BASIC ASSESSMENT REPORT

Draft – 19 October 2022

DEVELOPMENT OF THE MERCURY POWER LINE NEAR VILJOENSKROON, FREE STATE PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No.	:	2022-07-0025
Project Title	:	Development of the Mercury Power Line near Viljoenskroon, Free State Province.
Authors	:	Lisa De Lange (Opperman) Christia van Dyk
Client	:	Paleso Solar Power Plant (RF) (Pty) Ltd
Report Status	:	Draft Basic Assessment Report
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When used as a reference this report should be cited as: Environamics (2022) Draft BAR: Development of the Mercury Power Line near Viljoenskroon, Free State Province.

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GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DoE	Department of Energy
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
Mitigate	Activities designed to compensate for unavoidable environmental
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
PAOI	Project Area of Influence
PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
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, 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. The use of renewable energy technologies, as one of a mix of technologies needed to meet South Africa's future energy consumption requirements has been enshrined in the Integrated Resources Plan (2010 -2030, as amended), which forms part of the national Department of Mineral Resources and Energy (DMRE) (previously known as Department of Energy (DoE)) long-term strategic planning and research process.

This project is proposed as a grid connection solution for multiple Solar Power Plants located near Viljoenskroon in the Free State Province (refer to Figure A for the locality map). The Solar Power Plants that will be catered includes three authorised projects which includes the Paleso Solar Power Plant, Siyanda Solar Power Plant and Ngwedi Solar Power Plant. Each of these projects received Environmental Authorisation (EA) from the Department of Forestry, Fisheries and the Environment (DFFE), (ref.: 14/12/16/3/3/1/2365, 14/12/16/3/3/1/2369 and 14/12/16/3/3/1/2535) on 04 October 2021, 13 October 2021 and 27 July 2022, respectively.

In order for the three authorised projects (i.e. Paleso Solar Power Plant, Siyanda Solar Power Plant and the Ngwedi Solar Power Plant (SPP)), to connect to the national grid specific grid connection infrastructure needs to be developed to enable the evacuation of the generated power. Paleso Solar Power Plant (RF) (Pty) Ltd is proposing the development of the required infrastructure. The infrastructure for the proposed development consists of a double circuit 132kV power line, with the associated infrastructure, as well as the development of two collector substations[1] required for the operation of the authorised and proposed solar energy facilities.

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

[1] The collector substation can be used as switching station, collector substation and/or step-up substation.

The proposed project is intended to cater for three developments that are planned to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programs/opportunities to generate power in South Africa. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. Recently, the Government has announced the increase in the megawatt allocation under the REIPPPP Bid Window (BW) 6, increasing the capacity of procured from 2600MW to 4200MW. Aiming to add a total of 5200 MW under BW6 to the National Grid and continuing the urgent work to address South Africa's energy supply crisis.

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Moqhaka Local Municipality, within which the project is proposed, faces a number of challenges in addressing the needs and improving the lives of the community. The Integrated Development Plan (2021-2022) of the Fezile Dabi District Municipality[2] states that it is the vision of the municipality to improve the lives of their citizens and to meet their economic, basic and social needs through sustainable development. The municipality aims to achieve their key strategic goals, such as delivering quality basic services (i.e. electricity, water and sanitation) to their communities, stimulating local economic growth and to ensure sound financial management and viability within the municipality. The Moqhaka Local Municipality's Integrated Development Plan (2020-2021) vision is to create an environment for sustainable development and socio-economic growth. Providing quality, affordable, efficient and effective services to enhance the quality of life for the people of the community, is the mission of the Moqhaka Local Municipality. The development of the grid connection infrastructure will enable the operation of potentially three solar power plants which will contribute to the realisation of the vision and mission of the respective local and district municipalities that will be affected by the proposed development.

The Paleso Solar Power Plant, Siyanda Solar Power Plant and Ngwedi Solar Power Plant each obtained EA for the development of three separate 150MW photovoltaic solar facilities and associated infrastructure on the Remaining Extent, the Remaining Extent of Portion 1 of the Farm Grootdraai 468 and Portion 23 of the Farm Pretorius Kraal No. 53, Registration Division Viljoenskroon, Free State Province situated within the Moqhaka Local Municipality and the greater Felize Dabi District Municipality. The town of Viljoenskroon is located approximately 30km south-east of the project.

This Application for Environmental Authorisation and Basic Assessment process is for the grid connection solution to connect the three abovementioned solar power plants to the national grid via the existing Eskom Mercury MTS Substation. The grid connection solution requires the development of specific grid connection infrastructure which includes a double circuit 132kV overhead power line and two collector substations located at two of the solar power plant sites. For this Basic Assessment a larger grid connection corridor has been identified within which the power line route will be placed. The corridor is 200m wide on average (up to 800m in some instances) and ~11km in length and was assessed within this draft BA Report. The two 132kV collector substations will each be 2.5ha in extent and a service road associated with the power line is also included as part of the development (required associated infrastructure). The service road will be a twin track gravel road up to 5m wide.

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 grid connection infrastructure proposed. The following listed activities have been

[2] The Moqhaka Local Municipality falls within the Fezile Dabi District Municipality.

identified with special reference to the proposed development and is listed in the EIA Regulations (as amended):

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 12(ii)(a)(b) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."*
- Activity 14 (GN.R 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 19 (GN.R. 327): "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse"*
- Activity 27 (GN.R. 327): *"The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation."*
- Activity 4(b)(i)(ee)(gg) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres, in the (b) Free State Province, (i) outside urban areas and within (ee) a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) 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, excluding disturbed areas."*
- Activity 10(b)(i)(ee)(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 meters in (b) the Free State Province, (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) 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; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*
- Activity 12(b)(i)(ii)(iv) (GN.R 324): *"The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State Province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004, (ii) within a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and*

(iv) areas within a watercourse or wetland; or within 100 metres from the edge of watercourse or wetland."

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

Being listed under Listing Notice 1 and 3 (Regulation 327 and 324) implies that the development is considered as potentially having a negative impact on the environment. Subsequently a 'basic assessment process' is required as described in Regulations 19 – 20 of the EIA Regulations. Environamics has been appointed as the independent consultant to undertake the Basic Assessment (BA) for the grid connection infrastructure on behalf of Paleso Solar Power Plant (RF) (Pty) Ltd.

Regulation 19 of the EIA Regulations (2017) requires that a Basic Assessment Report (BAR) must contain the information set out in Appendix 1 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 1 of GNR326 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the BAR. It has been determined through the BA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically where the affected landowner is experiencing challenges and limitations in terms of the current agricultural land use. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarized below:

Impacts during the construction phase:

Construction of the grid connection solution will potentially result in the following impacts: habitat fragmentation and degradation, introduction of IAP species and invasive fauna, disturbance and degradation of wetland vegetation, direct mortality from persecution or poaching of avifauna species and collection of eggs, visual impact of construction activities on sensitive visual receptors, in-migration or influx of job seekers, presence of construction workers on the local communities and increased risk of veld fires. The impacts expected to occur during the construction phase will mainly have a significance of low and negligible. No impacts of a high significance are expected to occur with the implementation of mitigation measures. The construction phase will also result in the following positive impacts: the creation of local employment and business opportunities and skills development and training.

Impacts during the operational phase:

The grid connection infrastructure will require routine maintenance work throughout the operational phase. The negative impacts are generally associated with collision of avifauna when flying into power line infrastructure, electrocution of avifauna when perched on power line infrastructure and potential visual impacts on sensitive visual receptors located within a 5km radius. The operational phase will have a direct positive impact through local employment and business opportunities, skills development and training, and the development of infrastructure for the generation of clean, renewable energy. The significance of the expected impacts is considered to be medium and low, with no impacts of a high significance expected to occur (this being with the implementation of mitigation).

Impacts during the decommissioning phase:

The photovoltaic solar energy facilities have a lifespan of between 20 and 30 years from where the projects and its associated infrastructure will be decommissioned or upgraded. If the solar plants is not decommissioned the grid connection infrastructure is expected to have a lifespan of more than 40 years (with maintenance) and the infrastructure will only be decommissioned once it has reached the end of life, or if no longer required. Upon decommissioning, the grid infrastructure would be disassembled, and the components removed from site. The physical environment will benefit from the decommissioning of the infrastructure since the site will be restored to its natural state. During the decommissioning phase the following impacts are foreseen: degradation of wetland vegetation and proliferation of alien and invasive species, increased bare surfaces, runoff and potential for erosion, and the generation of waste.

Cumulative impacts:

The cumulative impacts for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment and the proposed grid connection solution will enable the operation of three solar power plant. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. From an Avifaunal perspective, the development of the Mercury Power Line Project in isolation has a Negative Low impact significance. In consideration of the anthropogenic activities within the landscape as indicated by field observations and the 2018 national landcover dataset, the cumulative impact was determined to be of a Negative High significance. However, the consolidation of power line infrastructure with existing Eskom infrastructure and the implementation of the proposed mitigation measures will in turn reduce the overall impact of the development.

In accordance with the EIA Regulations, this draft BAR evaluates and rates each identified impact, and identifies mitigation measures which will be required in order to ensure the avoidance of negative residual risks. The report also considers potential positive impacts and enhancement measures to increase the significance of the positive impacts. This BAR also contains information that is necessary for the competent authority (DFFE) to consider the application and to reach a decision contemplated in Regulation 20.

1 INTRODUCTION

This section aims to introduce the draft Basic Assessment Report (BAR) and specifically to address the following requirements of the regulations:

Appendix 1. (3) A basic 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: (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

Regulations No. 326, 327, 325 and 324 (of 07 April 2017) promulgated in terms of Section 24(5) and 44 of the National Environmental Management Act, (107 of 1998) determine that an BA process should be followed for certain listed activities, which might have a detrimental impact on the environment. According to Regulation No. 326 the purpose of the Regulations is: *"…to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto*".

The EIA Regulations outline the activities for which a BA process should apply. The following listed activities with special reference to the proposed activity is relevant to the proposed development:

Table 1.1: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327, 07 April 2017	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • The development of a 132kV double circuit power line (and two 132kV collector substations) is required to enable the connection of the authorised Paleso, Siyanda and Ngwedi SPPs (DFFE ref.: 14/12/16/3/3/1/2365, 14/12/16/3/3/1/2369 and 14/12/16/3/3/1/2535), to the national grid network. A 150m wide (to 800m wide in some instances) and ~11km long grid connection corridor is being assessed for the placement of the power line route and

		substation. The power line is proposed to connect into the existing Mercury MTS Substation.
GNR. 327, 07 April 2017	Activity 12(ii)(a)(b)	• "*The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."* • The power line requires the development of a service road and pylon infrastructure which will exceed 100 square meters in extent. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road.
GNR. 327, 07 April 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. • The two collector substations will require the infrastructure for the storage and handling of dangerous goods, with a combined capacity of 80 cubic metres, but not exceeding 500 cubic metres.
GNR. 327, 07 April 2017	Activity 19	• "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse"* • The power line requires the development of a service road. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road. This will require the removal and moving of soils of more than 10 cubic meters.
GNR. 327, 07 April 2017	Activity 27	• *"The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation."* • The development of the two 132kV collector substations proposed as part of the project will require

		the clearance of 2.5 hectares each of indigenous vegetation each. The total vegetation clearance required for the two collector substations is 5 hectares.
GNR. 324, 07 April 2017	Activity 4(b)(i)(ee)(gg)	• *The development of a road wider than 4 metres with a reserve less than 13,5 metres, in the (b) Free State Province, (i) outside urban areas, within (ee) a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) 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, excluding disturbed areas.* • A service road with a width of approximately 5 metres will be required during the construction and operational phase of the project. The road is located within 5km of a protected area as identified in terms of NEMPAA. The power line route traverses a section of the Mispha Game farm as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.
GNR. 324, 07 April 2017	Activity 10(b)(i)(ee)(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, in (b) the Free State Province, (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) 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; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • The two collector substations and power line will require the infrastructure for the storage and handling of dangerous goods, with a combined capacity of 80 cubic metres. The project is located in the Free State province and outside urban areas. Surface water

		features, including wetlands, are present within the grid connection corridor as well as a CBA 1. The power line and the two collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The power line route traverses a section of the Mispha Game farm as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.
GNR. 324, 07 April 2017	Activity 12(b)(i)(ii)(iv)	• *The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State Province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004, (ii) within a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of watercourse or wetland.* • The power line, substation and the associated service road will require more than 300 square meters of vegetation clearance within a vegetation type classified as endangered. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road. A portion of the grid connection corridor is located within a CBA1.
GNR. 324, 07 April 2017	Activity 14 (xii)(a)(b)(i)	• *The development of (xii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs (a) within a watercourse; in the (b) Free State Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) 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.* • The power line requires the development of a service road and pylon infrastructure which will exceed 100

		square meters in extent. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road. The project is located in the Free State province and outside urban areas. The connection corridor is located within a CBA 1, ESA 1 and ESA 2. The power line and the two collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The power line route traverses a section of the Mispha Game farm as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.

Being listed under Listing Notices 1 and 3 implies that the proposed activity is considered as potentially having a potential impact on the environment. Subsequently a 'basic assessment process' is required as described in Regulations 19 - 20. According to Appendix 1 of Regulation 326, the objective of the basic assessment process 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;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine —
    - The nature, significance, consequence, extent, duration and probability of the impacts occurring; and
    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated; and
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –
    - Identify and motivate a preferred site, activity and technology alternative;

- 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 Basic Assessment Report (DBAR) to be submitted to the Department of Forestry, Fisheries and the Environment (DFFE), for review and comment, who is the decision-making authority on the project as the proposed development relates to the Integrated Resource Plan in terms of enabling the evacuation of the generated electricity from potentially three solar power plants to the national grid. According to Regulation 326 all registered I&APs and relevant State Departments were allowed the opportunity to review the report. The draft BAR has been made available to all registered I&APs and relevant State Departments for the 30-day review and commenting period from 19 October 2022 – 18 November 2022. They were requested to provide written comment on the draft BAR within 30 days of receiving notification of its availability for review and comment. All issues identified during the review period will be documented and compiled into a Comments and Response Report as part of the Final BAR, and will be addressed in the Final BAR, as relevant.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the BA 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:	Christia van Dyk
Postal Address:	14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone:	078 470 5252 (Cell)
Electronic Mail:	christia@environamics.co.za

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

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information on the specialists that have been appointed as part of the BA 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 D to this report. The expertise of the specialists is also summarized in their respective curriculum vitae's.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Ecological and Wetland Assessment	The Biodiversity Company	Andrew Husted/ Rian Pienaar	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Avifaunal Impact Assessment	The Biodiversity Company	Andrew Husted/ Mahomed Desai	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Visual Impact Assessment	Donaway Environmental	Johan Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	johan@donaway.co.za
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Palaeontological Impact Assessment	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	elizebutler002@gmail.com
Agricultural Compliance Statement	The Biodiversity Company	Andrew Husted/ Matthew Mamera	-	Cell: 081 319 1225	info@thebiodiversitycompany.com

1.4 STATUS OF THE BA PROCESS

The BA process is conducted strictly in accordance with the stipulations set out in Regulations 19 – 20 and Annexure 1 of Regulation No. 326. Table 1.3 provides a summary of the BA process and future steps to be taken. It can be confirmed that to date:

- A pre-application meeting request was submitted on 22 July 2022.
- The Department confirmed per email on 25 July 2022, that a pre-application meeting for the project is not required.
- A site visit was conducted on 22 July 2022.
- Site notices were erected on site on 22 July 2022 and a newspaper advertisement was placed in the Klerksdorp Record on 22 July 2022 for the initial public participation.
- An Application for Environmental Authorisation and the draft BAR was submitted on 19 October 2022.
- The draft Basic Assessment report has been made available for a 30-day review and comment period from 19 October to 18 November 2022.

It is envisaged that the BA process should be completed within approximately five months of submitting the Application for EA and the BAR, i.e. by March 2023 – see Table 1.3.

Table 1.3: Project schedule

Activity	**Prescribed timeframe**	**Timeframe**
Submit pre-application meeting request	-	18 Oct. 2021
Site visits (Initial PP – Press Advertisement & Site Notices).	-	22 July 2022
Appointment of specialists	-	July 2022
Receive specialist studies	-	August 2022
Submit application form and DBAR	-	19 Oct. 2022
Public participation (DBAR)	30 Days	19 Oct. 2022 – 18 Nov. 2022
Submit FBAR	44 Days	Nov. 2022
Department acknowledges receipt	10 Days	Nov. 2022
Decision	57 Days	By Feb. 2023
Department notifies of decision	5 Days	By Mar. 2023
Registered I&APs notified of decision	14 Days	Mar. 2023

Appeal	20 Days	By Mar. 2023

1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 1 of Regulation No. 326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: Structure of the report

Requirements for the contents of a BAR as specified in the Regulations		Section in report
Appendix 1. (3) - A basic 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 activities to be undertaken including associated structures and infrastructure.	

(e)	a description of the policy and legislative context within which the development is proposed including:	3
	(i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	
(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 site, activity and technology alternative.	5
(h)	a full description of the process followed to reach the preferred alternative within the site including –	
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(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 associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	

	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcomes of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity 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, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	
(n)	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
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(p)	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;	
(q)	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
(r)	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; and	
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable

(t)	any specific information that may be required by the CA; and	Not applicable
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable

2 ACTIVITY DESCRIPTION

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

Appendix 1. (3) A BAR (...) must include-

(b) the location of the activity, including-

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

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

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

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

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

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

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

(i) all listed and specified activities triggered and being applied for;

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

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a 132kV double-circuit overhead power line and two collector substations connecting the authorised Paleso, Siyanda and Ngwedi SPPs, to the existing Mercury MTS substation. The grid connection corridor currently under assessment for the placement of the power line route, and collector substations, and to be submitted for authorisation, is 150m wide (up to 800m wide in some instances) and ~11km long. The grid connection corridor will cross several farms and falls within the Moqhaka Local Municipality of the Fezile Dabi District Municipality, Free State Province (refer to Figure A). Various properties are affected by the grid connection corridor. Refer to Figure B for the Regional Map of the project.

Refer to Table 2.1 for general site information.

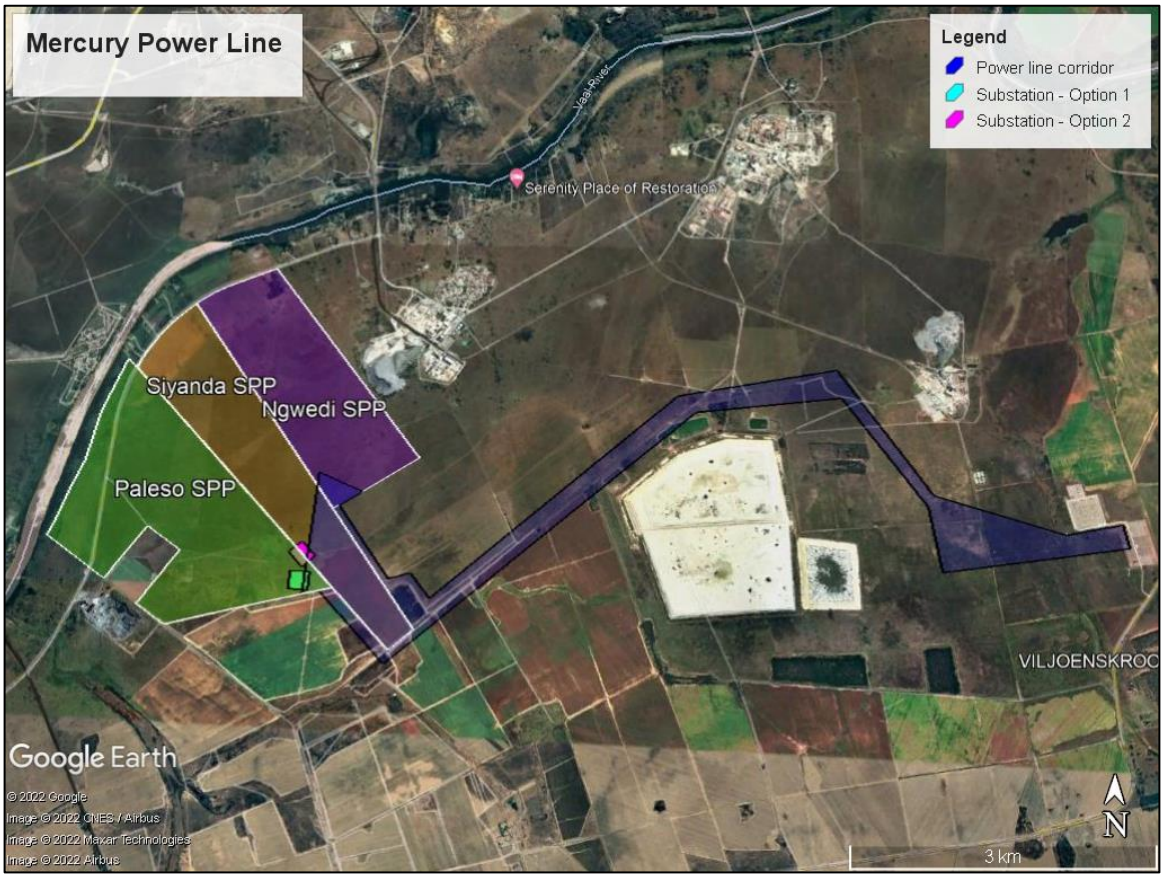

Figure 2.1: Location of the grid connection corridor and the positions of the two collector substations under assessment

Table 2.1: General site information

Description of affected farm portion	<u>Power Line</u> Portion 23 of the farm Pretorius Kraal No. 53 Portion 24 of the farm Pretorius Kraal No. 53 Remaining Extent of the farm Pretorius Kraal No. 53 Remaining Extent of the Farm Grootdraai No. 468 Remaining Extent of Portion 1 of the Farm Grootdraai No. 468 Mispah No. 274 Kleinfontein No. 472 Chrystalkop No. 69 Remaining Extent of the Farm Doornkom-West No. 446 Edom No. 277 Moab No. 279 Portion 1 of the Farm Zuiping No. 394

