areas	Up to 4 hectares. Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office.
Area occupied by buildings	Up to a total permanent area of 1 ha: • Site Administration Office (~500m^2); • Switch gear and relay room (~400m^2); • Staff lockers and changing room (~200m^2); • Security control (~60m^2); • Operations & Maintenance (O&M) building (~ 500 m^2); and • Warehouse (350 m^2).
Length of internal roads	~ 7 km
Width of internal roads	Between 6 and 8 meters, with perimeter road of up to 8 meters wide
Height of fencing	Approximately 2.4 meters
Type of fencing	The type of fencing could be galvanized palisade fencing and/or mesh and/or fully electrified.

Table 2.5 and Table 2.6 provide the coordinate points for the proposed project site and associated infrastructure for Steenbok Solar 1 and Steenbok Solar 2 respectively. This is in line with the final facility layouts proposed for the respective developments.

It must however be noted that locations may change slightly as a result of changes in the landscape that may occur during the time period between initial planning and actual implementation of the facility layouts.

Table 2.5: Coordinates of Steenbok Solar 1

Steenbok Solar 1 Coordinates			
Project Site	A	28°57'29.16"S	26°11'41.09"E
	B	28°57'29.24"S	26°12'24.05"E
	C	28°57'53.03"S	26°12'29.59"E
	D	28°57'51.47"S	26°12'15.00"E
	E	28°57'51.68"S	26°12'6.88"E
	F	28°57'50.12"S	26°11'47.31"E
Proposed Access Road (bend-points)	1	28°57'38.09"S	26°12'29.03"E
		28°57'53.16"S	26°12'28.94"E
		28°57'50.40"S	26°11'50.78"E
		28°57'52.17"S	26°11'44.02"E

Battery Energy Storage System (BESS)	A	28°57'53.16"S	26°12'23.60"E
	B	28°57'58.11"S	26°12'23.52"E
	C	28°57'57.84"S	26°12'33.57"E
	D	28°57'53.63"S	26°12'33.58"E
On-site facility substation corner coordinates	A	28°57'58.37"S	26°12'23.60"E
	B	28°57'58.11"S	26°12'29.42"E
	C	28°58'5.15"S	26°12'29.48"E
	D	28°58'5.21"S	26°12'23.52"E

Table 2.6: Coordinates of Steenbok Solar 2

Steenbok Solar 2 Coordinates			
Project Site	A	28°58'28.81"S	26°11'58.52"E
	B	28°58'7.75"S	26°11'52.02"E
	C	28°57'58.04"S	26°12'4.58"E
	D	28°57'53.75"S	26°12'16.42"E
	E	28°57'53.90"S	26°12'23.23"E
	F	28°58'27.16"S	26°12'22.93"E
Proposed Access Road (bend-points)	1	28°57'54.32"S	26°12'33.51"E
		28°58'5.49"S	26°12'33.62"E
		28°58'5.67"S	26°12'27.34"E
		28°58'27.39"S	26°12'23.57"E
Battery Energy Storage System (BESS)	A	28°57'55.67"S	26°12'27.16"E
	B	28°57'55.28"S	26°12'33.55"E
	C	28°58'0.72"S	26°12'33.43"E
	D	28°58'0.81"S	26°12'26.52"E
On-site facility substation corner coordinates	A	28°57'58.29"S	26°12'26.60"E
	B	28°58'5.18"S	26°12'26.74"E
	C	28°58'4.88"S	26°12'33.64"E
	D	28°57'57.98"S	26°12'33.64"E

2.5 SERVICES PROVISION

The following sections provides information on services required on the site e.g., water, sewage, refuse removal, and electricity. The descriptions provided below are relevant to both Steenbok Solar 1 and Steenbok Solar 2.

2.5.1 Water

Adequate provision of water will be a prerequisite for the developments. Water for the proposed developments will most likely be obtained from ground water resources or alternatively collected with water trucks from an authorized water service provider and stored on site. The Department of Water and Sanitation has been contacted by the project proponent to confirm the water resource availability in the relevant catchment management area in order to ensure sustainable water supply. 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 or is developed as part of another power generation programme or opportunity.

The estimated maximum amount of water required during construction is a total of 3000 kl in (estimated max of 8.5 kl per day) during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 2000 kl per annum. The majority of this usage is for the cleaning of the solar panels. It is estimated that the panels may only need to be washed twice per annum. Other uses during operations include potable water for sewage and drinking water, as well as water for maintenance tasks and operations.

Drinking water supplied will comply with the SANS:241 quality requirements. Water quality from the borehole will be tested to confirm SANS:214 quality, if water quality is not sufficient for drinking, bottled water will be supplied to staff during construction and operational phases of the projects.

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

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. It will also be good practice to design stormwater canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Stormwater management and mitigation measures are included in the Environmental Management Programmes (EMPr) – refer to Appendix F1 and Appendix G1.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised, that will be serviced privately or by the municipality. Waste will be disposed of 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 municipality.

2.5.4 Electricity

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

2.5.5 Decommissioning of the facilities

The operating period of each facility 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 facilities.

A likely extension of the lifetime of the facilities would involve putting new, more efficient, solar panels on the existing structures to improve the efficiency of the facilities 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 facilities halt operations, the Environmental Authorisations and contract with the landowner will be respected during the decommissioning phase.

The decommissioning process will consist of the following steps:

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

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

- Removal of all structures and rubble,
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil,
- The surface will be restored to the original contours and hydro seeding will take place.

3 LEGISLATIVE AND POLICY CONTEXT

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

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

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries, and the Environment (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 developments 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)
- Electricity Regulation Act (Act No. 4 of 2006) (as amended)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA)
- 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)
- Subdivision of Agricultural Land Act (70 of 1970) (SALA)
- Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA)
- The National Forests Act, 1998 (Act 84 of 1998)
- The National Road Traffic Act (93 of 1996) (NRTA)
- Disaster Management Act, 2002. Regulations issues in terms of section 27(2) of 27 February 2023.

- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Free State Provincial Spatial Development Framework (PSDF) (2012)
- Manguang Metropolitan Municipality Draft Integrated Development Plan 2022/2027 (April 2022)
- Manguang Metropolitan Municipality District / Metro One Plan (October 2022)

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 solar developments.

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 Steenbok Solar 1 and Steenbok Solar 2 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	National Department of Environmental Affairs (now known as the Department of	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

Management Act **(Act No. 107 of 1998)**	Forestry, Fisheries and the Environment) and the Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the 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 combined EIA process undertaken for Steenbok Solar 1 and Steenbok Solar 2, as pe Regulation 11, 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 Steenbok Solar 1 and Steenbok Solar 2 are proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed projects are in-line with the Act.

Electricity Regulation Act (Act No. 4 of 2006) (as amended)	National Energy Regulator of South Africa (NERSA)	2006	The Act provides a national regulatory framework for the electricity supply industry. The Act requires registration and licensing of anyone wanting to generate, transmit, reticulate, distribute, trade, or import and export electricity. One of the requirements for the REIPPPP is for the Proponent to hold an environmental authorisation for the proposed project. The REIPPPP is guided by the National Energy Act, one of the purposes of which is to promote sustainable development of renewable energy infrastructure.
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 Wetland Impact Assessment (Appendix E1) identified the presence of wetlands on the Steenbok Solar 1 site and a seasonal drainage channel on the Steenbok Solar 2 site. The relevant water use licensing (WULA or General Authorisation) will need to be

			applied for the two projects, as relevant. The National Water Act will be applicable in terms of obtaining the relevant license.
National Environmental Management: Biodiversity Act (10 of 2004) (NEMBA)	Department of Forestry, Fisheries and the Environment (DFFE)	2004	"The Act calls for the management of all biodiversity within South Africa. The 2007 Threatened or Protected Species Regulations (GN R150, as amended) provides protection through a permit system as well as through the identification of restricted activities. If required, the relevant permits will be applied for." The Act also provides for duty of care with regards to control of alien species.
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 developments as no listed activities in terms of waste management are expected to be triggered.
National Environment	National Department Environmental Affairs (DEA)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention

Management: Air Quality Act **(Act No. 39 of 2004)**	(Now known as the Department of Forestry, Fisheries and the Environment)		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 developments.
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 Steenbok Solar 1 Steenbok Solar 2 and the relevant documents have been submitted for their comments and approval. The Heritage Impact Assessment undertaken for the projects included as Appendix E5. The Heritage Impact Assessment considers and assesses the impact of the developments on archaeology, palaeontology and cultural heritage.
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 developments are not located on high potential agricultural land and to approve the long term lease agreement. A Soils and Agricultural Compliance statement has been undertaken for Steenbok Solar 1 and Steenbok Solar 2 and is included as Appendix E4.
Subdivision of Agricultural Land Act (70 of 1970) (SALA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	1970	The purpose of this Act is to control the subdivision of agricultural land and, in connection therewith, the use of agricultural land. Applications are lodged with Department of Agriculture, Land Reform and Rural Development (DALRRD) to allow for the subdivision of agricultural land, as well as other prohibited actions in terms of the Act. In order to limit the potential threat that solar energy development could pose to agricultural production and to the agricultural economy, DALRRD created the 10% rule to inform the decision of whether a solar energy development on agricultural land

			should be approved or not. This rule states that a solar energy facility may not utilise more than 10% of the surface area of a farm. Its aim was to ensure that each farm unit remained predominantly agricultural rather than certain farms abandoning agricultural production in favour of renewable energy generation.
Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA);	Provincial Authority	2013	This suite of legislation provides the framework for spatial planning and regulates the use and development of land.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry; (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no

			person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. An Ecological Impact Assessment has been undertaken for Steenbok Solar 1 and Steenbok Solar 2 and is included in Appendix E1.
National Road Traffic Act (93 of 1996) (NRTA)	Department Roads and Public Works	1996	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. Due to the large size of some of the facility's component, they will need to be transported via "abnormal loads". The site is directly adjacent to the R700 therefore providing easy access from national roads. Some roads have been identified for upgrade to ensure that the heavy vehicles can reach the site.
Disaster Management Act (57 of 2002)	Department of Co-Operative Governance	2002	On 27 February 2023 (Government Notice 3089) regulations were issues in terms of Section 27(2) of the Disaster Management Act. These regulations have been gazetted to address the current energy crisis experienced in the country. The regulations provide measures to address effects of disaster and prevent escalation of severe electricity supply constraints. Furthermore, the regulations call for implementing measures to remove impediments to the development or construction of new generation capacity and enabling effective co-ordination between state departments, Eskom and other relevant entities and institutions to ensure security of electricity infrastructure.

	The development and operation of Steenbok Solar 1 and Steenbok Solar 2 will contribute (albeit to a limited extent) to the relief of the current energy crisis.

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. Steenbok Solar 1 and Steenbok Solar 2 are 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). Steenbok Solar 1 and Steenbok Solar 2 are in line with this paper 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	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a "living plan" which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030. "*This scenario was derived based on the 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".* In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options (RSA, 2011a). The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that: "*The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry*; *To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP; The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS*" (RSA, 2011a:6).

	"The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources" (RSA, 2011a:6). The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is: "*Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment."* "*Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed*" (IRP, 2011a:17). In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP was updated and was open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. For the revision scenario, analysis was conducted. The results revealed that for the period ending 2030 that: *"The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025"; "Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the*

		energy mix for the period up to 2030"; and *"the scenario without renewable energy annual build limits provides the least-cost option by 2030*" (RSA, 2018:34). Lastly, the draft IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: "*Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050*" (RSA, 2018:34–35). In the final IRP of 2019 key considerations were taken into account together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *"The application of renewable build limits 'smoothes out' the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence*". The decision stated against this key consideration is to *"retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan"* (RSA, 2019:46). Hereby the IRP also recognises renewable technologies' potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13). Steenbok Solar 1 and Steenbok Solar 2 are 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 Steenbok Solar 1 and Steenbok Solar 2 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 development of Steenbok Solar 1 and Steenbok Solar 2 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 in 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 area identified within the framework, the development of Steenbok Solar 1 and Steenbok Solar 2 are 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. Steenbok Solar 1 and Steenbok Solar 2 comprises the development of two renewable energy generation facilities and would not result in the generation or release of emissions during its operation.

Climate Change Bill	National Department of Forestry, Fisheries and the Environment	2021	The Department of Forestry, Fisheries and the Environment has published a new Climate Change Bill for public comment. The bill notes that climate change represents an urgent threat to human societies and the planet, and requires an effective, progressive and incremental response from both government and citizens. It recognises that South Africa has a global responsibility to reduce greenhouse gasses and that the anticipated impacts arising as a result of climate change have the potential to undermine achieving of the country's developmental goals. The main objective of the bill is to enable the development of an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society, and to provide for matters connected therewith. Steenbok Solar 1 and Steenbok Solar 2 comprises the development of two renewable energy generation facilities 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 Steenbok Solar 1 and Steenbok Solar 2 facilities are potential SIP 9 Projects as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become SIP 9 projects if selected as Preferred Bidder projects 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. Steenbok Solar 1 and Steenbok Solar 2 could be registered as SIP projects once selected as preferred bidder under the REIPPP Programme. The projects 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 Environmental Affairs (DEA) 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 were 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. Steenbok Solar 1 and Steenbok Solar 2 are not located within a REDZ, but the developments will contribute to the expansion of renewable energy facilities and infrastructure within the country, and provide the positive opportunities associated with it.
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 Steenbok Solar 1 and Steenbok Solar 2 is in-line with the framework based on the contributions and opportunities presented by development of this nature.
Mangaung Metropolitan Municipality Draft Integrated Development Plan (IDP) 2022/2027	Mangaung Metropolitan Municipality	2022	The Mangaung Metropolitan Municipality identified five strategic development objectives for the municipal area as part of the 2022/2027 Draft Integrated Development Plan (IDP). The objectives include spatial transformation, economic growth, service delivery improvement, financial health improvement and organisational strength. With these objectives the Municipality also identifies strategic risks to enable early warning in terms of the city's planning, implementation and monitoring to achieve the objectives. These risks include, but are not limited to climate change, pollution, drought, flooding, loss of natural resources, high unemployment rates, financial instability, financial viability, technological failure and skills shortage. Further to the above, the Municipality has considered and identified specific outcome indicators in terms of energy and electricity within the municipal area. One outcome identified by the IDP is improved energy sustainability, with the outcome indicator referring to renewable energy capacity available within the municipal jurisdiction as a percentage of Eskom supply capacity to the municipality. With the output

			indicators referring to the total renewable energy capacity available through IPPs and a percentage of municipal buildings utilising electricity from renewable electricity. The IDP of the municipal area within which Steenbok Solar 1 and Steenbok Solar 2 is located therefore supports the development of renewable energy generation and seeks to promote such developments as part of improved energy sustainability.
Mangaung Metropolitan Municipality District / Metro One Plan	Mangaung Metropolitan Municipality	2022	Six transformational goals are outline in the plan which includes spatial restructuring and environmental sustainability. In terms of environmental sustainability, the strategic outcome is to facilitate the protection and sustainable management of the natural environmental resources, with the strategic action being to contain urban development and manage rural areas through appropriate application of Spatial Planning Categories. Furthermore, the plan indicates the need to implement climate change adaptation and mitigation measures, which considered the energy sector. The mitigation measures /intervention projects proposed includes the development of renewable energy, as well as the implementation of measures for energy efficiency. The details of the interventions include the building of solar parks that will feed electricity to the National Grid, use of Solar in residential areas and industry and the installation of solar water heaters. The plan for the municipal area therefore identifies the need for renewable energy developments, specifically that of solar energy facilities, such as Steenbok Solar 1 and Steenbok Solar 2.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

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

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

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

3.6 CONCLUSION

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

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed developments, as well as an indication of the need and desirability of the proposed developments from a national, provincial and local level. For this reason, the proposed projects have been 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 and a need for the development of Steenbok Solar 1 and Steenbok Solar 2. 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 attention is given explicitly to renewable sources like PV solar energy. 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 Steenbok Solar 1 and Steenbok Solar 2 facilities are therefore supported by the related policy and planning documents reviewed in this section of the report. The support for the development of solar energy facilities from all spheres of Government also indicates the significant need and desirability of the development of such facilities within the country, especially considering the current State of Disaster pertaining to the energy crisis.

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 activities are 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 this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO2 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 an 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 projects are intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes / opportunities. 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 be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

Furthermore, on the 09 February 2023, South African President Cyril Ramaphosa declared a national state of disaster over the countries crippling power shortages. On the 27 February 2023 new regulations were gazetted to address the energy crisis (No. 11547, Vol. 692) in this regard. There is

currently therefore a strong need for new generation capacity to come online which may assist in the combating of the current crisis being experienced.

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

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

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

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

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5. In December of 2022, five solar energy preferred bidders were announced by the Department of Mineral Resources and Energy under Bid Window 6, with a total capacity amounting to 860MW. Bid window 7 is expected mid 2023

From a local perspective the need for renewable energy development within the municipal area has been specified in the Mangaung Metropolitan Municipality Draft Integrated Development Plan (IDP) 2022/2027 and the Mangaung Metropolitan Municipality District / Metro One Plan.

The need for the development of Steenbok Solar 1 and Steenbok Solar 2 is therefore relevant from a local to national level, and considering the current state of disaster in terms of electricity supply in the country the need for the development of facilities of this nature is quite significant.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The contribution of the two facilities 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 facilities 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 projects have 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 projects 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 projects 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 facilities will in turn lead to growth in tax revenues for the municipality and sales of carbon credits, resulting in increased foreign direct investment. The location of the proposed development within the Mangaung Metropolitan Municipality is desirable since the development of renewable energy is require to ensure environmental and energy sustainability for the municipal area.
- 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.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.
- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).

- Climate change mitigation - On a global scale, the projects make a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in non-renewable electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Reduced dispersion of environmental impacts – As the sites for Steenbok Solar 1 and Steenbok Solar 2 are located within the same affected property and directly adjacent to one another an opportunity is created to reduce the dispersion of environmental impacts associated with the development of solar energy facilities in the general landscape. The impacts will take place within a consolidated/confined area which will create opportunities for the mitigation and management of the impacts within a single area.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the power plants. 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 developments 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 225 employment opportunities will be created (per facility) during the construction and operational phases.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Because of predominantly the climate and soil limitations, the sites are unsuitable for cultivated crops, and the viable agricultural land use is limited to grazing only. The proposed developments in this specific area will generate alternative land use income through rental for the proposed energy facilities, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: In Mangaung Metro Municipality, there are 47 informal settlements which are home to an estimated 30 329 households. The Metro has adopted a municipal wide approach to the upgrading of the informal settlements wherein all the settlements have access to municipal utility services such as solid waste removal, access to water (individua and communal); 95% have access to electricity; and the roll-out of basic

services is underway. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.

- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy, it is preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental and agricultural value elsewhere in the country. Furthermore, as the two proposed developments are located within one affected property it creates an opportunity to concentrate the cumulative transformation and disturbance of the landscape within one area which increases the positive impacts expected to occur, but also provides for the easy mitigation of negative impacts as these are expected to occur within close proximity to one another.

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 survey was conducted by the developer, prior to the commencement of the EIA process, on the Remaining Extent of the Farm Floradale No. 15 and the farm was found favorable due to its close proximity to existing grid connections, solar radiation, limited ecological features from a general point of view, readily available access to the property and relative flat terrain. Some parts of the farm have been deemed not suitable for the proposed development such as areas associated with surface water features and areas under cultivation. The sites under assessment for the two developments are also the areas which the landowner deems suitable considering the existing agricultural activities being undertaken at the property.

A single alternative site on the affected property has been identified for assessment for each proposed solar energy facility. The site assessed for Steenbok Solar 1 is 160 ha and the site for Steenbok Solar 2 158 ha. Specific features of environmental sensitivity have been identified by the independent

specialists as part of the Scoping Phase, these areas and the associated required buffers have been considered by the developer to ensure that the facility layouts for both Steenbok Solar 1 and Steenbok Solar 2 are appropriate.

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

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo of the affected environment. The description provided in section 5.3 of this report could be considered the baseline conditions (*status quo*) to persist should the no-go alternative be preferred. The sites are currently zoned for agricultural land uses. Should the proposed activity not proceed, the sites will remain unchanged and will continue to be used for the current land uses present. The area associated with the development footprint has limited agricultural potential and is unsuitable for cultivation, with grazing considered to be the only agricultural option. The potential opportunity costs in terms of adding solar energy generation to the current land use, would be lost if the *status quo* persist, and therefore all positive socio-economic opportunities and associated growth will also be lost.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the development of the proposed facilities. No other properties have at this stage been secured by Steenbok Solar (Pty) Ltd in the Bloemfontein area to potentially establish Steenbok Solar 1 and Steenbok Solar 2. From a local perspective, the Remaining Extent of the Farm Floradale No. 15 is preferred due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., agricultural potential and archaeology), proximity to a grid connection point (i.e., for the purpose of electricity evacuation), as well as site access (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

Within the affected property, areas under cultivation have been excluded from the two sites and is not being considered for development at all.

No alternative areas on the Remaining Extent of the Farm Floradale No.15 have been considered for the placement of the development footprints, as the areas identified and assessed in the Scoping Phase avoids the areas currently under cultivation, is identified as available for development by the landowner and is therefore considered available without excluding the current agricultural land use activities from the property and impacting on the operations thereof. The sites assessed during the Scoping Phase for the placement of the development footprints are 160ha and 158ha respectively.

Therefore, a single preferred location alternative for each solar facility was assessed for the placement of the respective development footprints – refer to Figures 5.1.

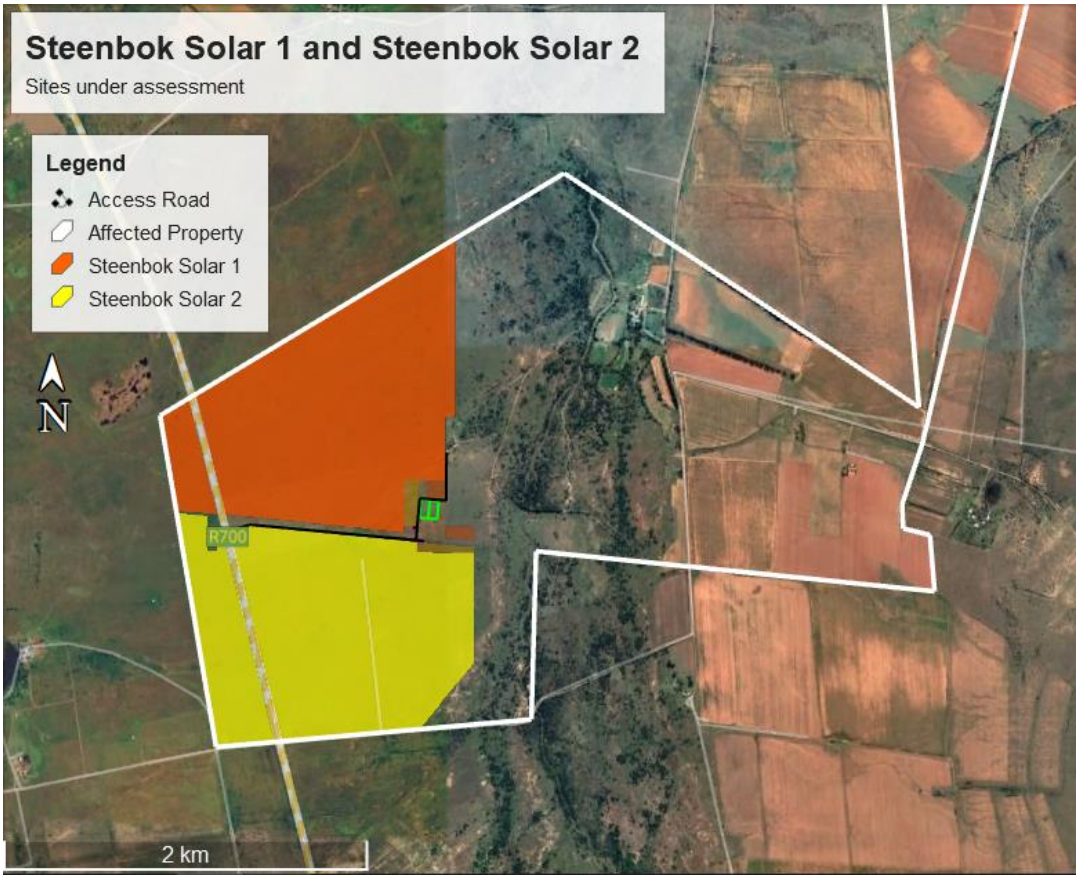


Figure 5.1: Location of the single preferred location alternative for each facility (i.e., Steenbok Solar 1 and Steenbok Solar 2) within the affected property assessed for the placement of the respective project development footprints

Following the Scoping Phase, the Applicant has placed and designed the respective development footprints / facility layouts within the areas assessed (160ha and 158ha respectively) which avoids the sensitive environmental features and areas that are not considered to be appropriate for development, as identified during the Scoping Phase by the independent specialists. Each development footprint proposed and assessed as part of this EIA phase, and within this EIA Report, has an extent of 86ha to enable the generation of 35MW per facility. Refer to Figures 5.2 and 5.3 for the environmental sensitivity maps produced during the Scoping Phase.

As part of the specialist studies undertaken, areas that will need to be avoided have been identified which mainly relate to surface water features including wetlands and a seasonal drainage channel. The sites assessed for the two projects are however large enough to enable the avoidance of the sensitive features and the associated buffers by the layouts of the facilities / development footprints and still provide an opportunity for the successful development and operation of the Steenbok Solar 1 and Steenbok Solar 2 from a technical perspective.

Considering the above, the proposed development footprints assessed for Steenbok Solar 1 and Steenbok Solar 2 are just over 50% of the larger sites assessed for the projects and therefore provide an opportunity for sufficient avoidance of the sensitive environmental features as well as sufficient space for the technical optimization of the facilities. Refer to Figure 5.4.

