

BASIC ASSESSMENT REPORT

Draft – 6 January 2022

DEVELOPMENT OF A POWER LINE FOR
THE PALESO SOLAR POWER PLANT
NEAR VILJOENSKROON, FREE STATE
PROVINCE



ENVIRONAMICS



PROJECT DETAIL

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TABLE OF CONTENTS

1	INTRODUCTION	0
1.1	LEGAL MANDATE AND PURPOSE OF THE REPORT.....	0
1.2	DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	5
1.3	DETAILS OF SPECIALISTS	6
1.4	STATUS OF THE BA PROCESS	19
1.5	STRUCTURE OF THE REPORT.....	20
2	ACTIVITY DESCRIPTION	25
2.1	THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION	25
2.2	ACTIVITY DESCRIPTION	28
2.3	ACTIVITIES ASSOCIATED WITH THE POWER LINE	32
2.4	LAYOUT DESCRIPTION.....	33
2.5	SERVICES PROVISION	36
3	LEGISLATIVE AND POLICY CONTEXT	38
3.1	INTRODUCTION.....	38
3.2	LEGISLATIVE CONTEXT	40
3.3	POLICY CONTEXT	47
3.4	OTHER LEGISLATION	59
3.5	RELEVANT GUIDANCE	59
3.6	CONCLUSION.....	60
4	THE NEED AND DESIRABILITY	62
4.1	THE NEED FOR THE PROPOSED ACTIVITY	62
4.2	THE DESIRABILITY OF THE PROPOSED ACTIVITY	63
5	DESCRIPTION OF ENVIRONMENTAL ISSUES.....	66
5.1	CONSIDERATION OF ALTERNATIVES	66
5.1.1	No-go alternative	67
5.1.2	Location alternatives.....	67
5.1.3	Design and layout alternatives	67



5.1.4	Technology alternatives.....	69
5.2	PUBLIC PARTICIPATION PROCESS	70
5.2.1	General.....	71
5.2.2	Consultation process.....	72
5.2.3	Registered I&APs.....	72
5.2.4	Issues raised by I&APs and consultation bodies	73
5.3	THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE	73
5.3.1	Biophysical environment	73
5.3.1.1	Geology, Soils, Landscape Characteristics, Land Use and Topography	73
5.3.1.2	Biodiversity and Vegetation	74
5.3.1.3	Surface Water Features	80
5.3.1.4	Avifauna	82
5.3.1.5	Soil and Agriculture	82
5.3.1.6	Climate	83
5.3.1.7	Visual landscape.....	84
5.3.1.8	Socio-economic conditions	86
5.3.1.9	Cultural and heritage aspects	87
5.4	SITE SELECTION MATRIX	89
5.5	CONCLUDING STATEMENT ON ALTERNATIVES.....	90
6	DESCRIPTION OF THE IMPACTS AND RISKS.....	91
6.1	SCOPING METHODOLOGY	91
6.1.1	Checklist analysis	92
6.1.2	Matrix analysis	97
6.2	KEY ISSUES IDENTIFIED	110
6.2.1	Impacts during the construction phase	110
6.2.2	Impacts during the operational phase.....	124
6.2.3	Impacts during the decommissioning phase	131
6.3	SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES.....	134
6.3.1	Issue 1: Heritage, archaeological and palaeontological impacts	134
6.3.2	Issue 2: Ecological and Wetland Impacts	135



6.3.3	Issue 3: Agricultural Impacts.....	135
6.3.4	Issue 4: Avifaunal Impacts	136
6.3.5	Issue 5: Visual Impacts	137
6.4	SENSITIVITY ANALYSIS.....	137
6.5	METHOD OF ENVIRONMENTAL ASSESSMENT	138
7	CUMULATIVE EFFECTS ASSESSMENT	143
7.1	INTRODUCTION.....	143
7.2	GEOGRAPHIC AREA OF EVALUATION.....	144
7.3	TEMPORAL BOUNDARY OF EVALUATION	144
7.4	OTHER PROJECTS IN THE AREA	145
7.4.1	Existing projects in the area.....	145
7.4.2	Projects in the foreseeable future	146
7.5	SPECIALIST INFORMATION ON CUMULATIVE EFFECTS.....	147
7.5.1	Ecology and Wetlands.....	147
7.5.2	Avifaunal	147
7.5.3	Visual.....	148
7.5.4	Heritage (archaeology, cultural and palaeontology)	148
7.5.5	Soil and Agriculture	149
7.6	IMPACT ASSESSMENT	149
7.6.1	Potential Cumulative Effects.....	149
7.7	CONCLUSION.....	153
8	ENVIRONMENTAL IMPACT STATEMENT	155
8.1	SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS	155
8.2	SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS.....	157
8.3	RECOMMENDATION OF EAP	157
9	REFERENCES	160



LIST OF TABLES

Table 1.1: Listed activities.....	0
Table 1.2: Details of specialists	7
Table 1.3: Project schedule	19
Table 1.4: Structure of the report.....	20
Table 2.1: General site information	26
Table 2.2: Listed activities.....	28
Table 2.3: Coordinates	34
Table 3.1: Legislative context for the construction of photovoltaic solar plants and the associated grid connection infrastructure	40
Table 3.2: Policy context for the construction of solar PV plants and the associated grid connection infrastructure	47
Table 5.1: ZTV Visibility Rating in terms of Proximity to the Power Line.....	84
Table 6.1: Environmental checklist	92
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	98
Table 6.2: Matrix analysis	100
Table 6.3: Impacts and the mitigation measures during the construction phase	112
Table 6.4: Impacts and the mitigation measures during the operational phase.....	125
Table 6.5: Impacts and the mitigation measures during the decommissioning phase	132
Table 6.6: The rating system	139
Table 7.1: A summary of related facilities, that may have a cumulative impact, in a 30 km radius of the study area	145



LIST OF FIGURES

Figure A: Locality map

Figure B: Regional map

Figure C: Footprint map

Figure D: Land capability classification map

Figure E: Vegetation map

Figure F: Sensitivity Map

Figure G: Cumulative impacts map

Figure H1: Critical Biodiversity Areas Map

Figure H2: Sensitivity map

Figure I: South Africa Protected Areas (SAPAD) map

Figure 2.1: Location of the grid connection corridor and the positions of the three collector substations under assessment 26