	Portion 3 of the Farm Zuiping No. 394 Portion 4 of the Farm Zuiping No. 394 Portion 5 of the Farm Zuiping No. 394 Remaining Extent of the Farm Zuiping No. 394 Portion 2 of the Farm Zaaiplaats No. 190 Portion 3 of the Farm Zaaiplaats No. 190
Province	Free State
District Municipality	Fezile Dabi District Municipality
Local Municipality	Moqhaka Local Municipality
Ward numbers	22
Closest towns	The town of Viljoenskroon is located approximately 27 km south-east of the proposed development.
21 Digit Surveyor General codes	<u>Power Line</u> Portion 23 of the farm Pretorius Kraal No. 53 F03600000000005300023 Portion 24 of the farm Pretorius Kraal No. 53 F03600000000005300024 Remaining Extent of the farm Pretorius Kraal No. 53 F03600000000005300000 Remaining Extent of the Farm Grootdraai No. 468 F03600000000046800000 Remaining Extent of Portion 1 of the Farm Grootdraai No. 468 F03600000000046800001 Mispah No. 274 F03600000000027400000 Kleinfontein No. 472 F03600000000047200000 Chrystalkop No. 69 F03600000000006900000 Remaining Extent of the Farm Doornkom-West No. 446 F03600000000044600000 Edom No. 277 F03600000000027700000 Moab No. 279 F03600000000002790000 Portion 1 of the Farm Zuiping No. 394 F03600000000039400001 Portion 3 of the Farm Zuiping No. 394 F03600000000039400003

	Portion 4 of the Farm Zuiping No. 394 F03600000000039400004 Portion 5 of the Farm Zuiping No. 394 F03600000000039400005 Remaining Extent of the Farm Zuiping No. 394 F03600000000039400000 Portion 2 of the Farm Zaaiplaats No. 190 F03600000000019000002 Portion 3 of the Farm Zaaiplaats No. 190 F03600000000019000003
Type of technology	132 kV single circuit/ double circuit overhead power line
Structure Height	Power lines ~32m
Length of the power line	Approximately 11km
Grid connection corridor width	200m wide on average (and up to 800m in some instances)
Collector Substation capacity	132kV
Collector Substation footprint	2.5 hectare
Servitude width	Approximately 32m
Surface area to be covered	Approximately 373 hectares
Service road	Twin track gravel road up to 5m wide

The grid connection corridor runs directly to the east, which is in a rural area and characterised by farms, mines and linear infrastructure (i.e., roads and power line infrastructure). The site survey revealed that the site is currently used for of grazing for cattle and mining – refer to plates 1-11 for photographs of the grid connection corridor.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activity:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327, 07 April 2017	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • The development of a 132kV double circuit power line (and two 132kV collector substations) is required to enable the connection of the authorised Paleso, Siyanda and Ngwedi SPPs (DFFE ref.: 14/12/16/3/3/1/2365, 14/12/16/3/3/1/2369 and 14/12/16/3/3/1/2535), to the national grid network. A 150m wide (to 800m wide in some instances) and ~11km long grid connection corridor is being assessed for the placement of the power line route and substation. The power line is proposed to connect into the existing Mercury MTS Substation.
GNR. 327, 07 April 2017	Activity 12(ii)(a)(b)	• "*The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."* • The power line requires the development of a service road and pylon infrastructure which will exceed 100 square meters in extent. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road.

GNR. 327, 07 April 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. • The two collector substations will require the infrastructure for the storage and handling of dangerous goods, with a combined capacity of 80 cubic metres, but not exceeding 500 cubic metres.
GNR. 327, 07 April 2017	Activity 19	• "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse*" • The power line requires the development of a service road. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road. This will require the removal and moving of soils of more than 10 cubic meters.
GNR. 327, 07 April 2017	Activity 27	• *"The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation."* • The development of the two 132kV collector substations proposed as part of the project will require the clearance of 2.5 hectares each of indigenous vegetation each. The total vegetation clearance required for the two collector substations is 5 hectares.
GNR. 324, 07 April 2017	Activity 4(b)(i)(ee)(gg)	• *The development of a road wider than 4 metres with a reserve less than 13,5 metres, in the (b) Free State Province, (i) outside urban areas, within (ee) a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) 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, excluding disturbed areas. • A service road with a width of approximately 5 metres will be required during the construction and operational phase of the project. The road is located within 5km of a protected area as identified in terms of NEMPAA. The power line route traverses a section of the Mispha Game farm as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.
GNR. 324, 07 April 2017	Activity 10(b)(i)(ee)(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, in (b) the Free State Province, (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) 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; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* • The two collector substations and power line will require the infrastructure for the storage and handling of dangerous goods, with a combined capacity of 80 cubic metres. The project is located in the Free State province and outside urban areas. Surface water features, including wetlands, are present within the grid connection corridor as well as a CBA 1. The power line and the two collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The power line route traverses a section of the Mispha Game farm as per the South Africa Protected Area

		Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.
GNR. 324, 07 April 2017	Activity 12(b)(i)(ii)(iv)	• *The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State Province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004, (ii) within a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of watercourse or wetland.* • The power line, substation and the associated service road will require more than 300 square meters of vegetation clearance within a vegetation type classified as endangered. Surface water features, including wetlands, are present within the grid connection corridor that will need to be crossed by the service road. A portion of the grid connection corridor is located within a CBA1.
GNR. 324, 07 April 2017	Activity 14 (xii)(a)(b)(i)	• *The development of (xii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs (a) within a watercourse; in the (b) Free State Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) 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.* • The power line requires the development of a service road and pylon infrastructure which will exceed 100 square meters in extent. Surface water features,

		including wetlands, are present within the grid connection corridor that will need to be crossed by the service road. The project is located in the Free State province and outside urban areas. The connection corridor is located within a CBA 1, ESA 1 and ESA 2. The power line and the two collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The power line route traverses a section of the Mispha Game farm as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.

2.3 ACTIVITIES ASSOCIATED WITH THE POWER LINE

For the Paleso, Siyanda and Ngwedi SPPs to connect to the electrical grid the projects require transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation (i.e. collector substation) will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. A substation has been authorised/proposed to step the voltage up to 132kV at each of the three solar power plants, after which the power will be evacuated into the national grid via the new proposed respective collector substations and the power line. The Eskom Mercury MTS substation is a feasible connection to the national grid.

- Construction Phase:

  The proposed 132kV overhead power line will be approximately 11km long and will be constructed within the identified grid connection corridor. The minimum vertical clearance to buildings, poles and structures not forming part of the power line must be 3.8m, while the minimum vertical clearance between the conductors and the ground is 6.7m. The minimum distance between trees and shrubs and any bare phase conductor of a 132kV power line must be 4m, allowing for the possible sideways movement and swing of both the power line conductor and the tree or shrub. The structure to be utilised for the power line towers will be informed by the local geotechnical and topographical conditions as well as by specific requirements from Eskom.

  The construction of the proposed overhead power line and collector substations will take approximately 12 months to complete. Following the Commercial Operation Date (COD) of the authorised Paleso, Siyanda and Ngwedi SPPs, the applicant will hand over the power line and the associated infrastructure (i.e. collector substations and service road) to Eskom Holdings SOC Ltd (Eskom) to operate and maintain. This is in line with Eskom's

well-established Self Build Grid Connection Strategy for Renewable Energy Projects developed under the REIPPP Procurement Programme.

- Operation Phase:

  The proposed power line, collector substations and associated servitude will require routine maintenance throughout the operation period.

- Decommissioning Phase:

  The photovoltaic solar power plants each have a lifespan of between 20 and 25 years from where the facility and its associated infrastructure will be decommissioned or upgraded. If the solar plants are not decommissioned the power line is expected to have a lifespan of more than 40 years (with maintenance) and the infrastructure will only be decommissioned once it has reached the end of life, or if no longer required. Upon decommissioning, the power line would be disassembled, and the components removed from site, and recycled where possible, in line with the Environmental Management Programme EMPr.

2.4 LAYOUT DESCRIPTION

The grid connection corridor follows the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes – refer to Figure 2.2 below. The total surface area proposed for the power line route is approximately 373 hectares in extent. The proposed route of the power line is the shortest route from the two respective proposed collector substations to the Mercury MTS substation and is the preferred alternative for the developers based on the line distance and willingness of the landowners. Also, the power line route follows existing Eskom infrastructure (e.g., power lines etc.) therefore consolidating power line infrastructure. A final layout plan is included as Appendix H in the report.

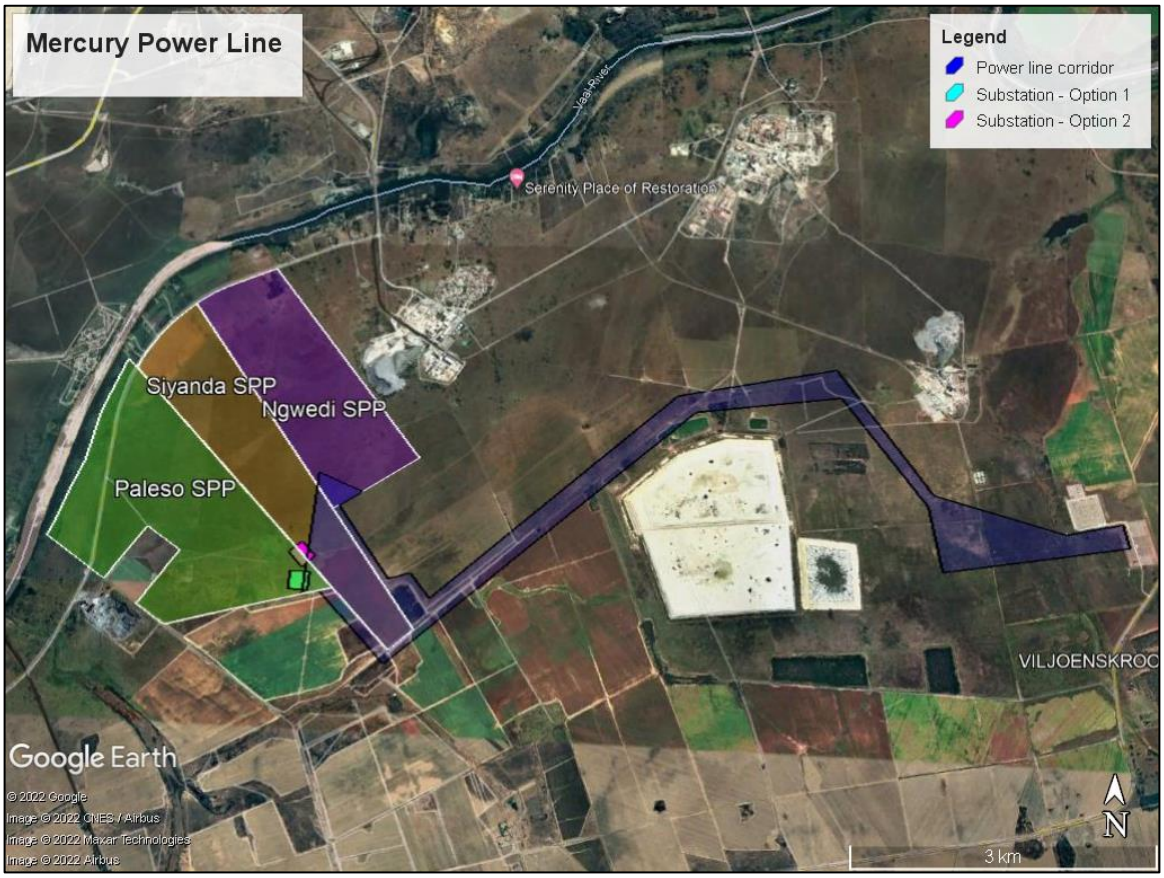

Figure 2.2: Proposed grid connection corridor, locations of the two proposed collector substations and the areas/properties within which the Paleso, Siyanda and Ngwedi SPPs are located

Table 2.3 provides the coordinate points for the proposed grid connection corridor and two collector substations which are being put forward for Environmental Authorisation.

Table 2.3: Coordinates

Power line corridor		
Point	Latitude	Longitude
A	26°59'47.35"S	26°43'57.17"E
B	26°59'54.05"S	26°44'14.58"E
C	26°59'59.09"S	26°44'6.00"E
D	27° 0'24.51"S	26°44'26.82"E
E	27° 0'22.40"S	26°44'35.12"E
F	27° 0'30.95"S	26°44'42.87"E

G	26°59'17.06"S	26°46'17.26"E
H	26°59'6.33"S	26°47'20.71"E
I	26°59'52.03"S	26°47'55.92"E
J	27° 0'5.09"S	26°48'45.94"E
K	27° 0'1.17"S	26°49'7.84"E
L	27° 0'9.36"S	26°49'9.47"E
M	27° 0'18.96"S	26°47'57.36"E
N	26°59'56.18"S	26°47'53.46"E
O	26°59'16.88"S	26°47'22.04"E
P	26°59'23.10"S	26°46'24.31"E
Q	27° 0'53.10"S	26°44'27.12"E
R	27° 0'28.91"S	26°44'0.69"E
S	27° 0'30.19"S	26°43'54.37"E
Substation 1		
Point	Latitude	Longitude
A	27° 0'22.20"S	26°43'49.23"E
B	27° 0'22.47"S	26°43'56.62"E
C	27° 0'28.79"S	26°43'56.35"E
D	27° 0'28.44"S	26°43'48.80"E
Substation 2		
Point	Latitude	Longitude
A	27° 0'15.68"S	26°43'47.88"E
B	27° 0'11.85"S	26°43'52.89"E
C	27° 0'16.81"S	26°43'58.22"E
D	27° 0'21.03"S	26°43'53.59"E

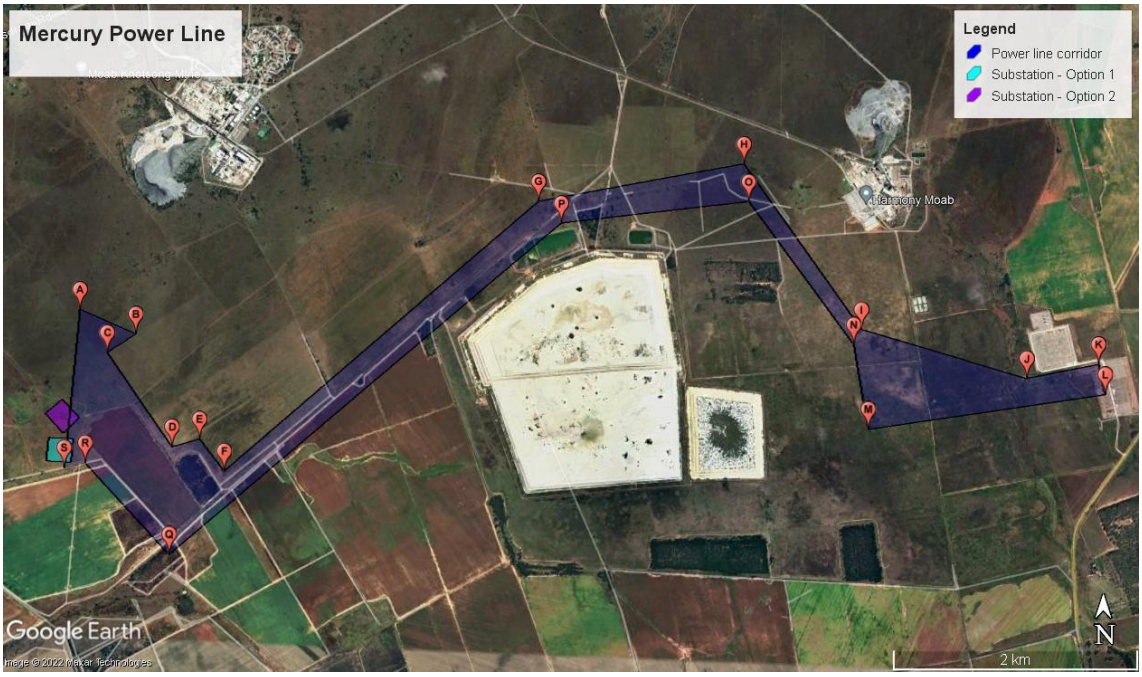

Figure 2.2: Map indicating coordinate points for the Mercury Power Line corridor as related to Table 2.3 above

Figure 2.3: Map indicating coordinate points for the substations associated with the Mercury Power Line as related to Table 2.3 above

2.5 SERVICES PROVISION

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

2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources, or alternatively from the local municipality. The Department of Water and Sanitation has been asked to confirm the water resource availability in the relevant catchment management area in order to ensure sustainable water supply. Water will not be required for the powerlines or substations as the water is already covered in the facilities EA's. Although, 1000m^3 water will be required for construction period of the power line.

A water use license will need to be applied for based on the presence of a wetland within the grid connection corridor.

2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Stormwater management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed landfill site. The construction- and hazardous waste will be removed to licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality.

2.6 Decommissioning of the facility

The operating period will be 20 years from the commencement date. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant to the solar power plants which the grid connection solution caters for. 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 three solar facilities. The implementation of new technologies and equipment at the solar power plants, which the grid connection infrastructure will cater for, will also then extend the operation of the power line and collector substations.

If, for whatever reason the solar power plants halt operations, the Environmental Authorisation and contracts with the landowners will be respected during the decommissioning phase.

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

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and
- 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 1. (3) A BAR (...) 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 and associated infrastructure (including the associated grid connection infrastructure) 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 IDPs and SDFs. Therefore, to ensure streamlining of Environmental Authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The National Forests Act, 1998 (Act 84 of 1998)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa

- New Growth Path Framework
- Free state Provincial Spatial Development Framework (PSDF) (2012)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Fezile Dabi District Municipality Final Draft Integrated Development Plan (IDP) 2020-2021 (2022)
- Moqhaka Local Municipality Draft Integrated Development Plan 2020/2021 (2020)

Based on the fact that the proposed grid connection infrastructure is necessary for the operation of authorised/proposed solar power plants, the legislative and policy documents of the solar power plants are also deemed relevant to the proposed grid connection solution.

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

3.2 LEGISLATIVE CONTEXT

Table 3.1: Legislative context for the construction of photovoltaic solar plants and the associated grid connection infrastructure

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa **(Act No. 108 of 1996)**	National Government	1996	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that "everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people's environmental right and places government under a legal duty to act as a responsible custodian of the country's environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development. The development of the Paleso, Siyanda and Ngwedi SPPs and the proposed gird connection solution, as well as the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.

The National Environmental Management Act (Act No. 107 of 1998)	National and Provincial Department of Forestry, Fisheries and the Environment	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the 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 BA process undertaken for the grid connection solution as part of the authorised/proposed SPPs are in-line with the requirements of NEMA for the Application for Environmental Authorisation.'
The National Energy Act (Act No. 34 of 2008)	Department of Mineral Resources and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble).

			Considering that the Paleso, Siyanda and Ngwedi SPPs are proposed to make use of PV technology and the solar resource for the generation of electricity (with the generated electricity to be evacuated through the proposed grid connection solution), the proposed project is in-line with the Act.
The National Water Act (Act No. 36 of 1998)	Department of Water and Sanitation (DWS)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The site falls within the C24B quaternary drainage region, this drainage region falls under Zone H, which refers to the amount of water that may be taken from the ground water resource, per hectare.

			A water use license will be required for the project due to the presence of a wetland within the grid connection corridor and therefore the National Water Act will be applicable in terms of obtaining the relevant license.
National Environmental Management: Waste Act **(Act No. 59 of 2008)**	Department of Forestry, Fisheries and the Environment (DFFE)	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) determine that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development.
National Environment Management: Air Quality Act **(Act No. 39 of 2004)**	Department of Forestry, Fisheries and the Environment (DFFE)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in

			atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
The National Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA) and the Free State Provincial Heritage Resources Authority	1999	The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a “heritage resource” includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS for the proposed project and all relevant documents were submitted for their comments and approval. The Heritage Impact Assessment and

			Palaeontological Impact Assessment undertaken for the solar power plant is included as Appendix D4 and Appendix D5 respectively.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long-term lease agreement. An Agricultural Compliance Statement has been undertaken for the grid connection corridor and is included as Appendix D6 of this draft BAR.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry;

			(f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette. A Biodiversity and Wetland Impact Assessment has been undertaken for the project and is included in Appendix D1 of this draft BAR.
Free State Nature Conservation Ordinance, 1969 (Act 8 of 1969)	Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	1969	The Act provides for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto. This includes wild animals, fish, indigenous plants, as well as nature reserves. The Act also provides for the permitting of the disturbance of such species. A Biodiversity and Wetland Impact Assessment has been undertaken for the project and is included in Appendix D1 of this draft BAR.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the construction of solar PV plants and the associated grid connection infrastructure

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The White Paper on the Energy Policy of the Republic of South Africa	Department of Mineral Resources and Energy	1998	The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives: • Increasing access to affordable energy services • Improving energy governance • Stimulating economic development • Managing energy-related environmental and health impacts • Securing supply through diversity • Energy policy priorities The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist.

			The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include: • Minimal environmental impacts in operation in comparison with traditional supply technologies; and • Generally lower running costs, and high labour intensities. Disadvantages include: • Higher capital costs in some cases; • Lower energy densities; and • Lower levels of availability, depending on specific conditions, especially with sun and wind based systems. The proposed grid connection solution for the Paleso, Siyanda and Ngwedi SPPs is in line with this policy as it proposes the generation of renewable energy from the solar resource, as well as the evacuation of the generated electricity.
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 recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

			The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix). The Paleso, Siyanda and Ngwedi SPPs are in line with this paper as it proposes the generation of renewable energy from the solar resource, the proposed grid connection solution will enable the evacuation of the generated electricity.
Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2010-2030	The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation. The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.

		The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.25GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro, and gas. Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018. According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5. The Paleso, Siyanda and Ngwedi SPPs 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. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.
National Development Plan of 2030	The Presidency: National Planning Commission -	The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge.