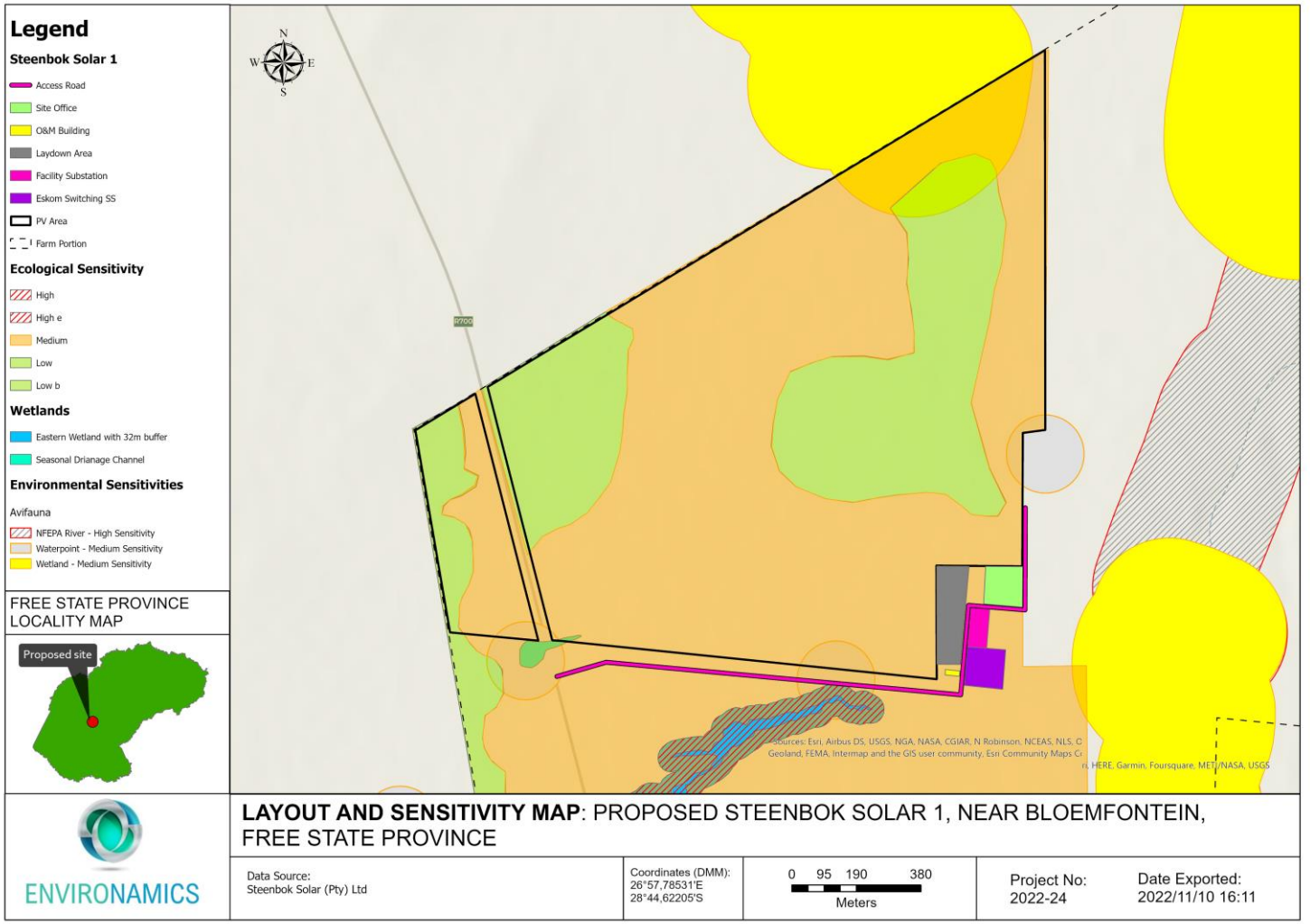


Figure 5.2: Scoping Phase Layout and Sensitivity Map for Steenbok Solar 1

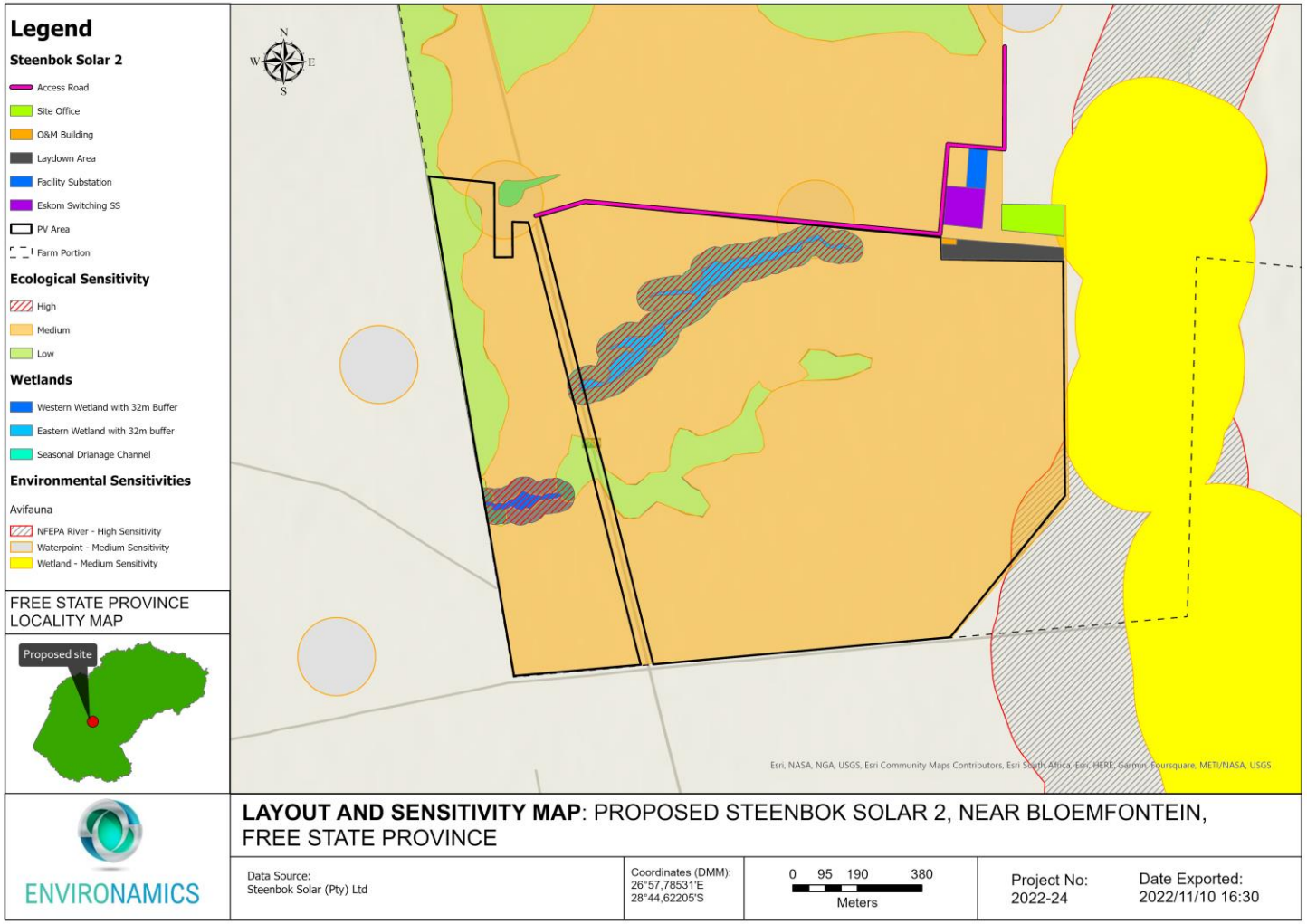


Figure 5.3: Scoping Phase Layout and Sensitivity Map for Steenbok Solar 2

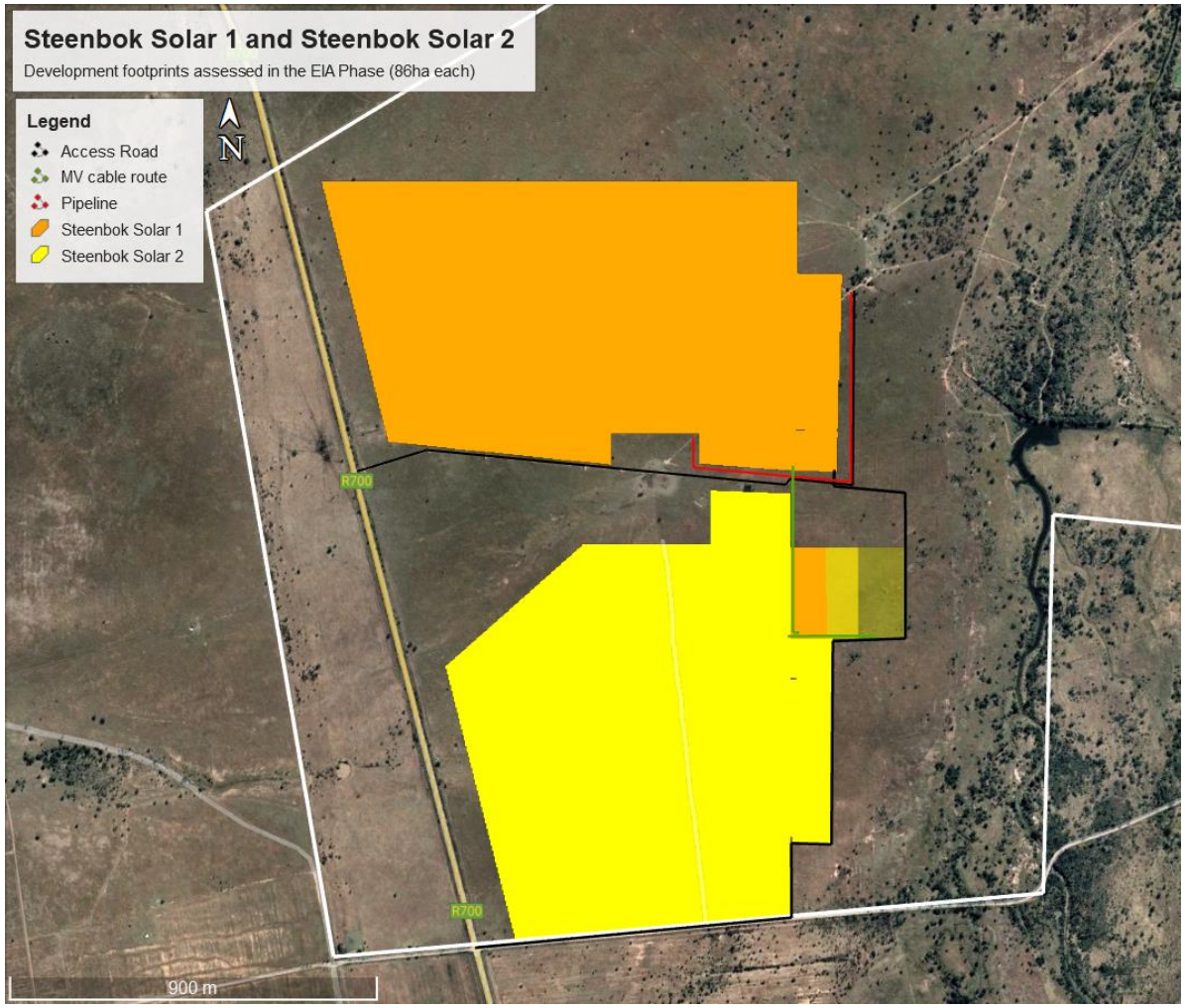


Figure 5.4: Development footprints proposed and assessed for Steenbok Solar 1 and Steenbok Solar 2 that avoids the environmental sensitivities identified during the Scoping Phase

5.1.3 Activity alternatives

The EIA process also needs to consider if the development of the two solar PV facilities would be the most appropriate land use for the particular site.

- Photovoltaic (PV) solar facility – Steenbok Solar (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa, and therefore based on experience and the condition of the site deems the installation of solar PV panels as the most suitable and appropriate technology for the sites. From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2129.2 kwh/m^2.
- 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 renewable energy resource available for the area. This alternative is therefore not regarded as 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 county. Therefore, this alternative will not be considered further in this report.

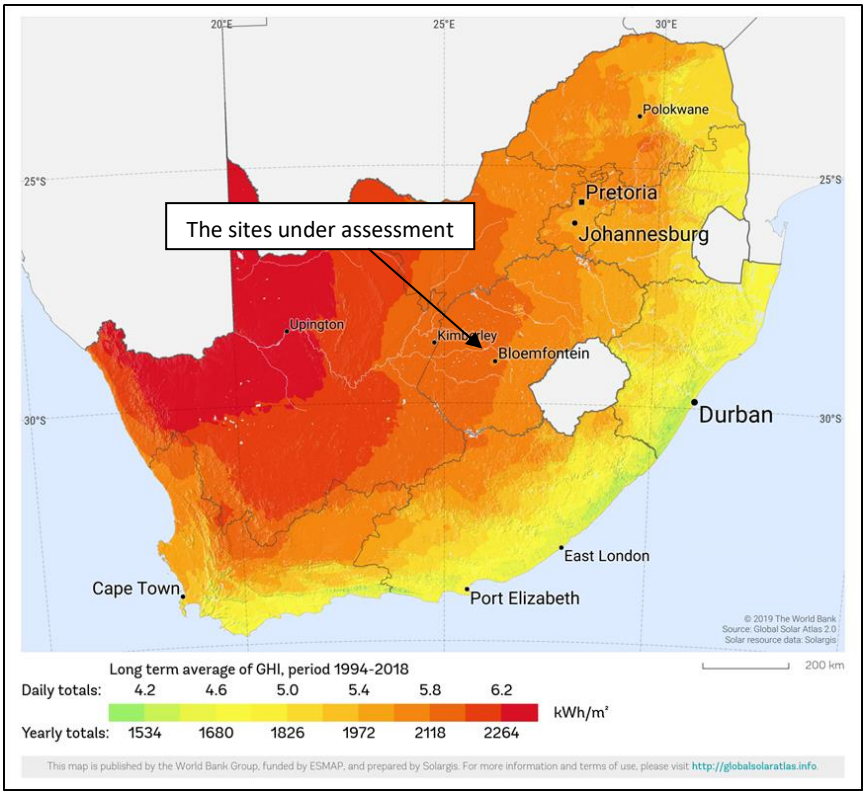


Figure 5.5: Global horizontal irradiation values for South Africa (SolarGIS, 2021).

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 Battery Energy Storage Facility (BESS)

Three types of battery technologies are being considered for the proposed project: Lithium-ion (Lithium-Phosphate), Sodium-sulphur or Vanadium Redox flow battery. While there are various battery storage technologies available, 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). Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation.

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 baseload and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer, which also included the consideration of sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. The final layout plans/development footprints proposed for development is included as Figures I1 and I2.

The layouts follow the limitations of the respective sites and aspects such as environmental sensitive areas (supported by specialist input), roads, fencing and servitudes are considered. The developer has considered the environmental sensitivities as identified during the Scoping Phase and have accordingly optimised the layout of the two respective facilities to ensure avoidance of the sensitive areas (Figures H3A and H3B). This optimised layouts are therefore considered to be appropriate for development within the respective sites and are considered to be the final layout plans as assessed within this draft EIA Report.

The total surface area proposed for each facility (up to 86 hectares per facility) includes the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, facility substation, BESS and perimeter fences).

With regards to the PV structures, tracking PV with mono- or bi-facial panels are being considered. Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the

balance of system (BOS) costs and maximizing the efficiency of land use, resulting in the lowest levelized cost of energy (LCOE). The preference for single axis tracking is also based on the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel mounting types.

The development of the PV facilities will take into consideration, as part of the final design phase, the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed- tilt mounting structures. Both options are considered feasible for the Steenbok Solar 1 and Steenbok Solar 2 sites.

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).

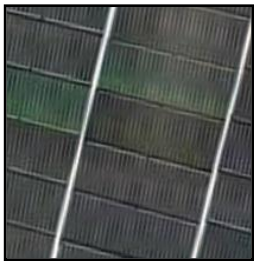
- Thin film (low-cost technology with lower efficiency):

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. Refer to Figure 5.6.

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 projects.

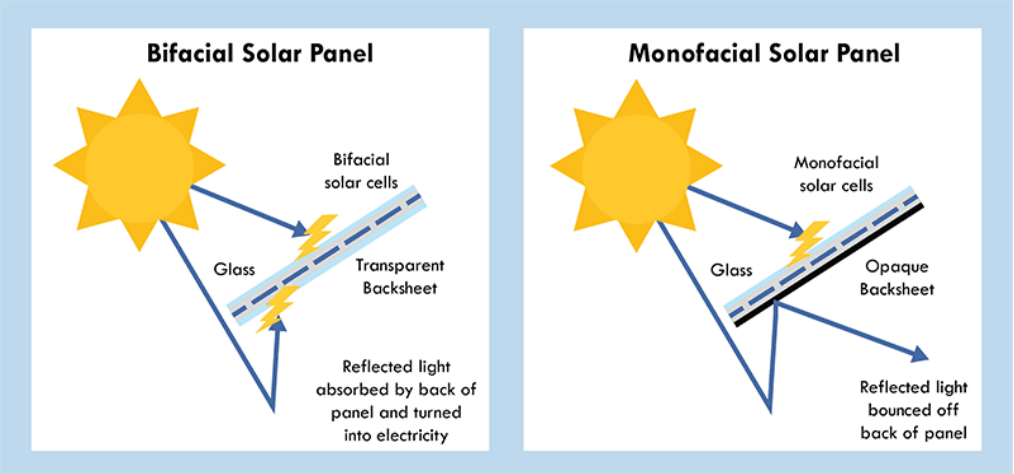


Figure 5.6: Bifacial vs Monofacial Solar Panel absorption.

5.2 PUBLIC PARTICIPATION PROCESS

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

5.2.1 General

The public participation process for Steenbok Solar 1 and Steenbok Solar 2 has conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

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

Since the scale of anticipated impacts is low, the general land use of the area is related to agriculture, the limited environmental sensitivity of the sites and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms are considered at this stage of the process. This is also based on the fact that no objections or significant comments have been raised during the Scoping Phase of the EIA process.

The following actions have already been taken in terms of the public participation process:

- Newspaper advertisement

  Since the proposed developments are 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 (Bloemnuus) on 29 September 2022 (see Appendix C1) 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.

  The advertisement provided information relating to both developments and the details thereof.

- Site notices

  Site notices were erected on site for both the Steenbok Solar 1 and Steenbok Solar 2 solar energy facilities in Afrikaans and English on 15 September 2022 to inform surrounding communities and immediately adjacent landowners of the proposed developments. I&APs were given the opportunity to raise comments. Photographic evidence of the site notices is included in Appendix C2.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, were directly informed of the EIA process on 28 September 2022 via WhatsApp and emails (as relevant). The Background Information Document (BID) was distributed with the notification. For a complete list of I&APs with their contact details see Appendix C3 to this report. It was expected from I&APs to provide their inputs and comments on the EIA process by 28 October 2022.

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via WhatsApp or email (as relevant) to all surrounding landowners and occupiers on 28 September 2022. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C3. Refer to Figure 5.7.

- Circulation of Draft Scoping Report

  Copies of the draft Scoping report were provided to all I&APs via courier, Dropbox and/or email (as relevant) as part of the Scoping Phase. 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 within 30-days of the notification of availability of the draft Scoping Report. The 30-day review and comment period was from 14 November 2022 until 14 December 2022. All issues identified during the 30-day review and comment period were recorded and documented and compiled into a Comments and Response Report (Appendix C6) included as part of the Final Scoping Report for decision-making.

Acceptance of the Scoping Report and plan of study for the EIA has been received from the DFFE and is dated 23 February 2023. The requirements of the Acceptance of Scoping have been addressed and considered as part of this draft EIA Report. Refer to section 1.7 of this report.

- Circulation of the Draft Environmental Impact Assessment Report

  All registered I&APs and State Departments have been informed of the availability of the draft EIA Report on 21 April 2023 and requested to provide their comments within 30 days (refer to Appendix C4). The 30-day review and comment period is from 21 April 2023 to 23 May 2023. All comments received during this period will be included in the final EIA Report to be submitted to the DFFE for decision-making. All comments received prior to the release of the draft EIA Report have been included in Appendix C.

  The Comments and Responses report is included as Appendix C6 of this draft EIA Report.

- Circulation of decision and submission of appeals:

  Notice will be given to all identified and registered I&APs of the decisions taken by the DFFE on the Application for EA. Two separate EAs will be issues for each development. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decisions 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 decisions was sent to the applicant by the competent authority.

5.2.2 Consultation process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C3 and C4.

5.2.3 Registered I&APs

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

This report is the draft Environmental Impact Report. The draft Environmental Impact Report has been made available to all potential and/or registered I&APs and State Departments. They have been provided with a copy of the draft EIA Report and have been requested to provide written comments

on the report within 30 days. All issues identified during this review period, and previous review periods (i.e. Scoping Phase), will be documented and responded to in the Comments and Response Report to be included as part of the final EIA Report (Appendix C6).

All comments received during the Scoping Phase, and prior to the release of the draft EIA Report for the 30-day review and comment period have also been included in this report as Appendix C4 and C5 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

To date, no significant comments or issues have been raised by registered I&APs as part of the EIA phase. All original comments received are included in Appendix C5 of this draft EIA Report. All comments will be included and responded to in the comments and responses report (Appendix C6).

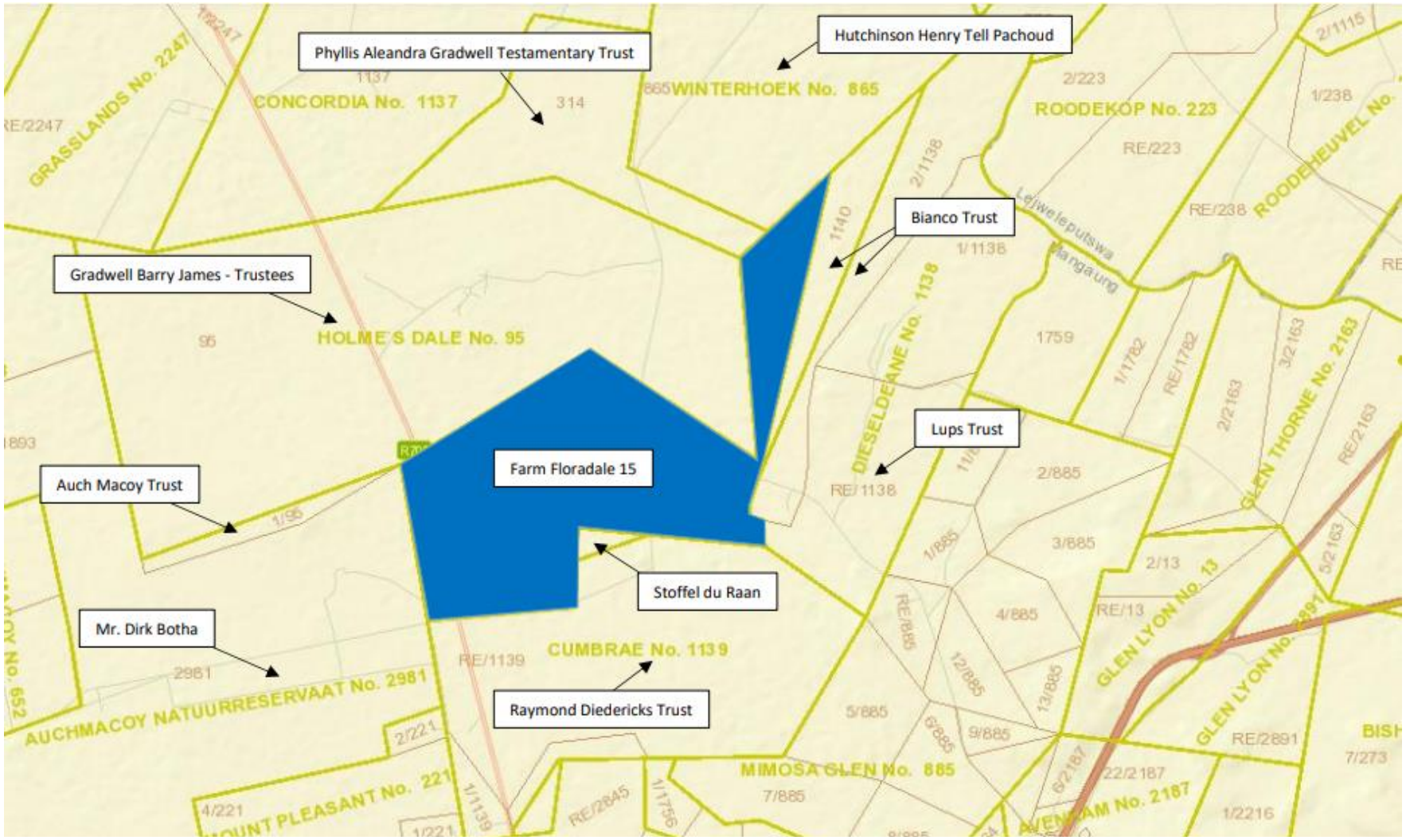


Figure 5.7: Surrounding Landowners to the affected property

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributes associated with the preferred alternative (i.e., the location of the sites and development footprints within the affected property assessed for Steenbok Solar 1 and Steenbok Solar 2).

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected by the proposed developments. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to the Table 1.2.

However, due to the fact that the area proposed for development (i.e., the sites and development footprints under assessment for the placement of the respective Steenbok Solar 1 and Steenbok Solar 2 facilities) exclusively consists of land used for grazing and excludes areas under cultivation, limited sensitive areas from an ecological, heritage or conservation perspective have been identified. The sensitive areas relevant to the Steenbok Solar 1 and Steenbok Solar 2 sites relate mainly to surface water features such as wetlands and drainage channels. The facility layouts/development footprints under assessment in this draft EIA Report have been sited/designed within the sites by the Applicant to avoid the environmental sensitivities identified within the affected property. This approach is to ensure that the developments within the affected property are considered to be environmentally appropriate.

These features are described in more detail below.

5.3.1.1 Geology, topography, soils, agricultural potential and land use

The sites are mostly level to undulating with a slight slope from the central part to the west and east. Towards the north the sites border onto an open grassland where sections have been cleared and the rest mowed. In the south the sites border a gravel road and old agricultural fields while in the west and east open grassland used for grazing with some sections in the west previously cleared, occurs.

According to the Agriculture Compliance Statement (attached in Appendix E4) the sites are located on very gently sloping land with an easterly aspect and a slope gradient of approximately 1%. The geology is mudstone and shale of the Ecca Group and also sandstone, shale and mudstone of the Beaufort Group partially covered by wind-blown sand and surface limestone. Dolerite intrusions occur.

Although the single land type across the sites, Ca8, includes a fairly high proportion of deeper Hutton and Bainsvlei soils that would be suitable for cropping, none of those soils actually occur on the sites. All the investigated soils were shallow, clay-rich soils predominantly of the Valsrivier soil form that are unsuitable for crop production. The cropping potential is limited by the shallow depth above the limiting, dense clay horizon in the subsoil. In the relatively low

rainfall of the sites (499 mm per annum), the shallow soils have too little potential root volume and moisture reservoir to support viable cropping. This land is used only for grazing. The long term grazing capacity of the sites are 7 hectares per large stock unit.

Apart from the results of the soil investigation, the fact that the land is not used for crop production is evidence of its lack of suitability. In a well-developed agricultural area, like the one being assessed, the suitable versus the unsuitable soils have been identified over time through trial and error. All the suitable soils are generally cropped, and uncropped soils can therefore fairly reliably be considered to be unsuitable for crop production. It should be noted that the suitability changes with a changing agricultural economy over time. Poorer soils that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy, with increased input costs.

When considering the affected property proposed for development, all of the suitable soils are utilised for crop production. These are the deep and more sandy Hutton and Bainsvlei soils. There are approximately 220 hectares of cropland out of a total farm area of approximately 900 hectares. The farmer crops a total of 700 hectares over several farms in the area, which includes rented lands. If other parts of the farm under assessment were suitable for cropping, the farmer would use those rather than having to rent additional land.

When considering the DFFE Screening Tool Reports (Appendix B), the Agricultural Compliance Statement (Appendix E4) indicates that because none of the land is classified as cropland, agricultural sensitivity is purely a function of land capability. The land capability of the sites on the screening tool is predominantly 7 (it includes a few pixels of 6 and 8). The small scale differences in the modelled land capability across the sites are not very accurate or significant at this scale and are more a function of how the data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. Values of 6 to 8 translate to a medium agricultural sensitivity.

The agricultural sensitivity, as identified by the screening tool, is therefore confirmed by the Agricultural Compliance Statement as medium. The motivation for confirming the sensitivity is that the sites are not under crop production and the combination of climate and shallow, heavy clay soil on the sites mean that it is not suitable for viable crop production.

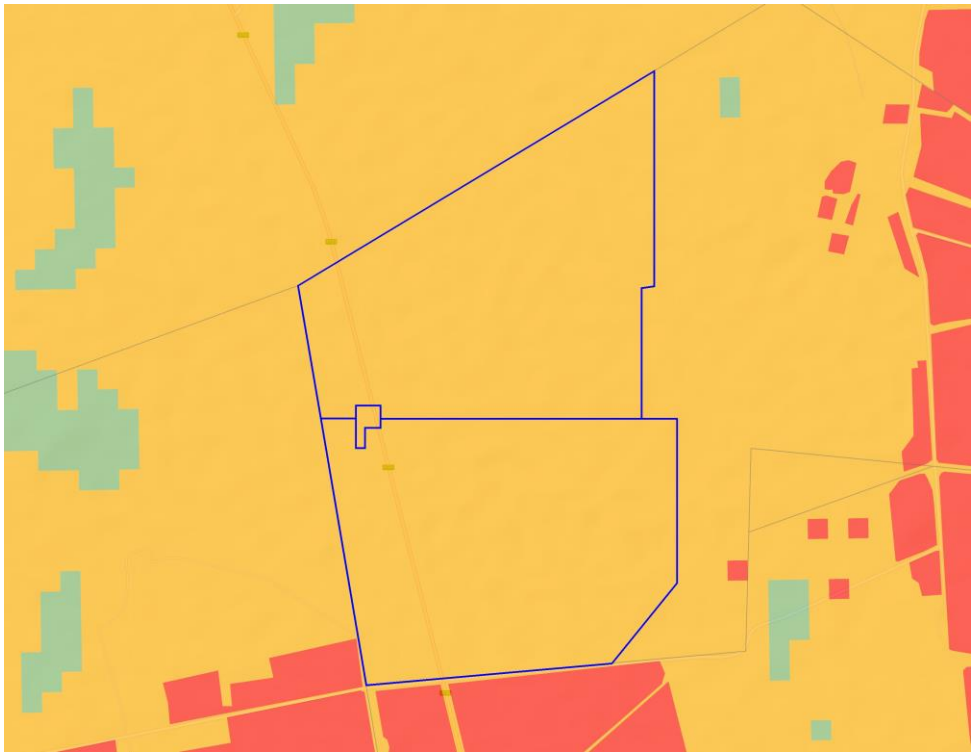


Figure 5.8: Agricultural sensitivity of the Steenbok Solar 1 and Steenbok Solar 2 sites as per the results of the DFFE Screening Tool Reports (Appendix B)

This site sensitivity verification verifies the entire extent of the sites as being of less than high agricultural sensitivity, with a maximum land capability value of 7. The land capability value is in keeping with the combination of soil and climate that makes the site too marginal for crop production.