Figure 2.2: Map indicating coordinate points as related to Table 2.3 above 36

Figure 5.1: CBAs relevant to the grid connection corridor 75

Figure 5.2: Project proximity to threatened ecosystems. 76

Figure 5.3: Vegetation units identified within the grid connection corridor through the site survey . 79

Figure 5.4: Delineated wetland: buffer and regulated areas..... 82

Figure 5.5: Agricultural sensitivity as per the results of the Screening Report (green = low; yellow = medium; red = high)..... 83

Figure 5.6: Climatic diagram of the area within which the grid connection corridor is located 84

Figure 5.7: Zone of Theoretical Visibility (ZTV) for the Power Line – Hill shading 85

Figure 5.8: Palaeo-sensitivity Map..... 89

Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites (assuming the presence of required associated grid connection infrastructure) 144



PLATES

Plate 1: The site (taken toward the north)

Plate 2: The site (taken toward the north east)

Plate 3: The site (taken toward the east)

Plate 4: The site (taken toward the south east)

Plate 5: The site (taken toward the south)

Plate 6: The site (taken toward the south west)

Plate 7: The site (taken toward the west)

Plate 8: The site (taken toward the north west)

Plate 9: The proposed power line will traverse the existing power line route.

APPENDICES

Appendix A: EAP declaration and CV

Appendix B: Screening Report

Appendix C: Public Participation

Appendix C1: Press advertisement

Appendix C2: On site notice

Appendix C3: List of I&APs

Appendix C4: Proof of correspondence

Appendix C5: Written comments

Appendix C6: Comments and Responses Report

Appendix C7: Public Participation Plan

Appendix D: Specialist Reports

Appendix D1: Ecology and Wetland Impact Assessment

Appendix D2: Avifaunal Impact Assessment



Appendix D3: Visual Impact Assessment

Appendix D4: Heritage Impact Assessment

Appendix D5: Palaeontological Impact Assessment

Appendix D6: Agricultural Compliance Statement

Appendix E: Developer Site Assessment

Appendix F: Environmental Management Programme (EMPr)

Appendix F1: Generic EMPr for the power line infrastructure

Appendix F2: Generic EMPr for the substation infrastructure

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
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 two authorised projects which includes the Paleso Solar Power Plant and Siyanda 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 and 14/12/16/3/3/1/2369) on 04 October 2021 and 13 October 2021, respectively. Furthermore, the grid connection solution is also proposed to cater for the proposed Ngwedi Solar Power Plant for which the Basic Assessment process is currently underway¹.

In order for the two authorised projects (i.e. Paleso Solar Power Plant and Siyanda Solar Power Plant (SPP)), as well as the proposed Ngwedi Solar Power Plant, 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 three collector substations² 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

¹ Environamics are the appointed EAP undertaking the Ngwedi Solar Power Plant Basic Assessment Process.

² The collector substation can be used as switching station, collector substation and/or step-up substation.



1000 MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

The proposed project is intended to 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.



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 (2020-2021) of the Fezile Dabi District Municipality³ 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 and Siyanda Solar Power Plant each obtained EA for the development of two separate 150MW photovoltaic solar facilities and associated infrastructure on the Remaining Extent and the Remaining Extent of Portion 1 of the Farm Grootdraai 468, Registration Division Viljoenskroon, Free State Province situated within the Moqhaka Local Municipality and the greater Fezile Dabi District Municipality. The Basic Assessment process for the proposed Ngwedi Solar Power Plant on Portion 23 of the Farm Pretorius Kraal No. 53, is still in progress. 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 Jersey 132kV Substation located along the R76 regional road. The grid connection solution requires the development of specific grid connection infrastructure which includes a double circuit 132kV overhead power line and three collector substations located at each 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 between 150m - 250m wide⁴ and ~6km in length, and was assessed within this draft BA Report. The three 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 4m wide.

³ The Moqhaka Local Municipality falls within the Fezile Dabi District Municipality.

⁴ The corridor ~570m wide around the existing Jersey Substation to consider all connection points into the substation.



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 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: increased soil erosion and sedimentation, soil compaction and increased risk of sediment transport and erosion, soil and water pollution, establishment of alien invasive plant species, displacement of priority avian species from important habitats, impacts to freshwater features, impacts on heritage and palaeontological objects, generation of waste, potential loss of farmland, loss of plant species and biodiversity, 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: soil erosion and sedimentation, impacts to biodiversity 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. No cumulative impacts with a high residual risk have been identified.

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)	<ul style="list-style-type: none">“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 three 132kV collector substations) is required to enable the connection of the authorised Paleso and Siyanda SPPs (DFFE ref.: 14/12/16/3/3/1/2365 and 14/12/16/3/3/1/2369), as well as the proposed Ngwedi SPP to the national grid network. A 150m - 250m wide and ~6km 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 Jersey D.S. 88/132 kV substation.
GNR. 327, 07 April 2017	Activity 12(ii)(a)(b)	<ul style="list-style-type: none">• <i>“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.”</i>• 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	<ul style="list-style-type: none">• 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 three 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	<ul style="list-style-type: none">• <i>“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”</i>• The power line requires the development of a service road. Surface water features, including wetlands and drainage channels, 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	<ul style="list-style-type: none"> • <i>“The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation.”</i> • The development of the three 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 three collector substations is 7.5 hectares.
GNR. 324, 07 April 2017	Activity 4(b)(i)(ee)(gg)	<ul style="list-style-type: none"> • <i>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.</i> • 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 Mispha Game farm is located approximately 2.7km north east of the proposed development 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)	<ul style="list-style-type: none"> • <i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres, in (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</i>



		<p><i>watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</i></p> <ul style="list-style-type: none"> The three 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 and drainage channels, are present within the grid connection corridor as well as a CBA 1. The power line and the three collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The Mispha Game farm is located approximately 2.7km north east of the proposed development 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)	<ul style="list-style-type: none"> <i>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.</i> 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)	<ul style="list-style-type: none"> <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)</i>



		<p><i>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.</i></p> <ul style="list-style-type: none">• 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 and ESA 1. The power line and the three collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The Mispha Game farm is located approximately 2.7km north east of the proposed development as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.
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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. 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: Christia van Dyk
Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone: 078 470 5252 (Cell)
Electronic Mail: christia@environamics.co.za

And/or

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

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the 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	Envirogaud Ecological Services	Prof. L.R. Brown	P.O. Box 703 Heidelberg 14387	Cell: 082 464 1021	envgaud@telkomsa.net
Avifaunal Impact Assessment	Agreenco	ASH Haagner	PO Box 19896 Noordbrug Potchefstroom 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Visual Impact Assessment	Phala Environmental Consultants	Marelle Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	Phala.env@gmail.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Palaeontological Impact Assessment	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	elizebutler002@gmail.com
Agricultural Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za



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 and public participation plan was submitted on 20 October 2021. The Department confirmed that a pre-application meeting for the project is not required.
- The DFFE accepted the public participation plan in an email dated 21 October 2021.
- A site visit was conducted on 27 October 2021.
- Site notices were erected on site on 27 October 2021 and a newspaper advertisement was placed in the Klerksdorp Record on 29 October 2021 for the initial public participation.
- An Application for Environmental Authorisation and the draft BAR was submitted on 06 January 2022.
- The draft Basic Assessment report has been made available for a 30-day review and comment period from 6 January 2022 to 4 February 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 April 2022 – see Table 1.3.