			The development of the grid connection solution and the Paleso, Siyanda and Ngwedi SPPs will contribute to the intervention strategy as identified within the plan.
National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretches over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project (including the solar power plant which the power line is required to cater for) 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's aim is 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 Paleso, Siyanda and Ngwedi SPPs are 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. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.
New Growth Path Framework	Department of Economic Development -	The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b). This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy on the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to: • Identify the possible areas of employment creation; and • Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b). This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction and investment of

			renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term. Considering that the construction of and investment in renewable energy is a key are identified within the framework, the Paleso, Siyanda and Ngwedi SPPs are considered to be in-line with the framework. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.
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. Paleso, Siyanda and Ngwedi SPPs comprise renewable energy generation facilities and would not result in the generation or release of emissions during its operation. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.

Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee	2010 - 2030	The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility: • SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities. • SIP 9: Electricity generation to support socio-economic development: The proposed Springbok Solar Power Plant is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Mineral Resources and Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances. Paleso, Siyanda and Ngwedi SPPs could be registered as SIP projects once selected as preferred bidders under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.
Strategic Environmental Assessment (SEA) for wind and solar PV	Department of Forestry, Fisheries and	2014	The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment.

Energy in South Africa	the Environment		The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit. The Paleso, Siyanda and Ngwedi SPPs are all located within the Klerksdorp REDZ (Figure D). It must be noted that the grid connection corridor is also located within the central corridor of the Strategic Transmission Corridors.
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 international to the local level.

The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology.

The development of the Paleso, Siyanda and Ngwedi SPPs is in-line with the framework based on the contributions and opportunities presented by a development of this nature. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.

Fezile Dabi District Municipality Final Integrated Development Plan (IDP)	Fezile Dabi District Municipality	2021 - 2022	The long-term vision of the Fezile Dabi DM is: "Improving the lives of citizens and progressively meeting their basic, social and economic needs, thereby restoring community confidence and trust in government". The above stated vision defines what Fezile Dabi District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialise, their mission is that: "Fezile Dabi District Municipality will strive to be a more responsive and accountable municipality towards sustainable development". Of the eighteen (18) SIPs that are contained in the National Infrastructure Plan (NIP), there are eight which impact on the Fezile Dabi District and therefore need to be recognised and where appropriate; the municipality's plans will be aligned with these SIPs in an effort to respond to national government's service delivery initiatives. Furthermore, work is to be done to align key cross-cutting areas, namely human settlement planning and skills development in line with each of the Strategic Infrastructure Projects, especially: • Green Energy in support of the South African economy (SIP 8): Supporting sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010). • Electricity Generation to support socio-economic development (SIP 9): acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy; and addressing historical imbalances. Considering the plans for the alignment of the DM's plans with SIP 8 and SIP 9 it is confirmed that the Paleso, Siyanda and Ngwedi SPPs is in line with the plan. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.
Moqhaka Local Municipality Draft Integrated	Moqhaka Local Municipality	2020-2021	The vision of the Moqhaka LM is to "…strive to *be a Municipality that creates an enabling environment for socio-economic growth and sustainable development."*

Development Plan (IDP)	The Mission Statement is *"To maintain and enhance quality of life by providing effective, efficient quality and affordable services equitably and facilitating sustainable socio-economic growth through active community participation."* The vision and mission of the municipality have led to the conceptualisation of the following strategic objectives below: • Broaden access and improve quality of municipal services. • Create an environment that promotes the development of the local economy an facilitates job creation. • Build united, non-racial, integrated and safer communities. • Promote a culture of participatory and good governance. • Improved organisational cohesion and effectiveness. • Improve overall financial management by developing and implementing appropriate financial managements policies, procedures, and systems. The development of the Paleso, Siyanda and Ngwedi SPPs will contribute to the local economy of the area and therefore assist (albeit to a limited extent) with socio-economic growth and therefore contribute to the strategic objectives of the LM. The proposed grid connection solution will enable the evacuation of the generated electricity from the three solar power plants mentioned above.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

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

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)[3]
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEAT, (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

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

- 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 Basic Assessment 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, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

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

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

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, including the grid connection infrastructure, are supported on all spheres of Government. The proposed grid connection solution for the Paleso, Siyanda and Ngwedi SPPs is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

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

Appendix 1. (3) A BAR (...) 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 grid connection solution forms part of the required electrical infrastructure of the authorised Paleso SPP, Siyanda SPP and the Ngwedi SPP, and the proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that these results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO_2 emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 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 primary rationale for the authorised SPPs 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 the Department of Mineral Resources and Energy (DMRE) (Integrated Resource Plan 2010-2030). The establishment of the photovoltaic solar facilities will significantly contribute to achieving this objective and will also address some of the objectives identified by the Moqhaka Local Municipality's Integrated Development Plan such as creating an environment that is conducive for local economic development.

The need for constructing the grid connection infrastructure and thereby connecting the authorised Paleso, Siyanda SPPs and the Ngwedi SPP to the electricity grid outweighs any negative aspects relating to the construction and associated loss of land. The proposed project will facilitate the connection of the facilities to the national grid thereby facilitating the transmission of renewable energy and upliftment of the local community through social economic development initiatives. This will have a positive impact at a local, regional and

national level. Without the development of the proposed grid connection infrastructure the operation of the authorised/proposed SPPs will not be possible.

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The proposed project's contribution towards sustainable development and the associated benefits to society in general is discussed below. The desirability of the proposed grid connection infrastructure is directly linked with the desirability of the Solar Power Plants that it will cater for.

- Lesser dependence on fossil fuel generated power - The deployment of the facilities, and the required proposed grid connection infrastructure, will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the photovoltaic solar facilities and the proposed grid connection infrastructure will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment.
- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will soon be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy, proposed to be evacuated to the national grid via the proposed grid connection infrastructure, 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 a 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). The proposed grid connection infrastructure will cater for three solar power plants.
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities. Furthermore, the development of one grid connection solution with specific grid connection infrastructure for three solar power plants provides an opportunity to consolidate linear infrastructure and the associated disturbance within the landscape and reduces the need for each of the solar power plants to develop its own alone-standing grid infrastructure to enable evacuation to the national grid. This is seen as the main need for the project.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilisation of solar power and the experience gained through the construction and operation of the power plant (including the grid connection infrastructure). In future, this experience can be employed at other similar solar installations in South Africa.
- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 800 employment opportunities will be created during the construction phase and 45 during the operational phase - this number is the total number of opportunities for each of the Paleso, Siyanda and Ngwedi SPPs and the opportunities created for the

proposed power line is included in the number of employment opportunities of the SPP's.

- 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 - The proposed development in this specific area will generate alternative land use income through rental, 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.
- Preferred location - The proposed grid connection corridor is considered to be the most feasible option for the location of this infrastructure, taking technical and environmental issues into consideration. The proposed power line is approximately 11km long, and the proposed route of the power line is the shortest route from the proposed collector substations to the existing Eskom Mercury MTS substation and is the preferred alternative for the developer.
- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one (where the landscape has been disturbed by mining and agriculture), than to lose land with a higher environmental value elsewhere in the country. Furthermore, considering that the grid connection solution will cater for three solar power plants, which in turn eliminates the need for each facility to develop its own alone-standing grid connection infrastructure, the project is seen as an opportunity to reduce cumulative impacts associated with each of the solar power plants and it therefore considered as desirable based on the opportunity it represents.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

Appendix 1. (3) A BAR (...) must include-

(g) A motivation for the preferred site, activity and technology alternative;

(h) a full description of the process followed to reach the proposed preferred alternative, within the site, including –

(i) details of all the alternatives considered;

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

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

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

(v) the impacts and risks identified for each alternative, 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;

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

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

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

(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.

The grid connection corridor proposed for the development is considered to be the preferred alternative based on the location of the connection point into the national grid in relation to the authorised SPPs, the need to identify the shortest and most feasible route for the connection and the need to consider the current environment and how disturbance within the landscape can be consolidated within an area (i.e. along an existing linear disturbance such as a road etc.) than rather being distributed throughout. The developer also considers the grid connection corridor as being preferred from a technical perspective.

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

5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The grid connection corridor and the surrounding areas is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the corridor will remain unchanged and will continue to be used for agricultural and mining purposes. The purpose of the proposed 132kV power line is to connect the authorised Paleso, Siyanda and Ngwedi Solar Power Plants with the National Grid. If the status quo is maintained, the potential opportunity costs in terms of the successful operation of the SPP would be lost, since it will not be able to operate without the grid connection infrastructure, which in turn will result in job losses and loss of economic growth in the area.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the grid connection infrastructure. Only one route alternative is being considered since this is considered as the most feasible and shortest route to connect the SPP to the National Grid. The proposed power line is approximately 11km long, and the proposed route of the power line is the shortest route to the National Grid.

In terms of the locations of the two proposed collector substations, these were identified by the developer on the respective solar power plant project sites considering the technical aspects of the facilities, as well as the placement of infrastructure as included in the solar power plant layouts.

5.1.3 Design and layout alternatives

Within the grid connection corridor, two collector substation locations options are being considered for development. These are all located within the eastern section of the grid connection, and each has a capacity of 132kV and will be ~2.5ha in extent. It must be noted that as the two collector substations are placed to cater for each of the three solar power plants, the locations of the collector substations are not assessed as alternatives but are rather

both being put forward for assessment and authorisation as part of the grid connection solution.

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

Steel lattice towers:

The steel lattice towers provide the following advantages over the other tower types available:

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

Steel monopoles:

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

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

Wood poles:

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

5.1.4 Technology alternatives

The power line will be constructed within the identified grid connection corridor towards the existing Eskom Mercury MTS Substation. The 132kV overhead power line is the only preferred alternative for the evacuation of the generated electricity due to the following reasons:

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

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

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

Underground Transmission Lines - Underground cables have generally been used where it is impossible to use overhead lines for example because of space constraints. Underground cabling of high voltage power lines over long distances is not considered a feasible or environmentally practicable alternative for the following reasons:

- Underground cabling will incur significantly higher installation and maintenance costs.
- It is more difficult and takes longer to isolate and repair faults on underground cables.
- There is increased potential for faulting at the transition point from underground cable to overhead power line.
- Underground cables require a larger area to be disturbed during construction and maintenance operations and hence have a bigger environmental disturbance footprint.
- Underground cabling requires the disturbance of a greater area when it comes to agriculture and other compatible land uses as the entire servitude becomes available for use as opposed to just the area around the towers.

The use of an underground power line is not feasible for the proposed project due to the length of the line, which is ~6km long. The following alternatives may be considered for the overhead power line:

Single Circuit Overhead Power Line

The use of single circuit overhead power lines to distribute electricity has been designed over many years for the existing environmental conditions and terrain as specified by Eskom Specifications and best international practice. Based on all current technologies available, single circuit overhead power lines are considered as an environmentally practicable technology available for the distribution of power. This option is beneficial for the following reasons:

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

Double Circuit Overhead Power Line

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

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

The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the three solar power plants and during maintenance the three solar power plants would not have to be off-line as one of the double circuit lines would still be able to supply electricity.

The use of a double circuit power line is therefore preferred for the proposed project as it will meet the requirements to evacuate the generated solar electricity from the Paleso, Siyanda and Ngwedi SPPs to the national grid.

5.2 PUBLIC PARTICIPATION PROCESS

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

5.2.1 General

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

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

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Klerksdorp Rekord) on the 21 July 2022 (see Appendix C1) notifying the public of the BA 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 until 24 August 2022.

- Site notices

  Site notices were placed on site in English and Afrikaans on 14 July 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 15 August 2022. Photographic evidence of the site notices is included in Appendix C2.

- Direct notification of identified I&APs

  Identified and registered I&APs, including key stakeholders representing various sectors, were directly informed of the Basic Assessment via telephone calls, WhatsApps and emails (as appropriate). For a complete list of I&APs with their contact details see Appendix C3 to this report.

- Direct notification of surrounding landowners and occupiers

  Written notices were provided via WhatsApp or email to all surrounding landowners and occupiers. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C3.

- Circulation of Draft Basic Assessment Report

  The registered I&APs were notified of the availability of the draft BAR at the commencement of the 30-day review and comment period. This included the details of where the report can be accessed. They have been requested to provide their comments on the report within 30 days (19 October 2022 – 18 November 2022). All issues identified, raised and recorded during the 30-day review and comment period will be documented and compiled into a Comments and Responses Report (Appendix C6) and included as part of the Final Basic Assessment Report to be submitted to the DFFE for decision-making.

- Circulation of decision and submission of appeals:

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

5.2.2 Consultation process

Regulation 41 requires that the affected landowners, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity and any other party as required by the competent authority 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 Appendix C.

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 Basic Assessment Report which 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 BAR and have been requested to provide written comments on the report within 30 days. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the Final BAR (Appendix C6).

All comments received prior to the release of the Draft BAR for the 30-day review and comment period have been included in this report as Appendix C6 to provide I&APs an opportunity to confirm that their comments raised during the initial public participation phase have been included and considered.

5.2.4 Issues raised by I&APs and consultation bodies

To date no comments have been received. Any comments received during the circulation of the draft BAR will be summarised in the final BAR. The full wording and original correspondence are included in Appendix C4 and C5.

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

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

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to the table 1.2. The most notable features identified within the grid connection corridor is a wetland.

5.3.1.1 Geology, Soils, Landscape Characteristics, Land Use and Topography

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Bd 13 and Fa13 land types. The Bd land consists of plinthic catena. Upland duplex and margalitic soils are rare and eutrophic and/or mesotrophic red soils are not widespread. The Fa land type is characterised by Glenrosa and/or Mispah soil forms which are common in this area, however, other soils may occur. Lime is rare or absent throughout the entire landscape.

The geology of this area is characterised by aeolian and colluvial sand which overlies mudstone, sandstone and shale of the Karoo Supergroup. Older Ventersdorp Supergroup basement gneiss and andesite is located to the north. Soil forms associated with the project area includes the Bd, Bc, Ae and Ba land types, which correlates with the findings from the land type database (Mucina and Rutherford, 2006).

The proposed power line development is located in close proximity to the Vaal River, approximately 3km. The area drains to the north towards the Vaal River.

The site is 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 power line corridor is located at an above mean sea level (amsl) of approximately 1333m at the highest elevation and at an amsl of 1299m at the lowest elevation.

5.3.1.2 Biodiversity and Vegetation

Critical Biodiversity and Ecological Support Areas

Critical Biodiversity Areas (CBA) are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use

planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity.

When considering the location of the grid connection corridor the following is relevant when considering the Free State CBA map. The most northern section of the grid connection corridor is located within Critical Biodiversity Area 1 (CBA 1) (red). The western and middle section of the grid connection corridor is located within an Ecological Support Area 2 (ESA2) (light green)", with sections of crossing over areas classified as "Other". The remaining extent of the corridor is classified as degraded. See Figure 5.1 below.

It is therefore confirmed that the project will impact on Critical Biodiversity Areas (CBA 1) in one location within the grid connection corridor.

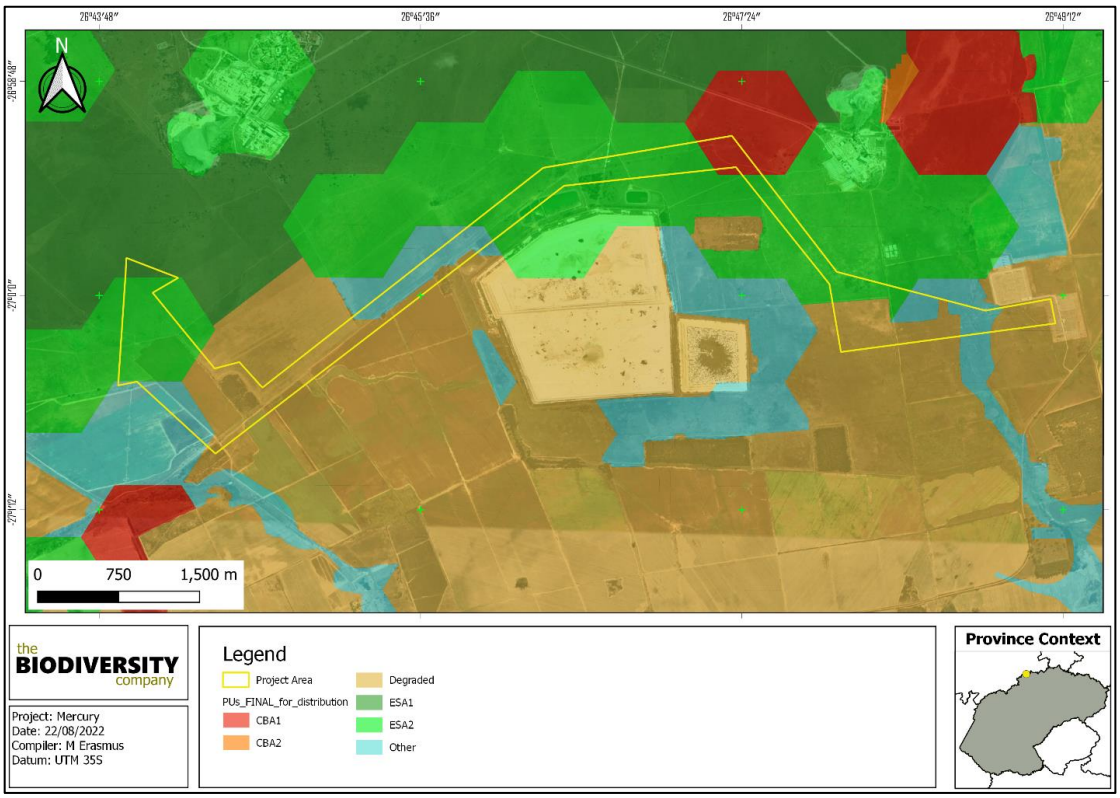

Figure 5.1: CBAs relevant to the grid connection corridor

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

Officially protected areas, either Provincially or Nationally that occur close to a project site could have consequences as far as impacts on these areas are concerned.

According to the spatial data for SAPAD (2022) and SACAD (2022), the project area overlaps with the Mispah Game Farm (Figure 5.2), however based on satellite imagery and field observations as indicated in the Biodiversity Assessment (appendix D1), it appears to not exist anymore.

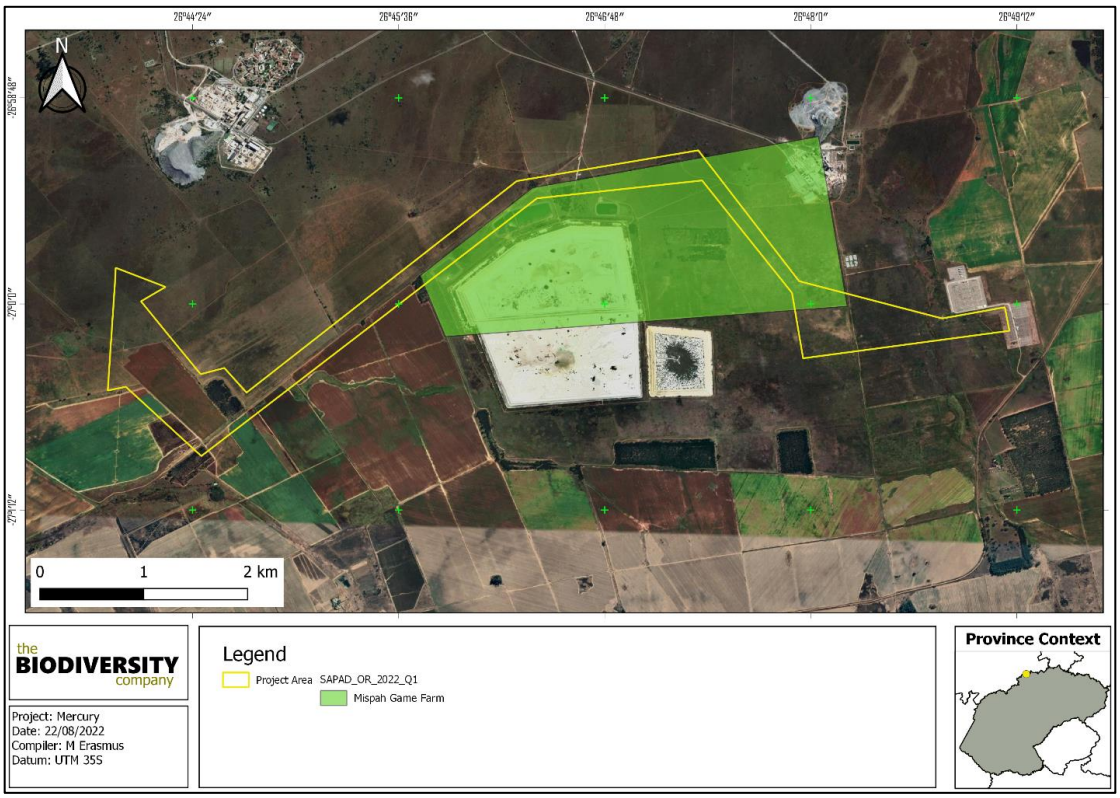

Figure 5.2: The Mercury Power Line corridor in relation to the nearest protected area

The National Protected Area Expansion Strategy (NPAES) sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The grid connection corridor does overlap with any Priority Focus Areas, as per the NPAES. The NPAES corresponds to the Mispah Game Farm (see Figure 5.2), however based on satellite imagery and field observations, it appears to not exist anymore

Nationally Threatened Ecosystems

The Biodiversity Act (Act 10 of 2004) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value.

According to the Biodiversity Assessment (appendix D1), the proposed project area mainly overlaps with an EN ecosystem, with some areas of Least concern. Refer to the Figure 5.3 below.

Figure 5.3: Project proximity to threatened ecosystems.

Vegetation

South Africa has been recognized as having remarkable plant diversity with high levels of endemism. South Africa hosts a wide range of ecosystems, including nine biomes, namely the Fynbos, Succulent Karoo, Desert, Nama-Karoo, Grassland, Savanna, Albany Thicket, Indian Ocean Coastal Belt and Forest Biomes (Mucina & Rutherford, 2006).