5.3.1.2 Vegetation and landscape features

The vegetation of the study area, within which the sites and development footprints under assessment are located, belongs to the endangered Bloemfontein Dry Grassland vegetation type (Gh 5). This vegetation type occurs at altitudes ranging between 1320-1420 masl within the Free State Province. It occurs on slightly undulating plains with mainly medium to tall grasses with smaller patches of karroid dwarf shrubs. The soil varies from deep red sand and clay with Hutton, Bainsvlei and Bloemdal soil forms. Refer to Figure 5.9.

The vegetation is dominated by the grasses *Anthephora pubescens, Aristida diffusa, Digitaria argyrograpta, Eragrostis chloromelas, Eragrostis lehmanniana, Eragrostis superba, Eragrostis trichophora, Themeda triandra, Setaria sphacelata* and the forbs *Selago densiflora, Berkheya onopordifolia, Blepharis integrifolia, Commelina africana, Dicoma macrocephala, Gazania krebsiana, Pollichia campestris, Oxalis depressa, Haemanthus humilis*. Common dwarf shrubs include *Pentzia globosa, Pentzia incana, Asparagus striatus* and the succulent shrub *Hertia pallens*.

This vegetation type is regarded as being endangered with only a small portion of the target of 24% statutorily conserved. More than 40% is already transformed due to cultivation, overgrazing and urbanisation. The grassland vegetation of the sites show resemblance with this vegetation type with many species in common, though the sites are slightly degraded due to grazing practices.

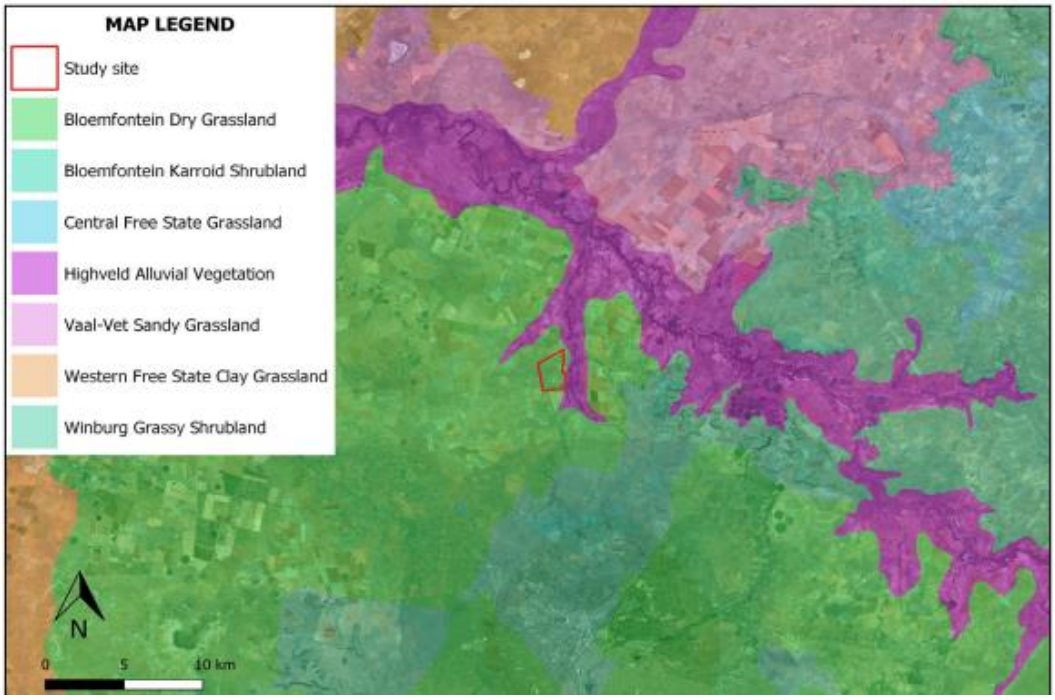


Figure 5.9: Approximate location of the sites located within the Bloemfontein Dry Grassland vegetation types

Vegetation Units:

The vegetation units on the sites vary according to soil characteristics, topography, and vegetation structure. Vegetation units were identified within the sites under assessment and can be divided into four distinct vegetation units (Figure 5.10 and Table 5.1). The units include:

1(a) & (b) *Themeda triandra-Eragrostis curvula* grassland

2. *Vachellia karroo* open woodland

3. Seasonal drainage channel

4. Wetland area (western)

5. Wetland area (eastern)

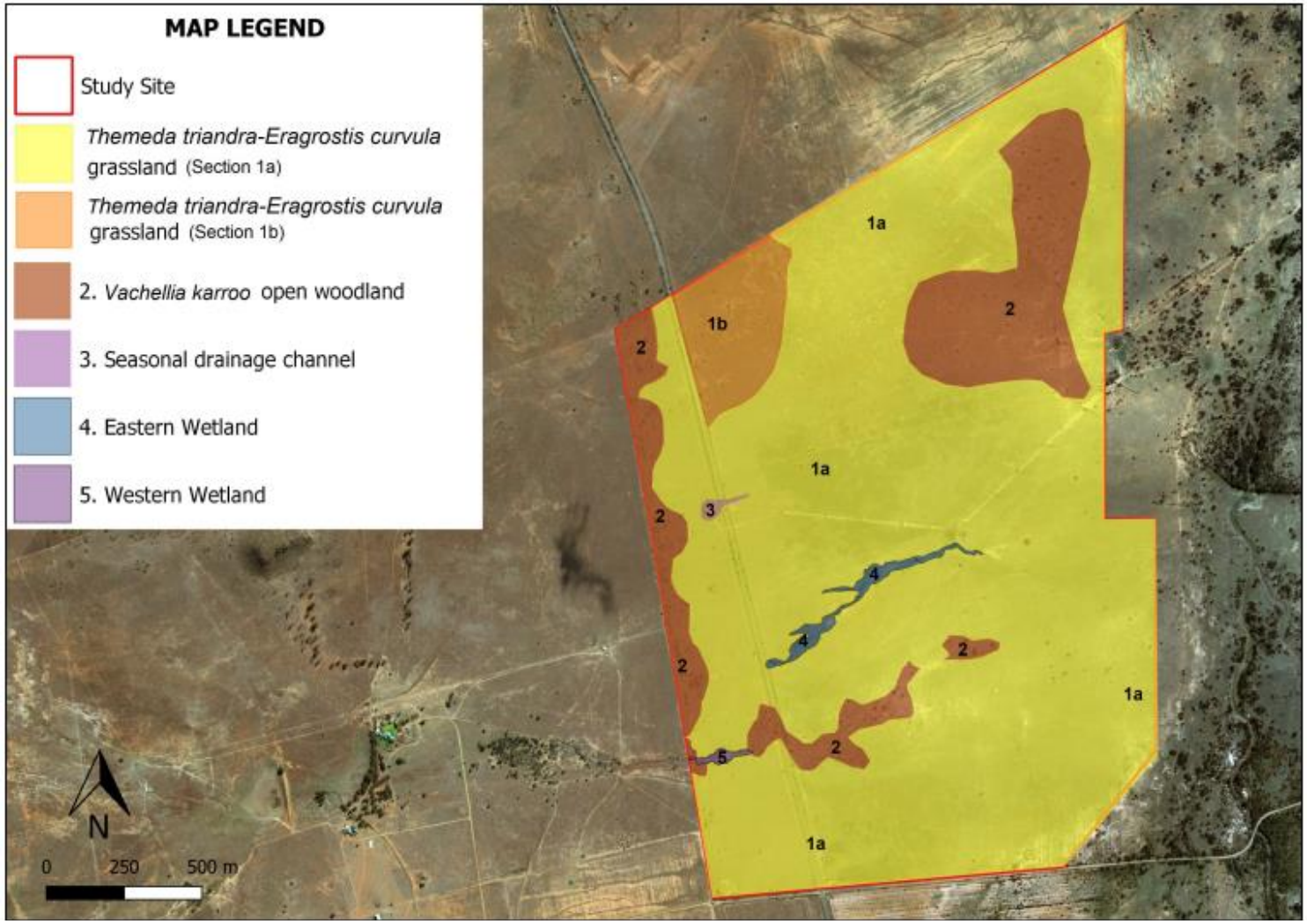


Figure 5.10: Vegetation units present within the area associated with the two sites proposed for development for Steenbok Solar 1 and Steenbok Solar 2 within which the development footprints have been placed and are under assessment within this EIA Report

Table 5.1: Summary of the Vegetation units present at the Steenbok Solar 1 and Steenbok Solar 2 sites

Vegetation Unit	Description	Characteristics	Photograph
Themeda triandra-Eragrostis curvula grassland Units 1a & 1b	• Relevant to majority of the Steenbok Solar 1 and Steenbok Solar 2 sites • This vegetation unit comprises two sections with the same structure and broad species composition though one section is more degraded than the other namely sections 1a, and 1b. Section b is only relevant to the Steenbok Solar 2 site area. • Vegetation structure: medium tall grassland • Topography: mostly level • Soil: clayey loam • The area has a few rocks with clay to loam soil. • The grasses have the highest cover followed by the forbs. • Only a few single individuals of woody species occur scattered in some parts of this unit with less than 2% cover.	• Section 1a: ○ Few rocks with clay to loam soil. ○ Dominated by the secondary successional grass *Eragrostis curvula* with the climax grass *Themeda triandra* co-dominant. ○ One red data species (*Boophone disticha*) were found. ○ Need for rehabilitation: Medium ○ Conservation priority: Medium • Section 1b: ○ Shallow gravely to loam soil. ○ Dominated by the grasses *Themeda triandra* and *Eragrostis superba*, with *Eragrostis curvula* prominent. ○ Encroacher dwarf shrub *Seriphium plumosum* occurs. ○ Need for rehabilitation: Medium-high ○ Conservation priority: Low	Unit 1a  Unit 1b 

Vachellia karroo open woodland Unit 2	• Relevant to both the Steenbok Solar 1 and Steenbok Solar 2 sites, but majority of the unit is present within the Steenbok Solar 2 site. • Vegetation structure: medium tall open woodland • Topography: level (slight 1 degree western slope) • Soil: loamy clay	• Few rocks present, while the grass layer has the highest cover followed by the trees and shrubs. • Clayey to loam soil present. • The vegetation is dominated by the tree *Vachellia karroo* with the dwarf shrub *Asparagus laricinus* and the grass *Themeda triandra* are prominent throughout the community. • Other species present include the grasses *Eragrostis chloromelas*, *Cynodon dactylon*, and the forbs *Chenopodium album*, *Berkheya onopordifolia* and *Pavonia burchellii*. • Need for rehabilitation: Medium • Conservation priority: Low	
Seasonal drainage channel	• Relevant primarily to the Steenbok Solar 2 site. • Feature stretches underneath the R700 regional road. • Vegetation structure: short grass and forb land. • Topography: slight 2 degree western slope • Soil: Clay	• Soil is clayey with no rocks present. • The grasses and forbs have the highest cover. • The vegetation is dominated by the grasses *Eragrostis curvula, Sporobolus fimbriatus* and the forb *Verbena brasiliensis.* • Other species present include the grasses *Panicum schinzii, Setaria sphacelata,* and the forbs *Berkheya onopordifolia, Pseudognaphalium luteo-album, Schkuhria pinnata, Schoenoplectus muricinux, Conium chaerophylloides* and *Sonchus nanus*. • Alien plant species present include *Verbena brasiliensis* and *Cirsium vulgare*. • Need for rehabilitation: Medium • Conservation priority: High	

Eastern wetland Unit 4	• Relevant primarily to the Steenbok Solar 1 site. • Permanently to seasonally wet vegetation unit. • The vegetation has a patch appearance and consists of a mixture of hydrophilic and terrestrial plant species. • The grasses and forbs have the highest cover. • Vegetation structure: medium to tall grass and forb land. • Topography: slight 2 degree western slope • Soil: dark and gleyed clay	• Soils include dark clay soil as well as gleyed clay soil in the permanently wet patches. • The only rocks that was noted occurs close to the R700 road. • The grasses *Arundinella nepalensis* and *Setaria sphacelata* dominated the moist and wet areas. • Other species present include the grasses *Aristida junciformis, Eragrostis biflora, Eragrostis inamoena, Sporobolus africanus* and the forbs *Marsilea macrocarpa, Senecio hastatus, Felicia muricata* and *Mariscus spp*. • A few single woody species (*Vachellia karroo*) occur in the drainage line area of the wetland close to the R700 road. • One alien plant species was identified namely *Cirsium vulgare*. • Need for rehabilitation: Medium • Conservation priority: High	
Western wetland Unit 5	• Relevant primarily to the Steenbok Solar 1 site. • Consist of an artificial ground dam that collects surface water from the drainage channel outside the site. • Vegetation structure: medium to tall grass and forb land. • Topography: slight 2 degree eastern slope • Soil: dark and gleyed clay	• The soil is clayey with few rocks present. • The grasses and forbs have the highest cover. • The vegetation is dominated by the tree *Vachellia karroo* and the grasses *Arundinella nepalensis* and *Sporobolus africanus.* • Other species present include the dwarf shrub *Asparagus laricinus*, the grasses *Eragrostis inamoena, Cynodon dactylon* and the forbs *Marsilea macrocarpa*, *Senecio hastatus* and *Tagetes minuta*. • *Vachellia erioloba* is a protected species identified on site. A single individual of the	

		protected tree *Vachellia erioloba* was found along the western boundary of the wetland. • Alien plan species identified on site include *Cirsium vulgare and Gleditsia triacanthos.* • Need for rehabilitation: Medium • Conservation priority: High	

Protected Areas, Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA)

According to the Department of Forestry, Fisheries and Environment's South African Protected Areas Database (SAPAD) various protected areas are present within the surrounding areas of the Steenbok Solar 1 and Steenbok Solar 2 sites. These include Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south. Furthermore, the Soetdoring Nature Reserve is located approximately 14 km north-west of the sites which is identified as an Important Bird Area. Refer to Figure 5.11.

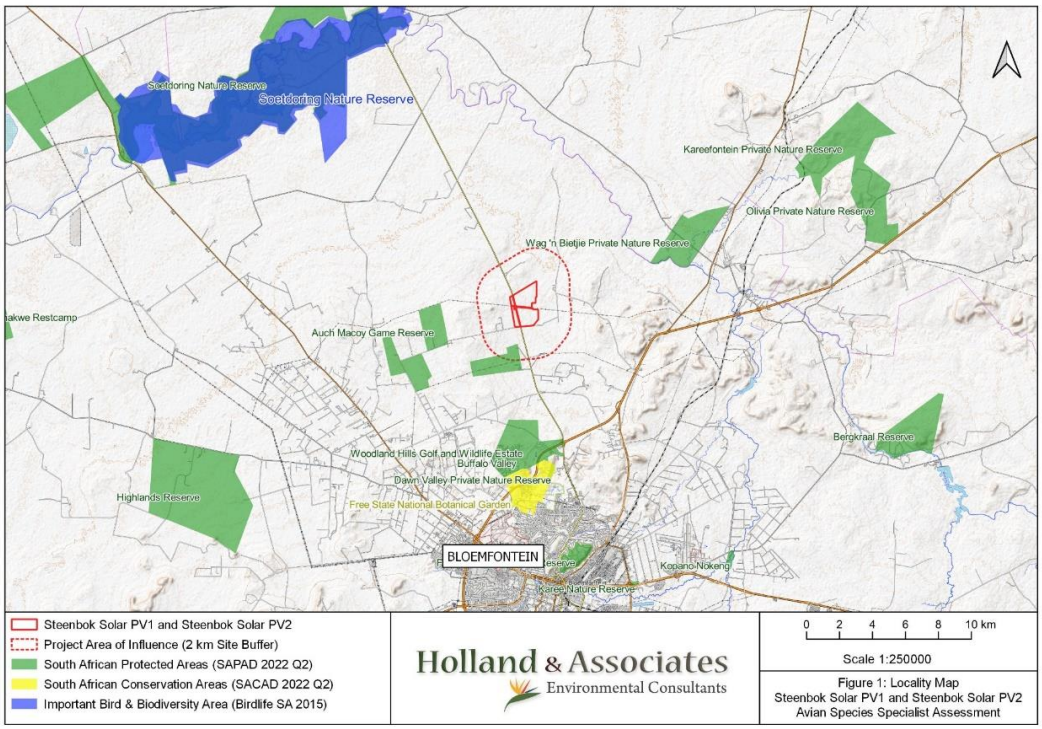


Figure 5.11: Protected areas located within the surrounds of the Steenbok Solar 1 and Steenbok Solar 2 sites

The Free State Biodiversity Conservation Plan has been considered for the identification of the relevant Critical Biodiversity Areas (CBA) associated with the proposed development. The area within which the sites are located represent an Ecological Support Area (ESA) 1. The management objective for this area is to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern. No CBAs are present within the sites proposed for development. Refer to Figure 5.12.

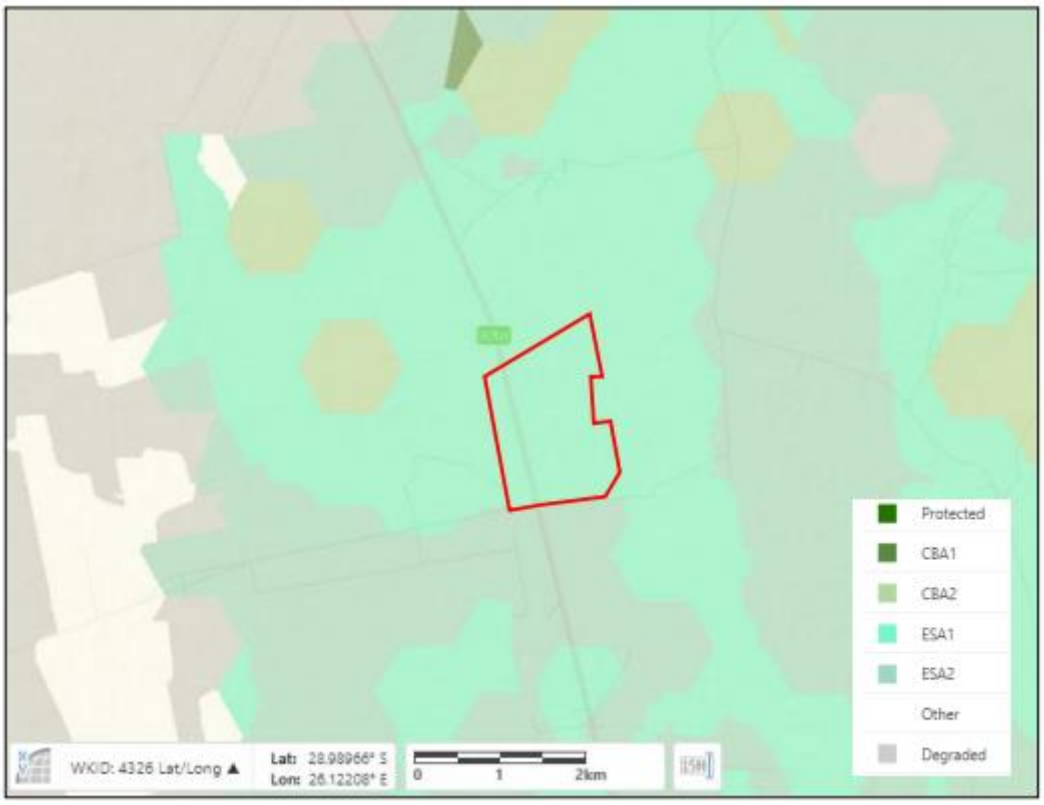


Figure 5.12: Critical Biodiversity Map for the sites proposed for development for Steenbok Solar 1 and Steenbok Solar 2

Furthermore, approximately two thirds of both sites fall within a National Protect Area Expansion Strategy (NPAES) Focus Area (Figure 5.13), referred to as the Freestate Highveld Grassland Focus Area. It is unclear why the area is mapped as a focus area, but it may be associated with the river to the east of the sites, which will remain unaffected by the development.

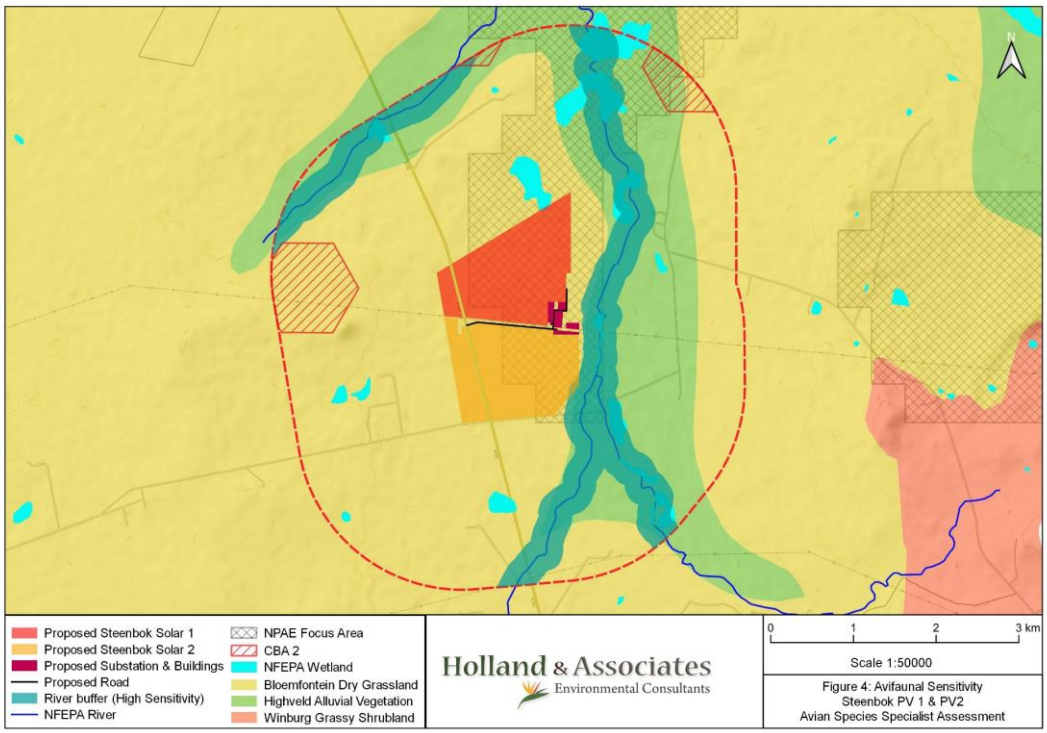


Figure 5.13: NPAES map for the sites proposed for development for Steenbok Solar 1 and Steenbok Solar 2

Red data species, protected species and medicinal plants

A list of red data plant species previously recorded in the grid square in which the proposed development is planned was obtained from SANBI. The Ecological and Wetland Impact Assessment (Appendix E1) indicates that there is a total of 9 red data plant species that could be found in similar habitats as the sites. One such species was found within the sites within vegetation unit 5, though the eastern wetland (vegetation unit 4) provides marginal habitat for one species. This species is *Acacia erioloba*.

One protected *Vachellia erioloba* tree was found within the Western wetland (vegetation unit 5).

The DFFE Screening Report also did not highlight any flora species of conservation concern (Appendix B).

Three (3) medicinal plant species were recorded within the sites. Refer to Table 5.2.

Except for the threatened *Boophone disticha*, none of the medicinal plant species present are threatened and occur abundantly within the Province.

Table 5.2: List of medicinal plant species identified

Plant name	Plant part used	Medicinal use	Vegetation unit
Boophone disticha	The bulb scales	Outer scales of the bulb used as dressing after circumcision, also applied to septic wounds. Bulb scales also administered as an enema. Headaches,abdominal pain, weakness and eye condition.Effective sedative.	1a
Gomphocarpus fruticosus	Leaves, sometimes roots	Headache, stomach pain, tuberculosis.	1a; 1b
Vachellia karroo	Leaves, bark and gum	Diarrhoea & dysentery	2; 3; 4; 5

Declared Invasive Alien Species

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

Category 1 plants are prohibited plants which must be controlled or eradicated. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals or the environment.

- Category 1a: Plants are high-priority emerging species requiring compulsory control. All breeding, growing, moving and selling are banned
- Category 1b: Plants are widespread invasive species controlled by a management program.

Category 2 plants are invaders with certain useful qualities, such as commercial use or for woodlots, animal fodder, soil stabilisation, etc. These plants are allowed in demarcated areas under controlled conditions and in biocontrol reserves.

Category 3 plants are alien plants that are currently growing in, or have escaped from areas such as gardens, but that are proven invaders. No further planting is allowed (except with special permission), nor trade in propagative material. Existing plants may remain but must be prevented from spreading. Plants within the flood line and watercourses must be removed (Bromilow, 2010).

The sites have few declared alien invasive plants with only single individuals of three different species identified. Refer to Table 5.3.

Table 5.3: List of alien plant species identified

Species	CARA	NEMBA	Vegetation units				
			1	2	3	4	5
Cirsium vulgare (Savi) Ten.	1	1b			●	●	●
Gleditsia triacanthos	2	1b					●
Verbena brasiliensis Vell.		1b			●		

5.3.1.3 Wetlands and Riparian Features

Two wetlands have been identified within the Steenbok Solar 2 site (Appendix E1). These wetlands have also been referred in in Table 5.1 which provides a description of the various vegetation units present. The wetlands are referred to as the Eastern wetland (vegetation unit 4) and the Western wetland (vegetation unit 5). Furthermore, a seasonal drainage channel was also identified which is primarily related to the Steenbok Solar 1 site. Refer to Figure 5.14.

The Seasonal drainage channel (vegetation unit 3) is a small narrow section located towards the south-western part of the Steenbok Solar 2 site that drains surface/rainwater during the wet season from the adjacent land towards a larger patch on the western side of the R700 regional road. This unit forms a narrow section that is in some parts indistinguishable from the surrounding *Themeda triandra-Eragrostis curvula* grassland (vegetation unit 1a). The soil is dark clay with hydrophilic vegetation present within this unit indicating moist conditions. The unit has a low-moderate species richness and due to its water retention and channelling function it is from a plant ecological and ecosystem functioning point of view regarded as having a high conservation value.

The two wetlands (Eastern wetland & Western wetland - vegetation units 4 & 5) are located east and west of the R700 road respectively. A water reservoir (round concrete farm dam) occurs close to the Eastern wetland with the surrounding area, as expected, trampled and grazed whereas a similar dam area occurs in the western wetland together with an open dam with ground walls. The eastern wetland varies in width and forms various “fingers” into the terrestrial vegetation with dark clay. Some sections have permanent standing water while others are dry with mostly terrestrial vegetation. The Western wetland collects surface water from the western areas outside the site and channels it into a ground dam. Water slowly seeps through the ground dam wall and has created a wetland area underneath the dam wall. The vegetation in both wetlands is typical of seasonally-permanently wet wetland in the area with a low-moderate species richness. From a plant ecological and ecosystem functioning point of view these wetlands have a **high conservation value**.

The results from the Present Ecological Status (PES) analysis for both wetlands (Eastern wetland & Western wetland) indicate them to be largely natural while they obtained a moderate ecological sensitivity score. Although they do not have a high diversity of species, they comprise natural vegetation indicative of moist and permanently wet conditions. None of the two systems provide a high number of ecosystem functions other than water retention and the provision (especially the artificial farm dam of the Western wetland) of suitable habitat for insects and amphibian species.