Table 1.3: Project schedule

Activity	Prescribed timeframe	Timeframe
Submit public participation plan	-	18 Oct. 2021
Public Participation Plan Approval	-	21 Oct. 2021
Site visits (Initial PP – Press Advertisement & Site Notices).	-	27 October 2021
Appointment of specialists	-	18 Oct. 2021
Receive specialist studies	-	15 Nov. 2021
Submit application form and DBAR	-	6 Jan. 2022
Public participation (DBAR) (No PP between 15 Dec. 2021 & 5 Jan. 2022)	30 Days	6 Jan. 2022 – 4 Feb. 2022
Submit FBAR	44 Days	Feb. 2022
Department acknowledges receipt	10 Days	Feb. 2022
Decision	57 Days	By April 2022



Department notifies of decision	5 Days	By April 2022
Registered I&APs notified of decision	14 Days	April 2022
Appeal	20 Days	By May 2022

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: <ul style="list-style-type: none"> (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; 	3
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	A motivation for the preferred site, activity and technology alternative.	
(h)	a full description of the process followed to reach the preferred alternative within the site including – <ul style="list-style-type: none"> (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; 	5
	<ul style="list-style-type: none"> (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks 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 	6



	<p>the geographical, physical, biological, social, economic, heritage and cultural aspects;</p> <p>(viii) the possible mitigation measures that could be applied and level of residual risk;</p> <p>(ix) the outcomes of the site selection matrix;</p> <p>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and</p> <p>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;</p>	
(i)	<p>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 -</p> <p>(i) a description of all environmental issues and risks that were identified during the EIA process; and</p> <p>(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.</p>	
(j)	<p>an assessment of each identified potentially significant impact and risk, including-</p> <p>(i) cumulative impacts;</p> <p>(ii) the nature, significance and consequences of the impact and risk;</p> <p>(iii) the extent and duration of the impact and risk;</p> <p>(iv) the probability of the impact and risk occurring;</p> <p>(v) the degree to which the impact and risk can be reversed;</p> <p>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) the degree to which the impact and risk can be mitigated;</p>	
(k)	<p>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;</p>	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 EMP; and	
(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 three collector substations connecting the authorised Paleso and Siyanda SPPs, as well as the proposed Ngwedi SPP to the existing Jersey D.S. 88/132 kV 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 – 250m wide and ~6km 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.

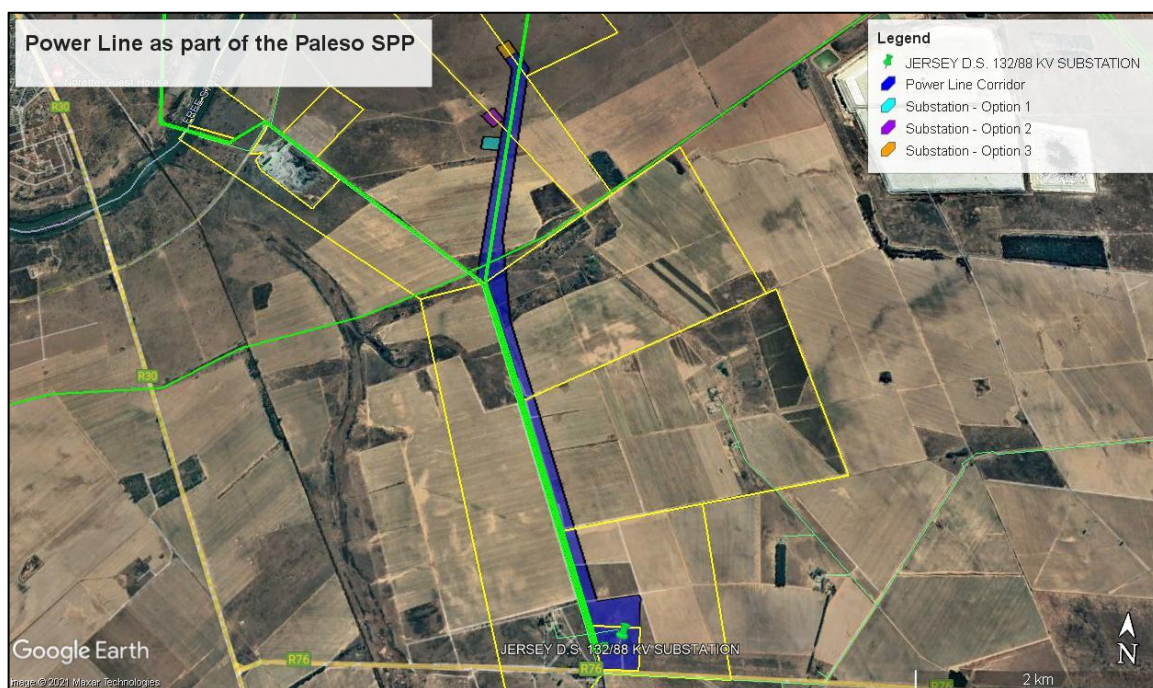


Figure 2.1: Location of the grid connection corridor and the positions of the three collector substations under assessment

Table 2.1: General site information

Description of affected farm portions	<ul style="list-style-type: none"> - Portion 23 of the Farm Pretorius Kraal No. 53 - Remaining Extent of the Farm Grootdraai No. 468 - Portion 1 of the Farm Grootdraai No. 468 - Portion 4 of the Farm Barberspan No. 452 - Remaining Extent of the Farm Barberspan No. 452 - Farm Sihor No. 275 - Farm Edom No. 277
Province	Free State
District Municipality	Fezile Dabi District Municipality
Local Municipality	Moqhaka Local Municipality
Ward numbers	22