According to the Biodiversity Assessment (Appendix D1), the project area is situated within the Grassland biome. In South Africa, the Grassland Biome occurs mainly on the high central plateau (Highveld), the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal (KZN) and the central parts of the Eastern Cape (Mucina & Rutherford, 2006). However, grasslands can also be found below the Drakensberg, both in KZN and the Eastern Cape, with floristic links to the high-altitude Drakensberg grassland (Mucina & Rutherford, 2006). The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Altitude is mostly from about 300 to 400 m.a.s.l, but reaches up to 3 482 m on Thabana Ntlenyana, the highest mountain in southern Africa (Mucina & Rutherford, 2006).

In terms of climate, the temperate grasslands of the Highveld in South Africa have cold and dry conditions, with rainfall during the summer (which can sometimes be a strong summer rainfall) and winter drought (Mucina & Rutherford, 2006). Frost is common and there is a high risk of lightning-induced fires (Mucina & Rutherford, 2006).

In terms of vegetation structural composition, grasslands are characteristically dominated by grasses of the Poaceae Family (Mucina & Rutherford, 2006). On the Lesotho Plateau and

highest peaks of the Drakensberg, grassland plants xeromorphic characteristics due to the severity of the climate in these places (Mucina & Rutherford, 2006).

On a fine-scale vegetation type, the project area overlaps mainly with the Vaal-Vet Sandy Grasslands with a portion of the corridor overlapping with the Vaal-Reefs Dolomite Sinkhole Woodlands. Refer to Figure 5.4 below.

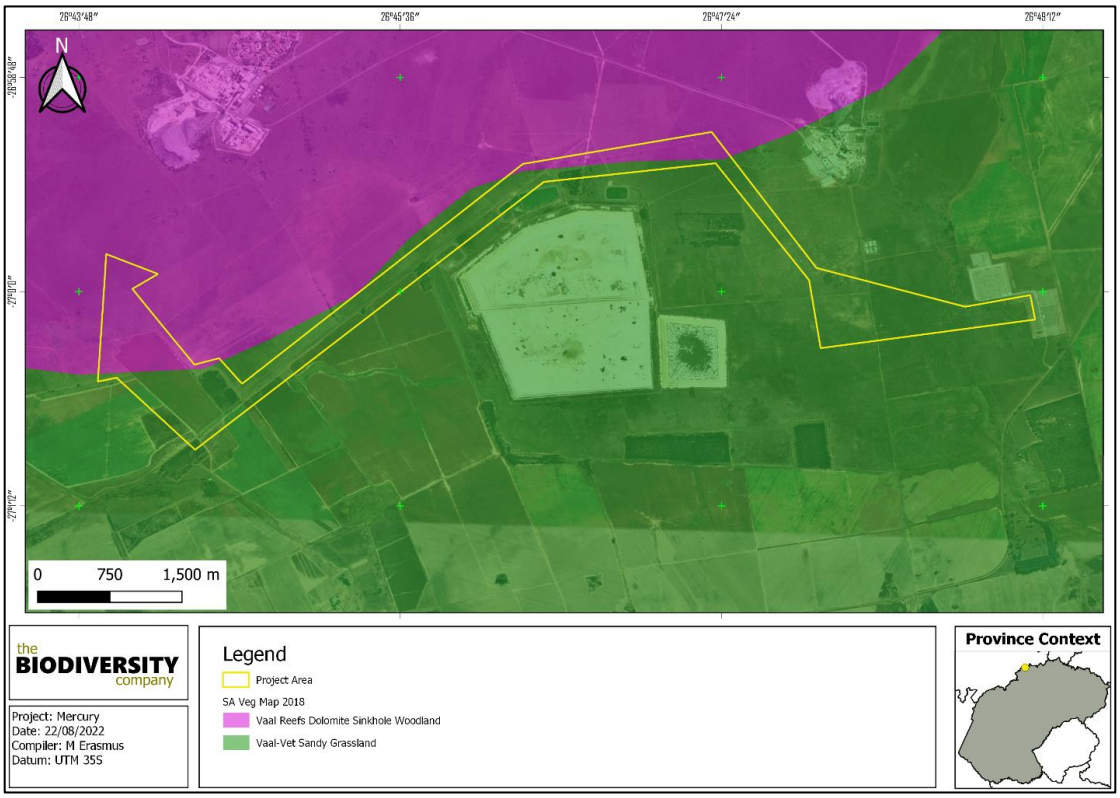

Figure 5.4: Vegetation type associated with the project area.

The **Vaal-Vet Sandy Grassland** vegetation type occurs at altitudes ranging between 1260-1360 m within the Northwest and Free State Provinces. It occurs on plains dominated areas and consist of undulating terrain. The dominance of the vegetation by the climax grass *Themeda triandra* is characteristic. Areas that are heavily overgrazed are characterised by the prominence of the grasses *Elionurus muticus* and *Cymbopogon spp*. The vegetation type is found on aeolian and colluvial sand overlying sand and mudstone. The vegetation is dominated by the grasses *Anthephora pubescens*, *Aristida congesta*, *Cymbopogon caesius*, *Cynodon dactylon*, *Digitaria argyrograpta, Elionurus muticus, Eragrostis chloromelas, Setaria sphacelata*, *Themeda triandra*, *Eragrostis trichophora, Heteropogon contortus*, and the forbs *Stachys spathulata*, *Barleria Macrostegia, Geigeria aspera, Monsonia burkeana*, *Hermannia depressa*, *Hibiscus pusillus Selago densiflora*. The low shrubs *Pentzia globosa* and *Ziziphus mucronata* are also prominent.

This vegetation type is regarded as being endangered with only 0.3% statutorily conserved of the target of 24%. More than 60% is already transformed due to cultivation and overgrazing. Of the target of 24% only a small section is conserved at the Cradle of Humankind World

Heritage Site. It is estimated that 25% of this vegetation type is already transformed due to mining, cultivation and urban sprawl.

The **Vaal Reefs Dolomite Sinkhole Woodland** vegetation type occurs at altitudes of 1280- 1380 m on slightly undulating landscapes that is dissected by chert ridges and dolomite outcrops. The vegetation type occurs on dolomites from the Malmani Subgroup and sinkholes are a prominent feature of the land. The soil is mostly shallow rocky though shallow Hutton soil is also present. The vegetation is characterised by the dominance of the trees *Vachellia erioloba, Celtis africana, Senegalia caffra, Vachellia karroo*, the shrubs *Diospyros lycioides, Grewia flava, Asparagus suaveolens, Gymnosporia buxifolia*, the grasses *Digitaria eriantha, Eragrostis curvula, Anthephora pubescens, Bewsia biflora, Brachiaria nigropedata*, the shrublet *Elephantorrhiza elephantina*, and the forbs *Osteospermum muricatum, Crabbea angustifolia, Hermannia depressa, Commelina africana, Cyanotis speciosa* and *Pollichia campestris*.

Of the target of 24% only a small section is conserved at the Cradle of Humankind World Heritage Site. It is estimated that 25% of this vegetation type is already transformed due to mining, cultivation and urban sprawl.

Habitat Assessment

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in Figure 5.5. The habitats identified include the degraded Vaal-Vet Sandy Grasslands and Vaal Reefs Dolomite Sinkhole Woodland, wetlands, disturbed and transformed habitats.

- Degraded (Vaal-Vet Sandy Grassland and Dolomite)

The degraded habitat includes areas that are connected to and play a crucial role regarding the water resource habitats present. This habitat type is regarded as semi-natural, but disturbed due to fragmentation, grazing by livestock and also human infringement in areas close to roads. The invasive species *Stoebe plumosa* was however, proliferated throughout the majority of the sandy grassland habitat unit, especially in relation to the water resources.

Generally, this habitat unit has intact ecological functioning attributed to faunal communities found in this habitat. The current ecological condition of this habitat, regarding the driving forces, are inconsistent due to the different land uses. Portions of these areas have been disturbed by the historic and current grazing pressure. Additionally, the presence of some disturbances such as AIP presence or edge effect impacts on floral communities have resulted in decreased habitat integrity. The condition difference within this habitat depends on the extent of the disturbance in some areas being more severe, usually related to one being more overgrazed than the other.

The degraded habitats are located adjacent to various seep, channelled valley bottom and floodplain wetlands, and as such still serves as a movement corridor as it creates a link between these systems and its surrounding terrestrial landscape for several faunal species, especially avifauna and mammals.

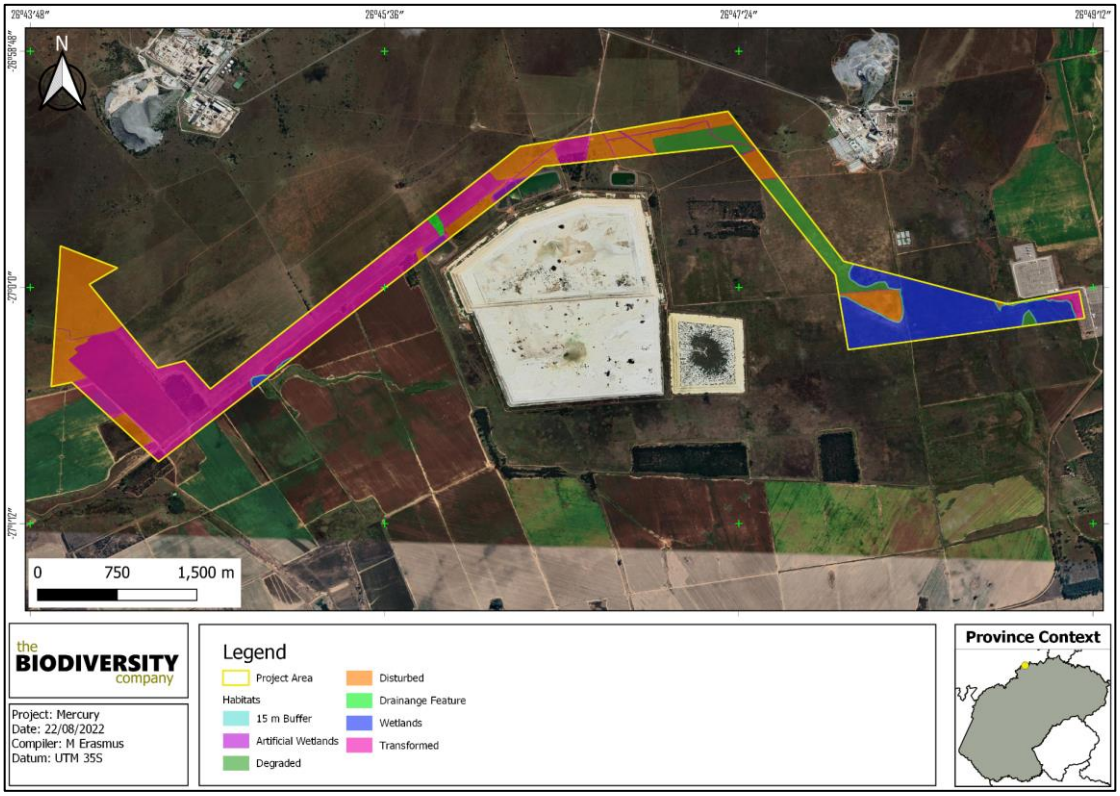

Figure 5.5: Habitats identified in the project area.

- Wetlands

This habitat unit represents the wetland areas located across the project area. The wetland assessment where these areas are identified can be found in a separate Wetland Delineation and Impact Assessment Report (see Appendix D1b). Even though somewhat disturbed, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of these systems is an important aspect to consider for the proposed development, even more so due to the high sensitivity of the area according to the various ecological datasets. This habitat needs to be protected and improved due to the role of this habitat as a water resource.

- Disturbed Habitat

The disturbed habitat is regarded as areas that has been impacted by edge effects of transformed areas as well as direct impacts from historic and ongoing overgrazing, servitudes (power line) and infringement. These areas have been disturbed and modified from its natural state, it represents habitat that is more disturbed than the 'degraded habitat' area, but not as disturbed as the 'transformed' area. This habitat is regarded as areas that have been impacted more by historic overgrazing and mismanagement. These habitats aren't entirely transformed but in a constant disturbed state as they can't recover to a more natural state due to ongoing disturbances and impacts it receives from grazing and mismanagement. These areas are considered to have a medium sensitivity due to the fact that the areas may be used as a movement corridor and in many cases form a barrier between the more degraded bushveld and the transformed areas.

- Transformed

This habitat unit has previously been impacted upon and shows a change from their natural state, with little to no remaining natural vegetation due to land transformation. The transformed habitat predominantly comprised of agricultural fields, roads and residential buildings.

Figure 5.6: Transformed areas associated with the project area.

Red data species

Lists of red data species are normally acquired via various resources and if no specific recording was made/confirmed on the site, lists obtained from Quarter Degree Grids (QDG) are used as a broad guideline. According to the lists obtained from literature and previous studies in the QDGC there is a total of 13 red data plant species that could be found in similar habitats as the corridor. No such species were found within the study area and no suitable habitat exists.

Protected Plant Species

Plant species are also protected in the Free State Province according to the Free State Nature Conservation Ordinance. According to this ordinance, no person may pick, import, export, transport, possess, cultivate, or trade in a specimen of a specially protected or protected plant species. Communication with Provincial authorities indicates that a permit is required for all these species if they are expected to be affected by the proposed project.

After a detailed survey was conducted during August 2022, which includes *Aloe grandidentata, Helichrysum callicomum, Melanospermum foliosum* and *Helichrysum caespititium*, was confirmed as present for the site. No eradication of these species should be allowed without a permit.

During the field assessment 1 species of protected tree was recorded, *Vachellia erioloba* (Camelthorn). The protected tree observed are protected by the List of Protected Tree Species under the National Forests Act, 1998 (Act No. 84 of 1998) (NFA). In terms of the NFA, no person

may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence. The coordinates of the protected tree recorded are 26°59'15.95"S 26°46'41.77"E.

Alien plant species

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

NEMBA is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation calls for the removal and / or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
    - Section 75 of the NEMBA;
    - The relevant invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the NEMBA.

Seven (7) IAP species were recorded within the project area. Nine (9) of these species are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. The Category 1b plant species include, *Argemone ochroleuca, Cirsium vulgare, Melia azedarach, Eucalyptus grandis, Cortaderia selloana, Datura ferox* and *Verbena bonariensis.* These IAP species must be controlled by implementing an IAP Management Programme, in compliance of section 75 of the NEMBA, as stated above.

Fauna Species

Herpetofauna and mammal observations and recordings fall under this section. A separate Avifauna impact assessment was conducted for the avifauna species associated with the project area.

➢ Amphibians and Reptiles

No herpetofauna species were recorded during the survey period, this was largely due to the season in which the field survey was carried out as well as the fact that no pitfall trapping was done, surveys relied on opportunistic sightings as opposed to intensive sampling methods. However, there is the possibility of several species being present, as certain reptile species are secretive and longer-term surveys are required in order to ensure adequate sampling.

➢ Mammals

Twelve (12) mammal species were observed during this survey of the project area (Table 5.1) based on either direct observation or the presence of visual tracks and signs. None of the species recorded are regarded as a SCC. One species is a SCC, namely Serval, while five species are listed as Schedule 2 (Ordinary Game).

Table 5.1: Summary of mammal species recorded within the project area

Species	Common Name	Conservation Status		Free State Nature Conservation Ordinance 8 of 1969
		Regional (SANBI, 2016)	IUCN (2021)	
Atilax paludinosus	Water Mongoose	LC	LC	
Cryptomys hottentotus	Common Mole-rat	LC	LC	
Cynictis penicillata	Yellow Mongoose	LC	LC	
Damaliscus pygargus	Blesbok	LC	LC	Schedule 2 (Ordinary Game)
Gerbilliscus brantsii	Highveld Gerbil	LC	LC	
Hystrix africaeaustralis	Cape Porcupine	LC	LC	

Leptailurus serval	Serval	NT	LC	
Lepus saxatilis	Scrub Hare	LC	LC	Schedule 2 (Ordinary Game)
Orycteropus afer	Aardvark	LC	LC	
Pedetes capensis	Springhare	LC	LC	
Sylvicapra grimmia	Common Duiker	LC	LC	Schedule 2 (Ordinary Game)
Xerus inauris	Cape Ground Squirrel	LC	LC	

5.3.1.3 Surface Water Features

According to the Wetland Impact Assessment Report (Appendix D1), during the site visit, six Hydrogeomorphic (HGM) units were identified within the project area of influence. The wetland areas were delineated in accordance with the DWAF (2005) guidelines. The HGM units have classified into three different wetland types, namely hill slope seeps (HGM 1, 4 & 5), channelled valley bottom (HGM 2) and unchannelled valley bottoms (HGM 3 and 6) Along with the wetlands three artificial wetlands were identified in proximity to the tailing's facility. These systems have been formed through artificial means, and have only been delineated for this assessment. No functional assessment has been completed for these systems. Some of the systems are located adjacent to waste impoundments. Water infiltrates waste impoundments during rainfall events and seeps out into the adjacent areas without the presence of successful trenches.

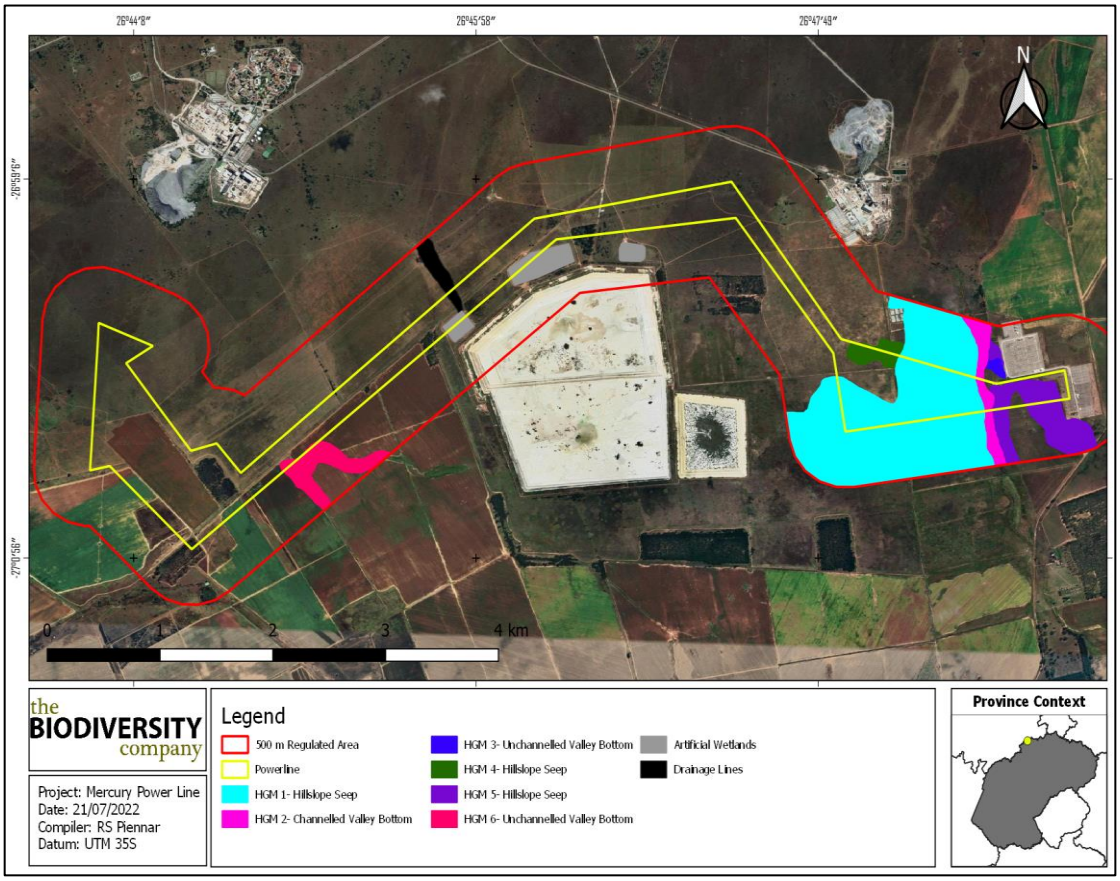

Figure 5.7: Delineation and location of the different hydrogeomorphic units

Ecological Functional Assessment

The ecosystem services provided by the wetland units identified on site were assessed and rated using the WET-EcoServices method (Kotze et al., 2008). HGM unit 2 scored "High" for ecosystem service benefits due to the high volumes of hydrophyte vegetations inside the HGM unit. The wetland provides a high variety of habitats for birds, amphibians, and mammals. The high density of hydrophytes also helps with the assimilation of nutrients and toxicants from the water column. The HGM unit is classified as a channelled valley bottom which plays an important role in streamflow regulation as well as flood attenuation. Flood attenuation is important to help prevent damage to the power station to the west of the HGM unit and to prevent property damage downstream.

HGM unit 4 scored "Moderately High" for ecosystem service benefits due to the number of hydrophytes present within the wetland. This wetland however does not play a role in streamflow regulations and flood attenuations and thus not play such a big role as HGM 2. The wetland does receive toxicants and nutrients from the agricultural practises inside the wetland buffer.

HGM 1, 3, 5 and 6 scored "Intermediate" for ecosystem service benefits. The reason for the lower score is due to the lower density of hydrophytes associated with the wetlands. This will lower the ability of the wetland to provide habitat and resources for both human and animals. The HGM units have little to no signs of erosion and functions well for sediment trapping and flow attenuation.

Ecosystem services contributing to these scores include flood attenuation, streamflow regulation, sediment trapping, phosphate assimilation, nitrate assimilation, toxicant assimilation, erosion control, biodiversity maintenance and tourism and recreation.

Ecological health assessment

The delineated wetland systems have been scored overall Present Ecological State (PES) ratings ranging from "Moderately Modified" (class C) to "Seriously Modified" (class E).

HGM 2 scored the highest ecological state of "Moderately Modified" (C). The wetland seems to be largely intact due to the presence of wetlands around the HGM unit acting as a buffer. There are however a few dirt roads traversing over the wetland and some overgrazing has taken place in some parts.