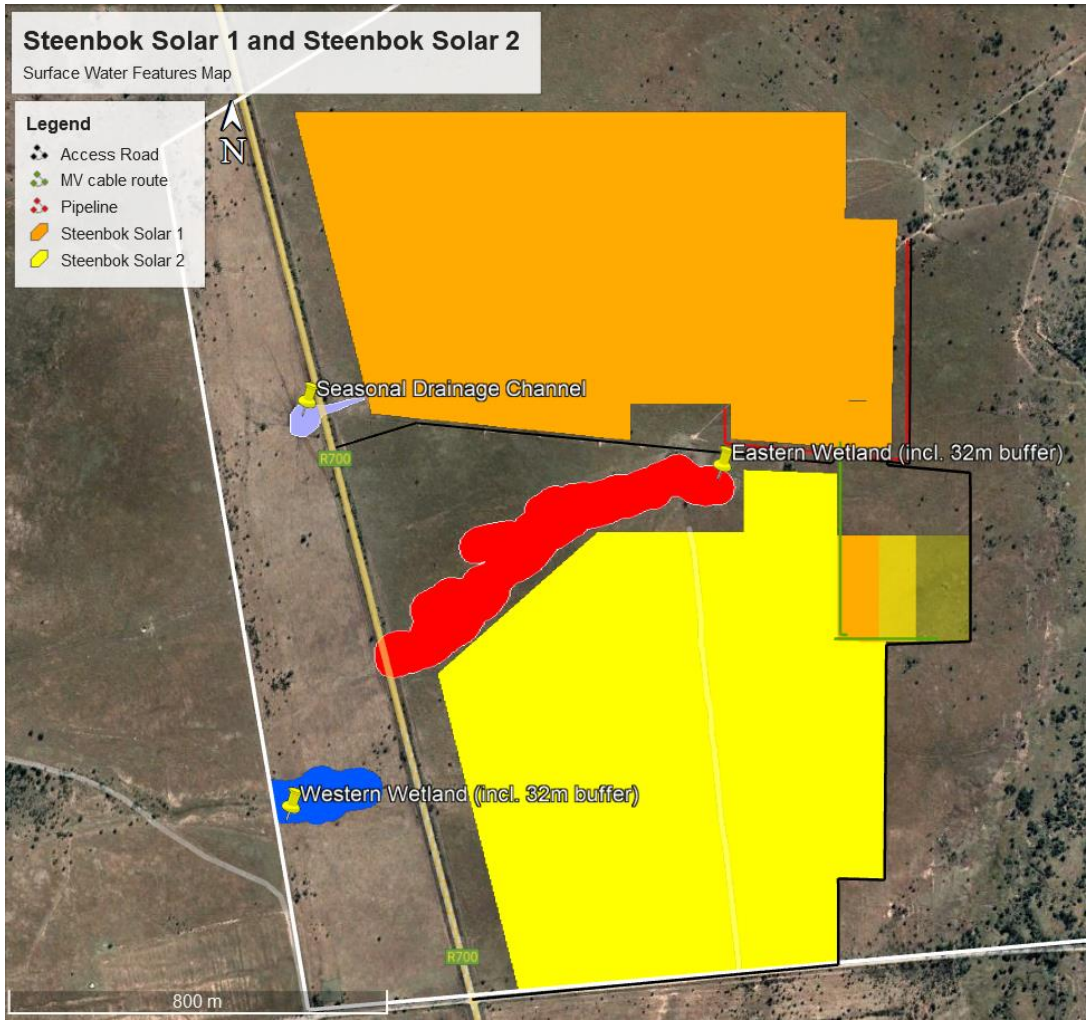


Figure 5.14: Location of the Steenbok Solar 1 and Steenbok Solar 2 development footprints in relation to the surface water features present within the respective sites

The largest part of the Western wetland is moist, while the Eastern wetland consists of sections where shallow standing water (1 cm) occur and drier terrestrial sections.

Water systems fulfil important roles in the environment and are considered threatened ecosystems. Wetlands also affect ecosystems adjacent to them, as well as systems further away from them. The wetland areas present do not seem to have any connectivity with other water systems, but they are regarded as having a high conservation value.

It is important that no development is allowed within the wetland ecosystem and that a 32 m buffer zone is implemented around their edges within which no development should be allowed.

The development footprints for the two facilities have been placed within the respective sites considering the need to avoid the sensitive surface water features, as per Figure 5.14 above. Therefore, these sensitive features will not be directly impacted by the developments.

5.3.1.4 Climate

Summer in the Bloemfontein region starts at the end of January and ends in December. The month with the highest relative humidity is April (53.76 %). The month with the lowest relative humidity is September (29.34 %). The month with the highest number of rainy days is January (11.97 days). The month with the lowest number of rainy days is July (1.50 days).

Bloemfontein is influenced by the local steppe climate. There is not much rainfall in Bloemfontein all year long. The climate here is classified as BSk by the Köppen-Geiger system. The average annual temperature in Bloemfontein is 17.1 °C. In a year, the rainfall is 545 mm. Figure 5.15 presents a climate graph of the Bloemfontein area.

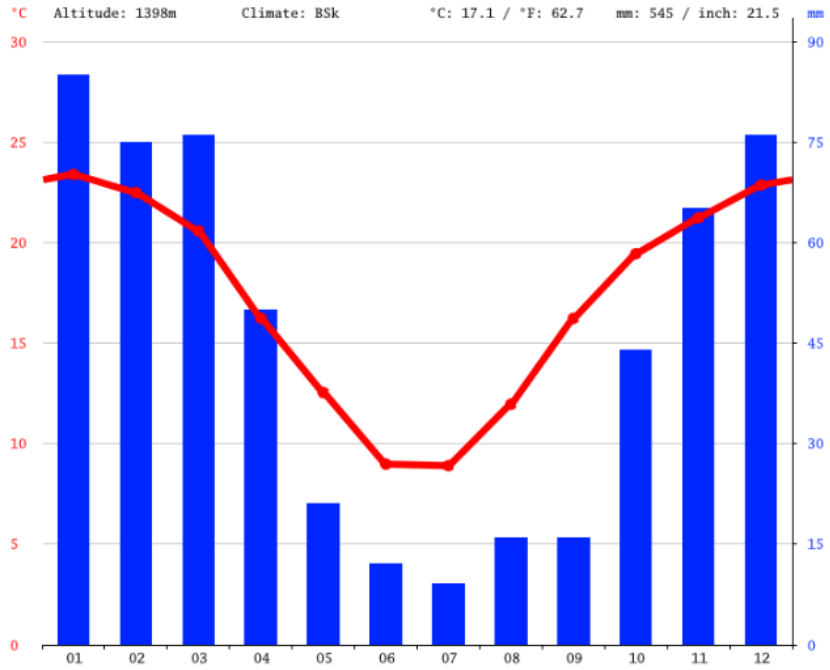


Figure 5.15: Climatic graph of the Bloemfontein area

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.

Avifauna

According to the Avifaunal Impact Assessment (Appendix E2) the sampling effort of two seasonal multi-day surveys conducted in summer (January) and winter (July) is considered adequate for the type and size of the developments and the avifaunal sensitivity of the sites. Sampling effort is in line with Regime 2 of the Best Practice Guidelines, the Species Assessment Guidelines and with the Terrestrial Species Protocol (GN 1150 of October 2020 which refers to the Species Environmental Assessment Guideline (SANBI 2021).

The South African Bird Atlas Project 2 (SABAP2) has recorded 155 species within the pentad (2855_2610) covering the sites, with 26 full protocol cards having been submitted, which is a relatively large number of cards for a farming area. Two of these species are Red Data listed as Vulnerable (Lanner Falcon and Secretarybird) and two are Red Data listed as Near-threatened (Black-winged Pratincole and European Roller). Six near-endemic species have been reported for the pentad.

A total of 108 species of birds were recorded during the two seasonal surveys within the sites. Three Species of Conservation Concern (SCC) were recorded: Secretarybird (Endangered), Lanner Falcon (Vulnerable) and Maccoa Duck (Near-threatened). Thirteen near-endemic species were recorded (Table 5.4).

During walked transects 98 avian species were recorded, with 83 species recorded during the summer survey, some of which were migrants, and 57 avian species recorded during the winter survey. The highest number of individuals were recorded on walked transect 5 with an Index of Kilometric Abundance (number of birds recorded per km) of 170.9. This was due mainly to the presence of large flocks of Grey-headed Gull and Red-billed Quelea recorded. Overall, the number of individual birds present is relatively high compared to other areas proposed for solar PV developments, however the species recorded were mostly abundant and common.

Table 5.5 presents the potentially occurring SCC on the proposed sites, their probability of occurrence, and reasons thereof.

Table 5.4: Species of Conservation Concern, endemic and near-endemic bird species recorded during the surveys

Common Name	Scientific Name	Red Data Status[8]	Endemism[9]	Walked transects	Focal Sites	Incidentals
Lanner Falcon	*Falco biarmicus*	VU		x		x
Maccoa Duck	*Oxyura maccoa*	EN			x	
Secretarybird	*Sagittarius serpentarius*	EN				x
South African Cliff Swallow	*Petrochelidon spilodera*		NE			
Cape Weaver	*Ploceus capensis*		NE	x	x	
Melodious Lark	*Mirafra cheniana*		NE	x		
Cloud Cisticola	*Cisticola textrix*		NE	x		
Fiscal Flycatcher	*Melaenornis silens*		NE	x		
Cape Grassbird	*Sphenoeacus afer*		NE	x		
Cape White-eye	*Zosterops virens*		NE	x		
Fairy Flycatcher	*Stenostira scita*		NE	x		
Grey Tit	*Melaniparus afer*		NE	x		
Karoo Prinia	*Prinia maculosa*		NE	x		
Large-billed Lark	*Galerida magnirostris*		NE	x		
Karoo Thrush	*Turdus smithi*		NE	x		
Pied Starling	*Lamprotornis bicolor*		SLS	x		
Grey-winged Francolin	*Scleroptila afra*		SLS	x		

Table 5.5: Species of Conservation Concern potentially occurring in the sites and their Probability of Occurrence (PoC)

Species indicated in bold have been confirmed for the sites

Common Name	Scientific name	Red Data Status	Habitat requirement (Hockey *et al*. 2005)	PoC	Reason for PoC
Black-winged Pratincole	*Glareola nordmanni*	NT	Open grassland, edges of pans and cultivated fields. Attracted to damp ground and newly flooded grasslands	Medium	Potentially suitable habitat on site. Palaearctic migrant that has become increasingly uncommon, with a zero SABAP2 reporting rate for the pentad (one incidental record).
European Roller	*Coracias garrulus*	NT	Open woodlands, perching on open dead branches, telephone poles and	Medium	Potentially suitable habitat on site but vagrant to the area with a zero SABAP2

Common Name	Scientific name	Red Data Status	Habitat requirement (Hockey *et al*. 2005)	PoC	Reason for PoC
			powerlines. Bushy plains and dry savanna		reporting rate for the pentad (one incidental record).
Maccoa Duck	***Oxyura maccoa***	**EN**	**Deep inland water bodies with emergent vegetation**	**Confirmed**	**Observed in a river dam outside of PV sites, within PAOI.**
Lanner Falcon	***Falco biarmicus***	**VU**	**Open grassland, open or cleared woodland near cliff or electricity pylons**	**Confirmed**	**Was recorded during the pre-application monitoring in the PAOI.**
Secretarybird	***Sagittarius serpentarius***	**EN**	**Open grassland, shrubland, open savanna.**	**Confirmed**	**Was recorded during pre-application monitoring in the PAOI.**

The Avifauna Impact Assessment (Appendix E2) further identified three avifauna habitats relevant to the sites (Figure 5.16). These include the following:

1. Grassland avifaunal habitat

   This is a relatively uniform habitat in terms of plant species composition and abundance and is dominated by grasses with a few scattered woody species. This type of habitat is favoured by the SCC Secretarybird (Endangered), as well as terrestrial species such as Northern Black Korhaan and is also utilised for foraging by Lanner Falcon (Vulnerable), and other small raptors, as well as a variety of passerines. The majority of the two sites consists of this habitat.

2. Open woodland patches

   The sites contain areas with small trees and shrubs, in addition to grass species. The trees may serve as perches for small raptors such as Lanner Falcon (Vulnerable), Pale Chanting Goshawk, Black-winged Kite, Amur Falcon, Common Buzzard, and Gabar Goshawk. Northern Black Korhaan was recorded utilising this habitat.

3. Reservoirs and dams

   Open water attracts all avifauna with the reservoirs and dams most frequently utilised by weavers, doves, sparrows, and bishops, but also by water-associated birds such as Yellow-billed Duck, Little Grebe, Hamerkop and Grey Heron observed.

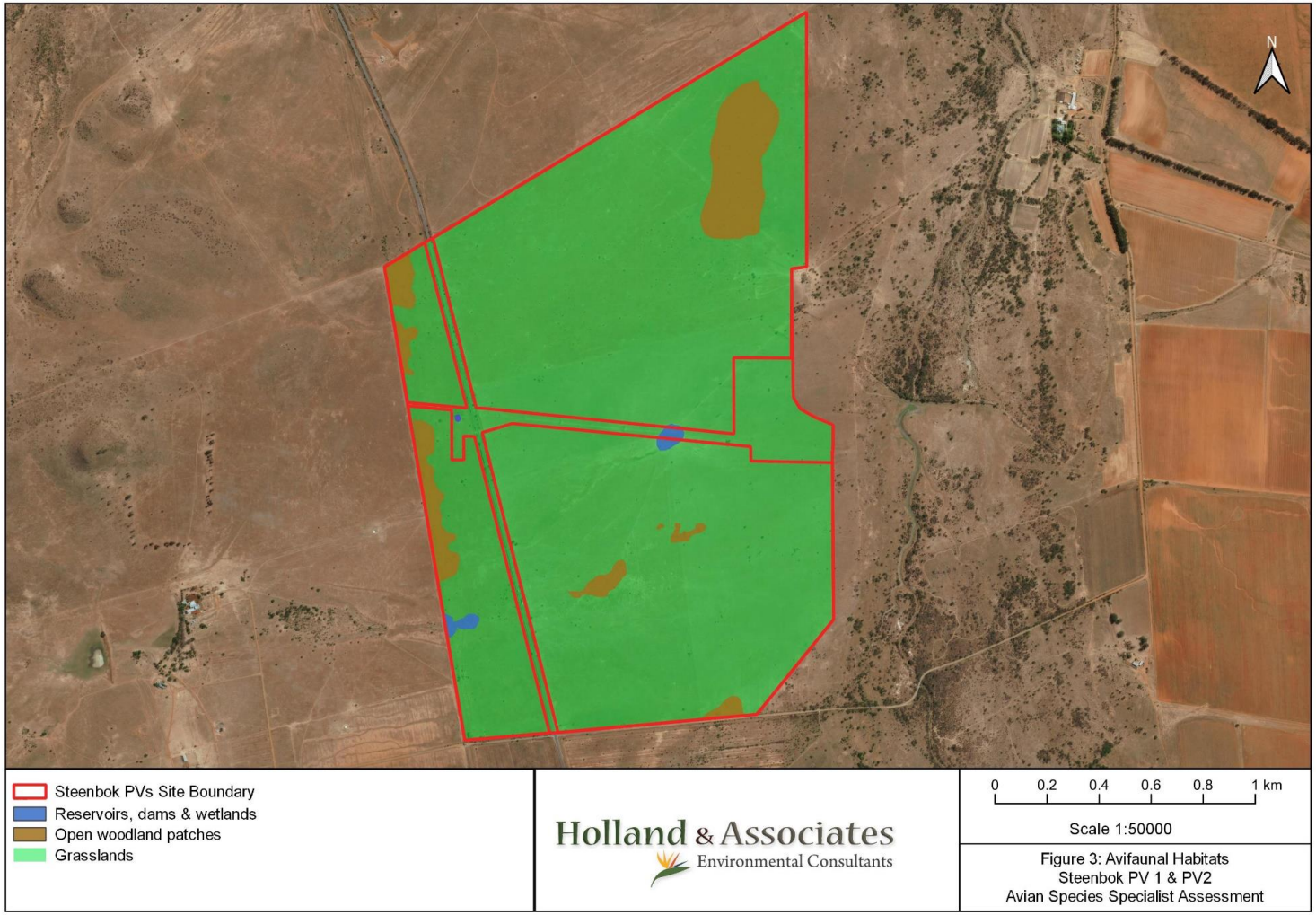


Figure 5.16: Avifaunal habitats associated with the Steenbok Solar 1 and Steenbok Solar 2 sites and development footprints

Fauna

The DFFE screening report (Appendix B) indicated that the area that may potentially contain habitats of *Hydrictis maculicollis* (Spotted-necked otter). Spotted-necked Otters are thought to inhabit freshwater habitats where water is not silt-laden, and is unpolluted, and rich in small fishes. They are thought to be indicators of pristine and unpolluted systems and generally indicates a healthy, unpolluted habitat (SANBI & EWT 2016)). Adequate riparian vegetation, in the form of long grass, reeds, or bushes, is also essential to provide cover (Perrin & d'Inzillo Carranza 2000). No signs, tracks or any remains of spotted-necked otters were observed during the survey undertaken as part of the Ecological and Wetland Impact Assessment (Appendix E1) and none of the vegetation units within the sites contained adequate habitat as described by Perrin and d'Inzillo (2000).

Fauna observed on the sites were *Raphicerus campestris* (Steenbok) and signs such as tracks and excrement of *Phacochoerus africanus* (warthog) were noted close to artificial water bodies.

No fauna as listed in the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of Lists of Critically Endangered, Endangered, Vulnerable and Protected Species were observed. No signs of any faunal species listed in the NEMBA lists were noted either.

5.3.1.6 Visual landscape

The Visual Impact Assessment (Appendix E3) has considered and provided a description of the landscape character of the area within which the sites of Steenbok Solar 1 and Steenbok Solar 2 is located. Both sites are located in an area with relatively low significance in elevation, meaning that the site is not located on a mountain, at the foot of a mountain or in an area with a significant difference in elevation. The sites are located at an above mean sea level (amsl) of approximately 1330m at the highest elevation and at an amsl of 1310m at the lowest elevation. Both sites drain towards the north and east.

The landform and drainage described above is unlikely to limit visibility except to the east and south at distances of between 7km and 9km. Some higher elevation ridges and mountains are present within these distances. The highest amsl point in a 10km radius around the proposed sites is 1456m, approximately 9km towards the south east on top of an isolated plateau ridge. This a difference of approximately 146m in an extreme case. The rest of the area is rather level with much lower difference in amsl. Areas within 5km from the proposed development might have a clear view without taking existing screening into account.

The vegetation and landscape features can be described as slightly undulating bottomland landscape covered with tall, dense grassland alternating with patches of karroid scrub occurring especially over calcrete.

In terms of existing development within the area, the Visual Impact Assessment provides the following details regarding the development types present:

- **Industrial Development;** Industrial development associated with larger urban development, in this case, Bloemfontein.
- **Urban Development;** This is one of the main development types in the area. The city of Bloemfontein and associated suburbs covering approximately 14000 hectares.
- **Sports and Recreational Development;** Facilities associated with urban development like sports clubs, sport stadiums and parks.
- **Agricultural Development;** This is one of the main development types in the area consisting mostly out of cattle, sheep and irrigation farming.
- **Service Development;** Facilities and infrastructure associated with development. This includes roads, power infrastructure, water infrastructure etc. Most services are linked to urban development.
- **Tourism Development;** A number of lodging facilities are present within the study area. The area of Bloemfontein is not known to be a popular tourist destination, but there are some tourist attractions in and around Bloemfontein.

Visual receptors that may be impacted by the proposed development have also been identified in the Visual Impact Assessment, which includes:

- **Area Receptors** which include:
  - The greater Mangaung area including suburbs.
  - Soetdoring Nature Reserve.
- **Linear Receptors** which include:
  - N1 National Road.
  - N8 National Road.
  - R700 road.
  - R64 road.
  - R30 road.
  - Bram Fischer International Airport.
  - Tempe Aerodrome FATP.
  - Roads within Bloemfontein.
  - The Modder River
- **Point Receptors** which include:
  - Homesteads on farms.
  - Smallholdings.
  - River Homes.
  - Sports and Recreational facilities.
  - Tourism and lodging facilities.

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

A Zone of Theoretical Visibility (ZTV) assessment has been undertaken for each of the sites. A Zone of Theoretical Visibility (ZTV) is a Geographic Information System (GIS)-generated tool to identify the likely (or theoretical) extent of visibility of a development. The tool used in this model does not take existing screening into account but only the above mean sea level of the landscape.

Table 5.6 and 5.7 below reflects the visibility rating in terms of proximity on sensitive receptors of each site and respective development footprint. Figures 5.16 to 5.17 reflects the theoretical visibility. The distances were calculated according to experience, assumptions and opinion. The ZTV maps will give a clearer understanding of areas susceptible to line of sight of each site.

Table 5.6: ZTV Visibility Rating in terms of Proximity to Steenbok Solar 1

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- One homesteads on a farm - R700 road	Very High
1-5km	- 21 homesteads on farms - One lodging facility - R700 road	High
5-10km	- 20 homesteads on farms - N1 National Road - R700 road - R30 road - Two lodging facilities - The Modder River - Smallholdings	Medium
10-15km	- 10 homesteads on farms - A small percentage of the Mangaung area - R30 road	Low
15-20km	- 17 homesteads on farms - Two lodging facilities	Very Low
The line-of-sight coverage percentage within the 20km radius is 9.58%.		

Table 5.7: ZTV Visibility Rating in terms of Proximity to Steenbok Solar 2

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	- One homesteads on a farm - R700 road	Very High
1-5km	- 25 homesteads on farms - Three lodging facilities	High

	- R700 road	
5-10km	- 10 homesteads on farms - N1 National Road - R700 road - R30 road - The Modder River - Smallholdings - Free State National Botanical Garden	Medium
10-15km	- 11 homesteads on farms - A small percentage of the Mangaung area - The Modder River	Low
15-20km	- 18 homesteads on farms - Two lodging facilities - R30 road	Very Low
The line-of-sight coverage percentage within the 20km radius is 8.01%.		

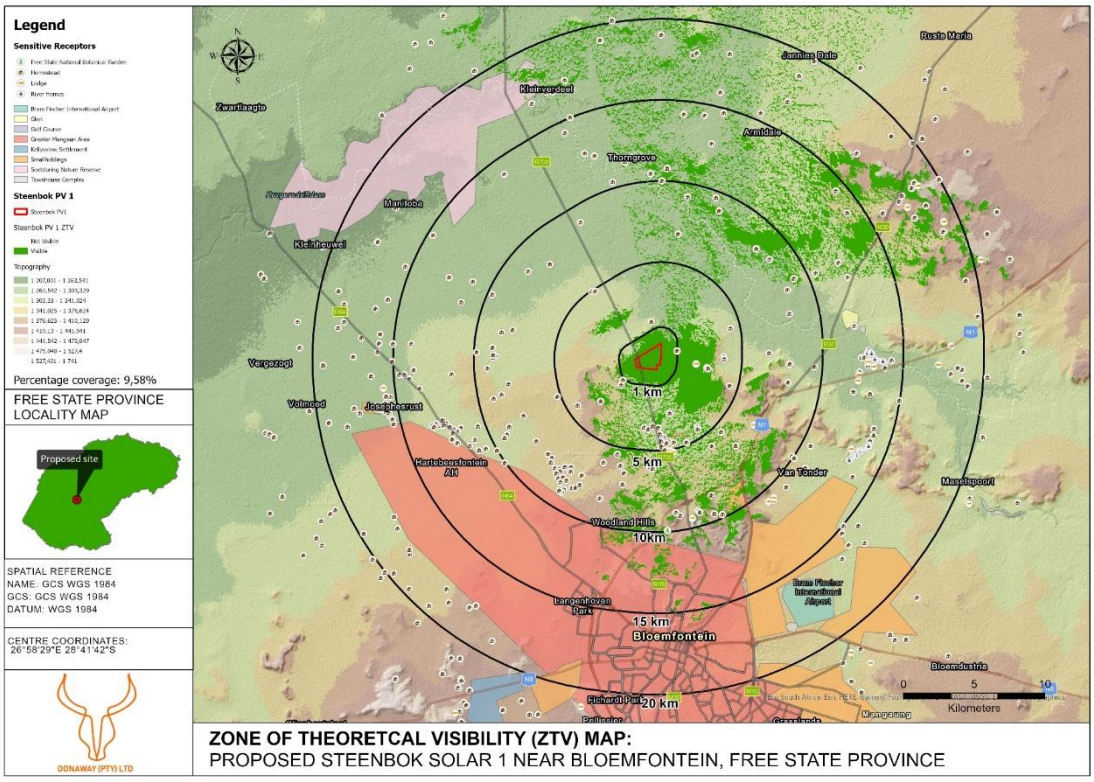


Figure 5.17: Zone of Theoretical Visibility (ZTV) for Steenbok Solar 1

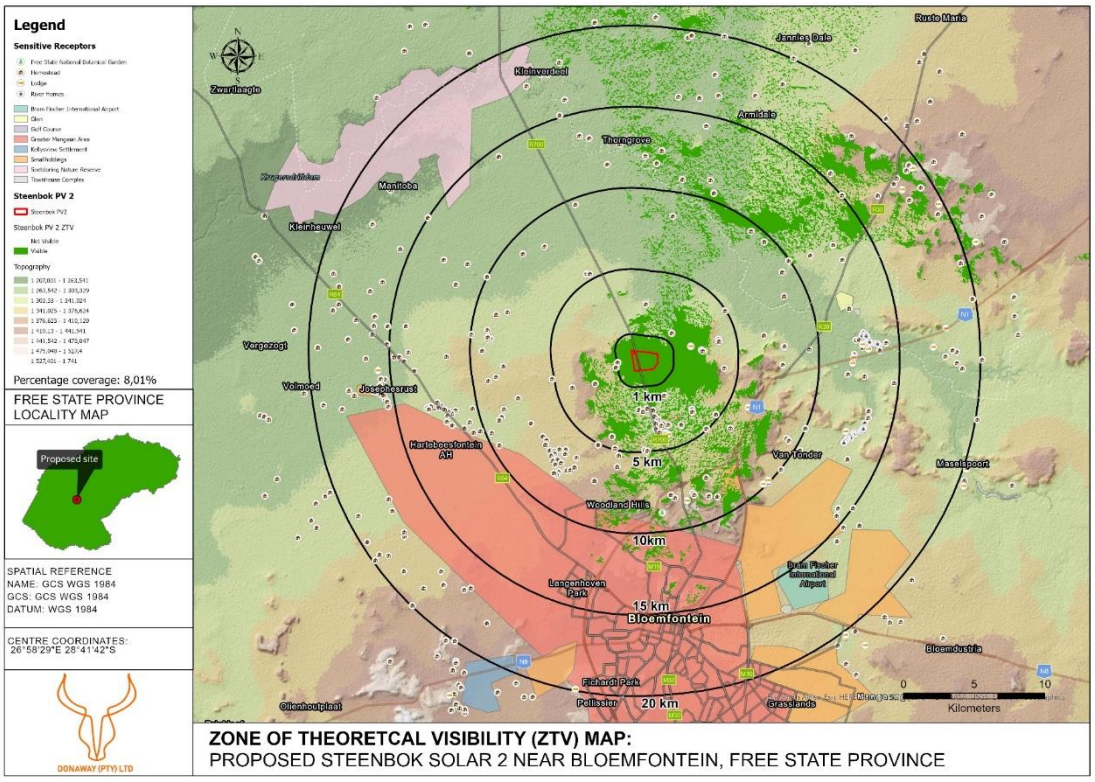


Figure 5.18: Zone of Theoretical Visibility (ZTV) for Steenbok Solar 2

5.3.1.7 Traffic consideration

According to the Traffic Impact Study (Appendix E7), the proposed Steenbok Solar 1 and Steenbok Solar 2 sites are located near Bloemfontein in the Free State Province. According to the road classification of the surrounding road network as per the Road Infrastructure Strategic Framework for South Africa (RISFSA), the R700, of which the sites will take access, can be classified as Rural Class 3 routes are major arterial roads that typically carry inter-district traffic between:

- Small towns, villages, and larger rural settlements,
- Smaller commercial areas and transport nodes of local importance that generate relatively high volumes of freight;
- Other traffic in the district (public transport and freight terminals, railway sidings, small seaports, and landing strips);
- Very small or minor border posts;
- Tourist destinations;
- Other Class 1, 2 and 3 routes; and
- Smaller centres than the above when travel distances are relatively long (longer than 50 to 100 km).

It is envisaged that the components for the projects will be imported to South Africa via the Port of Durban or the Port of Ngqura as the closest ports to the sites.

The Durban container terminal is one of the largest container terminals in the African continent and operates as two terminals Pier 1 and Pier 2. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia. Various capacity creation projects are currently underway, including deepening of berths and operational optimization. The terminal currently handles 65% of South Africa's container volumes. (Transnet Port Terminals, n.d). The Port of Durban is located approximately 640 km from the proposed project sites.

The Port of Ngqura is a world-class deep-water trans-shipment hub offering an integrated, efficient, and competitive port service for containers on transit. The Port forms part of the Coega Industrial Development Zone (CIDZ) and is operated by Transnet National Ports Authority. The Port of Ngqura is located approximately 650 km from the proposed sites.

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

Steenbok Solar 1 and Steenbok Solar 2 are located within the Free State Province. Free State Province is the landlocked core of the country. It is centrally placed, with good transport corridors to the north and the coast. It is the third biggest of South Africa’s nine provinces in terms of size, and primary agriculture is a key economic sector. Mining is also important but has been declining steadily since 2008.