Closest towns	Viljoenskroon located ~27km north-east and Orkney ~6.5km north-east
21 Digit Surveyor General codes	<ul style="list-style-type: none">- Portion 23 of the Farm Pretorius Kraal No. 53 - F0360000000005300023- Remaining Extent of the Farm Grootdraai No. 468 - F03600000000046800000- Portion 1 of the Farm Grootdraai No. 468 - F03600000000046800001- Portion 4 of the Farm Barberspan No. 452 - F03600000000045200004- Remaining Extent of the Farm Barberspan No. 452 - F03600000000045200000- Farm Sihor No. 275 - F03600000000027500000- Farm Edom No. 277 - F03600000000027700000
Type of technology	132kV double circuit overhead power line
Power Line Pylon Structure Height	~32m
Length of the power line	Approximately 6km
Power Line Servitude Width	Approximately 32m
Grid connection corridor width	Between 150m and 250m at sensitive areas and 570m around the existing Jersey Substation
Collector Substation capacity	132kV
Collector Substation footprint	2.5 hectare
Surface area to be covered	Approximately 133 hectares (including power line servitude and three collector substation footprints)
Service road	Twin track gravel road up to 5m wide

The grid connection corridor runs directly to the south, 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 game – refer to plates 1-9 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)	<ul style="list-style-type: none">• <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.”</i>• The development of a 132kV double circuit power line (and three 132kV collector substations) is required to enable the connection of the authorised Paleso and Siyanda SPPs (DFFE ref.: 14/12/16/3/3/1/2365 and 14/12/16/3/3/1/2369), as well as the proposed Ngwedi SPP to the national grid network. A 150m - 250m wide and ~6km 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 Jersey D.S. 88/132 kV substation.
GNR. 327, 07 April 2017	Activity 12(ii)(a)(b)	<ul style="list-style-type: none">• <i>“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.”</i>• 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	<ul style="list-style-type: none"> 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 three 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	<ul style="list-style-type: none"> <i>“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”</i> The power line requires the development of a service road. Surface water features, including wetlands and drainage channels, 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	<ul style="list-style-type: none"> <i>“The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation.”</i> The development of the three 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 three collector substations is 7.5 hectares.
GNR. 324, 07 April 2017	Activity 4(b)(i)(ee)(gg)	<ul style="list-style-type: none"> <i>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</i>



		<p><i>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.</i></p> <ul style="list-style-type: none"> 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 Mispha Game farm is located approximately 2.7km north east of the proposed development 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)	<ul style="list-style-type: none"> <i>The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres, in (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."</i> The three 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 and drainage channels, are present within the grid connection corridor as well as a CBA 1. The power line and the three



		<p>collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The Mispha Game farm is located approximately 2.7km north east of the proposed development as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.</p>
GNR. 324, 07 April 2017	Activity 12(b)(i)(ii)(iv)	<ul style="list-style-type: none"> <i>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.</i> 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)	<ul style="list-style-type: none"> <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</i>



		<p><i>protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.</i></p> <ul style="list-style-type: none">• 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 and ESA 1. The power line and the three collector substations are located within 5km of a protected area as identified in terms of NEMPAA. The Mispha Game farm is located approximately 2.7km north east of the proposed development as per the South Africa Protected Area Database (SAPAD) of the Department of Forestry, Fisheries and the Environment.
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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 Jersey D.S. 88/132 kV substation is a feasible connection to the national grid.

- Construction Phase:

The proposed 132kV overhead power line will be approximately 6km 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 and Siyanda SPPs, as well as the proposed Ngwedi SPP, 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 133 hectares in extent. The proposed route of the power line is the shortest route from the three respective proposed collector substations to the Jersey D.S. 88/ 132kV substation and is the preferred alternative for the developers based on the line distance and willingness of the landowners. Also, the grid connection corridor follows gravel roads present within the area which provides an opportunity for the consolidation of linear infrastructure and disturbance in the area. A final layout plan is included as Appendix H in the report.

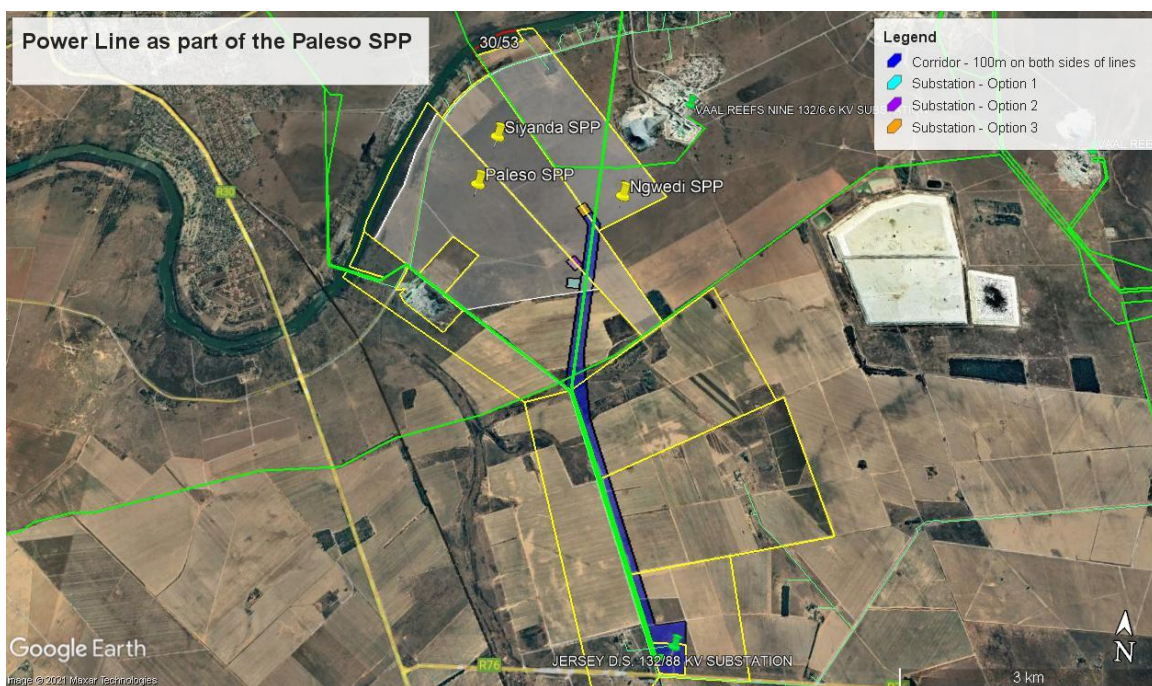


Figure 2.2: Proposed grid connection corridor, locations of the three proposed collector substations and the areas/properties within which the Paleso, Siyanda and Ngwedi SPPs are located