The wetlands that scored "Largely Modified" (HGM 1 and 4) was due to multiple anthropogenic impacts on the systems. These systems are characterised by overgrazing by cattle and some agricultural fields present within their delineated buffers, they are subject to anthropogenic increases in water inputs and have been affected by the removal of vegetation. HGM unit 1 will also receive an increase in water seeping from the tailing's facility directly west of it.

HGM 3 5 and 6 scored "Seriously Modified" for the ecological state due to the removal of most of the vegetation within the wetland's catchment. The wetlands are overgrazed and some development have taken place within HGM units 3 and 5s catchments.

5.3.1.4 Avifauna

According to the Avifaunal Impact Assessment (Appendix D2), Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity. the proposed development does not overlap any IBAs nor are there any within the surrounding landscape. The Suikerbosrand Nature Reserve is located approximately 140 km to the north-east, the Barberspan and Leeupan IBA is located 118 km to the north-west and the Sandveld and Bloemhof Nature Reserves are located 75 km to the south-west.

The avifauna community recorded within the Project Area of Influence (PAOI) could be regarded as depauperate with only 22 species recorded during the field survey, accounting for approximately 8% of the total number of expected species. The low species richness is attributed to the anthropogenic activities and influences within the PAOI and surrounding landscape. In addition, the inclement weather during the field survey would have influenced the species richness observed. The most speciose family was *Cisticolidae* represented by four species, accounting for 18% of the total number of species recorded.

None of the expected Speciecies of Conservation Concern (SCC) was recorded within the PAOI during the survey period. However, a single SCC, Sagittarius serpentarius (Secretarybird), was recorded within the PAOI during the field survey. This species is listed as endangered on a global scale (BirdLife International, 2020). The species has a wide distribution across sub-Saharan Africa, but surveyed densities suggest that the total population size does not exceed a five-figure number. Ad-hoc records, localised surveys and anecdotal observations indicate apparent declines in many parts of the species' range, especially in South Africa where reporting rates decreased by at least 60% of quarter degree grid cells used in Southern African Bird Atlas Projects. Threats include excessive burning of grasslands that may suppress populations of prey species, whilst the intensive grazing of livestock is also probably degrading otherwise suitable habitat. Disturbance by humans is likely to negatively affect breeding. The species is captured and traded; however, it is unknown how many deaths occur in captivity and transit. Direct hunting and nest-raiding for other uses and indiscriminate poisoning at waterholes are also further threats. A proposed conservation action is that landowners of suitable properties should join biodiversity stewardship initiatives and to manage their properties in a sustainable way for the species' populations. Only a single individual was observed adjacent to the PAOI. However, based on the extensive foraging range size of this species, it will utilise the majority of the PAOI and proximal habitats for foraging.

'Priority Species' are those avifauna that are particularly susceptible to energy developments, and although these priority species were developed for Wind Energy developments (Ralston Paton *et al*, 2017), the type of impact is congruent with general energy infrastructure, i.e., collision, electrocution, and habitat loss. Power Lines, guidelines (anchor lines) and connection lines associated with the development pose a risk. Three of the species observed within the PAOI are regarded as priority species (Table 5.2).

Table 5.2: Summary of Priority Species within the proposed Mercury Power Line Project PAOI

Scientific Name	Common Name	Risk Score	Priority Score
Afrotis afraoides	Korhaan, Northern Black	90	180
Asio capensis	Owl, Marsh	95	190
Sagittarius serpentarius	Secretarybird	125	320

Majority of the PAOI possesses a 'Very Low' Site Ecological Importance (SEI), which is congruent with the Animal Sensitivity of the screening tool. This was attributed to the limited habitat suitability for SCC and the very high resilience to impacts. However, it must be noted that this SEI is within the context of the present avifauna community. Wetland habitats as delineated by the wetland specialist have been overlaid onto the avifauna SEI. These systems have not been identified as sensitive within an avifauna context due to the recorded species composition. Nevertheless, the appropriate 15 m buffer must still be applied for maintenance of ecosystem function.

5.3.1.5 Soil and Agriculture

When considering the results of the Screening Report (Appendix B) and the results of the Soil and Agriculture Assessment Report (Appendix D6) the following must be considered.

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Bd 13 and Fa 13 land types. The Bd 13 land type is commonly dominated with Clovelly, Avalon, Kroonstad, Katspruit and Willowbrook soil forms according to the Soil classification working group, (1991), with other associated soil forms and rocky areas also occur in the terrains. within the terrain. The Fa 13 land type is characterised with Hutton and Glenrosa soil forms with other associated soil forms and rocky areas also occur in the terrains. The Bd land types are characterised by plinthic catena with upland duplex and margalitic soils being rare within the terrain. The terrains are characterised by eutrophic soil base status. In the Bd land types, red soils are not widespread. The Fa land types mostly have shallow and rocky soil profiles. Lime is rare or absent in the entire landscape.

The following land potential level has been determined:

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

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

- Land Capability 1 to 5 (Very Low to Low Sensitivity);
- Land Capability 6 to 8 (Low/Moderate to Moderate Sensitivity) and;
- Land Capability 9 to 10 (Moderate High Sensitivity).

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is predominantly covers “Moderately Low” to “Moderate” sensitivities. Smaller patches are characterised by sensitivities with “Very Low to Low” and “Moderately High” (Figure 5.8). Furthermore, various crop field boundaries were identified by means of the DEA Screening Tool (2022), which are predominantly characterised by “High” sensitivities with some areas being classified as “Very High” sensitivity. It is the specialist`s recommendation that such high potential crop fields be avoid for the project..

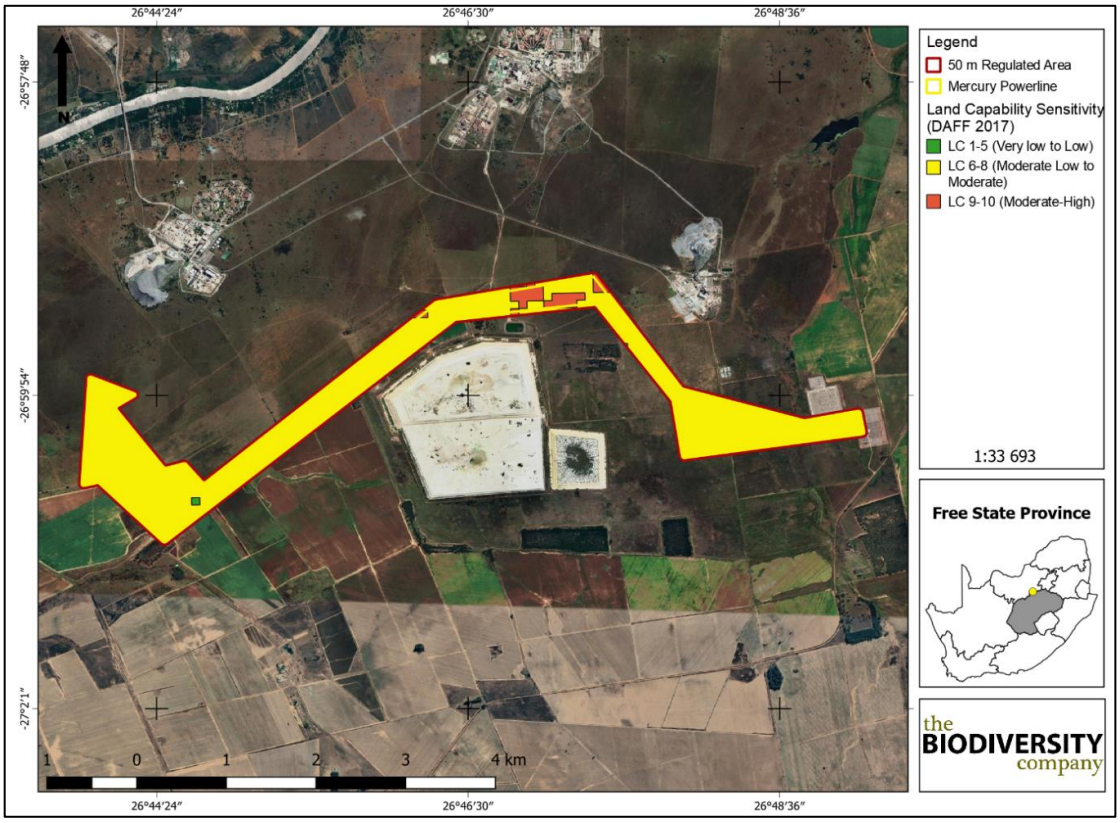

Figure 5.8: Land capability of the Mercury Power Line corridor.

5.3.1.6 Climate

A summary diagram of the climate encountered in the area is shown in Figure 5.9. The climate is strongly seasonal and semi-arid, with an average rainfall volume of 530 mm/annum, falling between October and May. The summers are hot and wet, with summer temperatures ranging typically between 14-30°C. The winters are cold and dry, with wintertime temperatures ranging typically between -1 to 19°C. An average of 37 frost days occur each winter. The soils are perpetually moisture stressed, with mean annual evaporation of 2,423 mm, resulting in 79% of days where the soils lose more moisture than they receive from precipitation.

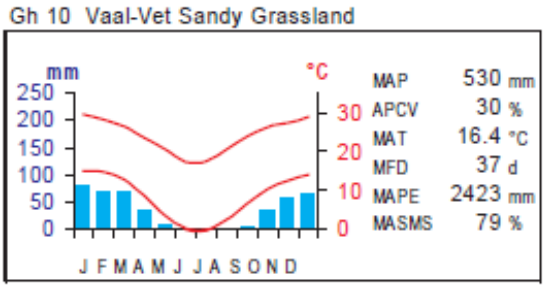

Figure 5.9: Climatic diagram of the area within which the grid connection corridor is located

5.3.1.7 Visual landscape

According to the Visual Impact Assessment (Appendix D3), the landform and drainage of the area is unlikely to limit visibility. Areas within 5km from the proposed development might have a clear view without taking existing screening into account.

Table 5.3 below reflects the visibility rating in terms of proximity on viewers of the grid connection corridor. The distances were calculated according to experience, assumptions and opinion. The ZTV map (Figure 5.10) give a clearer understanding of areas susceptible to line of sight of the project.

Table 5.3: ZTV Visibility Rating in terms of Proximity to the Power Line.

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	No sensitive receptors have visibility of the project within the 0-1km radius.	Very High
0-5km	• 28 homesteads on farms • Two townhouse complexes • Four lodging facilities • One cluster river homes • Kopanong Mine accommodation facilities • One airfield with its club • A small section of the R76 road • R30 road • S729 gravel road • Vermaasdrift gravel road • Orkney • Vaal River	High
5-10km	- 29 Homesteads - Orkney - Vierfontein - A small section of the Vaal River - One sport stadium	Medium

	- Vaal Reefs Village - Four lodging facilities - One cluster smallholdings - Four townhouse complexes - One cluster river homes - A small section of the R76 road - R30 road - R502 road - Vermaasdrift gravel road	
10-15km	• Kanana • A small section of Klersdorp • Khuma • One townhouse complex • 19 homesteads • R30 road • R502 road • One lodging facility • A small section of the Vaal River	Low
15-20km	• Jouberton • Klerksdorp • Stilfontein • Khuma • 12 homesteads • One religious institution • N12 National Road • R502 road	Very Low

The ZTV assessment did not take into account existing screening such as buildings and vegetation cover but rather the terrain's above mean sea level (AMSL) which indicates line of sight. The main visual receptors in the area are industrial developments, the mining sector and agricultural developments. The powerline will be developed parallel with existing power lines.

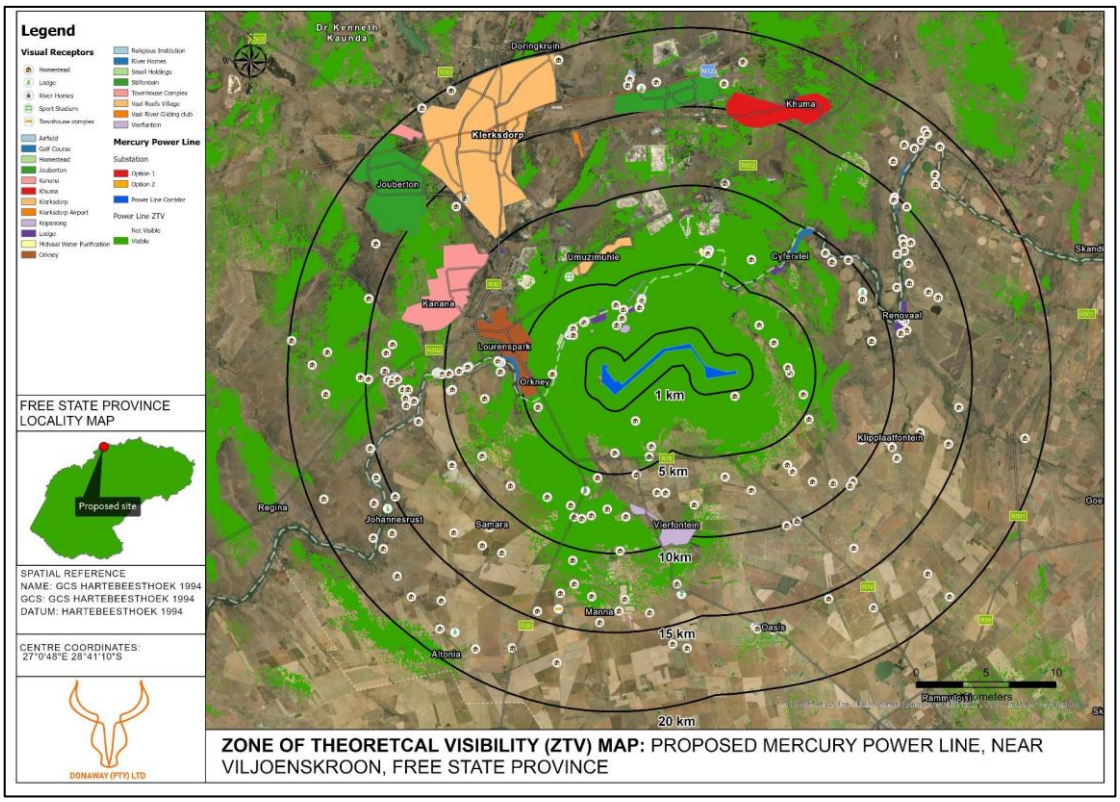

Figure 5.10: Zone of Theoretical Visibility (ZTV) for the Power Line – Hill shading

5.3.1.8 Socio-economic conditions

The 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. 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.

The Fezile Dabi District Municipality is a Category C municipality, formerly known as the Northern Free State District Municipality, situated in the north of the Free State. It is bordered by the North West, Gauteng and Mpumalanga Provinces to the north, Thabo Mofutsanyana District to the south, and Lejweleputswa District to the west. In 2011 the Municipality had a population of 488 036 with an unemployment rate of 33.9% and a youth unemployment rate

of 44.4%. By 2016 only 48.3% of dwellings had piped water inside their dwellings and 7.7% of household still did not have electricity in their dwellings.

The Moqhaka Local Municipality is a Category B municipality situated within the southern part of the Fezile Dabi District Municipality in the Free State Province. It is the largest of four municipalities in the district, making up over a third of its geographical area and covering an area of 7 925m^2. The former Kroonstad, Steynsrus and Viljoenskroon Transitional Local Councils and sections of the Riemland, Kroonkop and Koepel Transitional Rural Councils are included in the municipality. The general tendency of migration from rural to urban areas is also occurring in the area, as is the case in the rest of the Free State Province. In comparison to the other municipalities within the Fezile Dabi District Municipality, it appears as if Moqhaka is significantly less urbanised. The population dwindled from 2011 at 160 532 to 154 732 in 2016. In 2011 the unemployment rate stood at 35.2% and the youth unemployment rate at 47.2%. In 2016 89.7% of households had flush toilets connected to sewerage and 96.3% of households had electricity for lighting in their dwellings. The main economic sectors in the municipality are agriculture, commercial transport, business services and mining.

In the Moqhaka LM there are 55 594 economically active (employed or unemployed but looking for work) people, and of these 35,2% are unemployed. Of the 27 349 economically active youth (15–34 years) in the area, 47,2% are unemployed. The creation of employment opportunities within the formal sector as a result of the development could therefore contribute towards growing employment within the formal sector in both the LM and DM, which could lead to greater levels of job security than may typically be associated with employment in the informal sector.

5.3.1.9 Cultural and heritage aspects

Stone Age

Very little habitation of the highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River, or in sheltered areas such as the mountainous regions north of Klerksdorp and as far east as the Vredefort Dome area. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. The MSA is a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. Open sites were still preferred near watercourses.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Also, for the first time we get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA. The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes. A number of site containing rock engravings are known to exist to the east and south of the project.

Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area. Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water.

As far as is known, no Early Iron Age sites have yet been identified in the Free State Province. The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating conditions that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and the Mpumalanga highveld.

This wet period came to a sudden end sometime between 1800 and 1820 by a major drought lasting 3 to 5 years. The drought must have caused an agricultural collapse on a large, subcontinent scale.

The stone walled settlements dating to the Late Iron Age occur on a wide front over much of the central interior plateau area. In the larger vicinity of the project area, these sites conform to Maggs' (1976) type Z settlements. Such site consists mostly of a number of large primary enclosures clustered together, with, associated but on the outside, smaller primary enclosures.

This was also a period of great military tension. Military pressure from Zululand spilled onto the highveld by at least 1821. Various marauding groups of displaced Sotho-Tswana moved across the plateau in the 1820s. Mzilikazi raided the plateau extensively between 1825 and 1837. The Boers trekked into this area in the 1830s. And throughout this time settled communities of Tswana people also attacked each other.

As a result of this troubled period, Sotho-Tswana people concentrated into large towns for defensive purposes. Because of the lack of trees, they built their settlements in stone. These stone-walled villages were almost always located near cultivatable soil and a source of water. Such sites are known to occur north of Klerksdorp and in the Vredefort Dome area.

Historic Period

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Pretoria was started in 1850, but Johannesburg only dates to the 1880s, after the discovery of gold.

In 1837 the establishment of a trekker settlement at Klerksdorp marked the beginning of a new phase in the history of the region. Originally twelve trekker families settled on the farm Elandsheuvel, belonging to C.M. du Plooy. This settlement, known as 'Oude Dorp', had its first landdros Jacob de Clercq, after which the settlement was then named. In 1853, the name was changed to Klerksdorp. With the discovery of gold in 1886 on the farm Rietpoort, the gold rush gave rise to a new settlement called 'Nieuwe Dorp'. In 1897 the railway line from Krugersdorp reached Klerksdorp. The railway line from Fourteen Streams (Warden region), on the main line from Kimberley to Zimbabwe (Then Rhodesia) was completed in 1906. (SESA 1973).

The town of Orkney was established in 1940 at the junction of the various railway lines. It was name after the old gold mine opened by Thomas Leask, who came from the Orkney Islands, in 1880 (SESA 1973).

Site Specific Considerations in terms of archaeology

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

One site, destroyed, shows the remains of bricks that were used for the buildings. Some exotic trees indicate that this might have been a homestead, although nothing is indicated on any of the maps. It was probably demolished when the existing power line was constructed adjacent to it.

Due to the fact that these features are demolished, they judged to have low significance and are viewed to be sufficiently documented after having been included in this report.

Palaeontology

The proposed Mercury power line is underlain by Quaternary sands in the east, the Precambrian dolomites and associated marine sedimentary rocks of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) underlies the northern portion of the line, while the eastern portion is underlain by the Vryheid Formation (Ecca Group, Karoo Supergroup) and Quaternary sands.

According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) and that of the Vryheid Formation (Ecca Group, Karoo Supergroup) is Very High while that of the Quaternary aeolian sand is moderate (Almond et al, 2013; SAHRIS website)(Figure 5.11).

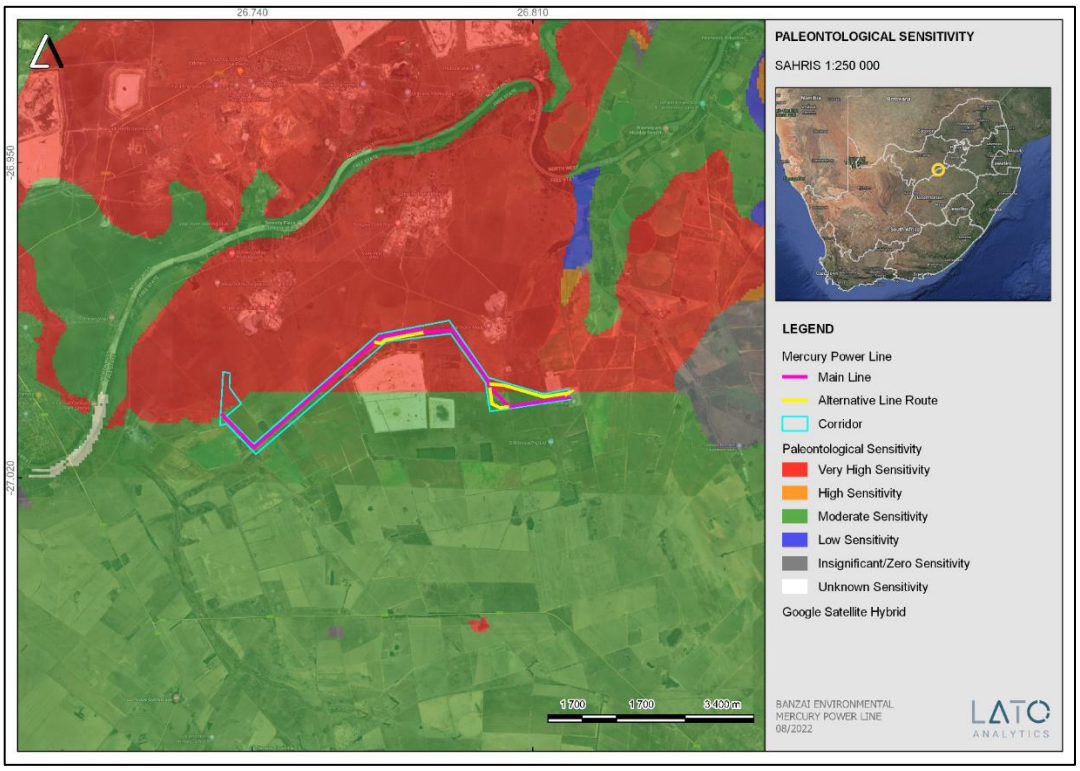

Figure 5.11: Palaeo-sensitivity Map

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 30 July 2022 No fossiliferous outcrop was detected in the proposed development area. The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a Low significance in palaeontological terms.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the grid connection infrastructure is largely dependent on technical and environmental factors such as topography of the site, access to the grid and capacity of the grid, as well as the three solar power plants that the infrastructure will cater for. The grid connection corridor is considered favourable and suitable from a technical perspective due to the following characteristics:

- Site access: Access will be obtained from the Stokkiesdraai Road.
- Grid connection: In order for the three PV facilities to connect to the national grid two collector substations and a double-circuit 132kV power line will be constructed within the identified corridor towards the existing Eskom Mercury MTS substation located to the east. Available grid connections are becoming scarce and play a huge role when selecting a viable site.
- Environmental sensitivities: From an environmental perspective the proposed grid connection corridor is considered desirable due to limited environmental sensitivities in terms of vegetation, surface water and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 of this report. Features that need to

be avoided by the placement of infrastructure, mainly relate to a wetland present within the grid connection corridor. Considering the nature of the proposed infrastructure (i.e., a power line which can span sensitive features), avoidance of the sensitive features will be possible with proper planning on the developer's side. Also, the grid connection solution provides the opportunity to enable the evacuation of electricity from three solar power plants eliminating the need for individual grid infrastructure for each facility and thereby consolidating linear infrastructure and the associated disturbance within the landscape.