The Free State is situated in the heart of the country, between the Vaal River in the north and the Orange River in the south, bordered by the Northern Cape, Eastern Cape, North West, Mpumalanga, KwaZulu-Natal and Gauteng provinces, as well as Lesotho. The Free State is a rural province of farmland, mountains, goldfields, and widely dispersed towns. This province is an open, flat grassland with plenty of agriculture that is central to the country’s economy. Mining is its largest employer.

Although the Free State 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).

Agriculture is a key economic sector – 8% of the country’s produce comes from Free State. In 2010, agriculture provided 19.2% of all formal employment opportunities in the region. The economy is dominated by agriculture, mining and manufacturing. Known as the ‘bread-basket’ of South Africa, about 90% of the province is under cultivation for crop production. It produces approximately 34% of the total maize production of South Africa, 37% of wheat, 53%

of sorghum, 33% of potatoes, 18% of red meat, 30% of groundnuts and 15% of wool. The province is the world's fifth-largest gold producer, with mining the major employer.

Important towns include Welkom, the heart of the goldfields; Odendaalsrus, another gold-mining town; Sasolburg; Kroonstad; Parys; and Phuthaditjhaba. The Free State is also home to the Vredefort Dome, the largest visible meteor-impact site in the world, which was formed two billion years ago when a meteorite 10 kilometres wide slammed into Earth. The Vredefort Dome is one of South Africa's seven UNESCO World Heritage sites.

Mangaung Metropolitan Municipality

The projects fall within the Mangaung Metropolitan Municipality. The Mangaung Metropolitan Municipality is a Category A municipality. It is situated in the Free State Province, in the central interior of South Africa. The Free State is bordered by the Gauteng, Eastern Cape, Northern Cape, KwaZulu-Natal and North West Provinces, as well as by the neighbouring country of Lesotho. Mangaung, meaning 'Place of the Cheetahs', accentuates the vibrant, dynamic and energetic character of the tourism industry in the 'At the Heart of it All'.

The economy is strongly driven by the government sector, which has seen the fastest growth in the last five years as a result of increased government programmes in livelihoods improvement interventions. The finance sector is the second-fastest growing sector due to very active estate and construction activities.

In an area such as Mangaung, with its relatively high levels of unemployment and poverty, it can be expected that the SMME sector plays an even more important role in job creation and poverty alleviation. The informal economy makes an important contribution to the economic and social life of Mangaung. Due to the decline in formal employment and consequent increase in unemployment, many people seek alternative means of earning an income. The municipality has a total population of 459 357 according to the 2016 Community Survey, living in 127 103 households of which 87% have access to electricity and 43% are female headed. The DM has an unemployment rate of 35,8% and a youth unemployment rate of 46% in 2011 which contributed to a Dependency ratio of 66.1 in 2016.

The main economic sectors include: Community services (35.3%), finance (26.8%), trade (16%), transport (11.8%), manufacturing (3.5%).

Site Specific

The R700 regional road traverses the western boundary of the sites. The surrounding properties are characterised by agriculture and livestock farming.

A site inspection was conducted by the social specialist on 15 September on the Remaining Extent of the Farm Floradale No. 15, Registration Division Bloemfontein, Free State Province refer to Table 5.8 and Table 5.9 for the key features present at the sites.

Table 5.8: Key features of the Steenbok Solar 1 site

Steenbok Solar 1 Site			
			
			

Table 5.9: Key features of the Steenbok Solar 2 site

Steenbok Solar 2 Site			
			
			

5.3.2.2 Cultural and heritage aspects

A Heritage Impact Assessment (Appendix E5) has been compiled for each of the sites. Both studies found that no heritage resources were identified during the field assessment and the underlying geology has zero palaeontological sensitivity for impacts to significant fossils.

The area proposed for development is located approximately 17km north of the centre of Bloemfontein. Prior to its establishment in 1846, the area is said to have been the location of an Orana settlement and subsequently a Boer settlement. With colonial policy shifts, the region changed into the Orange River Sovereignty (1848–54) and eventually the Orange Free State Republic (1854–1902). From 1902 to 1910 it served as the capital of the Orange River Colony and since that time as the provincial capital of the Free State. In 1910 it became the Judicial capital of the Union of South Africa. The area proposed for development is located on the Remaining Extent of the Farm Floradale No. 15 and the proposed infrastructure is located approximately 1km from a number of farm buildings - possibly the farm werf.

Other farm werfs located nearby which may be indirectly impacted by the proposed development include Cumbrae, Mount Pleasant and Holmesdale. According to Roodt (2012, SAHRIS NID 48744), "Historically, the area north of Bloemfontein is known for military activities that took place here during the South African War (1900 - 1902). Evidence of fortification can be found on the hills around Bloemfontein…" It is possible such evidence may be present within the area proposed for development.

Archaeology

Bloemfontein is located on the edges of the Great Karoo. Scattered throughout the Karoo is evidence of historic and prehistoric occupation in the form of Early, Middle and Later Stone Age lithics and other material remains. The descendants of the historic and prehistoric occupants of the region are found in the indigenous Khoe and San, as well as modern inhabitants of the area.

Tomose (2013) notes that the earliest evidence of Iron Age communities in the Free State is documented in the south-eastern region of the Free State where they came into contact with the San people. Most of the existing evidence about the Iron Age communities in the Free State dates to the 16th and 18th century when they moved across the Vaal River coming into contact with the San hunter-gather people (Klatzow 1994). Numerous stone wall structures and pottery dating to this period have been recorded and lie on the frontier zone where the San people come into contact with agro-pastoralist (Thorp 1996). Stonewalls are one major characteristic of the Iron Age people. However, they are not the only characteristic features of the Iron Age. Huffman (1982) described cattle dug, both vitrified and unverified, as one of the Iron Age traits. He also included pits and burials, with some located inside the cattle kraals (ibid)."

No significant archaeological heritage resources have been identified within close proximity to the area proposed for development, however it is clear that no heritage impact assessments have been conducted in close proximity to the development area. It is therefore possible, although unlikely, that significant archaeological heritage resources are located within the area proposed for development.

A survey was conducted on foot and by vehicle and sought to assess the presence and significance of archaeological occurrences within the site. No significant archaeology was documented within the sites proposed for either Steenbok Solar 1 and Steenbok Solar 2.

Evidence for archaeology was extremely minimal on the potentially affected property. No graves were identified within the survey, and visibility was reasonably good for stone structures, so the latter finding could be considered comprehensive. However, the substantial grass cover and soil formation across most of the footprint was a relevant constraint to documenting stone artefacts and other smaller potential surface remains such as pottery etc.

Furthermore, no heritage resources were identified.

Palaeontology

According to the SAHRIS Palaeosensitvity Map (Figure 5.19 and 5.20), the sites are underlain by sediments of zero palaeontological sensitivity. The sediments underlying the sites include Karoo Dolerite which has no palaeontological sensitivity, Quaternary Sands may overlie the dolerite bedrock. It is very unlikely that significant palaeontological heritage will be impacted by the proposed developments and no further studies are recommended in this regard.

The DFFE Screening Reports for the two projects (Appendix B) indicates that the palaeontological sensitivity of the sites is medium with a small section of the Steenbok Solar 2 site being located within an area of high sensitivity.

However, the results of the Heritage Impact Assessment (Appendix E5) indicates that the developments are located within areas of insignificant / zero palaeontological sensitivity and therefore the sensitivity ratings provided for in the DFFE Screening Reports are disputed. The Heritage specialist has confirmed through the results of the results of the Heritage Impact Assessments that the sensitivity is low/negligible.

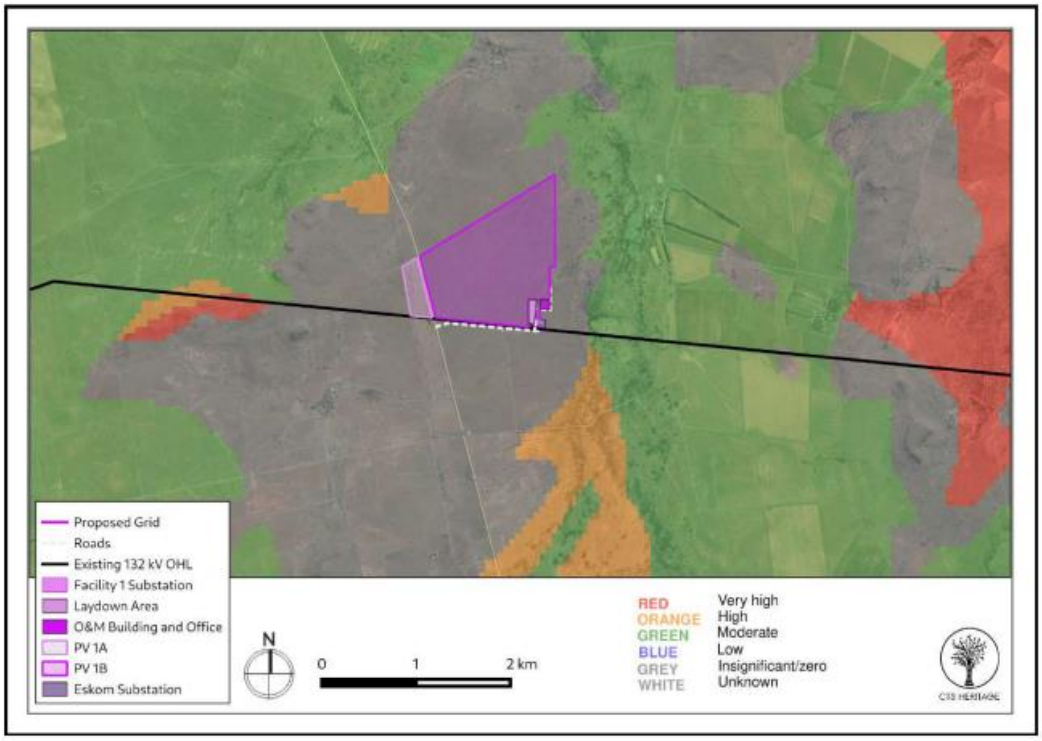


Figure 5.19: Palaeontological sensitivity associated with the Steenbok Solar 1 site and development footprint

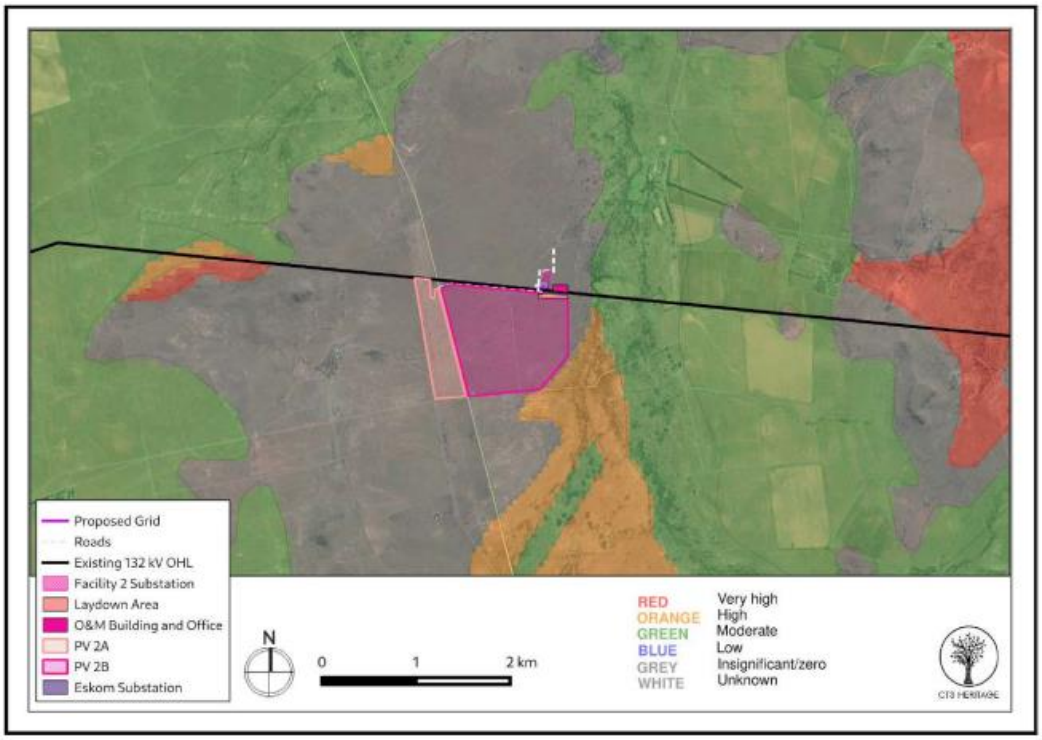


Figure 5.20: Palaeontological sensitivity associated with the Steenbok Solar 1 site and development footprint

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed developments, the location of the solar energy facilities is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, readily available access to the sites, access to the grid and capacity of the grid. Studies of solar irradiation worldwide indicate that the Free State Province has a high potential for the generation of power from the solar resource.

The receptiveness of the sites to PV Development includes the presence of optimal conditions for the sitting of solar energy facilities due to high irradiation values and optimum grid connection opportunities (i.e., the viable grid connection points available within the affected property which minimizes the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property)[5]. Farm Floradale No. 15, where the projects are 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 projects will be viable from an economic perspective as the solar energy facilities are 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 projects includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of ~2129.2 kWh/m^2/year is relevant in the area.

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

- Extent of the sites: A significant portion of land is required to evacuate the prescribed 35MW per facility and space is a constraining factor in PV facility installations. Provision was made to assess a larger area/site than is required for each of the facilities to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. The Remaining Extent of the Farm Floradale No. 15, and the sites assessed therein for Steenbok Solar 1 and Steenbok Solar 2 is considered to provide an opportunity for the successful construction and operation of the two individual solar energy facility each with a capacity of 35MW, as well as opportunities for the avoidance and mitigation of impacts on the affected environment and sensitive environmental features.

[5] The grid connection infrastructure associated with the Steenbok Solar 1 and Steenbok Solar 2 is being assessed as part of a separate Basic Assessment process undertaken by Environamics.

- 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 obtained via the R700 regional road that traverses the western sections of the two sites proposed for development.
- Grid connection: In order for the PV facilities to connect to the national grid the facilities will have to construct an on-site substation, Eskom switching station and a power line from the respective sites to connect to the Eskom grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site. Existing and viable grid connection options are available within the affected property which presents an opportunity for the consolidation of infrastructure and disturbance within the affected landscape. The Steenbok Grid Connection will be assessed as part of a separate Basic Assessment process which will cover a new overhead power line and ne Eskom Switching Substation(s).
- Environmental sensitivities: From an environmental perspective the proposed sites are 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 sites proposed for development exclusively consists of land used for agriculture, but wetland features and a seasonal drainage channel are located within the sites under assessment that have been considered and avoided by the developer for the placement of the facility infrastructure within the respective development footprints. The development footprints proposed by the developer are considered to be appropriate from an environmental perspective as the sensitive features, and associated buffers, are avoided by the developments and any associated infrastructure.

It is evident from the discussion above that the Remaining Extent of the Farm Floradale No. 15 may be considered favourable and suitable in terms of the sites and environmental characteristics, as well as the opportunities available for the avoidance of sensitive environmental areas and features, as has been illustrated by the appropriate placement of the respective project development areas proposed. As mentioned previously, no alternative areas on the property have been considered for the placement of the respective development footprints for Steenbok Solar 1 and Steenbok Solar 2 as the assessed sites avoids areas that are under cultivation within the affected property and sensitive environmental features identified.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the sites selection criteria, the sites assessed for Steenbok Solar 1 and Steenbok Solar 2 are identified as preferred due to fact that the opportunities presented on the sites to develop the projects in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of Steenbok Solar 1 and Steenbok Solar 2 on the Remaining Extent of the Farm Floradale No. 15 is the preferred option.

Considering the environmental sensitive features present within the sites assessed, the Applicant has proposed facility layouts / development footprints which considers these features, and thereby avoid any direct impact on these features. The layouts are assessed as part of this EIA Phase of the projects and are considered to be appropriate from an environmental and surface water feature perspective. Refer to Figures H3 and I for the layouts proposed for developments.

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 for both Steenbok Solar 1 and Steenbok Solar 2. The method aims at providing a first order cause and effect relationship between the environment and the proposed activities. 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 for both Steenbok Solar 1 and Steenbok Solar 2 on 16 September 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the two respective sites proposed for Steenbok Solar 1 and Steenbok Solar 2. Tables 6.1 and 6.2 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 6.3.

Table 6.1: Environmental checklist for Steenbok Solar 1

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the developments?				
I. A river, stream, dam or wetland	×			Surface water features have been identified within the site under assessment. For Steenbok Solar 1, a seasonal drainage channel is present along the southern boundary of the site. The development footprint provided by the Applicant for the EIA phase avoids this feature and its associated buffer.
II. A conservation or open space area		×		The site is located in an area classified as an Ecological Support Area 1 (ESA 1). The site does not traverse any conservation or open space area.
III. An area that is of cultural importance		×		None.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous Forest		×		None.
IX. Grass land	×			The site is located within the Bloemfontein Grassland vegetation type which is classified as an Endangered ecosystem. However, the on-site condition of the site is slightly degraded due to grazing practices. The overall sensitivity of the grassland is medium.
X. Bird nesting sites		×		The Avifauna Impact Assessment (refer to Appendix E2) does not make any reference to nesting sites for the site under assessment.

XI. Red data species	×			The Avifauna Impact Assessment (refer to Appendix E2) identified three Red Data species present within the site under assessment. These species includes the Secretarybird (Endangered), Lanner Falcon (Vulnerable) and Maccoa Duck (Near-threatened).
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			The VIA (refer to Appendix E3) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads. However, a large part of the visual landscape is still reflecting a farming landscape with a better visual appearance.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of 12-18 months. The noise impact is unlikely to be significant.
IV. Construction of an access road		×		Steenbok Solar 1 will be accessed via existing farm tracks off of the R700 regional road.
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 210 employment opportunities will be created during the construction phase and 14 employment opportunities during the operation phase.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during construction is a total of 3000 kl in (estimated max of 8.5 kl per day) during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 2000 kl per annum.
VIII. Job creation	×			Approximately 210 employment opportunities will be created during the construction phase and 14 employment opportunities during the operation phase.
IX. Traffic generation	×			Traffic will be generated during the construction phase and will reduce significantly during the operational phase of the project.
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. Construction areas will be rehabilitated after construction.
XI. Installation of additional bulk telecommunication, transmission lines or facilities		×		None, except for the project related grid connection infrastructure.

3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			Surface water features are present within the surrounding areas of the site under assessment. Towards the east the perennial Stinkhoutspruit flows from south to north towards the larger Modder River located further north.
II. A conservation or open space area	×			Protected areas are present within the surrounding areas of the site. The site is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.
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	×			Areas under crop production are located outside of the site under assessment, but within the affected property to the east.
VII. A tourist resort	×			One venue that provides accommodation and a campsite is present within the affected property and located to the east of site. These facilities will not be directly affected.
VIII. A formal or informal settlement	×			The site under assessment is located 17km north from the centre of Bloemfontein.

Table 6.2: Environmental checklist for Steenbok Solar 2

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the developments?				
I. A river, stream, dam or wetland	×			Surface water features have been identified within the site under assessment. For Steenbok Solar 2, two wetlands are present within the central and western sections of the site. The development footprint provided by the Applicant for the EIA phase avoids these features and its associated buffer.
II. A conservation or open space area		×		The site is located in an area classified as an Ecological Support Area 1 (ESA 1). Steenbok Solar 2 does not traverse any conservation or open space area.
III. An area that is of cultural importance		×		None.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous Forest		×		None.
IX. Grass land	×			The site is located within the Bloemfontein Grassland vegetation type which is classified as an Endangered ecosystem. However, the on-site conditions of the site are slightly degraded due to grazing practices. The overall sensitivity of the grassland is medium.

X. Bird nesting sites		×		The Avifauna Impact Assessment (refer to Appendix E2) does not make any reference to nesting sites for the site under assessment.
XI. Red data species	×			The Avifauna Impact Assessment (refer to Appendix E2) identified three Red Data species present within the site under assessment. These species include the Secretarybird (Endangered), Lanner Falcon (Vulnerable) and Maccoa Duck (Near-threatened). One Red Data tree species was identified near the western wetland present within the Steenbok Solar 2 site. This is one individual of the protected tree *Vachellia erioloba*. This individual has been avoided by the placement of the development footprint within the site.
XII. Tourist resort		×		None.
4. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			The VIA (refer to Appendix E3) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads. However, a large part of the visual landscape is still reflecting a farming landscape with a better visual appearance.

III. Noise pollution		×		Construction activities will result in the generation of noise over a period of 12-18 months. The noise impact is unlikely to be significant.
IV. Construction of an access road		×		The site will be accessed via existing farm tracks off of the R700 regional road.
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 210 employment opportunities will be created during the construction phase and 14 employment opportunities during the operation phase.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during construction is a total of 3000 kl in (estimated max of 8.5 kl per day) during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 2000 kl per annum.
VIII. Job creation	×			Approximately 210 employment opportunities will be created during the construction phase and 14 employment opportunities during the operation phase.
IX. Traffic generation	×			Traffic will be generated during the construction phase and will reduce significantly during the operational phase of the project.

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. Construction areas will be rehabilitated after construction.
XI. Installation of additional bulk telecommunication, transmission lines or facilities		×		None, except for the project related grid connection infrastructure.
5. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			Surface water features are present within the surrounding areas of the site. Towards the east the perennial Stinkhoutspruit flows from south to north towards the larger Modder River located further north.
II. A conservation or open space area	×			Protected areas are present within the surrounding areas of the site. The site is located within 5km of protected areas identified in terms of NEMPAA which includes the Auch Macoy Game Reserve located 1km to the south, the Wag `n Bietjie Private Nature Reserve located 4km to the east and the Woodland Hills Golf and Wildlife Estate located 5.7km to the south.
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	×			Areas under crop production are located outside of the site under assessment, but within the affected property to the east.
VII. A tourist resort	×			One venue that provides accommodation and a campsite is present within the affected property and located to the east. These facilities will not be directly affected.
VIII. A formal or informal settlement	×			The site under assessment for is located 17km north from the centre of Bloemfontein.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the developments 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 6.3 and Table 6.4 for the respective projects under assessment). 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 significant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specifies 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 for each of the respective projects as included in Table 6.3 and Table 6.4 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 (**Appendix E**) where the details of the in-depth assessment of potential environmental impacts can be obtained for both Steenbok Solar 1 and Steenbok Solar 2.

It must be noted that the results of the specialist studies have indicated that majority of impacts and impact significance expected to be associated with both Steenbok Solar 1 and Steenbok Solar 2 are very similar. This is mainly due to the projects being located directly adjacent to one another within the same affected property, with the habitats and environmental features present being of a similar nature and sensitivity.

Specialist Study	Impact Assessment (pg.)	Cumulative Impacts (pg.)	Mitigation Measures (pg.)
Ecology and Wetland Impact Assessment (Appendix E1)	53-58	53-58	Same as Impact Assessment
Avifauna Impact Assessment (Appendix E2)	33-39	33-39	42-45
Visual Impact Assessment (Appendix E3)	44 – 68	64-68	Same as Impact Assessment, and page 69
Agriculture Compliance Statement (Appendix E4)	14-16	16-18	22-28
Heritage Impact Assessment (Appendix E5) (including archaeology and palaeontology)	21-26	26	27
Social Impact Assessment (Appendix E6)	70-96	97-102	Same as Impact Assessment
Transport Impact Assessment (Appendix E7)	25-33	32-33	34

Furthermore, Tables 6.5-6.10 provides an indication of the significance rating of each identified and assessed impact before and after the implementation of the recommended mitigation measures. The information is provided is separate tables in terms of Steenbok Solar 1 and Steenbok Solar 2.

Table 6.3: Matrix analysis for Steenbok Solar 1

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 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* *Activity 24 (ii) (GN.R 327): "The development of a road (ii) with a reserve wider than 13,5*	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	BIOPHYSICAL ENVIRONMENT	Fauna, Flora and surface water	• Site clearing and preparation. • Loss of Biodiversity. • Increased soil erosion. • Alien plant invasion. • Loss of fauna and flora. • Habitat destruction. • Soil pollution. • Negative effect of human activities on fauna and road mortalities.		-	S/L	S/L	Pr/ Po	BR/ PR	ML/ SL	Yes	- See Table 6.5	L	Ecology and Wetland Impact Assessment (Appendix E1)
			Avifauna	• Disturbance. • Habitat loss.		-	L	S/L	D	PR	ML	Yes	- See Table 6.5	L	Avifauna Impact Assessment (Appendix E2)
			Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are	L	-

meters, or where no reserve exists where the road is wider than 8 meters." <u>Activity 28(ii) (GN.R. 327):</u> *"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."* <u>Activity 56 (ii) (GN.R 327):</u> "*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…"* <u>Activity 1 (GN.R. 325):</u> *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* <u>Activity 15 (GN.R. 325):</u> *"The clearance of an area of 20 hectares or more of indigenous vegetation."* <u>Activity 4 (b)(i)(bb)(gg) (GN.R 324):</u> "*The development of a road wider than 4 metres with*	were reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration. <u>Transportation and installation of PV panels into an Array</u> The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw. <u>iring to the Central Inverters</u> Sections of the PV array would be wired to central inverters. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.											fitted with tarpaulins or covers.		
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Soil degradation, including erosion. • Enhanced agricultural potential through increased financial security for farming operations. • Improved security against stock theft and other crime.	-/+		S	S	Pr	PR	ML	Yes	- See Table 6.5	L	Agricultural and Soils Compliance Statement (Appendix E4)
			Geology	• Collapsible soil. • Seepage. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity.	-	-	S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	-
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Increase in construction vehicles on existing roads.	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality to be lodged with the Municipality for wayleaves
			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site.	L	-

a reserve less than 13,5 metres within (b) the Free State, (i) outside urban areas, (bb) within a National Protected Area Expansion Strategy Focus Area, and (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve." <u>Activity 10 (b)(i)(bb)(gg)(hh) (GN.R 324):</u> *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (b) in the Free State, (i) outside urban areas,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*												- Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards.		
		SOCIAL/ECONOMIC ENVIRONMENT	Socio-economic development and local growth	• Direct and indirect employment opportunities and skills development. • Economic multiplier effect.		+	L/ R	S	Pr/ D	CR	NL	Yes	- See Table 6.5	L	Social Impact Assessment (Appendix E6)
			Visual landscape	• Visual Impact of construction activities.	-		L	S	D	PR	ML	Yes	- See Table 6.5	L	Visual Impact Assessment (Appendix E3)
			Traffic volumes	• Temporary increase in traffic, noise and dust pollution.		-	L	S	D	CR	NL	Yes	- See Table 6.5	L	Transport Impact Assessment (Appendix E7)
			Social impacts	• Potential loss of productive farmland. • Influx of jobseekers and change in population.. • Safety and security impacts • Impacts on daily living and movement patterns. • Nuisance impacts (noise and dust). • Increased risk in potential veld fires.		-	S/ L/ R	S/ P	Pr/ D	BR/ CR/ Ir	ML/ NL/ SL	Yes	- See Table 6.5	L	Social Impact Assessment (Appendix E6)

<u>Activity 12 (b)(i)(iv) (GN.R 324):</u> *"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 and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* <u>Activity 18 (b)(i)(bb)(gg)(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 the Free State (i) outside urban areas, within (bb) National Protected Area Expansion Strategy Focus areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*				• Visual and sense of place impacts.										
			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 E6)
			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the sites (other than the accommodation on the other side of the affected property), 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 (archaeology and palaeontology)	• Destruction of significant archaeological and palaeontological heritage during the construction phase of development.	-		S	P	U	IR	CL	Yes	- See Table 6.5	L	Heritage Impact Assessment (Appendix E5)