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

Table 2.3: Coordinates

Power line corridor		
Point	Latitude	Longitude
A	26°59'54.45"S	26°43'55.27"E
B	26°59'51.61"S	26°43'59.60"E
C	26°59'57.18"S	26°44'4.30"E
D	27° 0'58.32"S	26°44'0.81"E
E	27° 1'25.06"S	26°44'5.89"E
F	27° 2'44.97"S	26°44'40.29"E
G	27° 2'42.64"S	26°44'52.92"E
H	27° 2'43.56"S	26°44'53.56"E



I	27° 3'2.31"S	26°44'53.79"E
J	27° 3'2.46"S	26°44'42.90"E
K	27° 1'13.68"S	26°43'56.20"E
L	27° 1'11.87"S	26°43'53.35"E
M	26°59'58.03"S	26°43'58.16"E
Substation 1		
Point	Latitude	Longitude
A	27° 0'23.41"S	26°43'50.31"E
B	27° 0'23.58"S	26°43'56.66"E
C	27° 0'28.15"S	26°43'56.34"E
D	27° 0'28.02"S	26°43'50.01"E
Substation 2		
Point	Latitude	Longitude
A	27° 0'12.73"S	26°43'52.79"E
B	27° 0'16.99"S	26°43'57.19"E
C	27° 0'19.99"S	26°43'53.52"E
D	27° 0'15.81"S	26°43'48.93"E
Substation 3		
Point	Latitude	Longitude
A	26°59'47.15"S	26°43'55.93"E
B	26°59'51.61"S	26°43'59.40"E
C	26°59'54.39"S	26°43'55.40"E
D	26°59'49.86"S	26°43'51.55"E

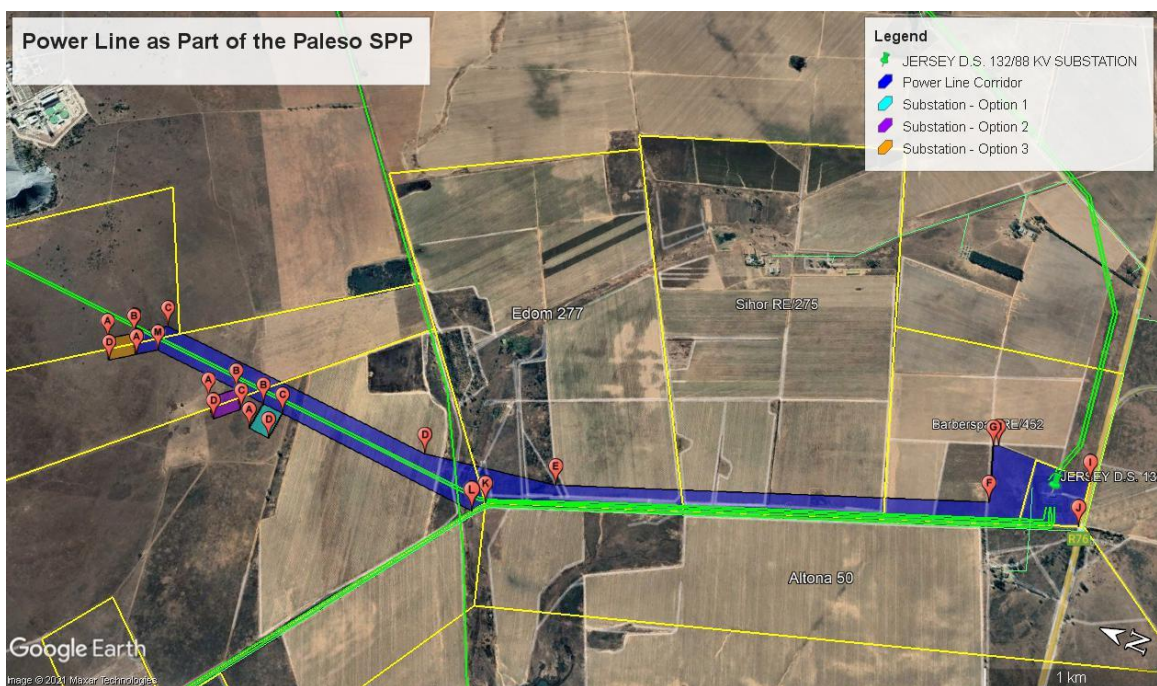


Figure 2.2: Map indicating coordinate points as related to Table 2.3 above

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, 1000m³ 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 (2020)
- 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	<p>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.</p> <p>The development of the Paleso, Siyanda and Ngwedi SPPs and the proposed grid 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.</p>



The National Environmental Management Act (Act No. 107 of 1998)	National Provincial Department of Forestry, Fisheries and the Environment	and 1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.
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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	of 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).
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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	<p>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.</p> <p>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.</p>
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Department of Forestry, Fisheries and the Environment (DFFE)	2004	<p>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.</p> <p>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</p>



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	<p>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.</p> <p>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.</p> <p>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</p>
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				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 Provincial Government	and	1983	<p>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.</p> <p>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.</p> <p>An Agricultural Compliance Statement has been undertaken for the grid connection corridor and is included as Appendix D6 of this draft BAR.</p>
The National Forests Act, 1998 (Act 84 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	of	1998	<p>The purposes of this Act are to:</p> <ul style="list-style-type: none"> (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees; (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry;



(f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette.

An Ecological 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 of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	1969	<p>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.</p> <p>An Ecological and Wetland Impact Assessment has been undertaken for the project and is included in Appendix D1 of this draft BAR.</p>
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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	<p>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:</p> <ul style="list-style-type: none">• 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 <p>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.</p>



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 <i>White Paper on Energy Policy</i> , 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.
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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	<p>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.</p> <p>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.</p>
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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.
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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	<p>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:</p> <ul style="list-style-type: none">• 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. <p>SIP 8 according to the Plan “<i>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</i>”. The purpose of SIP 9 according to the Plan is to “<i>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</i>”. 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 “<i>expand the transmission and distribution</i></p>
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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).
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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	<p>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:</p> <ul style="list-style-type: none">• 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. <p>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.</p>
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Strategic Integrated Projects (SIPs)	The Presidential Infrastructure Coordinating Committee	2010 - 2030	<p>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:</p> <ul style="list-style-type: none">• 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. <p>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.</p>
Strategic Environmental Assessment (SEA) for wind and solar PV	Department of Forestry, Fisheries and the Environment	2014	The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment.