It is evident from the discussion above that the proposed grid connection corridor may be considered favourable and suitable in terms of these site characteristics. Also, based on the opportunities presented with the proposed routing of the power line (as per the grid connection corridor being assessed), which is the shortest route to complete the connection, no other grid connection corridor routes are being considered. Based on the above, no site selection matrix was therefore required to compare the corridor.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to current conditions of the proposed grid connection corridor, the proposed grid connection corridor emerges as preferred due to the fact that the proposed power line route is the shortest option for the connection and disturbance within the landscape and is preferred by the developer from a technical perspective.

In conclusion the preferred alternative entails the development of the two collector substations and the ~11km power line within an identified corridor stretching over various properties located between the Paleso, Siyanda and Ngwedi SPPs, towards the existing Eskom Mercury MTS Substation. The preferred layout of the power line route is indicated in the attached layout plan to this BA report (Appendix H). It may be concluded that this is the only location that was assessed in detail for the proposed development.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 1. (3)(i) A BAR (...) must include-

(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 report;

6.1 SCOPING METHODOLOGY

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

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.
- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and

receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 27 October 2021. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area and the grid connection corridor. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	X			A hillslope seep, channelled valley bottom wetland and unchanneled valley bottom wetland is located within the grid connection corridor (Wetland Impact Assessment Appendix D1).
II. A conservation or open space area	X			The grid connection corridor falls within areas classified as CBA1, ESA1 and ESA 2.
III. An area that is of cultural importance		X		No sites or features of cultural significance has been identified for the project (Heritage Impact Assessment Appendix D4). No fossiliferous outcrop was detected (Appendix D5). The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a low significance in palaeontological terms.
IV. Site of geological significance		X		None.
V. Areas of outstanding natural beauty		X		None.

VI. Highly productive agricultural land		X		None. The Soil and Agricultural Assessment (Appendix D6) confirms that two of the collector substation locations are located on land classified as cultivated, however the land has not been under cultivation for at least 10 years, and should therefore no longer be classified as cultivated land or allocated to be of a high sensitivity.
VII. Floodplain		X		The Vaal River is located to the north of the grid connection corridor and therefore the floodplain associated with the River is not relevant to the project.
VIII. Indigenous forest		X		None.
IX. Grass land	X			According to the Biodiversity Impact Assessment (Appendix D1) the southern section of the grid connection corridor is located within the Vaal-Vet Sandy Grassland.
X. Bird nesting sites		X		None.
XI. Red data species		X		No red listed plant species were identified and no suitable habitat exists.
XII. Tourist resort		X		None.
2. Will the project potentially result in potential?				
I. Removal of people		X		None.
II. Visual Impacts	X			The Visual Impact Assessment (Appendix D3) concludes that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted are the nearby property owners and road users on nearby roads.

III. Noise pollution		×		Construction activities will result in the generation of noise over a period of 12 months. The noise impact is unlikely to be significant due to the location of the power line within an area of mining and agricultural land uses.
IV. Construction of an access road		×		Access will be obtained via the Stokkiesdraai 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 800 employment opportunities will be created during the construction phase and 45 during the operational phase - this number is the total number of opportunities for each of the Paleso, Siyanda and Ngwedi SPPs and the opportunities created for the proposed power line is included in the number of employment opportunities of the SPP's.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.		×		None.
VIII. Job creation	×			Approximately 800 employment opportunities will be created during the construction phase and 45 during the operational phase - this number is the total number of opportunities for each of the Paleso, Siyanda and Ngwedi SPPs and the opportunities created for the proposed power line is included in the number of employment opportunities of the SPP's.

IX. Traffic generation	X			Traffic will be generated during the construction and operation phases. With an increase in traffic on the Stokkiesdraai road.
X. Soil erosion	X			The servitude of the power line will need to be cleared or graded to a limited extent, which may result in a degree of dust being created, increased runoff and soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		X		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	X			The Vaal River is located ~3km north of the grid connection corridor
II. A conservation or open space area	X			The grid connection corridor falls within areas classified as CBA1, ESA1 and ESA 2.

III. An area that is of cultural importance	X			No sites or features of cultural significance has been identified for the project (Heritage Impact Assessment Appendix D4). According to the Palaeo Map of SAHRIS the Palaeontological Sensitivity of the Malmani Subgroup is Very High while that of the Quaternary aeolian sand is moderate. No fossiliferous outcrop was detected (Appendix D5). The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a medium significance in palaeontological terms.
IV. A site of geological significance		X		None.
V. An area of outstanding natural beauty		X		None.
VI. Highly productive agricultural land		X		None.
VII. A tourist resort	X			Tourist developments ae located within 1-5km from the project which includes the Vaal River, various lodging facilities and the Visarend Caravan Park.
VIII. A formal or informal settlement	X			Settlements located within 10km from the development includes homesteads, smallholdings, Orkney, Kanana Settlement, Vaal Reefs and Vierfontein.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in-

depth assessment. An indication is provided of the specialist studies which were conducted and that informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

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

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

Detailed impact assessments have been undertaken by each of the respective specialists which has informed the matrix analysis as included in Table 6.3, as well as the key issues identified as included in sections 6.2.1-6.2.3. The Table 6.2 includes reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained.

Table 6.2: Reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained

Specialist Study	Impact Assessment (pg.)	Cumulative Impacts (pg.)	Mitigation Measures (pg.)
Biodiversity Impact Assessment (Appendix D1)	49-53	49-53	49-53
Wetland Impact Assessment (Appendix D1)	49-53	49-53	49-53
Avifauna Impact Assessment (Appendix D2)	45-51	45-51 & 55	52-54
Visual Impact Assessment (Appendix D3)	41-50	41-50	51-52
Heritage Impact Assessment (Appendix D4)	16-17	16-17 & 20	17-18

Palaeontological Impact Assessment (Appendix D5)	21-22	21-22	22-25
Agricultural Compliance Statement (Appendix D6)	8-9	9-10	12

Table 6.3: Matrix analysis

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

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY		POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 12(ii)(a)(b) (GN.R. 327): *"The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."* Activity 14 (GN.R 327): *The development and related operation of facilities or infrastructure, for the storage, or for the storage*	Site clearing and preparation The proposed 132kV double circuit power line will connect the proposed Paleso, Siyanda and Ngwedi SPPs to the existing Eskom Mercury MTS substation and subsequently, to the national grid. Power line tower footprints and the substation footprint will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Tower pegging • Terrain levelling if necessary– levelling will be minimal as the potential site chosen is relatively flat.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community. • Introduction of IAP species and invasive fauna. • Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).		-	L	L	D	PR	SL	Yes	- See Table 6.3	L	Biodiversity Impact Assessment (Appendix D1)
			Avifauna	• Destruction, degradation and fragmentation of surrounding habitats • Displacement/emigration of avifauna community (including SCC) due to noise pollution • Direct mortality from persecution or poaching of avifauna species and collection of eggs • Direct mortality from increased vehicle and heavy machinery traffic		-	L	P	D	BR	CL	Yes	- See Table 6.3	L	Avifauna Impact Assessment (Appendix D2)
			Air	• Air pollution due to construction activities and the	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be	L	-

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 19 (GN.R. 327): "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse"* Activity 27 (GN.R. 327): *"The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation."* Activity 4(b)(i)(ee)(gg) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres, in the (b) Free State Province, (i) outside urban areas and within (ee) a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) 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*	• Construction of foundations for pylons. • Construction of the substation foundations • Assembly and erection of towers. • Stringing of conductors. • Installation of the substation components.			increase of traffic of construction vehicles.									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.		
			Soil/Agriculture	• Loss of Land Capability • Minimal soil and land degradation • Erosion and run-off • Nuisance disturbance to agricultural activities	-		S	S	Pr	PR	NL	Yes	- See Appendix F	L	Soil and Agricultural Impact Assessment (Appendix D6)
			Geology	• Removal of topsoil. • Soil erosion. • Hard/compact geology. If the bedrock occurs close to surface it may present problems.	-		S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing infrastructure as much as possible. - If an activity will mechanically disturb below surface levels in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation. - 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. • Generation of sewage that needs to be accommodated by the local sewage plant.	-		L	S	D	CR	NL	Yes	-	L	Confirmation from the Local Municipality

areas of a biosphere reserve, excluding disturbed areas." Activity 10(b)(i)(ee)(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 meters in (b) the Free State Province, (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) 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; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."* Activity 12(b)(i)(ii)(iv) (GN.R 324): *"The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State Province, (i) within any critically endangered or*		SOCIAL/ECONOMIC ENVIRONMENT		• Increase in construction vehicles on existing roads.											
		Surface water (wetland / riparian areas)	• Clearing and preparation of power line route including storage of equipment. • Excavation, levelling and installation of transmission towers.		-	S/L	S	U	PR	NL	Yes	- See Table 6.3	L	Wetland Impact Assessment (Appendix D1)
		Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	P	S	D	I	N/A	Yes	- Where reasonable and practical, the service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.	L	-
		Visual landscape	• Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed power line.	-		L	S	D	PR	NL	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix D3)
		Traffic volumes	• Increase in construction vehicles.	-		P	S	Pr	CR	NL	Yes	- The development may commence without influencing the levels-of-service for the local road network. Remedial work should take place before the construction starts. - Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	L	-
		Health & Safety	• Air/dust pollution. • Road safety.	-		L	S	Pr	PR	ML	Yes	- Contractor to ensure that construction	L	-

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 2004, (ii) within a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of watercourse or wetland." <u>Activity 14 (xii)(a)(b)(i) (GN.R 324):</u> *"The development of (xii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs (a) within a watercourse; in the (b) Free State Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of*				• Impacts associated with the presence of construction workers on site and in the area. • Influx of job seekers to the area. • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. • Increased risk of veld fires.								related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. - It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
			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	-
			Tourism industry	• Since there are no sensitive tourism facilities in close proximity to the corridor, the proposed activities are not expected to 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 (including archaeology & palaeontology)	• As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development.	-		S	S	PO	BR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix D4)

NEMPAA or from the core area of a biosphere reserve."				• Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study											Palaeontological Impact Assessment (Appendix D5)
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 10(b)(i)(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 meters in the (b) Free State Province, (i) outside urban areas and within (hh) areas within a watercourse or wetland; or within 100 meters from the edge of a watercourse or wetland."*	Connection to the grid - For the Paleso, Siyanda and Ngwedi SPPs to connect to the electrical grid the projects require transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation (i.e. collector substation) will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. A substation has been authorised/proposed to step the voltage up to 132kV at each of the three solar power plants, after which the power will be evacuated into the national grid via the new proposed respective collector substations and the power line. The Eskom Mercury MTS substation is a feasible connection to the national grid.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Continued fragmentation and degradation of natural habitats and ecosystems. • Continuing spread of IAP and weed species. • Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).		-	S	M	PO	PR	ML	Yes	- See Table 6.4	L	Biodiversity Impact Assessment (Appendix D1)
			Avifauna	• Collisions with infrastructure • Electrocution due to infrastructure. • Direct mortality from persecution or poaching of avifauna species and collection of eggs • Direct mortality by roadkill during maintenance procedures • Encroachment of Invasive Alien Plants into disturbed areas		-	L	L	D	BR	SL	Yes	- See Table 6.4	L	Avifaunal Impact Assessment (Appendix D2)
			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	• Minimal soil and land degradation • Erosion and run-off • Nuisance disturbance to agricultural activities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Soil and Agricultural Impact Assessment (Appendix D6)
			Geology	• Soil erosion. • Hard/compact geology. If the bedrock occurs close to surface it may present problems.	-		S	S	Po	PR	ML	Yes	- Mitigation measures proposed by the detailed engineering	L	-

													geological investigation should be implemented.		
			Surface water (wetland / riparian area)	• Routine operation and maintenance of power line route		-	L	L	U	PR	ML	Yes	-See Table 6.4	L	Wetland Impact Assessment (Appendix D1)
		SOCIAL/ECONOMIC ENVIRONMENT	Visual landscape	• Potential visual impacts on sensitive visual receptors located within a 5km radius. • Potential visual impacts on sensitive visual receptors in the region (5-10km) • Visual and sense of place impacts		-	L	L	PR	PR	SL	Yes	-See Table 6.4	L	Visual Impact Assessment (Appendix D3)
			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase. The only traffic expected would be during routine maintenance which would be limited.	-		L	L	Po	CR	NL	Yes	-	L	-
			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	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
			Tourism industry	• Since there are no tourism facilities in close proximity to the corridor, the proposed activities are not expected to 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 (including archaeology & palaeontology)	• Impact associated with the development are limited to the construction phase and therefore not applicable to the operation phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Heritage Impact Assessment (Appendix D4)
			Electricity supply	• Generation of additional electricity. The grid connection	+		I	L	D	I	N/A	Yes	-	N/A	-

				infrastructure will enable the evacuation of solar electricity that will be fed into the grid.												
			Electrical infrastructure	• Additional electrical infrastructure. The proposed power line and substations 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	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed power line and substations and the solar facilities which it will cater for 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 power line and substation will be dismantled. <u>Rehabilitation of biophysical environment:</u> The biophysical environment will be rehabilitated	BIOPHYSICAL ENVIRONMENT	Fauna & 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.	-		S	L	PO	PR	ML	Yes	- See Table 6.5	L	Biodiversity Impact Assessment (Appendix D1)
			Avifauna	• Direct mortality due to earthworks, vehicle collisions and persecution • Continued habitat degradation due to Invasive Alien Plant encroachment and erosion.		-	L	P	D	IR	CL	Yes	- See Table 6.5	L	Avifauna Impact Assessment (Appendix D2)
			Surface water features	• Removal of transmission towers and lines	-		S	S	Po	CR	NL	Yes	• Mitigation measure from the construction phase should be implemented	L	Wetland Impact Assessment (Appendix D1)

			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/Agriculture	• Minimal soil and land degradation • Erosion and run-off • Nuisance disturbance to agricultural activities	-		S	S	Pr	PR	NL	Yes	- See Appendix F	L	Agricultural Compliance Statement (Appendix D6)
			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 need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.		-	L	S	D	I	NL	Yes	-	L	Confirmation from the Local Municipality
			Ground water	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-Make use of appropriate drip trays for the repairing and servicing of vehicles.	L	-
		SOCIAL/ECONOMIC ENVIRONMENT	Visual landscape	• Visual impact of construction / decommissioning activities on sensitive visual receptors in close proximity to the proposed power line.	-		L	S	D	PR	NL	Yes	- See Table 6.5	L	Visual Impact Assessment (Appendix D3)
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should	L	-

													not take place over weekends.		
			Health & Safety	• Air/dust pollution. • Road safety. • Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.	-		L	S	Pr	PR	ML	Yes	- Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. - Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced. - Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.	L	-
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		S	S	D	CR	NL	Yes	- The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.	L	-
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources (including	• As no sites, features or objects of cultural historic significance	-		S	S	PO	BR	ML	Yes	- See Table 6.4	L	Heritage Impact Assessment

			archaeology & palaeontology)	have been identified in the project area, there would be no impact as a result of the proposed development. • Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study										(Appendix D4) Palaeontological Impact Assessment (Appendix D5)

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

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which were addressed in more detail in the BA 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 12(ii)(a)(b) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (b) within 32 meters of a watercourse, measured from the edge of a watercourse."*
- Activity 14 (GN.R 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 19 (GN.R. 327): "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse"*
- Activity 27 (GN.R. 327): *"The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation."*
- Activity 4(b)(i)(ee)(gg) (GN.R 324): *"The development of a road wider than 4 metres with a reserve less than 13,5 metres, in the (b) Free State Province, (i) outside urban areas and within (ee) a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (gg) 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, excluding disturbed areas."*
- Activity 10(b)(i)(ee)(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 meters in (b) the Free State Province, (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) 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; (hh) Areas*

within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."

- Activity 12(b)(i)(ii)(iv) (GN.R 324): *"The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State Province, (i) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004, (ii) within a Critical biodiversity area as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (iv) areas within a watercourse or wetland; or within 100 metres from the edge of watercourse or wetland."*
- Activity 14 (xii)(a)(b)(i) (GN.R 324): *"The development of (xii) infrastructure or structures with a physical footprint of 10 square metres or more where such development occurs (a) within a watercourse; in the (b) Free State Province, (i) outside urban areas, within (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) 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."*

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

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Biodiversity Impact Assessment (Appendix D1)	Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.	Negative Medium	Negative Low	• All high sensitivity areas should be avoided as much as possible, development in these areas kept to an absolute minimum, and the number of towers also a min. Where possible, access tracks must make use of existing routes • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited 'Very Low/Low' sensitivity areas. • The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorized areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. • All protected flora must be clearly demarcated prior to the commencement of site clearing. If construction activities are likely to affect any protected plants, these individuals should be relocated as part of a plant search and rescue plan. • Existing roads/servitudes should be considered first option over the construction of new roads/servitudes and must only be made where necessary • Materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be

				permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • Compile and implement a rehabilitation plan from the onset of the project. Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor must be in possession of an emergency spill kit that must always be complete and available on site. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone must be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.

				• All vehicles and equipment must be maintained, and all re-fueling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic must be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. • Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site. • All construction waste must be removed from site at the closure of the construction phase. • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. • Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan. • Cement mixing must not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site

				• A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The Contractor must supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility within every 10 days at least. • Where a registered disposal facility is not available close to the project area, the Contractor must provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins must be responsibly emptied and secured. Temporary storage of domestic waste must be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days. • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of sensitive fauna species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr. • Contractors and employees must all undergo the induction and must be made aware of the rocky areas to be avoided.

	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	• An Invasive Alien Plant Management Plan must be compiled and implemented. This must be regularly updated to reflect the annual changed in IAP composition. • The footprint area of the construction site must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the presence of SCC.
	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative Medium	Negative Low	• A qualified environmental control officer must be on site when activities begin. A site walk through, in the correct season, is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species must be noted. In situations where these species are observed these must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move

				out of the area on their own the relevant specialists must be contacted to advise on how the species can be relocated. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs basis only, as opposed to clearing and disturbing a number of sites simultaneously. • The duration of the activities must be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard. • All construction and maintenance motor vehicle operators must undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. • Any holes/deep excavations must be dug and planted in a progressive manner and must not be left open overnight. Should any holes remain open

				overnight they must be properly covered temporarily to ensure that no small fauna species fall in, and subsequently inspected prior to backfilling. • Use environmentally friendly cleaning and dust suppressant products. • Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. • No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • Only existing access routes and walking paths must be made use of. • Areas that are denuded during construction must be re-vegetated with indigenous vegetation to prevent erosion during flood events etc.
Wetland Impact Assessment (Appendix D1)	Disturbance and degradation of wetland vegetation	Negative Medium	Negative Low	• Restrict the disturbance and clearance footprint to within 5 m on either side of the proposed power line route (10 m disturbance corridor). • Avoid wetlands and buffers where feasible. • Implement a rehabilitation plan for any disturbed wetlands. Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent wetland and buffer areas. • Although the prescribed post-mitigation buffer as per the national buffer determination tool is 15 m attempt wherever possible to maintain a 33 m buffer on the delineated wetlands to lower the potential for bird collisions which are highest near water resources.

				• Reduce the disturbance footprint and the unnecessary clearing of vegetation when traversing the identified drainage lines. • Make use of existing access routes as much as possible, before new routes are considered. Any selected “new” route must not encroach into the wetland areas.
	Increased bare surfaces, runoff and potential for erosion	Negative Low	Negative Low	• Keep tower base excavation and soil heaps neat and tidy. • Limit construction activities in proximity (< 50 m) to wetlands to the dry season when storms are least likely to wash concrete and sand into wetlands. This is only where towers are within wetlands and buffer areas. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished. • Limit the placement of towers within wetlands and buffer areas where feasible. • Do not situate any of the construction material laydown areas within any wetland or buffer area. Try adhere to a 30 m buffer in these instances. • No machinery should be allowed to parked in any wetlands or buffer areas.
	Introduction and spread of alien and invasive vegetation	Negative Medium	Negative Low	• Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed.