OPERATIONAL PHASE																
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* Activity 10 (b)(i)(bb)(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)*	The key components of the proposed project are described below: • PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules 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 with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 35MW electricity. • Battery Energy Storage System (BESS) - The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 2 ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems. • Inverters - Sections of the PV array will be wired to	BIOPHYSICAL ENVIRONMENT	Fauna, Flora and surface water	• Loss of fauna and flora. • Habitat destruction caused by clearance of vegetation. • Soil and water pollution. • Spread and establishment of alien invasive species. • Negative effect of human activities on fauna and road mortalities. • Negative effect of fences on dispersal movements of fauna. • Negative effect of light pollution on nocturnal fauna.		-	S	M	U/ Po	PR	ML	Yes	- See Table 6.7	L	Ecology and Wetland Impact Assessment (Appendix E1)
			Avifauna	• Disturbance. • Collisions with PV Panels. • Electrocutions and collisions on electrical infrastructure and fencing. • Barrier effects.		-	L/ R	L	U/ Po/ Pr	PR/ CR	ML/ SL	Yes	- See Table 6.7	L	Avifaunal Impact Assessment (Appendix E2)
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Soil degradation, including erosion. • Enhanced agricultural potential through increased financial security for farming operations. • Improved security against stock theft and other crime.	-/+		S	S	Pr	PR	ML	Yes	- See Table 6.7	L	Agricultural and Soils Compliance Statement (Appendix E4)
			Geology	• Collapsible soil. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation	L	-

in the Free State, (i) outside urban areas,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."	inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. • <u>Connection to the grid and electrical reticulation</u> - 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 via the Steenbok Grid Connection to be assessed under a separate Basic Assessment process. Furthermore, an internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible. • <u>Supporting Infrastructure</u> – The following auxiliary buildings with basic services including water and electricity will be required: o Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office; o Site Administration Office (~500m^2); o Switch gear and relay room (~400m^2);			• 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.								should be implemented.		
			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	-
			General Environment (risks associated with BESS)	• Mechanical breakdown / Exposure to high temperatures. • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. • Generation of hazardous waste.		-	S	M	Pr	PR	ML	Yes	- See Table 6.7	L	-

	○ Staff lockers and changing room (~200m²); ○ Security control (~60m²); ○ Operations & Maintenance (O&M) building (~ 500 m²); and ○ Warehouse. • Roads – Access will be obtained via the R700 regional road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side). Perimeter roads may be up to 8m wide. • Fencing - For health, safety and security reasons, the facility will require perimeter fencing and internal security fencing. The fencing will be up to 2m in height.	SOCIAL/ECONOMIC	Visual landscape	• Visual impacts on sensitive visual receptors within a 1km radius. • Visual impacts on sensitive visual receptors between a 1km and 5km radius. • Visual impacts on sensitive visual receptors between a 5km and 10km radius. • Visual impacts of lighting at night on sensitive visual receptors. • Visual impacts of solar glint and glare as a visual distraction and possible air travel hazard. • Visual impact and impacts on sense of place.		-	L	L	D/ Pr	R/ PR/ CR	SL/ ML	Yes	- See Table 6.7	L	Visual Impact Assessment (Appendix E3)
			Positive social benefits	• Direct and Indirect employment opportunities and skills development. • Development of non-polluting, renewable energy infrastructure. • Contribution to Local Economic Development (LED) and social upliftment.		+	L/ R/ N	L	D/ Pr	BR/ CR	NL/ ML	Yes	- See Table 6.7	M	Social Impact Assessment (Appendix E6)
			Social impacts	• Potential loss of agricultural land. • Impact on tourism. • Visual and sense of place impacts.		-	S/ L/ R/ N	L	D/ Pr	BR/ PR/ R	ML/ NL	Yes	- See Table 6.7	L	Social Impact Assessment (Appendix E6)
			Traffic volumes	• Nominal impact expected.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
			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
			Electricity supply	• Generation of additional electricity.	+		I	L	D	I	N/A	Yes	-	N/A	-

			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the facility and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Fauna, Flora and surface water	• Site clearing and preparation. • Loss of Biodiversity. • Increased soil erosion. • Alien plant invasion. • Loss of fauna and flora. • Habitat destruction. • Soil pollution. • Negative effect of human activities on fauna and road mortalities.		-	S/L	S/L	Pr/ Po	BR/ PR	ML/ SL	Yes	- See Table 6.9	L	Ecology and Wetland Impact Assessment (Appendix E1)
			Avifauna	• Disturbance. • Habitat loss.	-		L	S/L	Po/ D	PR/ CR	ML	Yes	- See Table 6.9	L	Avifauna Impact Assessment (Appendix E2)
			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. • Soil degradation, including erosion. • Enhanced agricultural potential through increased financial security for farming operations. • Improved security against stock theft and other crime.	-/+		S	S	Pr	PR	ML	Yes	- See Table 6.9	L	Agricultural and Soils Compliance Statement (Appendix E4)
			Geology	• It is not foreseen that the decommissioning phase will	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

				impact on the geology of the site or vice versa.											
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in stormwater run-off. • Pollution of water sources due to soil erosion.		-	L	S	Pr	PR	ML	Yes	- Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater (or surface water) contamination.	M	-
			Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility. • The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, in the case of Steenbok Solar 1 it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life.	-		L	S	D	PR	ML	Yes	- See Table 6.9	L	Visual Impact Assessment (Appendix E3)

			Traffic volumes	• Temporary increase in traffic, noise and dust pollution.		-	L	S	D	CR	NL	Yes	- See Table 6.9	L	Transport Impact Assessment (Appendix E7)
			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 6.9	L	Social Impact Assessment (Appendix E6)
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the sites.	-		L	S	D	CR	NL	Yes	- See Table 6.9	L	Social Impact Assessment (Appendix E6)
			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the site (other than the accommodation on the other side of the affected property), 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

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

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPr for the Solar Power Plant is included in Appendix F1. The Generic EMPr for the on-site facility IPP substation is included in Appendix F2.

The Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F3.

Table 6.4: Matrix analysis for Steenbok Solar 2

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 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*	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.	BIOPHYSICAL ENVIRONMENT	Fauna, Flora and surface water	• Site clearing and preparation. • Loss of Biodiversity. • Increased soil erosion. • Alien plant invasion. • Wetland degradation. • Soil compaction, erosion and sedimentation of wetlands. • Soil and water pollution for the wetland areas. • Spread and establishment of alien invasive species in the wetlands and the site. • Loss of wetland habitat. • Erosion of streambank. • Water pollution. • Loss of fauna and flora. • Habitat destruction. • Soil erosion and pollution. • Negative effect of human activities on fauna and road mortalities.		-	S/L	S/L	Pr/ Po	BR/ PR	ML/ SL	Yes	- See Table 6.6	L	Ecology and Wetland Impact Assessment (Appendix E1)
			Avifauna	• Disturbance. • Habitat loss.		-	L	S/L	D	PR	ML	Yes	- See Table 6.6	L	Avifauna Impact

<u>Activity 24 (ii) (GN.R 327):</u> *"The development of a road (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."* <u>Activity 28(ii) (GN.R. 327):</u> *"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."* <u>Activity 56 (ii) (GN.R 327)</u>: "*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…"* <u>Activity 1 (GN.R. 325):</u> *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* <u>Activity 15 (GN.R. 325):</u> *"The clearance of an area of 20*	• Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration. <u>Transportation and installation of PV panels into an Array</u> The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw. <u>Wiring to the Central Inverters</u> Sections of the PV array would be wired to central inverters. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.													
															Assessment (Appendix E2)
			Air	• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Soil degradation, including erosion. • Enhanced agricultural potential through increased financial security for farming operations. • Improved security against stock theft and other crime.	-/+		S	S	Pr	PR	ML	Yes	- See Table 6.6	L	Agricultural and Soils Compliance Statement (Appendix E4)
			Geology	• Collapsible soil. • Seepage. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity.	-	-	S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - Retention of vegetation where possible to avoid soil erosion.	L	-

hectares or more of indigenous vegetation." Activity 4 (b)(i)(bb)(gg) (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, (bb) within a National Protected Area Expansion Strategy Focus Area, and (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve."* Activity 10 (b)(i)(bb)(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,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the*			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Increase in construction vehicles on existing roads.	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality to be lodged with the Municipality for wayleaves
			Groundwater	• Pollution due to construction vehicles and the storage and handling of dangerous goods.	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. - Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards.	L	-
		SOCIAL/ECONOMIC ENVIRONMENT	Socio-economic development and local growth	• Direct and indirect employment opportunities and skills development. • Economic multiplier effect.		+	L/ R	S	Pr/ D	CR	NL	Yes	- See Table 6.6	L	Social Impact Assessment (Appendix E6)
			Visual landscape	• Visual impact of construction activities.	-		L	S	D	PR	ML	Yes	- See Table 6.6	L	Visual Impact Assessment (Appendix E3)

core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland." <u>Activity 12 (b)(i)(iv) (GN.R 324):</u> *"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 and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* <u>Activity 18 (b)(i)(bb)(gg)(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 the Free State (i) outside urban areas, within (bb) National Protected Area Expansion Strategy Focus areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other*			Traffic volumes	• Temporary increase in traffic, noise and dust pollution.		-	L	S	D	CR	NL	Yes	- See Table 6.6	L	Transport Impact Assessment (Appendix E7)
			Social impacts	• Potential loss of productive farmland. • Influx of jobseekers and change in population. • Safety and security impacts. • Impacts on daily living and movement patterns. • Nuisance impacts (noise and dust). • Increased risk in potential veld fires. • Visual and sense of place impacts.		-	S/ L/ R	S/ P	Pr/ D	BR/ CR/ Ir	ML/ NL/ SL	Yes	- See Table 6.6	L	Social Impact Assessment (Appendix E6)
			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 E6)
			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the site (other than the accommodation on the other side of the affected property), 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

protected area identified in terms of NEMPAA or from the core area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."			Heritage resources (archaeology and palaeontology)	• Destruction of significant archaeological and palaeontological heritage during the construction phase of development.	-		S	P	U	IR	CL	Yes	- See Table 6.6	L	Heritage Impact Assessment (Appendix E5)
OPERATIONAL PHASE															
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* Activity 10 (b)(i)(bb)(gg)(hh) (GN.R 324): *"The development*	The key components of the proposed project are described below: • PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules 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 with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 35MW electricity. • Battery Energy Storage System (BESS) - The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 2 ha. The containers may be single	BIOPHYSICAL ENVIRONMENT	Fauna, Flora and surface water	• Loss of fauna and flora. • Habitat destruction caused by clearance of vegetation. • Soil and water pollution. • Spread and establishment of alien invasive species. • Negative effect of human activities on fauna and road mortalities. • Negative effect of fences on dispersal movements of fauna. • Negative effect of light pollution on nocturnal fauna. • Erosion. • Soil and water pollution. • Increase in stormwater run-off.		-	S	M	U/ Po	PR	ML	Yes	- See Table 6.8	L	Ecology and Wetland Impact Assessment (Appendix E1)
			Avifauna	• Disturbance. • Collisions with PV Panels. • Electrocutions and collisions on electrical infrastructure and fencing. • Barrier effects.		-	L/ R	L	U/ Po/ Pr	PR/ CR	ML/ SL	Yes	- See Table 6.8	L	Avifaunal Impact Assessment (Appendix E2)
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Loss of agricultural potential by occupation of land. • Loss of agricultural potential by soil degradation. • Soil degradation, including erosion.	-/+		S	S	Pr	PR	ML	Yes	- See Table 6.8	L	Agricultural and Soils Compliance Statement (Appendix E4)

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,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."	stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems. • <u>Inverters</u> - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. • <u>Connection to the grid and electrical reticulation</u> - 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 via the Steenbok Grid Connection to be assessed under a separate Basic Assessment process. Furthermore, an internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible. • <u>Supporting Infrastructure</u> – The following auxiliary buildings with basic services including water and electricity will be required: ○ Temporary Laydown Areas; (~ 20000 m^2)			• Enhanced agricultural potential through increased financial security for farming operations • Improved security against stock theft and other crime.										
			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 solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	L	-
			Groundwater	• Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.	-		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	-
			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.		-	S	M	Pr	PR	ML	Yes	- See Table 6.8	L	-

	and construction site camp/site office; ○ Site Administration Office (~500m²); ○ Switch gear and relay room (~400m²); ○ Staff lockers and changing room (~200m²); ○ Security control (~60m²); ○ Operations & Maintenance (O&M) building (~ 500 m²); and ○ Warehouse. • Roads – Access will be obtained via the R700 regional road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side). Perimeter roads may be up to 8m wide. • Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2m in height.	SOCIAL/ECONOMIC		• Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. • Generation of hazardous waste.											
			Visual landscape	• Visual impacts on sensitive visual receptors within a 1km radius. • Visual impacts on sensitive visual receptors between a 1km and 5km radius. • Visual impacts on sensitive visual receptors between a 5km and 10km radius. • Visual impacts of lighting at night on sensitive visual receptors. • Visual impacts of solar glint and glare as a visual distraction and possible air travel hazard. • Visual impact and impacts on sense of place.		-	L	L	D/ Pr	R/ PR/ CR	SL/ ML	Yes	- See Table 6.8	L	Visual Impact Assessment (Appendix E3)
			Positive social benefits	• Direct and Indirect employment opportunities and skills development. • Development of non-polluting, renewable energy infrastructure. • Contribution to Local Economic Development (LED) and social upliftment.		+	L/ R/ N	L	D/ Pr	BR/ CR	NL/ ML	Yes	- See Table 6.8	M	Social Impact Assessment (Appendix E6)
			Social impacts	• Potential loss of agricultural land. • Impact on tourism. • Visual and sense of place impacts.		-	S/ L/ R/ N	L	D/ Pr	BR/ PR/ R	ML/ NL	Yes	- See Table 6.8	L	Social Impact Assessment (Appendix E6)
			Traffic volumes	• Nominal impact expected.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A

			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
			Electricity supply	• Generation of additional electricity.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure</u> During the decommissioning phase the respective facilities and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.	BIOPHYSICAL ENVIRONMENT	Fauna, Flora and surface water	• Site clearing and preparation. • Loss of Biodiversity. • Increased soil erosion. • Alien plant invasion. • Wetland degradation. • Soil compaction, erosion and sedimentation of wetlands. • Loss of wetland habitat. • Erosion of streambank. • Loss of fauna and flora. • Habitat destruction. • Soil pollution. • Negative effect of human activities on fauna and road mortalities.		-	S/L	S/L	Pr/ Po	BR/ PR	ML/ SL	Yes	- See Table 6.10	L	Ecology and Wetland Impact Assessment (Appendix E1)
			Avifauna	• Disturbance. • Habitat loss.	-		L	S/L	Po/ D	PR/ CR	ML	Yes	- See Table 6.10	L	Avifauna Impact Assessment (Appendix E2)

			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. • Soil degradation, including erosion. • Enhanced agricultural potential through increased financial security for farming operations • Improved security against stock theft and other crime	-/+		S	S	Pr	PR	ML	Yes	- See Table 6.10	L	Agricultural and Soils Compliance Statement (Appendix E4)
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in stormwater run-off. • Pollution of water sources due to soil erosion.		-	L	S	Pr	PR	ML	Yes	- Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater	M	-

													(or surface water) contamination.		
			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 Steenbok Solar 2 it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life.	-		L	S	D	PR	ML	Yes	- See Table 6.10	L	Visual Impact Assessment (Appendix E3)
			Traffic volumes	• Temporary increase in traffic, noise and dust pollution.		-	L	S	D	CR	NL	Yes	- See Table 6.10	L	Transport Impact Assessment (Appendix E7)
			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 6.10	L	Social Impact Assessment (Appendix E6)
			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 6.10	L	Social Impact Assessment (Appendix E6)
			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the sites (other than the accommodation on the other side of the affected property), 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

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 G1. The Generic EMPr for the on-site facility IPP substation is included in Appendix G2.

The Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix G3.

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures need to be implemented for potential impacts associated with the proposed activity and development phases. The following key issues have been identified and are addressed in this draft EIA Report.

6.2.1 Impacts during the construction phase

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- *Activity 24 (ii) (GN.R 327):* *"The development of a road (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*
- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation."*
- Activity 4 (b)(i)(bb)(gg) (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, (bb) within a National Protected Area Expansion Strategy Focus Area, and (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve."*
- Activity 10 (b)(i)(bb)(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,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."

- Activity 12 (b)(i)(iv) (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 and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

- Activity 18 (b)(i)(bb)(gg)(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, within (bb) National Protected Area Expansion Strategy Focus areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

During the construction phase temporary negative impacts are foreseen over the short term for both Steenbok Solar 1 and Steenbok Solar 2. Tables 6.5 and 6.6 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase for Steenbok Solar 1 and Steenbok Solar 2.

Table 6.5: Impacts and the mitigation measures during the construction phase expected for Steenbok Solar 1

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecology and Wetland Impact Assessment (Appendix E1)	Site clearing and preparation (including loss of plant species, loss of rare/medical species, loss of animal species, loss of biodiversity, increased soil erosion, alien plant invasion)	Low Negative	Low Negative	• The areas to be developed must be clearly demarcated prior to initial site clearance. • Construction personnel should not be allowed to enter the no-go areas. • To minimise the effect on the vegetation, insects, small mammals, and environment it is recommended that the construction be done within the winter period as far as practically possible, when most plants are dormant and animals less active. • Where vegetation of areas not to be developed needs to be "opened" to gain access it is recommended that the herbaceous species are cut short rather than removing them. • Vegetation clearance/cutting should be restricted to the approved development areas allowing remaining faunal species the opportunity to move away from the disturbance. The Environmental Control Officer (ECO) should monitor these areas on a regular basis. • Any disturbed or eroded areas not to be developed should be appropriately revegetated. Only indigenous (to the area) grass species are recommended. • Storage of equipment, fuel and other materials should be limited to demarcated areas. They should be established at least 300 meters away from the buffer zone of the wetland

				areas of the sites as well as from the Stinkhoutspruit in the east outside the sites. • The few alien invasive plants present within the various vegetation units must be removed and eradicated throughout all stages of the projects. • All stormwater and runoff generated by the development activities must be appropriately managed to prevent erosion of the wetland areas. • Monitoring of all these activities must be done on a monthly basis by the ECO during the construction phase of the developments to ensure that minimal impact is caused to the surrounding fauna and flora of the area. Any transgressing of rules must be reported by the ECO.
	Loss of fauna and flora (including vegetation clearance, habitat destruction, soil erosion and pollution, spread and pollution of alien invasive plant species, negative effect of human activities on fauna, road mortalities of fauna and loss of biodiversity)	Negative Medium	Negative Low	• All temporary stockpile areas, litter and dumped material and rubble must be removed and disposed of at a licensed land fill facility. Proof of safe disposal must be obtained and kept on record for monitoring purposes. • The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site, and must therefore be undertaken. • Hazardous chemicals must be stored on an impervious surface accompanied by Safety Data Sheets (SDS) and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom. • Limit human activity in the no-go areas as well as the completed areas to the.

				• Any alien plants observed should be reported to the environmental manager and should be removed as soon as possible. • Regular monitoring (monthly) for damage to the environment as well as establishment of alien plant species must be conducted. minimum required for ongoing operation.
Avifauna Impact Assessment (Appendix E2)	Disturbance	Negative Low	Negative Low	• Disturbance can be managed and mitigated at the design stage by avoiding important nesting, roosting and foraging areas of sensitive species during site selection and layout design. • In order to ensure no Species of Conservation Concern (SCC) are breeding within the proposed disturbance footprint prior to the commencement of construction activities, a walkthrough of the sites must be conducted by an avifaunal specialist, as close as possible prior to the commencement of activities. • Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss. • All areas outside of disturbance footprint are No Go areas. • Avifaunal specialist to undertake an avifaunal walkthrough of the development footprint(s) to identify any breeding sites. • Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented. • Breeding sites of SCC must be left intact and undisturbed (where relevant).

				• Should SCC be found breeding within the disturbance footprint prior to or during construction or decommissioning all works within 1 km of the breeding site must be halted and an avifaunal specialist must be contacted for further instruction. • Any resulting recommendation by the avifaunal specialist to protect the breeding SCC must be implemented. • Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist. • Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction. • Minimise outdoor lighting needed to operate the facility to the maximum extent practicable. • Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents wherever possible • All electrical infrastructure is to be of bird-friendly insulated design in line with the latest Eskom Technical Standards. • Bury all low and medium voltage power lines. • All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing. • All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning.

	Habitat Loss	Negative Medium	Negative Medium	• Retain as much of the indigenous vegetation as possible beneath the PV panels. • Minimise the footprint of all associated infrastructure, including buildings, electrical infrastructure and the width and length of roads. • Keep vegetation clearing within the development footprint to the minimum practically possible to minimise habitat loss. • Indigenous vegetation which does not interfere with the development must be left undisturbed. • Breeding sites of any avian species as identified by an avifaunal specialist within the disturbance footprint must be kept intact and disturbance to breeding birds must be avoided.
Visual Impact Assessment (Appendix E3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Low	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site.

				• Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities to between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Agricultural and Soils Compliance Statement (Appendix E4)	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	• No mitigation measures are proposed. Avoidance of such areas has already been applied.
	Loss of agricultural potential by soil degradation and erosion and management of topsoil	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. • Design and 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. This is included in the stormwater management plan. • 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. • 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. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
Heritage Impact Assessment (Appendix E5)	Destruction of significant archaeological and palaeontological heritage during the construction phase	Negative Low	Negative Low	• Although all possible care has been taken to identify sites of cultural importance during the investigation of the specialist study, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.
Social Impact Assessment (Appendix E6)	Direct and indirect employment opportunities and skills development	Positive Low	Positive Low	• 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 Mangaung Metropolitan Municipality, 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	Positive Low	Positive Low	• 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 Low	Negative Low	• The proposed sites for Steenbok Solar 1 and Steenbok Solar 2 need 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.
	Influx of jobseekers and change in population	Negative Medium	Negative Low	• Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers (from Bloemfontein and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project sites. • 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 sites.

				• Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process. • Establish clear rules and regulations for access to the proposed site. • Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase. • Establish procedures for the control and removal of loiterers from the construction site.
	Safety and security impacts	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 sites outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the sites. The fencing of the sites 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 sites should be strictly controlled by a security company appointed to the projects.

				• 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 projects 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 Low	Negative Low	• 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 R700 road to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work).

				• The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impact (noise and dust)	Negative Medium	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project sites.

				• 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 in 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.
	Visual and sense of place impacts	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.
Transport Impact Assessment (Appendix E7)	Temporary increase in traffic, noise and dust pollution	Negative Medium	Negative Low	• Dust suppression of internal gravel roads and the access road. • Component delivery to/ removal from the sites can be staggered and trips can be scheduled to occur outside of peak traffic periods. • The use of mobile batching plants and quarries near the sites would decrease the impact on the surrounding road network, if available and feasible. • Staff and general trips should occur outside of peak traffic periods. • A “dry run” of the preferred route. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor. • Design and maintenance of the internal gravel roads and maintenance of the access road. • If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) or raised to accommodate the abnormal load vehicles.

Table 6.6: Impacts and the mitigation measures during the construction phase expected for Steenbok Solar 2

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecology and Wetland Impact Assessment (Appendix E1)	Site clearing and preparation (including loss of plant species, loss of rare/medical species, loss of animal species, loss of biodiversity, increased soil erosion, alien plant invasion)	Low Negative	Low Negative	• The areas to be developed must be clearly demarcated prior to initial site clearance. • Construction personnel should not be allowed to enter the no-go areas. • To minimise the effect on the vegetation, insects, small mammals, and environment it is recommended that the construction be done within the winter period as far as practically possible, when most plants are dormant and animals less active. • Where vegetation of areas not to be developed needs to be "opened" to gain access it is recommended that the herbaceous species are cut short rather than removing them. • Vegetation clearance/cutting should be restricted to the approved development areas allowing remaining faunal species the opportunity to move away from the disturbance. The Environmental Control Officer (ECO) should monitor these areas on a regular basis. • Any disturbed or eroded areas not to be developed should be appropriately revegetated. Only indigenous (to the area) grass species are recommended. • Storage of equipment, fuel and other materials should be limited to demarcated areas. They should be established at least 300 meters away from the buffer zone of the wetland

				areas of the sites as well as from the Stinkhoutspruit in the east outside the sites. • The few alien invasive plants present within the various vegetation units must be removed and eradicated throughout all stages of the projects. • All stormwater and runoff generated by the development activities must be appropriately managed to prevent erosion of the wetland areas. • Monitoring of all these activities must be done on a monthly basis by the ECO during the construction phase of the developments to ensure that minimal impact is caused to the surrounding fauna and flora of the area. Any transgressing of rules must be reported by the ECO.
	Wetland degradation (including soil compaction, erosion and sedimentation, soil and water pollution and spread, establishment of alien invasive species in the wetland, erosion of the streambank and loss of wetland habitat)	Negative Medium	Negative Low	• No development should be allowed within the wetland areas (Eastern & Western) and their associated buffer zones. • The wetlands and appropriate buffer zones must be declared as a No-Go areas. • The PV site must be designed such that no erosion will take place around or in the wetland systems. • No hazardous materials should be stored within 300 m of the wetland areas. • Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) and surface water in the area. • No cleaning of equipment should be done closer than 300m of the edge of the buffer zones. This includes the establishment of temporary and permanent offices and ablution facilities.

				• All vehicles and equipment should be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area at least 300 m away from the edge of the wetland buffer zones to prevent ingress of hydrocarbons into topsoil. • No dumping or storage of waste should take place within the watercourse areas. • Drainage must be controlled to ensure that runoff from the developments will not culminate in off-site wetland erosion and pollution. • Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. • The release of stormwater must be designed such that the force of the water is reduced to prevent unnecessary erosion. • No dumping of waste should take place within the watercourse areas. If any spills occur, they should be cleaned up immediately. • Adequate toilet facilities must be provided for all staff to prevent pollution of the environment. • No person/s involved with the construction must be allowed within any of the wetlands other than performing official work as instructed by the ECO.
	Loss of fauna and flora (including vegetation clearance, habitat destruction, soil erosion and pollution, spread and pollution of alien invasive plant species, negative	Negative Medium	Negative Low	• All temporary stockpile areas, litter and dumped material and rubble must be removed and disposed of at a licensed land fill facility. Proof of safe disposal must be obtained and kept on record for monitoring purposes. • The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will

	effect of human activities on fauna, road mortalities of fauna and loss of biodiversity)			limit the extent of erosion occurring on the site, and must therefore be undertaken. • Hazardous chemicals must be stored on an impervious surface accompanied by Safety Data Sheets (SDS) and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom. • Limit human activity in the no-go areas as well as the completed areas to the. • Any alien plants observed should be reported to the environmental manager and should be removed as soon as possible. • Regular monitoring (monthly) for damage to the environment as well as establishment of alien plant species must be conducted. minimum required for ongoing operation.
Avifauna Impact Assessment (Appendix E2)	Disturbance	Negative Low	Negative Low	• Disturbance can be managed and mitigated at the design stage by avoiding important nesting, roosting and foraging areas of sensitive species during site selection and layout design. • In order to ensure no Species of Conservation Concern (SCC) are breeding within the proposed disturbance footprint prior to the commencement of construction activities, a walkthrough of the sites must be conducted by an avifaunal specialist, as close as possible prior to the commencement of activities. • Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss. • All areas outside of disturbance footprint are No Go areas.

				• Avifaunal specialist to undertake an avifaunal walkthrough of the development footprint(s) to identify any breeding sites. • Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented. • Breeding sites of SCC must be left intact and undisturbed (where relevant). • Should SCC be found breeding within the disturbance footprint prior to or during construction or decommissioning all works within 1 km of the breeding site must be halted and an avifaunal specialist must be contacted for further instruction. • Any resulting recommendation by the avifaunal specialist to protect the breeding SCC must be implemented. • Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist. • Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction. • Minimise outdoor lighting needed to operate the facility to the maximum extent practicable. • Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents wherever possible

				• All electrical infrastructure is to be of bird-friendly insulated design in line with the latest Eskom Technical Standards. • Bury all low and medium voltage power lines. • All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing. • All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning.
	Habitat Loss	Negative Medium	Negative Medium	• Retain as much of the indigenous vegetation as possible beneath the PV panels. • Minimise the footprint of all associated infrastructure, including buildings, electrical infrastructure and the width and length of roads. • Keep vegetation clearing within the development footprint to the minimum practically possible to minimise habitat loss. • Indigenous vegetation which does not interfere with the development must be left undisturbed. • Breeding sites of any avian species as identified by an avifaunal specialist within the disturbance footprint must be kept intact and disturbance to breeding birds must be avoided.
Visual Impact Assessment (Appendix E3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Low	Negative Low	Planning • Retain and maintain natural vegetation immediately adjacent to the development footprint. Construction • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of laydown areas and temporary construction equipment camps in order to minimise

				vegetation clearing (i.e., in already disturbed areas) where possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. • Reduce and control dust during construction by utilising dust suppression measures. • Limit construction activities to between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. • Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.
Agricultural and Soils Compliance Statement (Appendix E4)	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	• No mitigation measures are proposed. Avoidance of such areas has already been applied.
	Loss of agricultural potential by soil degradation and erosion and management of topsoil	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. • Design and 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. This is included in the stormwater management plan. • 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. • 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. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
Heritage Impact Assessment (Appendix E5)	Destruction of significant archaeological and palaeontological heritage during the construction phase	Negative Low	Negative Low	• Although all possible care has been taken to identify sites of cultural importance during the investigation of the specialist study, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in

				the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.
Social Impact Assessment (Appendix E6)	Direct and indirect employment opportunities and skills development	Positive Low	Positive Low	• 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 Mangaung Metropolitan Municipality, 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	Positive Low	Positive Low	• 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 Low	Negative Low	• The proposed sites for Steenbok Solar 1 and Steenbok Solar 2 need 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.
	Influx of jobseekers and change in population	Negative Medium	Negative Low	• Develop and implement a local procurement policy which prioritises “locals first” to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers (from Bloemfontein and surrounds) to ensure workers can easily access their place of

				employment and do not need to move closer to the project sites. • 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 sites. • Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process. • Establish clear rules and regulations for access to the proposed site. • Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase. • Establish procedures for the control and removal of loiterers from the construction site.
	Safety and security impacts	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 sites outside of working hours.