Energy in South Africa	the Environment		<p>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.</p> <p>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).</p> <p>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.</p> <p>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.</p>
Free Provincial Spatial Development Framework (PSDF)	State Free Provincial Government	2012	<p>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'.</p> <p>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:</p>



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- 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. 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 Municipality Final Draft Integrated Development Plan (IDP)	Fezile Dabi Municipality	2020 - 2021	<p>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”.</p> <p>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”.</p> <p>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:</p> <ul style="list-style-type: none"> • 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. <p>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.</p>
Moqhaka Local Municipality Draft Integrated	Moqhaka Local Municipality	2020-2021	<p>The vision of the Moqhaka LM is to “...strive to <i>be a Municipality that creates an enabling environment for socio-economic growth and sustainable development.</i>”</p>



**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 and 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 management 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)⁵
- 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
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations

⁵ 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.



- 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 and Siyanda SPP and the proposed 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 CO₂ emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 an article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (source: <https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818>).

The 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 Mqohaka 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 and Siyanda SPPs and the proposed 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 CO₂ emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.

- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies). 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 6km long, and the proposed route of the power line is the shortest route from the proposed collector substations to the existing Jersey D.S. 88/132 kV 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 and proposed SPP, 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 purposes. The purpose of the proposed 132kV power line is to connect the authorised Paleso and Siyanda Solar Power Plants and the proposed Ngwedi SPP 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 6km long, and the proposed route of the power line is the shortest route to the National Grid.

In terms of the locations of the three 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, three collector substation locations options are being considered for development. These are all located within the northern 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 three 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 all three 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 than 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 Jersey 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 29 October 2021 (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 29 November 2021.

➤ Site notices

Site notices were placed on site in English and Afrikaans on 27 October 2021 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 29 November 2021. 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 (6 January 2022 – 04 February 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 and a river crossing.

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

The grid connection corridor is located in close proximity to the Vaal River, approximately 2.6km to the south of the feature. 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 site is located at an above mean sea level (amsl) of approximately 1335m at the highest elevation and at an amsl of 1308m at the lowest elevation.

The site is located in a grain farming agricultural region, but it is on the northern boundary of extensively cultivated land. Maize is cultivated on the southern part of the grid connection corridor, on soils that are suitable for crop production. Soils in the northern part of the corridor across all three collector substation locations, as well as to the north of it, are limited in depth and marginal for cultivation. The collector substation locations are used only for grazing of cattle. Mining occurs in the surrounding area.

In terms of the geology, only a small portion in the north of the corridor is underlain by the Precambrian dolomites and associated marine sedimentary rocks of the Malmani Subgroup while the southern portion is underlain by Quaternary aeolian sand (Qs).

The Quaternary superficial deposits are the youngest geological deposits formed during the most recent period of geological time (approximately 2.6 million years ago to present). The rocks and sediments can be found at or near the surface of the Earth. Most of the superficial deposits are unconsolidated sediments and consist of gravel, sand, silt, and clay, and they form relatively thin, often discontinuous patches of sediments or larger spreads onshore.



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 an Ecological Support Area (ESA 1) (light blue). Just below the ESA 1 the corridor moves through an ESA 2 (light pink) area towards the south, followed by an area classified as “Other”. Two areas classified as Critical Biodiversity Areas 1 (CBA 1) (beige) are located within the grid connection corridor – one section is at the bend point of the grid connection corridor in the northern section of the corridor and the other in close proximity to the existing Jersey substation located in the south. 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 two locations within the grid connection corridor.

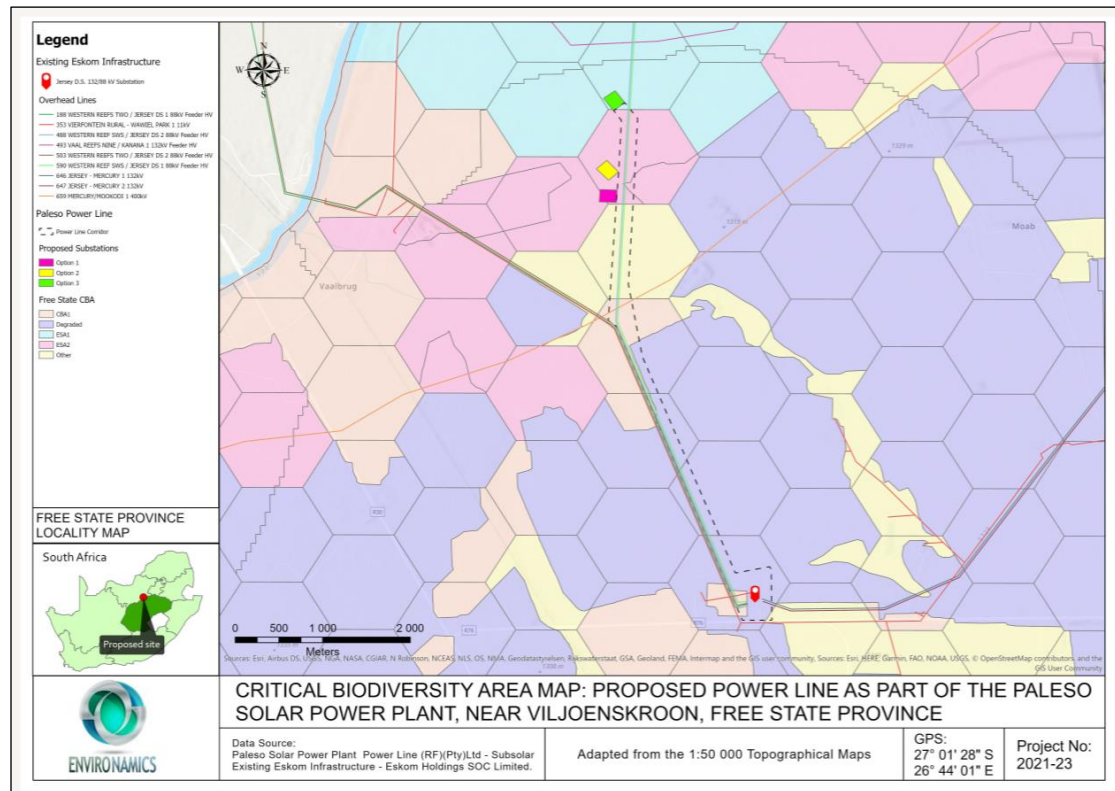


Figure 5.1: CBAs relevant to the grid connection corridor

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.