				• Limit soil disturbance • The use of herbicides is not recommended in or near wetlands (opt for mechanical removal). • Appropriately stockpile topsoil cleared from the power line footprint. • Clearly demarcate power line construction footprint, and limit all activities to within this area. • Minimize unnecessary clearing of vegetation beyond the tower footprints and power line corridors. • Lightly till any disturbed soil around the tower footprint to avoid compaction.
	Increased sediment loads to downstream reaches	Negative Low	Negative Low	• See mitigation for increased bare surfaces, runoff and potential for erosion • Re-instate topsoil and lightly till transmission tower disturbance footprint.
	Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as Contamination and eutrophication of wetland systems with human sewerage and litter.	Negative Low	Negative Low	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering wetland or buffer areas. • Mixing of concrete must under no circumstances take place within the wetland or buffer areas. • Check for oil leaks, keep a tidy operation, and promptly clean up any spills or litter.

				• Provide appropriate sanitation facilities for workers during construction and service them regularly. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility; • The Contractor must be in possession of an emergency spill kit that must be complete and available at all times on site; • Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility;
Avifauna Impact Assessment (Appendix D2)	Destruction, degradation and fragmentation of surrounding habitats	Negative Very High	Negative Low	• Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc. • Existing roads are to be used and no new roads are to be developed. • All solid waste must be managed in accordance with the Solid Waste Management Plan. Recycling is encouraged. • All construction activity and roads to be within the clearly defined and demarcated areas. • Temporary laydown areas must be clearly demarcated and rehabilitated subsequent to end of use. • Appropriate dust control measures to be implemented.

				• Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act. • All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.
	Displacement/emigration of avifauna community (including SCC) due to noise pollution	Negative High	Negative Low	• Noise pollution is difficult to mitigate against. • No construction activity is to occur at night, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes.
	Direct mortality from persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	• All personnel to undergo environmental awareness training that includes educating on not poaching/persecuting species and collecting eggs. • Prior to commencing work each day, two individuals must traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area. • Any avifauna threatened by the construction activities that does not vacate the area must be removed safely by an appropriately qualified environmental officer or removal specialist.
	Direct mortality from increased vehicle and heavy machinery traffic	Negative Medium		• All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill. • All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.

Visual Impact Assessment (Appendix D3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed project	Negative Low	Negative Low	• Retain and maintain natural vegetation immediately adjacent to the development footprint. • 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 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.
Heritage Impact Assessment (Appendix D4)	Impacts on heritage objects	Positive Low	Positive Low	• No sites, features or objects of cultural significance were identified, no mitigation measures are proposed.
Palaeontological Impact Assessment	Impacts on palaeontological objects	Negative Medium	Negative Low	• If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO/site manager in charge of these developments.

(Appendix D5)				These discoveries ought to be protected (if possible, in situ) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a palaeontologist. • Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.
Other	Generation of waste - general waste, construction waste, sewage and grey water.	Negative Medium	Negative Low	• The Contractor shall install mobile chemical toilets on the site. • Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. • Ablution facilities shall be within 30m from workplaces. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). • Toilets shall be serviced regularly, and the ECO shall inspect toilets regularly. • Under no circumstances may open areas, neighbours' fences or the surrounding bush be used as a toilet facility. • Construction methods and materials should be carefully considered in view of waste reduction, re-use and recycling opportunities. • Specific areas must be designated on-site for the temporary management of various waste streams. Location of such areas must seek to minimise the

				potential for impact on the surrounding environment, including prevention of runoff, seepage and vermin control. • Adequate weather and vermin proof waste bins and skips should be placed on site. Separate bins should be provided for general and hazardous waste. • Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time. • Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. • The Contractor shall supply waste collection bins where such is not available, and all solid waste collected shall be disposed of at registered/licensed landfill. • A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. • If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. • Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. • Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly.

				• All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. • Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. • A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. • Under no circumstances may solid waste be burnt on site. • All waste must be removed promptly to ensure that it does not attract vermin or produce odours
	Soil erosion	Negative Low	Negative Low	• There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
	Creation of local employment and business opportunities, skills development and training	Positive Low	Positive Medium	• Strategies need to be identified by the local municipality and the business sectors in order to maximise the potential benefits associated with the establishment. • Efforts should be made to employ local contractors first and contractors that are compliant with the Broad Based Black Economic Empowerment (BBBEE) criteria. • Gender equality should also be promoted. If possible, a training and skills development programme for the local workers should be initiated prior to the construction phase.

	Technical support to local farmers and municipalities	Negative Low	Positive Low	• Private consultation sessions with local farmers can be held to inform them about the installation of solar energy facilities, the benefits thereof, the process and costs. • Workshops can also be held for the local farmers as well as the local municipality to also advise them regarding the installation of SPPs (and the associated grid infrastructure) and the process and costs thereof.
	Potential loss of productive farmland	Negative Low	Negative Low	• Development footprint needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. Livestock grazing on the proposed site need to be relocated.
	In-migration or influx of job seekers.	Negative Low	Negative Low	• A policy that no employment will be available at the gate should be implemented. Job seekers from the local community should be employed first.
	Presence of construction workers on the local communities	Negative Medium	Negative Low	• The proposed site should be fenced off and the movement of construction workers should be limited to the vicinity of the site. • Transportation for the construction workers need to be arranged by the contractor to ensure that there will be no trespassing of properties by any staff. Necessary arrangements to enable workers to return to their hometowns over weekends should also be arranged in order to reduce the risks posed to local family structures and social networks. No staff should be accommodated overnight on site, except for security staff. Contractors need to ensure that all workers sign a code of conduct before the construction phase starts, which are drawn up in accordance with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or

				losses. This code of conduct should also outline the acceptable behaviour an activities of construction workers.
	Heavy vehicles and construction activities	Negative Low	Negative Low	• With regards to all safety measures, the drivers of the vehicles must be qualified, and all vehicles must be road worthy. • Drivers should also be made aware of the strict speed limits on and off site and the potential road safety issues on site. • The contractor must repair any damages to the gravel roads on the site, during the construction phase, and any cost with regards to the repair of the roads must be borne by the contractor.
	Risk to safety, livestock and farm infrastructure	Negative Low	Negative Low	• The proposed site should be fenced off and the movement of construction workers should be limited to the vicinity of the site. • Contractors need to ensure that all workers sign a code of conduct before the construction phase starts, which are drawn up in accordance with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or losses. • Any form of theft, damaged infrastructure and trespassing will lead to immediate dismissal and the workers would be held liable for the costs thereof.
	Increased risk of veld fires	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site.

				• Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • 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.

6.2.2 Impacts during the operational phase

During the operational phase the grid connection corridor will serve a 132kV double circuit power line and three collector substations. The potential impacts will take place over a period of 20 – 30 years. Table 6.4 summarised the negative impacts are generally associated with the power line and substations, which include impacts on the avifauna, soils, geology, surface water, the pressure on existing services infrastructure, and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community (albeit limited for the grid connection infrastructure, it will be significantly higher for the three solar power plants which the proposed project caters for).

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 (GN.R 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 10(b)(i)(ee)(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 meters in (b) the Free State Province, (i) outside urban areas, within (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) 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; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."*

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Biodiversity Impact Assessment (Appendix D1)	Continued fragmentation and degradation of natural habitats and ecosystems.	Negative Medium	Negative Low	• The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs basis only, as opposed to clearing and disturbing a number of sites simultaneously. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard. • All construction and maintenance motor vehicle operators must undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.

				• Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. • Use environmentally friendly cleaning and dust suppressant products.
	Continuing spread of IAP and weed species.	Negative Medium	Negative Low	• An Invasive Alien Plant Management Plan must be compiled and implemented. This must be regularly updated to reflect the annual changed in IAP composition. • The footprint area of the construction site must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the presence of SCC.

	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).	Negative Medium	Negative Low	• Mitigation measures from the construction phase needs to be implemented.
Wetland Impact Assessment (Appendix D1)	Degradation of wetland vegetation.	Negative Low	Negative Low	• Clear vegetation in line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead power line servitudes". • Avoid the use of herbicides and diesel to treat stumps within the wetland and buffer areas. • Make use of existing access routes as much as possible, before new routes are considered. Any selected “new” route must not encroach into the wetland areas.

	Proliferation of alien and invasive species	Negative Medium	Negative Low	• In line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead power line servitudes" all alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. By this Eskom is obliged to control category 1, 2 and 3 plants to the extent necessary to prevent or to contain the occurrence, establishment, growth, multiplication, propagation, regeneration and spreading such plants within servitude areas.
Avifauna Impact Assessment (Appendix D2)	Collision with infrastructure	Negative High	Negative Low	• The design of the proposed Power Line must be of a type or similar structure as endorsed by the Eskom-Endangered Wildlife Trust (EWT) Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. • Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines.

				• Overhead cables/lines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites.
	Electrocution due to infrastructure	Negative High	Negative Low	• Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered. • Perch discouragers can be used such as perch guards or spikes.
	Direct mortality from persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	• All personnel must undergo environmental awareness training that includes educating on not

				poaching/persecuting avifauna species and collecting eggs.
	Direct mortality by roadkill during maintenance procedures	Negative Medium	Negative Low	• All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill. • All vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected
	Encroachment of Invasive Alien Plants into disturbed areas	Negative Very High	Negative Low	• An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation. • Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project. • All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

Visual Impact Assessment (Appendix D3)	Potential visual impacts on sensitive visual receptors located within a 5km radius.	Negative Low	Negative Low	• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Maintain the general appearance of the power line corridor/servitude
	Potential visual impacts on sensitive visual receptors in the region (5-10km)	Negative Low	Negative Low	• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Maintain the general appearance of the power line corridor/servitude
	Visual and sense of place impacts	Negative Low	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.
Other	Soil erosion	Negative Low	Negative Low	• There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure and

				substation infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
	Local employment and business opportunities, skills development and training	Positive Low	Positive Medium	• If possible, a training and skills development programme for the local workers should be initiated prior to the operational phase.
	Potential loss of productive farmland	Negative Low	Negative Low	• The development footprint must be maintained.
	Change in the sense of place	Negative Low / Positive Low	Negative Low / Positive Low	• Due to the height of the power line and extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the power line, but 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.
	Development of infrastructure for the generation of clean, renewable energy	Positive Medium	Positive Medium	• Utilise the proposed solar power plant and the associated grid connection infrastructure to promote and increase South Africa's contributions of renewable energy to the national energy supply grid.

6.2.3 Impacts during the decommissioning phase

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

Table 6.6: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Wetland Impact Assessment (Appendix D1)	Degradation of wetland vegetation and proliferation of alien and invasive species	Negative Low	Negative Low	• See mitigation for the impacts on direct loss, disturbance and degradation of wetlands and spread of alien and invasive plants. • Control should continue for a minimum of three years following decommissioning.
	Increased bare surfaces, runoff and potential for erosion	Negative Low	Negative Low	• See mitigation for increased bare surfaces, runoff and potential for erosion and increased sediment loads during construction
Other	Generation of waste	Negative Medium	Negative Low	• All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept.
	Soil erosion	Negative Low	Negative Low	• There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure and substation infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.

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:

- Biodiversity Impact Assessment – conducted by The Biodiversity Company (see Appendix D1).
- Wetland Impact Assessment – conducted by The Biodiversity Company (see Appendix D1).
- Avifauna Impact Assessment – conducted by The Biodiversity Company (see Appendix D2).
- Visual impact assessment - conducted by Donnaway Environmental (see Appendix D3).
- Heritage Impact Assessment- conducted by J van Schalkwyk Heritage Consultant (see Appendix D4).
- Palaeontological Impact Assessment - conducted by Banzai Environmental (Appendix D5).
- Soil and Agricultural Impact Assessment – conducted by The Biodiversity Company (Appendix D6).
- An 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 identified to be associated with the development.

6.3.1 Issue 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 site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. An independent palaeontologist was also appointed to undertake the palaeontological impact assessment. The main question which needs to be addressed is:

> *"Will the proposed development impact on any heritage, archaeological or palaeontological objects?"*

The Heritage Impact Assessment (Refer to Appendix D4) confirmed that no sites, features or objects of cultural significance have been identified and therefore no mitigation is required. From a heritage point of view, it is recommended that the project be allowed to continue.

The Palaeontological Impact Assessment (Appendix D5) confirms that no fossiliferous outcrop was detected in the grid connection corridor. The apparent rarity of fossil heritage suggests that the impact of the development will be of a Low significance in palaeontological terms. It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to damaging

impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

6.3.2 Issue 2: Biodiversity Impacts

The potential impact of the proposed development on threatened flora and fauna and sensitive ecological features and areas 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?"

The Biodiversity Impact Assessment (Appendix D1) concluded that the project area has been altered both currently and historically. The current adjacent mining operation as well as other land uses have had an impact on both the fauna and the flora in the area with degraded Grassland and wetlands still present being impacted on in some way or another. These habitat units can be regarded as incredibly important, not only within the within the local landscape, but also regionally; as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by agriculture and mining to more natural areas where they may reproduce. The habitat sensitivity of the wetlands and degraded habitats is regarded as high, due to floral and faunal species recorded as well as the role of this intact habitat to biodiversity within a very fragmented local landscape, not to mention the sensitivity according various ecological datasets, the high sensitivity areas still:

- Serve as and represent CBA1, as identified by the conservation plan;
- Provide overall intermediate ecological benefits for the wetland ecosystem;
- Support various organisms and may play an important role in the ecosystem if left to recover from the superficial impacts; and
- Serves as a viable, functional constituent of an EN ecosystem;

The completion of the terrestrial biodiversity assessment confirmed the still high sensitivity of the project area and therefore corroborates the screening report in regard to the wetlands and degraded habitats.

The ecological integrity, importance and functioning of these areas play a crucial role and an important habitat for various fauna and flora. The preservation of this systems is the most important aspect to consider for the proposed project, even more so due to the sensitivity of the areas. These habitats need to be protected and improved due to the role of this crucial and limited habitat, as well as a water resource within this disturbed local area.

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

- Habitat loss and fragmentation;
- Degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

Mitigation measures as described in this report must be implemented to reduce the significance of the risk to an acceptable residual level. Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project location, may be favourably considered on condition that all prescribed mitigation measures and supporting recommendations are implemented.

6.3.3 Issue 3: Surface Water Impacts

The potential impact of the proposed development on threatened flora and fauna and sensitive ecological features and areas 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 surface water?"

The Wetland Impact Assessment (Appendix D1), indicated that during the site assessment, six hydrogeomorphic (HGM) units were identified and assessed within the project area of influence as well as multiple artificial dams and a drainage system. The wetlands comprise of three hillslope seep wetlands, one channelled valley bottom and two unchannelled valley bottom wetlands. The wetlands scored overall PES scores ranging between C – "Moderately Modified" to a E – "Seriously Modified" due to the modification to both the hydrology and vegetation of the wetlands through anthropogenic activities. The wetlands scored "Medium" importance and sensitivity scores due to the high protection level of both the wetland vegetation and units. The average ecosystem service score was determined to range between "Intermediate" and "High" depending on the hydromorphic vegetation cover inside the wetlands. A 15 m post-mitigation buffer was assigned to the wetland systems.

Based on the results and conclusions presented in this report, it is expected that the proposed activities will pose low residual risks on the wetlands and thus no fatal flaws were identified for the project. A General Authorisation (GN 509 of 2016) is required for the water use authorisation for the proposed development.

6.3.4 Issue 4: Agricultural Impacts

The potential impact of the proposed development on agriculture and soils 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 agriculture and soils of the area?"

According to the Soil and Agricultural Impact Assessment (Appendix D6), the Three main sensitive soil forms were identified within the assessment area, namely the Ermelo, Hutton, and Vaalbos soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Low" and "Moderate high" sensitivities, which correlates with the findings from the baseline assessment. The assessment area land potential falls within "Low" sensitivities which also concur with some sections from the DAFF, (2017) sensitivities. However, the soil baseline assessment findings also dispute some of the areas which were categorised as "High" following the DEA, (2022) agricultural theme screening tool. The project area is therefore assigned an overall sensitivity of 'Medium'.

The assessment area is associated with arable soils. However, the available climatic conditions of low annual rainfall and high evapotranspiration potential severely limits crop production significantly resulting in land capabilities with "Low" and "Moderate high" sensitivities. The land capabilities

associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed Mercury Power Line project will have an overall low residual impact on the agricultural production ability of the land. The proposed activities will result in the segregation of some high production agricultural land. However, the planned development will occur on already established infrastructure with minimal impacts to the land potential of these crop fields. In areas where these crop fields are still under high production, stakeholder engagement must be undertaken to compensate landowners for high crop field land use where necessary. It is, therefore, the specialist`s recommendation that the proposed Mercury Power Line Project and associate infrastructure may be favourably considered for development with no significant impacts expected to occur.

6.3.5 Issue 5: Avifaunal Impacts

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

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

According to the Avifauna Impact Assessment (Appendix D2) it is important to note that the field results are based on a single dry-season survey and therefore, must be interpreted with caution.

Based on the latest available ecologically relevant spatial data the following information is pertinent to the Project Area of Influence (PAOI):

- It predominantly overlaps with Ecological Support Areas;
- It is located adjacent to NPAES Focus Areas; and
- The Terrestrial Biodiversity Theme Sensitivity was rated as 'Very High' according to the Environmental Screening Tool.

The PAOI was observed to support a species-poor assemblage of avifauna with 22 species recorded during the field survey, accounting for approximately 8% of the total number of expected species. Although it is postulated that more species will be recorded during the wet season, the dominant species comprised recorded during the field survey of those that are typically considered to be 'tolerant' or non-sensitive species, typical of the western highveld. In addition, FFG diversity was low, with only six guilds recorded within the PAOI. The results of this assessment are in congruency with the findings of assessment undertaken for the proximal Paleso SPP (Environamics, 2021). However, the latter assessment did report a higher species richness, which is attributed to the better habitat suitability within the PAOI.

There are concerns within an avifauna context for the proposed development. A single species of conservation concern(SCC) on a global scale, Sagittarius serpentarius (Secretarybird), was observed within the PAOI. There is no evidence of the species nesting within the PAOI, and in addition, the PAOI lacked appropriate nesting sites for the species. This species and two additional priority species are at risk to collision and electrocution from the proposed development, and accordingly these impacts must be mitigated against. This is will primarily involve the use of bird flappers and diverters on cables, and perch discouragers on pylons.

The main expected impacts of the proposed Power Line will include the following:

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

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable residual risk level. Considering that the proposed development is located within a Renewable Energy Development Zone and a Strategic Power Corridor, it is the opinion of the specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented.

6.3.6 Issue 6: Visual Impacts

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

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

The Visual Impact Assessment (Refer to Appendix D3) concluded that the significance of the visual impact will remain a "Negative Low Impact". The construction and operational phase of the proposed project will have a visual impact on the study area, especially within (but not restricted to) a 1km radius of the power line. The visual impact will differ amongst places, depending on the distance of the power line. The proposed power line will be developed parallel with existing power lines which will have a cumulative impact on receptors in close proximity (0km-1km), although, it will blend in with the existing power lines for receptors further away.

Due to the height of the power line (32m) no viable mitigation measures can be implemented to eliminate the visual impact, 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 of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the project.

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

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

The details of the power line must be submitted with the South African Civil Aviation Authority (SACAA).

Considering the above the specialist recommends that the project be approved.

6.4 SENSITIVITY ANALYSIS

The sensitivity analysis undertaken as part of the BA Report focusses on providing an understanding of the environmentally sensitive areas and features identified within the grid connection corridor. This section considers the findings of each of the independent specialist studies undertaken for the development and describes the sensitive features and areas identified, including the location, the sensitivity rating of the features or areas as well as the associated buffers recommended by the specialist (where a buffer is considered to be relevant). The sensitive areas and features identified are also displayed on the sensitivity map included as Figure H1-H2 of this BA report.

Only two specialist fields identified an area of high sensitivity which need to be considered for the placement of infrastructure. This includes the Wetland Impact Assessment (Appendix D1) and the Avifauna Impact Assessment (Appendix D2). Six hydrogeomorphic (HGM) units were identified and assessed within the project area of influence as well as multiple artificial dams and a drainage system. The wetlands comprise of three hillslope seep wetlands, one channelled valley bottom and two unchannelled valley bottom wetlands.

The Wetland Impact Assessment (Appendix D1), six hydrogeomorphic (HGM) units were identified and assessed within the project area of influence as well as multiple artificial dams and a drainage system. The wetlands comprise of three hillslope seep wetlands, one channelled valley bottom and two unchannelled valley bottom wetlands. A 15 m post-mitigation buffer was assigned to the wetland systems.

The Avifauna Impact Assessment (Appendix D2) expressed concerns within an avifauna context for the proposed development. A single species of conservation concern (SCC) on a global scale, *Sagittarius serpentarius* (Secretarybird), was observed within the PAOI. There is no evidence of the species nesting within the PAOI, and in addition, the PAOI lacked appropriate nesting sites for the species. This species and two additional priority species are at risk to collision and electrocution from the proposed development, and accordingly these impacts must be mitigated against. This is will primarily involve the use of bird flappers and diverters on cables, and perch discouragers on pylons.

Considering the delineation of the feature by the wetland specialist, it would be possible to locate pylons outside of the wetland feature and the associated 15m buffer, which would ensure that the placement of the infrastructure is in line with the recommendations of both specialists. The installation of bird diverters in the area will also be undertaken by the developer.

6.5 METHOD OF ENVIRONMENTAL ASSESSMENT

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

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 6.6.