				• The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the sites. The fencing of the sites 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 sites should be strictly controlled by a security company appointed to the projects. • 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 projects 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 Low	Negative Low	• 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 R700 road to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work). • The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impact (noise and dust)	Negative Medium	Negative Low	• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and

				ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project sites. • 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 in 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.

	Visual and sense of place impacts	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.
Transport Impact Assessment (Appendix E7)	Temporary increase in traffic, noise and dust pollution	Negative Medium	Negative Low	• Dust suppression of internal gravel roads and the access road. • Component delivery to/ removal from the sites can be staggered and trips can be scheduled to occur outside of peak traffic periods. • The use of mobile batching plants and quarries near the sites would decrease the impact on the surrounding road network, if available and feasible. • Staff and general trips should occur outside of peak traffic periods.

				• A “dry run” of the preferred route. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor. • Design and maintenance of the internal gravel roads and maintenance of the access road. • If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) or raised to accommodate the abnormal load vehicles.

6.2.2 Impacts during the operational phase

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

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*
- Activity 10 (b)(i)(bb)(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,(bb) within National Protected Area Expansion Strategy Focus Areas, (gg) within areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve 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. Tables 6.7 and 6.8 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the operational phase for both Steenbok Solar 1 and Steenbok Solar 2.

Table 6.7: Impacts and the mitigation measures during the operation phase expected for Steenbok Solar 1

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecology and Wetland Impact Assessment (Appendix E1)	Loss of fauna and flora (including habitat destruction by clearance of vegetation, soil and water pollution, spread and establishment of alien invasive species, negative effect of human activities on fauna, road mortalities, negative effect of fences on dispersal movements of fauna and negative effect of light pollution on nocturnal fauna)	Negative Low	Negative Low	• All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded in an environmentally friendly way. • Undeveloped areas that were degraded due to human activities must be rehabilitated with indigenous vegetation. • Hazardous chemicals must be removed from the sites. • Regular monitoring must be undertaken to determine the nature of degradation of the vegetation and or animal habitat around the sites.
Avifauna Impact Assessment (Appendix E2)	Disturbance	Negative Low	Negative Low	• All areas outside of disturbance footprint are No Go areas. • Demarcate the disturbance footprint, and minimise disturbance to this footprint as much as practically possible • Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented (where relevant).

				• Breeding sites of SCC must be left intact and undisturbed (where relevant). • Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist. • Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction. • Minimise outdoor lighting needed to operate the facility to the maximum extent practicable. • Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents wherever possible • All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing. • All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning. • No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.
	Collisions with PV Panels	Negative Medium	Negative Low	• Make the sites unattractive to avifauna, i.e. by minimising any available perching and nesting structures, closing open water bodies, reducing attractive or disorientating lighting, and by implementing an operational monitoring programme with carcass searching.

				• The perimeter and internal fencing should consist of a single-fence design, and be in line with the Birdlife SA guideline on Fences & Birds. • Operational phase monitoring of mortalities should be undertaken in line with current Best Practice Guidelines and if unacceptably high levels of mortalities are recorded, adaptive mitigation measures such as deterrent devices may need to be considered.
	Electrocutions and collisions on electrical infrastructure and fencing	Negative Medium	Negative Low	• Implement bird-friendly pole design i.e., creating separation between conductors of differing electric potential, by placing insulation over conductors, or by redirecting birds to perch or nest away from conductors.
	Barrier effects	Negative Low	Negative Low	• Not applicable
Visual Impact Assessment (Appendix E3)	Visual impacts on sensitive visual receptors within a 1km radius	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impacts on sensitive visual receptors between a 1km and 5km radius	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient.

				Operations • Maintain general appearance of the facility as a whole.
	Visual impacts on sensitive visual receptors between a 5km and 10km radius	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impacts of lighting at night on sensitive visual receptors	Negative High	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. • The use of night vision or thermal security cameras are very effective and can replace security lighting entirely.
	Visual impacts of solar glint and glare as a visual distraction and possible air travel hazard	Negative Low	Negative Low	• No mitigation measures applicable

	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 (Appendix E4)	Enhanced agricultural potential through increased financial security for farming operations	Positive Low	Positive Low	• No enhancement measures are proposed.
	Dust impact	Negative Low	Negative Low	• Implement dust suppression as needed.
	Erosion	Negative Low	Negative Low	• Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring. • Facilitate re-vegetation of denuded areas throughout the site
	Topsoil Loss	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Social Impact Assessment (Appendix E6)	Direct and Indirect employment opportunities and skills development	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• No mitigation measures are proposed
	Potential loss of agricultural land	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 CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the projects 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).

	Impact on tourism.	Positive Low / Negative Low	Positive Low/ Negative Low	• Due to the extent of the projects 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 and sense of place impacts	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of Steenbok Solar 1 and Steenbok Solar 2, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard
General Environment (Risks associated	Mechanical breakdown / Exposure to high temperatures	Negative Medium	Negative Low	• Operators are trained and competent to operate the BESS. Training should include the discussion of the following: • Potential impact of electrolyte spills on groundwater;

with BESS development)	Fires, electrocutions and spillage of toxic substances into the surrounding environment.			• Suitable disposal of waste and effluent; • Key measures in the EMPr relevant to worker's activities; • How incidents and suggestions for improvement can be reported. • Training records should be kept on file and be made available during audits. • Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. • Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. • Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). • Firefighting equipment should readily be available at the BESS area and within the site. • Maintain strict access control to the BESS area.
	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.			• Ensure all maintenance contractors / staff are familiar with the supplier's specifications. • Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. • Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. • Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. • The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. • Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. • The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. • Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS. • Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal.
	Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.			
	Generation of hazardous waste			

				• 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.

Table 6.8: Impacts and the mitigation measures during the operation phase expected for Steenbok Solar 2

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecology and Wetland Impact Assessment (Appendix E1)	Loss of fauna and flora (including habitat destruction by clearance of vegetation, soil and water pollution, spread and establishment of alien invasive species, negative effect of human activities on fauna, road mortalities, negative effect of fences on dispersal movements of fauna and negative effect	Negative Low	Negative Low	• All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded in an environmentally friendly way. • Undeveloped areas that were degraded due to human activities must be rehabilitated with indigenous vegetation. • Hazardous chemicals must be removed from the sites. • Regular monitoring must be undertaken to determine the nature of degradation of the vegetation and or animal habitat around the sites.

	of light pollution on nocturnal fauna)			
	Impacts to surface water and wetlands (including erosion, soil and water pollution and increase in stormwater run-off)	Negative Medium	Negative Low	• The release of stormwater must be designed such that the force of the water is reduced to prevent unnecessary erosion of the wetland areas. • No dumping of waste should take place within or close to the wetland areas. • If any spills of pollutants occur, they should be cleaned up immediately. • Remove all substances which can result in groundwater (or surface water) pollution.
Avifauna Impact Assessment (Appendix E2)	Disturbance	Negative Low	Negative Low	• All areas outside of disturbance footprint are No Go areas. • Demarcate the disturbance footprint, and minimise disturbance to this footprint as much as practically possible • Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented (where relevant). • Breeding sites of SCC must be left intact and undisturbed (where relevant). • Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist. • Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an

				avifaunal specialist must be contacted within 7 days for further instruction. • Minimise outdoor lighting needed to operate the facility to the maximum extent practicable. • Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents wherever possible • All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing. • All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning. • No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.
	Collisions with PV Panels	Negative Medium	Negative Low	• Make the sites unattractive to avifauna, i.e. by minimising any available perching and nesting structures, closing open water bodies, reducing attractive or disorientating lighting, and by implementing an operational monitoring programme with carcass searching. • The perimeter and internal fencing should consist of a single-fence design, and be in line with the Birdlife SA guideline on Fences & Birds. • Operational phase monitoring of mortalities should be undertaken in line with current Best Practice Guidelines and if unacceptably high levels of mortalities are recorded, adaptive mitigation measures such as deterrent devices may need to be considered.

	Electrocutions and collisions on electrical infrastructure and fencing	Negative Medium	Negative Low	• Implement bird-friendly pole design i.e., creating separation between conductors of differing electric potential, by placing insulation over conductors, or by redirecting birds to perch or nest away from conductors.
	Barrier effects	Negative Low	Negative Low	• Not applicable
Visual Impact Assessment (Appendix E3)	Visual impacts on sensitive visual receptors within a 1km radius	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impacts on sensitive visual receptors between a 1km and 5km radius	Negative Medium	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient. Operations • Maintain general appearance of the facility as a whole.
	Visual impacts on sensitive visual receptors between a 5km and 10km radius	Negative Low	Negative Low	Planning • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient.

				Operations • Maintain general appearance of the facility as a whole.
	Visual impacts of lighting at night on sensitive visual receptors	Negative High	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. • The use of night vision or thermal security cameras are very effective and can replace security lighting entirely.
	Visual impacts of solar glint and glare as a visual distraction and possible air travel hazard	Negative Low	Negative Low	• No mitigation measures applicable
	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 (Appendix E4)	Enhanced agricultural potential through increased financial security for farming operations	Positive Low	Positive Low	• No enhancement measures are proposed.
	Dust impact	Negative Low	Negative Low	• Implement dust suppression as needed.
	Erosion	Negative Low	Negative Low	• Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring. • Facilitate re-vegetation of denuded areas throughout the site
	Topsoil Loss	Negative Low	Negative Low	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.
Social Impact Assessment (Appendix E6)	Direct and Indirect employment opportunities and skills development	Positive Low	Positive Medium	• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. • Vocational training programs should be established to promote the development of skills.

	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	• No mitigation measures are proposed
	Potential loss of agricultural land	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 CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the projects 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).
	Impact on tourism.	Positive Low / Negative Low	Positive Low/ Negative Low	• Due to the extent of the projects 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 and sense of place impacts	Negative Low	Negative Low	• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of Steenbok Solar 1 and Steenbok Solar 2, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard
General Environment (Risks associated with BESS development)	Mechanical breakdown / Exposure to high temperatures	Negative Medium	Negative Low	• Operators are trained and competent to operate the BESS. Training should include the discussion of the following: • Potential impact of electrolyte spills on groundwater; • Suitable disposal of waste and effluent; • Key measures in the EMPr relevant to worker's activities; • How incidents and suggestions for improvement can be reported. • Training records should be kept on file and be made available during audits. • Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. • Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. • Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and
	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.			chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). • Firefighting equipment should readily be available at the BESS area and within the site. • Maintain strict access control to the BESS area. • Ensure all maintenance contractors / staff are familiar with the supplier's specifications. • Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. • Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. • Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. • The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed.
	Water Pollution – spillages into surrounding watercourses as well as groundwater.			
	Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.			

	Generation of hazardous waste			• 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.

6.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the two solar facilities since the sites and respective development footprints will be restored to its natural state. Tables 6.9 and 6.10 provide a summary of the impacts during the decommissioning phase. The decommissioning phase will however potentially result in impact on soils, pressure on existing service infrastructure, surface water and the loss of permanent employment. Skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.

Table 6.9: Impacts and the mitigation measures during the decommissioning phase expected for Steenbok Solar 1

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifauna Impact Assessment (Appendix E2)	Disturbance	Negative Low	Negative Low	• In order to ensure no Species of Conservation Concern (SCC) are breeding within the proposed disturbance footprint prior to the commencement of decommissioning activities, a walkthrough of the sites must be conducted by an avifaunal specialist, as close as possible prior to the commencement of activities. • Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss. • All areas outside of disturbance footprint are No Go areas. • Avifaunal specialist to undertake an avifaunal walkthrough of the development footprint(s) to identify any breeding sites. • Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented. • Breeding sites of SCC must be left intact and undisturbed (where relevant). • Should SCC be found breeding within the disturbance footprint prior to or during construction or decommissioning all works within 1 km of the breeding site must be halted and an avifaunal specialist must be contacted for further instruction. • Any resulting recommendation by the avifaunal specialist to protect the breeding SCC must be implemented.

				• Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist. • Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction. • Minimise outdoor lighting needed. • All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning. • No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.
	Habitat Loss	Negative Low	Negative Low	• Retain as much of the indigenous vegetation as possible. • Keep vegetation clearing to the minimum practically possible to minimise habitat loss. • Indigenous vegetation which does not interfere must be left undisturbed. • Breeding sites of any avian species as identified by an avifaunal specialist within the disturbance footprint must be kept intact and disturbance to breeding birds must be avoided.
Agricultural and Soils Compliance Statement (Appendix E4)	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 (Appendix E6)	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.
Transport Impact Assessment (Appendix E7)	Temporary increase in traffic, noise and dust pollution	Negative Medium	Negative Low	• Dust suppression of internal gravel roads and the access road. • Component delivery to/ removal from the sites can be staggered and trips can be scheduled to occur outside of peak traffic periods. • The use of mobile batching plants and quarries near the sites would decrease the impact on the surrounding road network, if available and feasible. • Staff and general trips should occur outside of peak traffic periods. • A “dry run” of the preferred route. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor. • Design and maintenance of the internal gravel roads and maintenance of the access road. • If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will

				have to be moved (to be arranged by haulage company) or raised to accommodate the abnormal load vehicles.

Table 6.10: Impacts and the mitigation measures during the decommissioning phase expected for Steenbok Solar 2

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifauna Impact Assessment (Appendix E2)	Disturbance	Negative Low	Negative Low	• In order to ensure no Species of Conservation Concern (SCC) are breeding within the proposed disturbance footprint prior to the commencement of decommissioning activities, a walkthrough of the sites must be conducted by an avifaunal specialist, as close as possible prior to the commencement of activities. • Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss. • All areas outside of disturbance footprint are No Go areas. • Avifaunal specialist to undertake an avifaunal walkthrough of the development footprint(s) to identify any breeding sites. • Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented. • Breeding sites of SCC must be left intact and undisturbed (where relevant). • Should SCC be found breeding within the disturbance footprint prior to or during construction or decommissioning all works

				within 1 km of the breeding site must be halted and an avifaunal specialist must be contacted for further instruction. • Any resulting recommendation by the avifaunal specialist to protect the breeding SCC must be implemented. • Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist. • Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction. • Minimise outdoor lighting needed. • All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning. • No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.
	Habitat Loss	Negative Low	Negative Low	• Retain as much of the indigenous vegetation as possible. • Keep vegetation clearing to the minimum practically possible to minimise habitat loss. • Indigenous vegetation which does not interfere must be left undisturbed. • Breeding sites of any avian species as identified by an avifaunal specialist within the disturbance footprint must be kept intact and disturbance to breeding birds must be avoided.
Agricultural and Soils Compliance	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

Statement (Appendix E4)				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 (Appendix E6)	Loss of employment opportunities	Negative Low	Negative Low	• It is not expected that the facility will be decommissioned.
Transport Impact Assessment (Appendix E7)	Temporary increase in traffic, noise and dust pollution	Negative Medium	Negative Low	• Dust suppression of internal gravel roads and the access road. • Component delivery to/ removal from the sites can be staggered and trips can be scheduled to occur outside of peak traffic periods. • The use of mobile batching plants and quarries near the sites would decrease the impact on the surrounding road network, if available and feasible. • Staff and general trips should occur outside of peak traffic periods. • A “dry run” of the preferred route. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor. • Design and maintenance of the internal gravel roads and maintenance of the access road.

				• If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) or raised to accommodate the abnormal load vehicles.

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:

- Ecological and Wetland Impact Assessment – Enviroguard Ecological Services (see Appendix E1)
- Avifaunal Impact Assessment – Holland and Associates Environmental Consultants (see Appendix E2)
- Visual Impact Assessment – Phala Environmental Consultants (see Appendix E3)
- Agricultural Compliance Statement - Johann Lanz Soil Scientist (Appendix E4)
- Heritage Impact Assessment – CTS Heritage (see Appendix E5)
- Social Impact Assessment – Phala Environmental Consultants (see Appendix E6)
- Transport Impact Assessment – iWink Consulting (see Appendix E7)
- 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 and impacts identified to be associated with the proposed facilities. Furthermore, the section provides a sensitivity analysis which gives an indication of where specific sensitive environmental features or areas of sensitivity have been identified as part of the specialist assessments within the respective sites that need to be avoided by the placement of the development footprint.

6.3.1 Heritage (archaeological and palaeontological) 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 sites. Consideration and assessment was given in terms of archaeology and palaeontology. . The main question which needs to be addressed is:

> *"Will the proposed development impact on any heritage, archaeological artefacts or palaeontology?"*

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

The sites were comprehensively surveyed for heritage resources, and no archaeological material remains were documented. There are no objections on palaeontological heritage grounds and impacts to significant fossil heritage resources are unlikely.

Should significant archaeological materials – such as well-preserved subsurface artefacts or fossils – be exposed during construction, the on-duty Environmental Control Officer should protect these (preferably in primary exposed context), and should immediately consult a professional archaeologist. In this circumstance, the South African Heritage Resources Authority should be immediately alerted so that appropriate mitigation measures by a professional archaeologist can be implemented, at the expense of the developer. In such a scenario, mitigation measures would normally involve the application for an excavation permit and the digital documentation of the occurrences with modern archaeological recording standards, as well as the collection of a reflective sample of material to be deposited in a local approved curation facility.

Based on the outcomes of this report, it is not anticipated that the proposed development of the solar PV facilities and associated infrastructure will negatively impact on significant heritage resources. The following recommendations are made:

- The Final Optimised Layouts are supported from a heritage perspective (Figures I1 and I2).
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the sites, it is always possible that hidden or subsurface sites could be overlooked during the assessment. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed developments, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

Based on the above no objection to the Steenbok Solar 1 and Steenbok Solar 2 facilities have been made from a heritage perspective and no no-go areas or areas that need to be avoided by the placement of the development footprint has been identified.

6.3.2 Ecological and Wetland Impacts

The potential impact of the proposed developments on threatened flora and fauna 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 ecology and wetlands?"

The Ecological and Wetland Impact Assessment (refer to Appendix E1) confirmed that the sites comprises farmland that is used for grazing by cattle. Five different vegetation units were identified of which three are classified as watercourses.

Vegetation unit 1 (*Themeda triandra-Eragrostis curvula* grassland) is a large grassland area that is used for grazing by cattle. Overall, the area has a moderate species richness and the degraded and moribund section a low species richness. The vegetation has some affinity with the original native vegetation that occurred in the area but is not in a pristine condition. This unit achieved a medium Site Ecological Importance score. No signs of erosion were observed. Unit 1a is from a vegetation ecological perspective regarded as having a medium ecological sensitivity and unit 1b a low ecological sensitivity

Vegetation unit 2 (*Vachellia karroo* open woodland) consists of *Vachellia karroo* trees and shrubs that varies from small clumps to evenly spread with larger open grassland in between. The herbaceous layer has a moderate to good cover but is mostly degraded with many pioneer and secondary successional grasses and forbs. This unit achieved a low Site Ecological Importance score and is regarded as having a low ecological sensitivity.

Vegetation units 3, 4 & 5 (Seasonal drainage channel, Eastern wetland & Western wetland) are classified as seasonally and permanently wet watercourses. These areas do not have a high species richness but consist mostly of hydrophilic but also terrestrial vegetation typical of seasonally and permanently wet ecosystems. These units achieved a high Site Ecological Importance score and although they do not comprise vegetation in a pristine condition, these areas are, due to their ecosystem functioning, regarded as having a high ecological sensitivity. In some sections where trampling by cattle has occurred, there are a few pioneer and terrestrial species present. It is recommended that no development is allowed closer than the 32m buffer zone of the wetlands. The wetlands are associated with the Steenbok Solar 2 site, however the development footprint has been optimised by the Applicant to avoid the sensitive features, including the associated recommended buffer. Refer to Figure H3b and Figure I2.

Except for one single individual of the declining tree that is also listed a Protected tree namely *Vachellia erioloba*, no threatened species were found to be present while the medicinal plants identified are not threatened and occur abundantly throughout the province.

The few individuals of the declared alien invader species present must be controlled.

Based on the site verification and vegetation ecological survey visit, the ecological impacts of the proposed developments on vegetation units 1 & 2 should not have a large negative impact on the environment provided that the mitigation measures are adhered to. No development within the wetland areas and their associated buffer zones is recommended, and have been adhered to by the Applicant through avoidance of the sensitive features through careful consideration of the placement of the development footprint outside of these features and associated buffers.

According to the DFFE screening tool the vegetation of the sites has an overall low sensitivity and the faunal aspects a low sensitivity (with the eastern section medium). Due to the past and current agricultural activities the largest parts of the sites have a low to medium ecological sensitivity with the wetland areas having a high biodiversity sensitivity.

All of the envisaged impacts identified for vegetation units 1 and 2 were either Low or Negligible when mitigation measures are implemented. The areas surrounding the sites are also used for either grazing or crops.

The protected tree *Vachellia erioloba*, located within vegetation unit 5, should not be removed but it is already located within the wetland area that has been avoided by the placement of the development footprint of Steenbok Solar 2.

It is therefore not expected that the proposed impact of the developments should not have a long-term negative effect on the environment provided all the recommendations and mitigation measures recommended by the specialist are adhered to.

Based on the proposed development footprints provided by the developer the ecological sensitivity areas have been considered and it is not envisaged that the proposed developments as indicated on Steenbok Solar 1 and Steenbok Solar 2 would have any long-term negative effect on the environment and can therefore be supported from an ecological perspective.

6.3.3 Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in 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 E2) the Site Ecological Importance rating of medium indicates that the sites are potentially suitable for development if minimisation and restoration mitigation are implemented. Impacts of medium negative impact significance are acceptable, if followed by restoration activities (SANBI 2022).

The impact assessment has identified potential impacts to avian species, most of which can be mitigated to a very low or low negative level. No residual impacts of high significance were identified for the proposed developments.

Due to the footprints of the proposed developments, a loss of potential Species of Conservation Concern (SCC) habitat is however unavoidable, and even with mitigation this impact is expected to be of medium negative significance for the SCCs that occur here (confirmed or high probability of occurrence). These are Lanner Falcon, Secretarybird and Maccoa Duck. However, due to these species having plenty surrounding equivalent habitat available, this loss of habitat is not deemed to have unacceptably high impacts on these

species, if the recommended mitigation measures are implemented. All other identified impacts are expected to be of low negative significance with mitigation.

The impact management actions and impact management outcomes (i.e., mitigation measures) recommended by the specialist must be included in the Environmental Management Programmes (EMPr) for the projects, in order to achieve the residual impacts discussed above.

The specialist further confirms that optimised layouts of the respective facilities should avoid all areas of high sensitivity.

Based on the results of the specialist investigations the Applicant has developed an optimised layout. This final layout avoids all areas of high avifaunal sensitivity and is acceptable from an avifaunal perspective if all of the recommended mitigation measures are included for implementation in the Environmental Management Programmes for each project. Refer to Figure H3A and H3B.

6.3.4 Visual Impacts

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

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

The Visual Impact Assessment (refer to Appendix E3) concluded that the post mitigation impact is a "*Negative Low"* impact during the construction, decommissioning and operational phases for both project sites. The only receptors likely to be impacted by the proposed developments are the nearby property owners and road users on nearby roads. However, a large part of the visual landscape is still reflecting a farming landscape with a better visual appearance.

The construction and operational phase of Steenbok Solar 1 and Steenbok Solar 2 and their associated infrastructure will have a visual impact on the study area, especially within (but not restricted to) a 1km radius of the proposed projects. The visual impact will differ amongst places, depending on the distance to the projects.

Receptors that might be the most sensitive to the proposed developments are residents living on nearby farms and people travelling on the R700 regional road. The R700 regional road borders the projects to the west.

Both projects will have a negative low visual impact on the surrounding environment within a 20km radius. Referring to the ZTV assessments, Steenbok Solar 1 has a line-of sight visual coverage percentage within the 20km radius of 9.58% and Steenbok Solar 2 a visual coverage percentage of 8.01%.

The visual landscape mainly consists of agricultural and urban developments with a better visual appearance, together with a low tourism aspect connected to Bloemfontein, the capital of the Free State Province. Permanent residents of the area might be desensitised over time with the construction of more solar facilities, but this will stay subjective for each viewer. The location of the solar facilities within the study area will contribute to the consolidation of solar PV structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

Due to the extent of the projects, no viable mitigation measures can be implemented to eliminate the visual impact of the PV facilities entirely, but the possible visual impacts can be reduced. Several mitigation measures have however been proposed regardless of whether mitigation measures will reduce the significance of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the projects, if possible.

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

Considering all positive factors of such developments including economic factors, social factors and sustainability factors, especially in a semi-arid country, the visual impact of the proposed developments will be insignificant and is suggested that the developments commence, from a visual impact point of view. PLEASE NOTE that the details of the solar PV projects should be submitted to the South African Civil Aviation Authority (SACAA).

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

6.3.5 Agricultural / impacts on the soil

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

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

The Agricultural Compliance Statement (Appendix E4) stated that the entire extent of the sites was verified in this assessment as being of medium sensitivity for impacts on agricultural resources with a maximum land capability value of 7. The land was assessed as being of insufficient land capability for viable and sustainable future crop production. The cropping potential of the sites is limited by the combination of fairly low rainfall and shallow soils limited by dense clay in the subsoil.

Two potential negative agricultural impacts were identified, loss of agricultural land use, and land degradation. Two positive agricultural impacts were identified as enhanced agricultural potential through increased financial security for farming operations, and improved security against stock theft and other crime. All of these are likely to have low impact on future agricultural production potential and are therefore assessed as having low significance.

The conclusion of this assessment is that the proposed developments will not have an unacceptable negative impact on the agricultural production capability of the sites. Instead, the developments represent the ideal, win-win situation for both agricultural production and for electricity generation in South Africa, where renewable energy facilities are integrated with agricultural production in a way that provides benefits to agriculture and leads to very little loss of future agricultural production potential.

This is substantiated by the following points:

- The layout of the facilities has been deliberately designed to include only land within the farm that is not cropland and was identified as having soil limitations that make it unsuitable for supporting viable and sustainable crop production. There is not a scarcity of such agricultural land in South Africa and it is therefore considered to be below the threshold for being prioritised for conservation as agricultural production land.
- The amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with lower agricultural production potential.
- The proposed developments offer positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
- The PV panels will not totally exclude agricultural production. The area can still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facilities.

- The loss of agricultural potential by occupation of land is not permanent. The land will become fully available again for agricultural production once the proposed activity ceases.

- The proposed developments pose a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard, best practice mitigation management actions.

- The proposed developments will also have the wider societal benefits of generating additional income and employment in the local economy. In addition, it will contribute to the country's need for energy generation, particularly renewable energy that has

lower environmental and agricultural impact, on a national scale, than existing, coal powered energy generation.

Therefore, from an agricultural impact point of view, the proposed development is considered proposed developments are considered acceptable and it is recommended that it be approved.

In terms of the acceptability of the proposed developments and recommendation for its approval, it is not subject to any conditions other than the recommended mitigation measures provided by the specialist.

6.3.6 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 activities and the manner in which the environment may be affected by the proposed facilities; to provide a description and assessment of the potential social issues associated with the proposed facilities; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix E6). The main question which needs to be addressed is:

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

The findings of the Social Impact Assessment (Refer to Appendix E6) indicate that there are some vulnerable communities within the area that may be affected by the development of Steenbok Solar 1 and Steenbok Solar 2 and its associated infrastructure. Traditionally, the construction phase of a solar energy facility is associated with most of the social impacts expected to occur. 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 projects, 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. This is relevant to both Steenbok Solar 1 and Steenbok Solar 2.