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 not fall into a National Protected Area Expansion Strategy (NPAES) area.

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.

The project is located within two ecosystems namely, the endangered Vaal-Vet Sandy Grassland (Gh10) which is located within majority of the corridor in the southern section and the vulnerable Vaal Reefs Dolomite sinkhole Woodland (Gh12) located within the most norther section of the corridor.

Refer to the Figure 5.2 below.

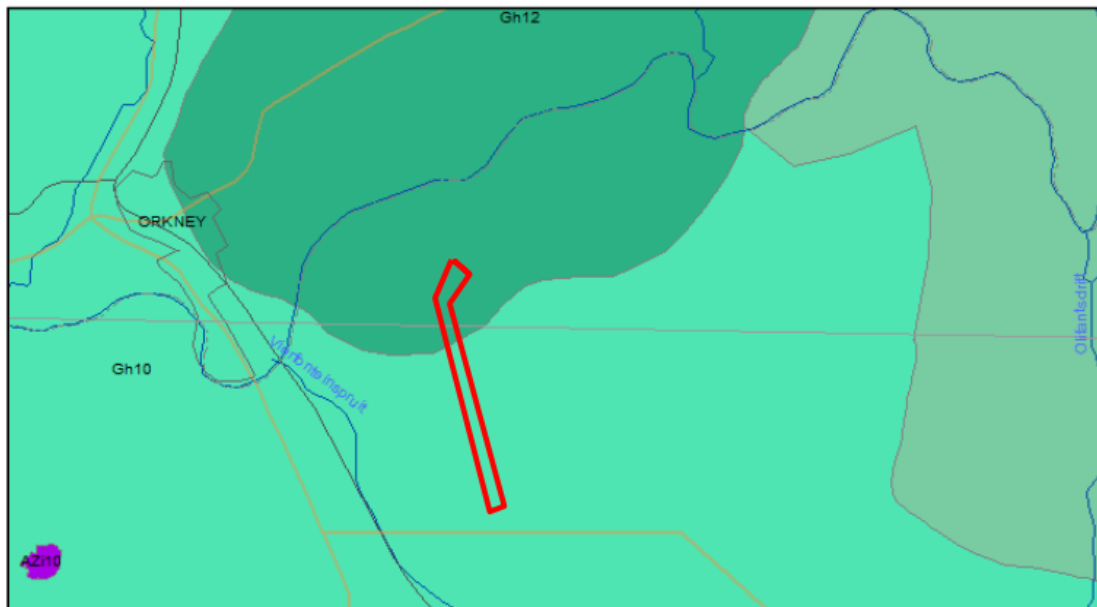


Figure 5.2: Project proximity to threatened ecosystems.

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).

As mentioned in the section above the grid connection corridor is located within the endangered Vaal-Vet Sandy Grassland and the vulnerable Vaal Reefs Dolomite Sinkhole Woodland.

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 *Antheophora 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*, *Antheophora 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.

A vegetation survey was completed in the project area. Seven different vegetation units were identified (Figure 5.3 below), namely:

1. *Themeda triandra-Cymbopogon caesius* grassland (vegetation unit 1) - comprises a small section area of the corridor. This vegetation unit is degraded due to heavy grazing by cattle, resulting in a homogenous vegetation composition, and low species richness, dominated by encroacher and secondary successional species. This degraded grassland has a low conservation value and ecosystem functioning.
2. *Cynodon dactylon* grassland (vegetation unit 2) - located in the northern section of the corridor. The area was used as a cultivated land in the past but has been left fallow for many years. As a result, the pioneer grass *Cynodon dactylon* and the anthropogenic grass *Hyparrhenia hirta* has become dominant and will remain so unless active rehabilitation is implemented. This grassland has a low species richness and comprises pioneer and secondary plant species mostly. From a plant ecological and ecosystem functioning point of view this area has a low conservation value and ecosystem functioning.
3. *Elephantorrhiza elephantina* shrubland (vegetation unit 3) – located within the northern section of the corridor. The area consists of dolomite sheets with shallow sandy loam soil and is dominated by the geophytic shrublet *Elephantorrhiza elephantina* while the shrublet *Ziziphus zeyheriana* is prominent in some areas where it forms dense colonies. This shrublet has outcompeted most other plant species and forms an extensive network of underground stems where nutrients and water are stored. As a result, this unit has a low species richness with mostly encroacher and pioneer plant species present resulting in this unit having a low conservation value and ecosystem functioning.



4. Eragrostis rigidior degraded grassland (vegetation unit 4) - located in the northern section of the corridor. This grassland has been subjected to heavy overgrazing in the past and is degraded with a low species richness consisting mostly of secondary successional and pioneer plant species. This area is regarded as being transformed with no resemblance to the original native vegetation that occurred in the area. From a plant ecological and ecosystem functioning point of view this unit has a low conservation value and ecosystem functioning.
5. Cultivated field and old fields (vegetation units 5 and 6) – unit 5 is actively used for the planting of mostly maize. Unit 6 has also been used for the planting of crops or has been degraded due to agricultural practices. Whereas unit 5 is totally transformed, unit 6 has recovered but comprises mostly pioneer and secondary successional plant species not resembling any natural vegetation that existed in the area. These areas are regarded as being transformed or degraded with a low conservation value and ecosystem functioning.
6. Wetland (vegetation unit 7) – the wetland is classified as a channeled valley bottomland wetland. This area was most probably an unchanneled wetland many years ago, but has over the years become eroded due to the top sandy layer that easily eroded due to surface water runoff from the adjacent cultivated fields. As a result, the wetland has become deeply incised and the central area has eroded down to the underlying bedrock. The area is utilised by cattle for drinking purposes with various cattle paths traversing the wetland. The vegetation within the broad channel is typical of these wetland systems while the embankment comprises more terrestrial species. The wetland has been affected by the surrounding agricultural practices, but has remained fairly natural. The area is fairly homogeneous with a low species richness. From a plant ecological and ecosystem functioning point of view this unit has a high conservation value and ecosystem functioning.