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

6.5.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

Table 6.7: The 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 following requirements of the regulations:

Appendix 1. (3)(i) A BAR (...) must include-

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

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

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

7.2 GEOGRAPHIC AREA OF EVALUATION

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

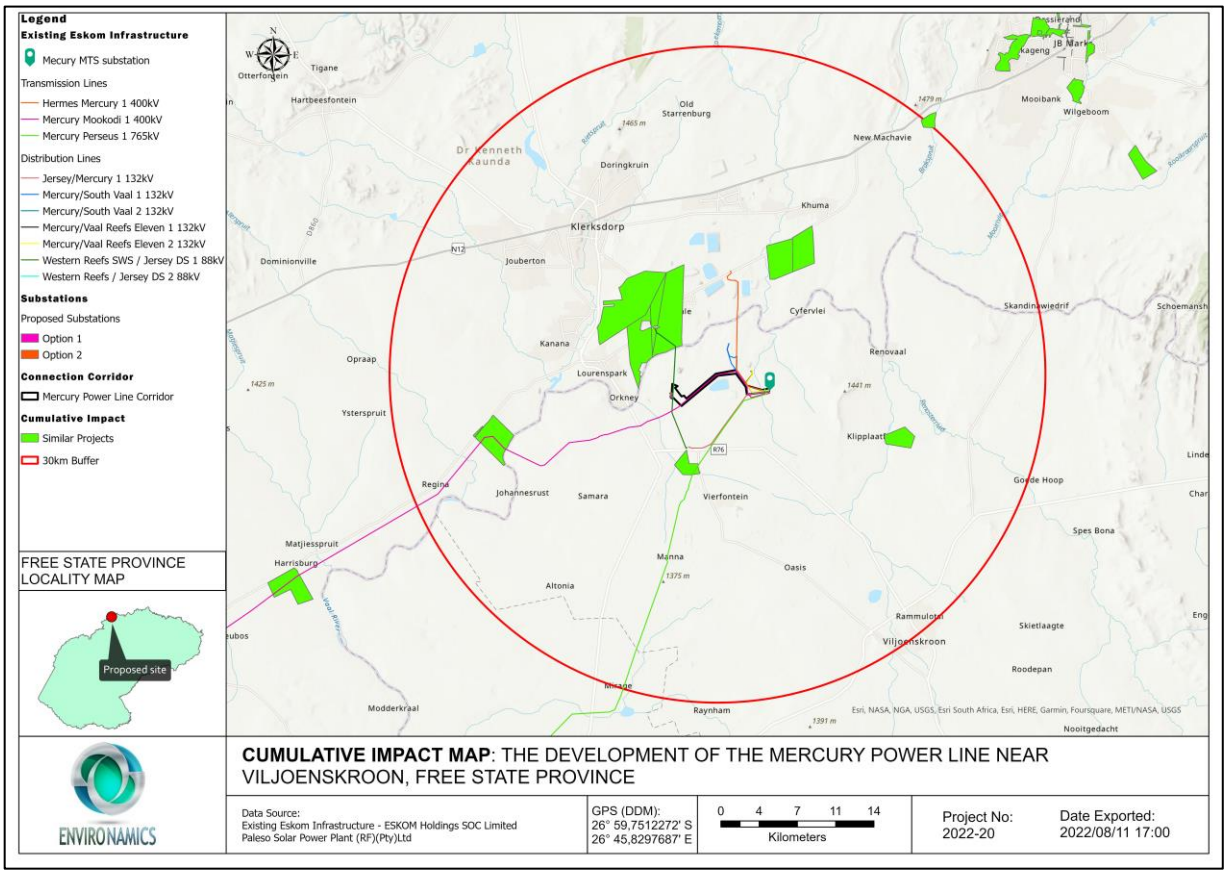

Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites (assuming the presence of required associated grid connection infrastructure)

The geographic spread of solar PV projects (including the associated grid connection infrastructure), 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 and North West 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 is the anticipated lifespan of the

proposed project, beginning in 2023 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

7.4 OTHER PROJECTS IN THE AREA

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

7.4.1 Existing projects in the area

The area within which the grid connection corridor is proposed is characterised by existing Eskom transmission and distribution infrastructure, solar power facilities and mining operation. It must be noted that not all details of existing and proposed grid connection infrastructure within the surrounding area are known. The focus of the cumulative impact assessment is on proposed and existing solar power plants and the associated required grid connection infrastructure needed for the operation of the facilities.

According to the DFFE's database twelve (12) PV solar plant applications (of which two applications have lapsed) have been submitted to the Department within the geographic area of investigation, – refer to Table 7.1. It should be noted that there is uncertainty with regards to the accuracy and validity of the information obtained from the Departments database.

Table 7.1: A summary of related facilities, 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
Paleso SPP[4]	<1km	150MW	14/12/16/3/3/1/2365	Basic Assessment	Approved
Siyanda SPP	<1km	150MW	14/12/16/3/3/1/2369	Basic Assessment	Approved
Ngwedi SPP	~1km	150MW	14/12/16/3/3/1/2535	Basic Assessment	Approved
Thakadu SPP	~1km	150MW	14/12/16/3/3/1/2476	Basic Assessment	Approved

[4] Environamics was the EAP responsible for the Basic Assessments for the Paleso, Siyanda, Ngwedi, Thakadu and Nyarhi Solar Power Plants.

Nyarhi SPP	~1km	100MW	14/12/16/3/3/1/2533	Basic Assessment	Approved
Kabi Vaalkop PV 3	17km	75 MW	12/12/20/2513/3	Scoping and EIA	Approved
Kabi Vaalkop PV 2	18km	75 MW	12/12/20/2513/2	Scoping and EIA	Approved
Kabi Vaalkop PV[5]	17km	75 MW	12/12/20/2513/4	Scoping and EIA	Approved
Kabi Vaalkop PV 1	17km	75 MW	12/12/20/2513/1	Scoping and EIA	Approved
Buffels Solar PV 1	18 km	100MW	14/12/16/3/3/2/777	Scoping and EIA	Approved
Buffels Solar PV 2	19 km	100 MW	14/12/16/3/3/2/778	Amendment	Approved
Afropulse 538 Pty Ltd	6 km	50MW	12/12/20/2280	BAR	Withdrawn/Lapsed

It is unclear whether other projects not related to renewable energy is or have been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development (and the associated grid connection) may take place within the general area. The next section of this report will aim to evaluate the potential for solar projects (including the associated grid connection infrastructure) for this area in the foreseeable future.

7.4.2 Projects in the foreseeable future

As part of the SEA for Wind and Solar Energy in South Africa, the CSIR and the DFFE mapped the location of all EIA applications submitted within South Africa. According to this database approximately ten (10) applications have been submitted for renewable energy projects within the geographical area of investigation, with six (6) of these being considered valid in terms of an Environmental authorisation as two (2) applications have lapsed or was withdrawn, one (1) application is only for transmission infrastructure and there is uncertainty regarding the completion of the EIA process for one (1) project which seems to be incorrectly listed on the DFFE database based on the lack of information available for the project. Environamics was the appointed EAP for five (5) other projects in close proximity to the

[5] The application was only for transmission infrastructure (i.e. substation and power lines).

development, which is not yet included in the DFFE database, but is considered in the cumulative impact assessment. The majority of these projects are located in close proximity to Orkney, and surrounding the site considered for the grid connection corridor.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

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

7.5.1 Biodiversity and Surface Water Features

The Biodiveristy Impact Assessment (refer to Appendix D1) stated that impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on local fauna and flora specifically.

Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby roads and power infrastructure including servitudes). Relevant activities and impacts include fragmentation, dust deposition and disruption of corridors or habitat,

Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of ecosystems and habitats. Due to the nature of the project, the actual footprint of the pole/pylon infrastructure has a small localised, impact. It is the creation off access and service roads that is a more important aspect to consider. However, no pylon footprint or road layout has been received, thus the exact area of habitat/ecosystem that may be lost cannot be determined.

The project area exists within the Klerksdorp REDZ and Central EGI corridor files, which indicates that the area is coined for power line and associated energy development projects.

According to the Wetland Impact Assessment (Appendix D1), stated that during construction (and without mitigation) the clearing and preparation of the power line route and storage of equipment may lead to the disturbance and degradation of wetland vegetation, increased bare surfaces, runoff and potential for erosion. Additionally, the excavation, levelling and installation of towers may lead to increased sediment loads and contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as contamination and eutrophication of wetland systems with human sewerage and litter. It is also assumed that most wetland and buffers can be avoided for the project.

Once constructed the routine operation and maintenance of power line route will invariably result in the degradation of vegetation due to mandatory and routine clearing of vegetation within the power line servitude. These routes together with any residual disturbances from construction may facilitate proliferation of alien and invasive species, if not managed appropriately. Risks associated with decommissioning the power line infrastructure centre on vegetation degradation from vehicle access and increased bare surfaces, runoff and potential for erosion from the removal of the tower infrastructure. Overall, all anticipated risks are considered to have a Low residual impact significance provided that the mitigation measures are effectively implemented.

In the light of all above, the expected cumulative impact is expected to be low to moderately detrimental, mainly attributed to the number of already existing OHLs and their servitudes.

7.5.2 Avifaunal

The Avifauna Impact Assessment (Appendix D2) indicates that localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, solar PV facilities, and power infrastructure). Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

In order to comprehend the cumulative impact of the proposed development, the Renewable Energy Development Zones (REDZs) spatial file, the South African Renewable Energy EIA Application Database (DFFE, 2021b) and the vegetation type remnant spatial file was overlaid onto a 30 km PAOI. The South African Renewable Energy EIA Application Database contains spatial data for renewable energy applications for environmental authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications. Data is captured and managed on a parcels level as well as aggregated to the project level at the boundary level. In addition, the 2020 National Landcover Dataset was considered in order to comprehend the type and extent of anthropogenic activities within the landscape.

The proposed Mercury Power Line Project in isolation has a Negative Low impact significance. However, in consideration of the anthropogenic activities within the landscape as indicated by field observations and the 2018 national landcover dataset, the cumulative impact was determined to be of a Negative High significance.

7.5.3 Visual

The Visual Impact Assessment (refer to Appendix D3) confirms that cumulative impacts are expected to occur during the construction and operation phases of the project. During the construction phase the construction activities may increase the cumulative visual impact together with existing electricity infrastructure and mines, and should any of the other proposed PV facilities be constructed, to people using the roads adjacent to site. Dust will be the main factor to consider. Furthermore there will be a

potential impact on the current sense of place in the are due to other power line infrastructure in the area already present (and possible proposed to be developed). However, the cumulative effect from a visual perspective and considering the area within which the project is proposed will be of a low significance.

During the operation phase visual impacts are expected to occur for observers in close proximity to the development, for visual receptors within the region and visual and sense of place impacts. The significance of these impacts will be low.

7.5.4 Heritage (archaeology, cultural and palaeontology)

The Heritage impact Assessment (Appendix D4) has indicated that heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

For the project area, the impacts to heritage sites are expected to be of medium significance. However, this can be ameliorated by implementing mitigation measures, include isolating sites, relocating sites (e.g. burials) and excavating or sampling any significant archaeological material found to occur within the project area. The chances of further such material being found, however, are considered to be negligible. After mitigation, the overall impact significance would therefore be low.

The Palaeontological Impact Assessment (Appendix D5) indicates that the cumulative impacts from a palaeontological perspective would be of a medium significance. This is considered to be within acceptable limits and therefore the development can continue.

7.5.5 Soil and Agriculture

According to the Soil and Agricultural Impact Assessment (Appendix D6) the potential cumulative agricultural impact of importance is a regional loss (including by degradation) of agricultural land, with a consequent decrease in agricultural production. The defining question for assessing the cumulative agricultural impact is this:

What level of loss of agricultural land use and associated loss of agricultural production 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?

Because the development itself leads to insignificant agricultural land loss, its cumulative impact must also logically be insignificant. It therefore does not make sense to conduct a more formal assessment of power line cumulative impacts as per DFFE requirements for cumulative impacts. Many times more electricity grid infrastructure than currently exists, or is currently proposed, can be accommodated before acceptable levels of change in terms of agricultural land loss are exceeded. Acceptable levels of change in terms of other types of impact, for example visual impact, would be exceeded long before

the levels for agricultural impact becomes an issue. In reality the landscape in this environment could be covered with power lines and agricultural production would continue, largely unaffected.

It is the specialist's opinion that the proposed Mercury Power Line project will have an overall low residual impact on the agricultural production ability of the land. The proposed activities will result in the segregation of some high production agricultural land. However, the planned development will occur on already established infrastructure with minimal impacts to the land potential of these crop fields. In areas where these crop fields are still under high production, stakeholder engagement must be undertaken to compensate landowners for high crop field land use where necessary. It is, therefore, the specialist`s recommendation that the proposed Mercury Power Line Project and associate infrastructure may be favourably considered for development with no significant impacts expected to occur.

7.6 IMPACT ASSESSMENT

Following the definitions of the term, the "residual effects on the environment", i.e., effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also, a "combination of different individual environmental effects of the project acting on the same environmental component" can result in cumulative effects.

7.6.1 Potential Cumulative Effects

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

Table 7.2: Potential Cumulative Effects for the proposed project

Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase		
Loss of habitat, and disruption of surrounding ecological corridors.	Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of ecosystems and habitats. Due to the nature of the project, the actual footprint of the pole/pylon infrastructure has a small localised, impact. It is the creation off access	- Medium

	and service roads that is a more important aspect to consider.	
Avifauna	Development of multiple solar energy facilities, and the associated grid connection infrastructure, in this region may have cumulative impacts on birds, this will happen via the same factors identified here is: collision, avoidance and displacement. The proposed Mercury Power Line Project in isolation has a Negative Low impact significance. However, in consideration of the anthropogenic activities within the landscape as indicated by field observations and the 2018 national landcover dataset, the cumulative impact was determined to be of a Negative High significance.	- High
Impacts to surface water features	Development of multiple solar energy facilities, and the associated grid connection infrastructure, in this region may have cumulative impacts on freshwater features where appropriate avoidance is not implemented, as well as the management of indirect impacts such as pollution in nearby areas to the feature. .	- Low
Soil erosion	The largest risk factor for soil erosion will be during the construction phase. Should these impacts occur, there may be a cumulative impact on storm water runoff in the corridor and surrounding areas.	- Low
Impacts of the geology on the proposed development	A fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm.	N/A
Generation of waste	An additional demand for landfill space could result in cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community.	- Low
Employment opportunities	The community will have an opportunity to better their social and economic well-being, since they will have the opportunity to	+ Low

	upgrade and improve skills levels in the area.	
Visual intrusion	The construction of the infrastructure may increase the cumulative visual impact together with farming and mining activities and people using the roads adjacent to site. Dust will be the main factor to consider.	- Low
Increase in construction vehicles	If damage to roads is not repaired, then this will affect the farming and mining activities in the area and result in higher maintenance costs for vehicles of locals and other road users. The costs will be borne by road users who were not responsible for the damage.	- Negligible
Impact of construction workers on local communities & influx of job seekers	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	- Low
Risk to safety, livestock and farm infrastructure	If fire spreads to neighbouring properties, the effects will be compounded. Negligible cumulative effects, provided losses are compensated for.	- Low
Increased risks of grass fires	The risk of grass fires can be mitigated and managed.	- Negligible
Operational Phase		
Loss of agricultural land	Because of the extent of the corridor its contribution to any cumulative impact is considered to be low.	- Low
Change in land use	Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. The impacts are however mitigated with the placement of the grid connection corridor adjacent to property	- Low

	borders so that central section of properties are not impacted and lost.	
Electrocution and collision of avifauna on grid connection infrastructure	Collisions with power line infrastructure and electrocutions when perched on power line infrastructure leading to injury or loss of avian life are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Medium
Visual intrusion	The operation of the grid connection infrastructure may increase the cumulative visual impact together with the existing Eskom power infrastructure and agricultural and mining infrastructure.	- Low
Consumption of water	An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water. However, the project will not use water during the operational phase.	- Negligible
Generation of additional electricity	The evacuation of generated electricity into the Eskom grid will strengthen and stabilise the grid (especially in the local area).	+ Low
Change in the sense of place	The construction of the grid connection infrastructure will increase the cumulative change in the sense of place due to industrial type infrastructure that is being proposed and the existing mining infrastructure in the region. Since the area is already largely transformed, the impact will be limited.	- Low
Development of infrastructure for the generation of clean, renewable energy	Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.	+ Medium
Decommissioning Phase		
Visual intrusion	The decommissioning of the PV plants and grid connection infrastructure may increase the cumulative visual impact together with farming and people using the existing roads	- Low

	adjacent to site. Dust and housekeeping will be the main factors to take into account.	
Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

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

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
  - Loss of habitat, and disruption of surrounding ecological corridors (-Medium)
  - Avifauna (- High)
- Cumulative effects during the operational phase:
  - Electrocution and collision of avifauna on grid connection infrastructure (- Medium)
  - Development of infrastructure for the generation of clean, renewable energy (+ Medium)
- Cumulative effects during the decommissioning phase:
  - Generation of waste (- Medium)

The cumulative impacts for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment and the proposed grid connection solution will enable the operation of three solar power plant. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. From an Avifaunal perspective, the development of the Mercury Power Line Project in isolation has a Negative Low impact significance. In consideration of the anthropogenic activities within the landscape as indicated by field observations and the 2018 national landcover dataset, the cumulative impact was determined to be of a Negative High significance. However, the consolidation of power line infrastructure with existing Eskom infrastructure and the implementation of the proposed mitigation measures will in turn reduce the overall impact of the development. In terms of the desirability of the development of renewable energy (and the associated grid infrastructure), it may be preferable to incur a higher cumulative loss in such a region as this one (which has already been degraded by mining and agricultural activities), than to lose land with a higher environmental value elsewhere in the country. Also, the acceptable cumulative

impacts expected will not result in a whole-scale change of the environment and therefore are considered to be acceptable, and considering the associated positive impacts associated with the development of solar energy facilities the proposed grid infrastructure is considered desirable.

8 ENVIRONMENTAL IMPACT STATEMENT

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

Appendix 3. (3) A BAR (...) 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, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;

(n) 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;

(o) 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 BAR (rating provided is the significance of the after mitigation):

- <u>Impacts during construction phase:</u>
  - Habitat fragmentation and degradation (- Low)
  - Introduction of IAP species and invasive fauna (- Low)
  - Disturbance and degradation of wetland vegetation (-Low)
  - Direct mortality from persecution or poaching of avifauna species and collection of eggs (-Low)
  - Visual impact of construction activities on sensitive visual receptors (- Low)

- Impacts on heritage and palaeontological objects (- Low)
- Creation of local employment and business opportunities, skills development and training (+ Medium)

➢ <u>Impacts during the operational phase:</u>

- Continued fragmentation and degradation of natural habitats and ecosystems (- Low)
- Proliferation of alien and invasive species (- Low)
- Degradation of wetland vegetation (- Low)
- Collision of avifauna when flying into power line infrastructure (- Low)
- Electrocution of avifauna when perched on power line infrastructure (- Low)
- Visual impact on sensitive visual receptors and change in the sense of place (- Low)
- Local employment and business opportunities, skills development and training (+ Medium)
- Development and operation of infrastructure for the generation of clean, renewable energy (+ Medium)

➢ <u>Impacts during the decommissioning phase:</u>

- Degradation of wetland vegetation and proliferation of alien and invasive species (- Low)
- Increased bare surfaces, runoff and potential for erosion (- Low)
- Generation of waste (- Low)

➢ Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity are expected to occur, however the cumulative impact assessment included in Section 7 of this report has indicated that the majority of the cumulative impacts will be of a medium or low significance, with Avifauna impacts expected to be of a high significance. However, the impact on avifauna can be reduced by effectively implementing the mitigation measures proposed by the specialist.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

Only two specialist fields identified an area of high sensitivity which need to be considered for the placement of infrastructure. This includes the Wetland Impact Assessment (Appendix D1) and the Avifauna Impact Assessment (Appendix D2). Six hydrogeomorphic (HGM) units were identified and assessed within the project area of influence as well as multiple artificial dams and a drainage system. The wetlands comprise of three hillslope seep wetlands, one channelled valley bottom and two unchannelled valley bottom wetlands.

The Wetland Impact Assessment (Appendix D1), six hydrogeomorphic (HGM) units were identified and assessed within the project area of influence as well as multiple artificial dams and a drainage system. The wetlands comprise of three hillslope seep wetlands, one channelled valley bottom and two unchannelled valley bottom wetlands. A 15 m post-mitigation buffer was assigned to the wetland systems.

The Avifauna Impact Assessment (Appendix D2) expressed concerns within an avifauna context for the proposed development. A single species of conservation concern (SCC) on a global scale, *Sagittarius serpentarius* (Secretarybird), was observed within the PAOI. There is no evidence of the species nesting within the PAOI, and in addition, the PAOI lacked appropriate nesting sites for the species. This species and two additional priority species are at risk to collision and electrocution from the proposed development, and accordingly these impacts must be mitigated against. This is will primarily involve the use of bird flappers and diverters on cables, and perch discouragers on pylons.

Considering the delineation of the feature by the wetland specialist, it would be possible to locate pylons outside of the wetland feature and the associated 15m buffer, which would ensure that the placement of the infrastructure is in line with the recommendations of both specialists. The installation of bird diverters in the area will also be undertaken by the developer.

8.3 RECOMMENDATION OF EAP

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

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations - already approved by the environmental authority.
- The Basic Assessment process has been conducted as required by the EIA Regulations, Regulations 19 and Appendix 1.
- The EMPr was compiled in conjunction with the Generic EMPr for overhead electricity transmission and distribution infrastructure and substation infrastructure which was published in Government Gazette 42323 on 22 March 2019.

- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and therefore, no terms of reference are provided for such studies.

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

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

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources through enabling the operation of the authorised Paleso, Siyanda and Ngwedi Solar Power Plants. All negative environmental impacts can be effectively mitigated through the proposed mitigation measures, and the significance of the impacts can be reduced to either medium or low significance. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the 132kV double circuit power line and two collector substations and associated infrastructure, Free State Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr(s).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed grid connection infrastructure must comply with all relevant national environmental laws and regulations.
- All actions and task allocated in the EMPr(s) should not be neglected and a copy of the EMPr should be made available onsite at all times.
- Should archaeologically 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 entire length of the proposed power line must be fitted with bird diverters as per the recommendations of the Avifauna Impact Assessment (Appendix D2).
- The period for which the Environmental Authorisation is required is between 7 and 10 years. This is based on the fact that the project is proposed to cater for three solar power plants which are proposed to be bid as part of the DMRE REIPPP Programme, with there being uncertainty regarding the announcement of the next bidding rounds,

and the need for a valid Environmental Authorisation. It must however be noted that the three solar power plants that the grid connection infrastructure will cater for will 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 eagerly await your comment in this regard.

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