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 developments will introduce employment opportunities during the construction and decommissioning phases (temporary employment) and a limited number of permanent employment opportunities during operation phase.

The proposed projects 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 developments also represent 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 projects, which include Renewable Energy generation and local economic and social development, outweigh the perceived negative impacts associated with the projects.

The specialist concludes that the projects, and its associated infrastructure, will be unlikely to result in permanent damaging negative social impacts, and therefore from a social perspective the projects can be developed subject to the implementation of the recommended mitigation measures and management actions identified for the projects. All impacts and mitigation measures proposed are relevant to both Steenbok Solar 1 and Steenbok Solar 2.

6.3.7 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 developments impact on the traffic on main delivery routes to the sites*?"

According to the Transport Impact Assessment (Appendix E7) the construction phase will generate traffic including transportation of people, construction materials, water, and equipment (abnormal trucks transporting the transformers. The exact number of trips generated will be determined by the appointed the haulage company. Based on the high-level screening of impacts, a moderate significance rating can be expected during the construction phase for both Steenbok Solar 1 and Steenbok Solar 2. The nature of the expected impact is a temporary increase in traffic, noise and dust pollution associated with potential traffic.

During the operation phase noise and dust pollution is expected to occur. The traffic generated during this phase will have a nominal impact on the surrounding road network.

The following main points in terms of the traffic impacts are provided for in the Transport Impact Assessment:

- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and to be found to be able to be accommodated by the road network.

- During operation, it is expected that maintenance and security staff will periodically visit the facility and the generated trips can be accommodated by the external road network.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative low significance after mitigation.
- The traffic generated during the decommissioning phase will be less than to similar to the construction phase traffic and the impact on the surrounding road network will also be considered to be of negative low significance after mitigation.

The proposed access point to the respective project sites has been assessed and was found to be acceptable from a traffic engineering perspective.

Furthermore, Steenbok Solar 1 and Steenbok Solar 2 are supported from a transport engineering perspective provided that the recommendations and mitigations provided by the specialist are adhered to.

The potential impacts associated with the proposed developments are acceptable and it is therefore recommended that the proposed facilities be authorised.

6.3.8 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 facilities 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 Steenbok Solar 1 and Steenbok Solar 2 the location of the BESS within the development footprint and the fact that the area is sparsely populated will reduce the risk associated with toxic chemicals, flammability and overpressure from explosions. The risk level is seen to be of a low risk that is unlikely to occur with the proper safety measures taken as mitigation. Provided that the facilities are 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 EMPrs (Appendix F1 and Appendix G1) to reduce the risk of an incident and manage an incident should one ever occur.

6.4 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activities. 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 6.11.

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

6.4.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

Table 6.11: 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 Draft EIR and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact – refer to Appendix E. This chapter analyses the potential cumulative impacts of Steenbok Solar 1 and Steenbok Solar 2 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 proposed Projects, and the overall effects on the ecosystem of the respective project areas that can be attributed to the Steenbok Solar 1 and Steenbok Solar 2 projects and other existing and planned future projects.

7.2 Geographic Area of Evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in the cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed Steenbok Solar 1 and Steenbok Solar 2 – refer to Figure 7.1 below.

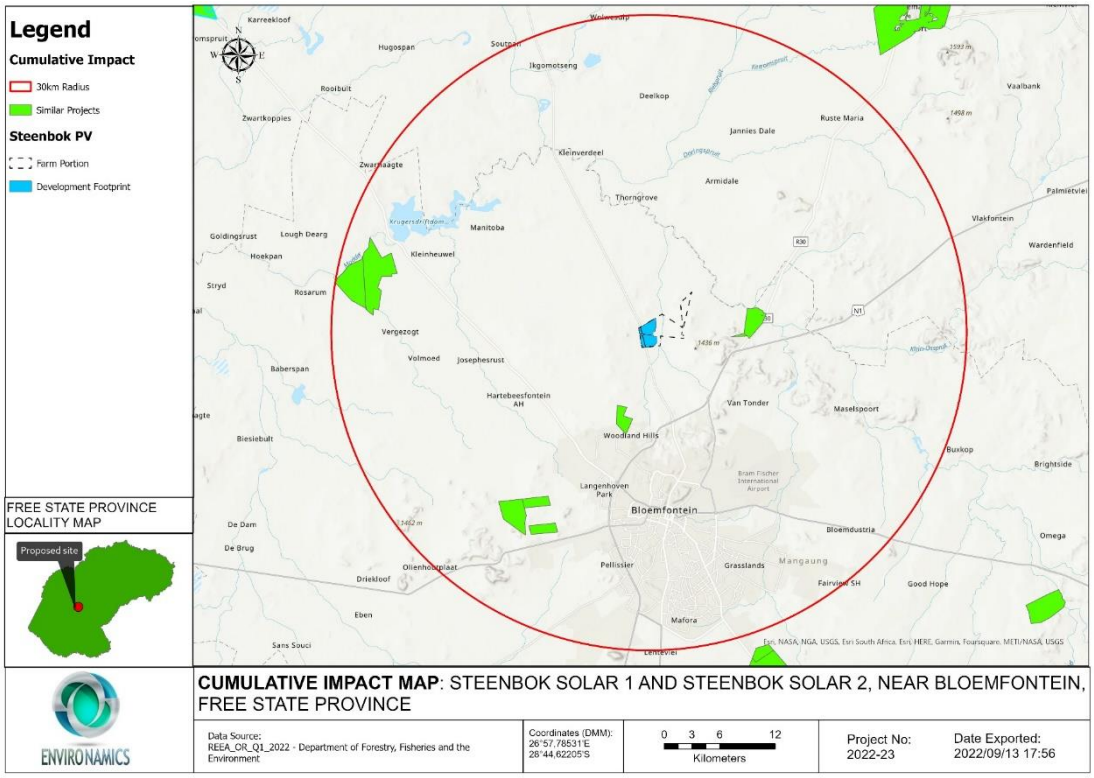


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

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 socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 Temporal Boundary of Evaluation

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

7.4 Other Projects in the Area

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

7.4.1 Existing projects in the area

According to the DFFE's database and local knowledge from the Applicant, eight (8) 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
Letsatsi Solar Power	<27km	100MW	12/12/20/1972/1	Scoping and EIA	Approved
Jedwater Solar Power Facility	<28 km	75MW	12/12/20/1972/2	Scoping and EIA	Approved
Solaire Direct Glen Thore Solar	<8km	75MW	12/12/20/2596	Scoping and EIA	Approved
Glenthorne PV	~16km	10MW	14/12/16/3/1/455	Basic Assessment	Withdrawn/Lapsed
SSS1 Solar PV	~18km	5MW	14/12/16/3/3/1/1093	Basic Assessment	Approved
Mara Solar Facility	~18km	15MW	14/12/16/3/3/1/564	Basic Assessment	Approved
Keren Holdings Spesbona Solar	~12km	0 MW	14/12/16/3/3/2/435	Scoping and EIA	Withdrawn/Lapsed
Spes Bona Solar PV	~15km	86 MW	14/12/16/3/3/2/641	Scoping and EIA	In Process

From the eight developments identified, two no longer have a valid Environmental Authorisation, and therefore only six of the listed projects have the potential to be developed and essentially contribute to a cumulative impact to the area (i.e. 30km radius). As per Figure 7.1, none of these other proposed developments are located in close proximity to the sites under assessment for Steenbok Solar 1 and Steenbok Solar 2, with the closest development being the Solaire Direct Glen Thorne Solar, located ~8km to the east.

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 agriculture. Agriculture in the area is primarily associated with cattle grazing and crop production. The next section of this report will aim to evaluate the potential cumulative impacts 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 developments 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.

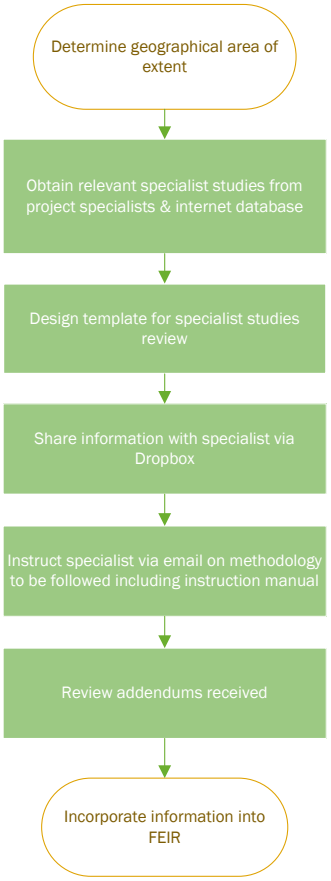


Figure 7.2: Process flow diagram for determining cumulative effects

The terms of reference of each specialist study is included in the respective specialists reports as included as Appendix E.

7.5.1 Soil, Land Capability and Agricultural Potential

According to the Agriculture Compliance Statement (Appendix E4), the potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

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

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

DEFF compliance for these projects requires considering all renewable energy applications within a 30km radius. There are 6 other renewable energy project applications within 30km of the proposed sites.

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

In quantifying the cumulative impact, the area of land taken out of agricultural production (grazing) as a result of all 8 developments, the two Steenbok ones plus the six others (total generation capacity of 426 MW) will amount to a total of approximately 1,065 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 0.38% of the surface area. That is within an acceptable limit in terms of loss of land which is only suitable for grazing, of which there is no particular scarcity in the country.

The proposed Steenbok Solar 1 and Steenbok Solar 2 developments poses a low risk in terms of causing soil degradation because it can be fairly easily and effectively prevented by standard best practice soil degradation control measures, as recommended by the Agricultural Compliance Statement (Appendix E4). If the risk for each individual development is low, then the cumulative risk is also low.

Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed developments are therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved.

7.5.2 Ecology and Wetlands

The Ecology and Wetland Impact Assessment (refer to Appendix E1), cumulative impacts are expected during the design and pre-construction phase, construction phase and operational phase.

During the design and pre-construction phase, cumulative impacts include loss of plant species, rare/medicinal species, animal species and biodiversity, as well as increased soil erosion and alien plant invasion. Further impacts include wetland degradation associated with soil compaction, erosion and sedimentation of the wetland, soil and water pollution and spread and establishment of alien invasive species in the wetland features.

Based on the proposed developments as well as the known developments planned in the

region the cumulative impact on biodiversity and wetlands (as listed above) should be negligible if all mitigation as recommended (excluding all watercourses from development) is implemented for the design and pre-construction phase.

During the construction phase, cumulative impacts include loss of fauna and flora and degradation of wetland areas, which includes vegetation clearance/habitat destruction, soil erosion and pollution, spread and establishment of alien invasive plant species, negative effect of human activities on fauna and road mortalities and loss of biodiversity.

Based on the proposed development the cumulative impact on biodiversity and watercourses (as listed above) would be negligible if all mitigation as recommended is implemented.

During the operational phase cumulative impacts include loss of fauna and flora and impacts to surface water and wetlands, which includes habitat destruction caused by clearance of vegetation, soil and water pollution, spread and establishment of alien invasive species, negative effect of human activities on fauna and road mortalities, negative effect of fences on dispersal movements of fauna and negative effect of light pollution on nocturnal fauna.

Based on the implementation of the recommended mitigation measures, it is not thought that the continued maintenance of the sites would have a negative cumulative effect on biodiversity. If all mitigation as recommended below is implemented the effect on the watercourses would be negligible with no accumulated loss of water ecosystems.

7.5.3 Avifauna

The Avifauna Impact Assessment (refer to Appendix E2) indicates that cumulative impacts are mainly relevant to the operation phase of the two developments.

In terms of disturbance the cumulative impact would be restricted to the two facilities and their associated infrastructure. There are no other projects located close enough to Steenbok Solar 1 and Steenbok Solar 2 to lead to an increased cumulative impact of disturbance. The significance of the cumulative impact of disturbance will be low. In terms of habitat loss the cumulative impact will also be of a low significance.

During operation collisions of avifauna with infrastructure has been identified as a potential cumulative impact. The specialist has indicated that the impact will be of a medium significance. Mitigation measures to avoid collisions with PV panels are limited, but collisions can be reduced by site selection away from areas where birds congregate or known flyways, which the projects have achieved, and by making the sites otherwise unattractive to avifauna, i.e. by minimising any available perching and nesting structures, closing open water bodies, reducing attractive or disorientating lighting, and by implementing an operational monitoring programme with carcass searching.

The only real mitigation possible in order to minimise cumulative impacts on avifauna, is for the Competent Authority to ensure only projects are authorised that are practically mitigatable to an acceptable level, and that do not lead to unacceptable negative impacts,

including cumulative impacts, and to ensure the correct implementation of authorised Environmental Management Programmes through compliance audits and enforcement.

7.5.4 Social Impact Assessment

The Social Impact Assessment (refer to Appendix E6) indicate that the proposed projects could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the location of the two projects within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.

Two social cumulative impacts have been identified and assessed, which includes positive impacts from employment, skills and business opportunities and skills development and negative impacts associated with large-scale in-migration of people. The significance of both the positive and negative cumulative impacts will be medium.

7.5.5 Visual

The Visual Impact Assessment (refer to Appendix E3) confirmed that the potential for cumulative impacts to occur as a result of the projects is. On the other hand, the location of the Steenbok Solar 1 and Steenbok Solar 2 projects within the study area will contribute to the consolidation of PV structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region. The visual landscape mainly consists of agricultural and urban developments with a better visual appearance, together with a low tourism aspect connected to Bloemfontein, the capital of the Free State Province. Permanent residents of the area might be desensitised over time with the construction of more solar facilities, but this will stay subjective for each viewer.

The anticipated cumulative visual impact for both proposed sites, separately, are expected to include the change in sense of place, as well as the precedent being set for Solar PV projects in the area where currently there is only a precedent for agricultural and urban related developments. The construction and operation of Steenbok Solar 1 and Steenbok Solar 2 in the area is likely to have a negative impact. The visual cumulative impacts are expected to be of a medium significance.

7.5.6 Heritage

The Heritage Impact Assessment (Refer to Appendix E5) concluded that cumulative impacts on both the archaeological heritage and palaeontological heritage will be of minor cumulative effects and of a medium significance.

The area proposed for development is presently dominated by agricultural activities and as such, the pattern of settlement within this landscape reflects this. At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively

impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial.

7.5.7 Traffic

According to the Transport Impact Assessment (refer to Appendix E7) confirms that cumulative impacts are expected during the construction and decommissioning phases.

Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when operational, do not add any significant traffic to the road network.

The cumulative impacts during the construction will be high, prior to mitigation, but will be reduced to a medium significance with the implementation of appropriate mitigation measures. The cumulative impacts during the operational phase will be very low.

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

A summary of the cumulative effects discussed are summarized in Tables 7.2 and 7.3 for the respective developments. There have been specific VECs identified with reference to the Solar Projects (Table 6.2), which relates to the biophysical and socio-economic environments. Tables 7.2 and 7.3 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.2: Potential Cumulative Effects for Steenbok Solar 1

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Ecology and Wetland Impact Assessment	Loss of fauna and flora and impacts to wetlands and surface water features	During the construction phase, cumulative impacts include loss of fauna and flora and degradation of wetland areas, which includes vegetation clearance/habitat destruction, soil erosion and pollution, spread and establishment of alien invasive plant species, negative effect of human activities on fauna and road mortalities and loss of biodiversity. Based on the proposed development the cumulative impact on biodiversity (as listed above) would be negligible if all mitigation as recommended is implemented.	- Low
Avifaunal Impact Assessment	Impacts on avifauna during the construction phase	Disturbance to avifauna and habitat loss are expected due to the undertaking of construction related activities on the site. However, the impacts are expected to be of a low significance.	-Low
Agricultural and Soils Compliance Statement	Loss of agricultural production	Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential 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.	- Low
Heritage Impact Assessment	Impact to heritage resources, including archaeology and palaeontology	The area proposed for development is presently dominated by agricultural activities and as such, the pattern of settlement within this landscape reflects this. At this stage, there is the potential for the cumulative impact of proposed renewable energy facility to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial.	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Steenbok Solar 1 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	+ Medium

		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 Steenbok Solar 1 alone.	
	Impact with large-scale in-migration of people	While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.	- Medium
Traffic Impact Study	Increase in traffic	Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable. The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when	- Medium

		operational, do not add any significant traffic to the road network.	
Operational Phase			
Ecology and Wetland Impact Assessment	Loss of fauna and flora and impacts to wetlands and surface water features	During the operational phase cumulative impacts include loss of fauna and flora and impacts to surface water and wetlands, which includes habitat destruction caused by clearance of vegetation, soil and water pollution, spread and establishment of alien invasive species, negative effect of human activities on fauna and road mortalities, negative effect of fences on dispersal movements of fauna and negative effect of light pollution on nocturnal fauna. Based on the implementation of the recommended mitigation measures, it is not thought that the continued maintenance of the site would have a negative cumulative effect on biodiversity.	- Low
Avifaunal Impact Assessment	Impacts on avifauna during the operation phase	Disturbance to avifauna, collisions with PV panels, electrocutions and collisions on electrical infrastructure and fencing and barrier effects are expected during operation. The only real mitigation possible in order to minimise cumulative impacts on avifauna, is for the Competent Authority to ensure only projects are authorised that are practically mitigatable to an acceptable level, and that do not lead to unacceptable negative impacts, including cumulative impacts, and to ensure the correct implementation of authorised Environmental Management Programmes through compliance audits and enforcement.	- Medium
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Steenbok Solar 1 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,	+ Medium

		regional, and national economy through employment and procurement of services are more considerable than that of Steenbok Solar 1 alone.	
Visual Impact Assessment	Visual impacts	The operation and maintenance of the facility will create visual instruction on observers that utilise and travel through the area, including travellers using the local roads. The anticipated cumulative visual impact is expected to include the change in sense of place, as well as the precedent being set for Solar PV projects in the area where currently there is only a precedent for agricultural and urban related developments. The construction and operation of the Solar PV projects in the area is likely to have a negative impact.	- Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium
Traffic Impact Study	Increase in traffic	Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable. The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when operational, do not add any significant traffic to the road network.	- Medium

Table 7.3: Potential Cumulative Effects for Steenbok Solar 2

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Ecology and Wetland Impact Assessment	Loss of fauna and flora and impacts to wetlands and surface water features	During the construction phase, cumulative impacts include loss of fauna and flora and degradation of wetland areas, which includes vegetation clearance/habitat destruction, soil erosion and pollution, spread and establishment of alien invasive plant species, negative effect of human activities on fauna and road mortalities and loss of biodiversity. Based on the proposed development the cumulative impact on biodiversity and watercourses (as listed above) would be negligible if all mitigation as recommended is implemented.	- Low
Avifaunal Impact Assessment	Impacts on avifauna during the construction phase	Disturbance to avifauna and habitat loss are expected due to the undertaking of construction related activities on the site. However, the impacts are expected to be of a low significance.	-Low
Agricultural and Soils Compliance Statement	Loss of agricultural production	Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential 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.	- Low
Heritage Impact Assessment	Impact to heritage resources, including archaeology and palaeontology	The area proposed for development is presently dominated by agricultural activities and as such, the pattern of settlement within this landscape reflects this. At this stage, there is the potential for the cumulative impact of proposed renewable energy facilities to negatively impact the cultural landscape due to a change in the landscape character from natural wilderness to semi-industrial.	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Steenbok Solar 2 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	+ Medium

		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 Steenbok Solar 2 alone.	
	Impact with large-scale in-migration of people	While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living. It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.	- Medium
Traffic Impact Study	Increase in traffic	Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable. The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when	- Medium

		operational, do not add any significant traffic to the road network.	
Operational Phase			
Ecology and Wetland Impact Assessment	Loss of fauna and flora and impacts to wetlands and surface water features	During the operational phase cumulative impacts include loss of fauna and flora and impacts to surface water and wetlands, which includes habitat destruction caused by clearance of vegetation, soil and water pollution, spread and establishment of alien invasive species, negative effect of human activities on fauna and road mortalities, negative effect of fences on dispersal movements of fauna and negative effect of light pollution on nocturnal fauna. Based on the implementation of the recommended mitigation measures, it is not thought that the continued maintenance of the site would have a negative cumulative effect on biodiversity. If all mitigation as recommended below is implemented the effect on the watercourses would be negligible with no accumulated loss of water ecosystems.	- Low
Avifaunal Impact Assessment	Impacts on avifauna during the operation phase	Disturbance to avifauna, collisions with PV panels, electrocutions and collisions on electrical infrastructure and fencing and barrier effects are expected during operation. The only real mitigation possible in order to minimise cumulative impacts on avifauna, is for the Competent Authority to ensure only projects are authorised that are practically mitigatable to an acceptable level, and that do not lead to unacceptable negative impacts, including cumulative impacts, and to ensure the correct implementation of authorised Environmental Management Programmes through compliance audits and enforcement.	- Medium
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Steenbok Solar 2 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	+ Medium

		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 Steenbok Solar 2 alone.	
Visual Impact Assessment	Visual impacts	The operation and maintenance of the facility will create visual instruction on observers that utilise and travel through the area, including travellers using the local roads. The anticipated cumulative visual impact the site is expected to include the change in sense of place, as well as the precedent being set for Solar PV projects in the area where currently there is only a precedent for agricultural and urban related developments. The construction and operation of the Solar PV projects in the area is likely to have a negative impact.	- Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium
Traffic Impact Study	Increase in traffic	Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable. The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when operational, do not add any significant traffic to the road network.	- Medium

7.7 CONCLUSION

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

The potential most significant cumulative impacts for Steenbok Solar 1 and Steenbok Solar 2 relate to:

- Cumulative effects during construction phase:
  - Loss of fauna and flora and impacts to wetlands and surface water features (- Low)
  - Impacts on avifauna during the construction phase (- Low)
  - Loss of agricultural production (- Low)
  - Impact to heritage resources, including archaeology and palaeontology (- Low)
  - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
  - Large-scale in-migration of people (- Medium)
  - Increase in traffic (- Medium)
- Cumulative effects during the operational phase:
  - Loss of fauna and flora and impacts to wetlands and surface water features (- Low)
  - Impacts on avifauna during the operation phase (- Medium)
  - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
  - Visual impacts (- Medium)
- Cumulative effects during the decommissioning phase:
  - Generation of waste (- Medium)
  - Increase in traffic (- Medium)

The cumulative impact for the proposed developments is medium to low and no high, unacceptable impacts related to the projects are expected. Considering the extent of the projects and information presented in section 7 of this report, it can be concluded that the cumulative impacts of Steenbok Solar 1 and Steenbok Solar 2 will not result in large scale changes and impacts on the environment, and therefore it is appropriate for the developments to proceed within the geographic area of evaluation.

Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed projects 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 developments, it may be preferable to incur a higher cumulative loss in such a region as this one (where the landscape is not considered to be of a high value), than to lose land with a higher environmental value elsewhere in the country. Furthermore, the location of the developments directly adjacent to one another presents an opportunity to concentrate impacts within one acceptable location, then to distribute the impacts throughout the landscape.

8 ENVIRONMENTAL IMPACT STATEMENT

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

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

(l) an environmental impact statement which contains-

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

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

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

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

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

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

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

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

- Impacts during construction phase:
  - Site clearing and preparation (including loss of plant species, loss of rare/medical species, loss of animal species, loss of biodiversity, increased soil erosion, alien plant invasion) (- Low)
  - Wetland degradation (including soil compaction, erosion and sedimentation, soil and water pollution and spread, establishment of alien invasive species in the wetland, erosion of the streambank and loss of wetland habitat) (- Low)
  - Loss of fauna and flora (including vegetation clearance, habitat destruction, soil erosion and pollution, spread and pollution of alien invasive plant species, negative effect of human activities on fauna, road mortalities of fauna and loss of biodiversity) (- Low)
  - Avifauna habitat Loss (- Medium)

- Destruction of significant archaeological and palaeontological heritage during the construction phase (- Low)
- Creation of direct and indirect employment opportunities (+ Low)
- Economic multiplier effects from the use of local goods and services (+ Low)
- Influx of jobseekers and change in population (- Low)
- Impacts on daily living and movement patterns (- Low)
- Temporary increase in traffic, noise and dust pollution (- Low)

- Impacts during the operational phase:
  - Loss of fauna and flora and impacts to wetlands (- Low)
  - Collisions and electrocutions of avifauna (- Low)
  - Visual impact of lighting (- Low)
  - Creation of employment opportunities and skills development. (+ Medium)
  - Development of non-polluting, renewable energy infrastructure. (+ Medium)
  - Contribution to LED and social upliftment (+ High)
  - Risks associated with BESS development(- Low)
- Impacts during the decommissioning phase:
  - Temporary increase in traffic, noise and dust pollution (- Low)
  - Loss of employment opportunities (- Low)
- Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity (-Low / - Medium)

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

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

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the layouts of Steenbok Solar 1 and Steenbok Solar 2 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 Figures H3 and I for the final layout map which avoids the areas required to be conserved.

The main features to be avoided are related to wetlands and is associated with the Steenbok Solar 2 site. Two wetlands have been identified within the Steenbok Solar 2 site (Appendix E1). These wetlands have also been referred to in Table 5.1 which provides a description of the various vegetation units present. The wetlands are referred to as the Eastern wetland (vegetation unit 4) and the Western wetland (vegetation unit 5).

The Applicant has optimised the facility layout in order to ensure avoidance of the sensitive features and the associated recommended buffers which has resulted in an environmentally appropriate development footprint for Steenbok Solar 2.

The Applicant has also optimised the facility layout of Steenbok Solar 1 from a technical perspective which is considered to be an environmentally appropriate development footprint for Steenbok Solar.

Further mitigation measures for the developments, as recommended by the independent specialists, have been included in the EMPr(s) for the project as per Appendix F and Appendix G1.

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

The details provided below are for both Steenbok Solar 1 and Steenbok Solar 2.

- PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules 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 with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 35MW electricity.
- Battery Energy Storage System (BESS) - The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 2 ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems.
- Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the grid and electrical reticulation - 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 via the Steenbok Grid Connection to be assessed under a separate Basic Assessment process.

Furthermore, 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:
    - Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office;
    - Site Administration Office (~500m^2);
    - Switch gear and relay room (~400m^2);
    - Staff lockers and changing room (~200m^2);
    - Security control (~60m^2);
    - Operations & Maintenance (O&M) building (~ 500 m^2); and
    - Warehouse (350 m^2).
- Roads – Access will be obtained via the R700 regional road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side). Perimeter roads may be up to 8m wide.
- Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2m in height.

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 draft EIA report. In terms of the legal requirements, it is concluded that:

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 EIA Regulations (as amended in 2017) – already approved by the environmental authority.
- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017).
- The EIA process has been conducted as required by the EIA Regulations (as amended in 2017), Regulations 23 and Appendix 3.
- The EMPrs have 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 associated with Steenbok Solar 1 and Steenbok Solar 2 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.
- The optimised facility development footprints (Figures I1 and I2) are considered to be appropriate for development from an environmental perspective based on the avoidance of sensitive environmental features and areas, and the associated buffer areas.

In terms of the contents and substance of the EIA report the EAP is confident that all key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP for Steenbok Solar 1 is that:

It is the opinion of the independent EAP that the proposed Steenbok Solar 1 will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures and avoidance of certain areas within the site as recommended by the specialists. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Steenbok Solar 1 and associated infrastructure on the Remaining Extent of the Farm Floradale No. 15, Registration Division Bloemfontein, Free State Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPrs (Appendix F).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPrs should not be neglected and a copy of the EMPrs should be made available on site 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-through must be undertaken prior to construction.
- The period for which the Environmental Authorisation is required is 10 years. This is based on the fact that the project is intended 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

may also participate in other programs/opportunities to generate power in South Africa, as available.

The final recommendation of the EAP for Steenbok Solar 2 is that:

It is the opinion of the independent EAP that the proposed Steenbok Solar 2 will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures and avoidance of certain areas within the site as recommended by the specialists. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Steenbok Solar 2 and associated infrastructure on the Remaining Extent of the Farm Floradale No. 15, Registration Division Bloemfontein, Free State Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPrs (Appendix G).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPrs should not be neglected and a copy of the EMPrs 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.
- All wetlands and associated recommended buffers must be avoided as per the recommendations made in the Ecological and Wetland Impact Assessment (Appendix E1).
- The required biodiversity walk-through must be undertaken prior to construction.
- The period for which the Environmental Authorisation is required is 10 years. This is based on the fact that the project is intended 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 may also participate in other programs/opportunities to generate power in South Africa, as available.

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

Mrs. Lisa de Lange (Opperman)
Environamics Environmental Consultants

ENVIRONAMICS

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