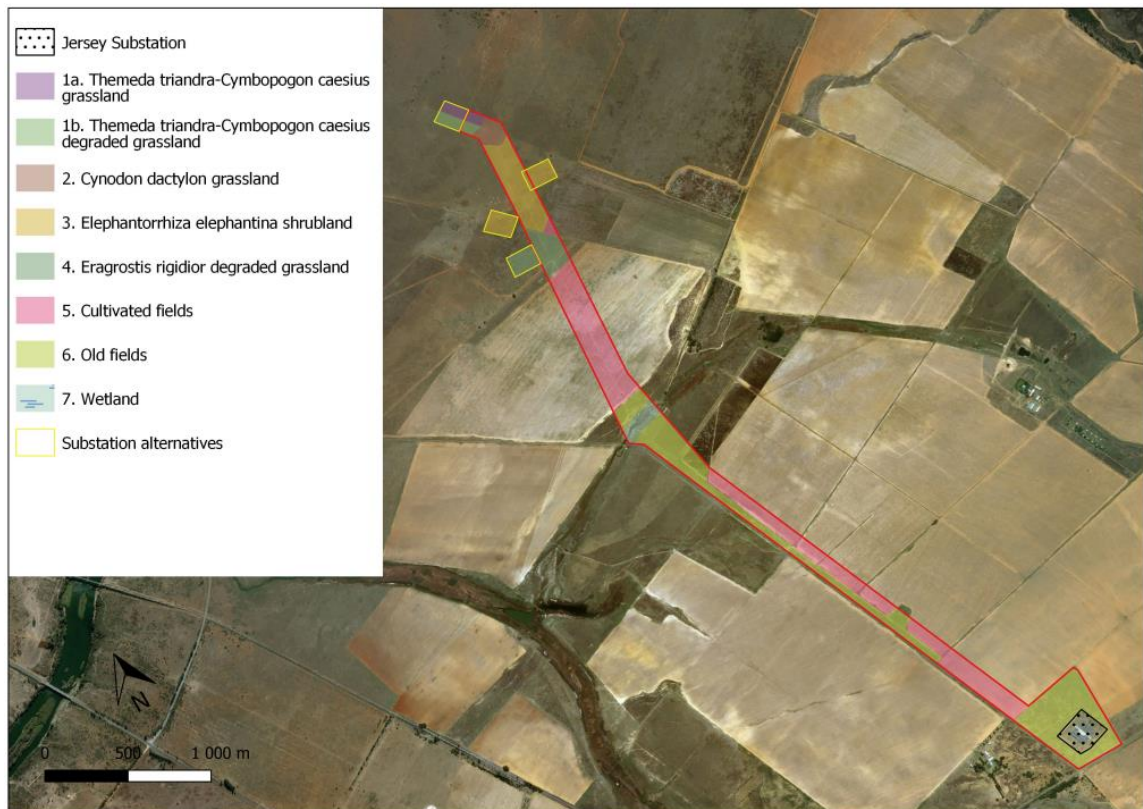


Figure 5.3: Vegetation units identified within the grid connection corridor through the site survey

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

According to the Free State Nature Conservation Ordinance (8 of 1969) various plant species are listed as protected. With reference to the project all *Aloe* species, *Crinum* species and *Boophone* species are protected. Any removal of these plant species would therefore require permits. One protected species, an *Aloe* species were found within vegetation unit 3. This species is regarded as indicative of disturbance; however, a permit will have to be obtained for its removal. No protected or threatened species were noted in any of the other vegetation units.

Alien plant species



Only one declared alien invasive species was noted. This species is *Datura stramonium* which is a category 1b CARA and 1 NEMBA alien invader plant that was found within vegetation unit 4.

Medicinal Plants

A total of nine (9) medicinal plant species were recorded for the project. These include:

- *Aloe davyana*
- *Datura stramonium*
- *Dicoma anomala*
- *Elephantorrhiza elephantina*
- *Gomphocarpus fruticosus*
- *Typha capensis*
- *Vachellia karroo*
- *Vernonia oligocephala*
- *Ziziphus mucronate*

None of these species are threatened while some are regarded as indicative of disturbed conditions and grow abundantly throughout the province. The forb *Datura stramonium* is classified as a category 1 alien invasive weed.

Fauna Species

The old cultivated field represents degraded grassland habitat that provides a habitat for burrowing animals, small mammals, reptiles and birds. The Vaal River located to the north is moderately modified, but still creates habitats for some species.

Much of the large and medium-sized mammal fauna that previously occurred in the area is now locally extinct or occurs in small fragmented populations in reserves. The majority of the habitat types are fragmented. Therefore, the expected mammalian richness on these areas is considered low. Breeding habitat of frogs and toads can be found mostly in the permanent wet zone of wetlands. Amphibian species potentially occurring in the larger area include Common River Frog, Gutteral Toad, Raucous Toad and Bubbling Kassina. These species are non-threatened and widespread, and as such the development will not have any impact on amphibian conservation within the region. Several reptile species are likely to be present in the area. They are common and widespread, and as such the development will not have any impact on reptile conservation within the region.

5.3.1.3 Surface Water Features

According to the Ecological and Wetland Impact Assessment (Appendix D1) one wetland is present within the grid connection corridor which is classified as a channelled valley bottomland wetland. The wetland is located in the central part of the corridor. The soil is



sandy to loam with few rocks present. The grasses have the highest cover followed by the forbs. The wetland is approximately 2.8ha in extent within the corridor.

Along the edges of the wetland the vegetation is dominated by the grass *Imperata cylindrica*, while the forb *Typha capensis* is dominant within the permanently wet channel. Other species present include the grasses *Setaria sphacelata*, *Phragmites australis*, *Themeda triandra* and the forbs *Berkheya setifera*, *Wahlenbergia caledonica*, *Mariscus congestus*, *Oenothera rosea* and the dwarf shrub *Seriphium plumosum*.

The wetland is moderately modified and a moderate change in ecosystem processes and loss of natural habitats has taken place but most of the natural features still remain. Due to the various anthropogenic influences along its edges as well as sand excavation upstream the hydrology, water quality and geomorphology has been negatively influenced resulting in the modification of the ecosystem services and some loss of ecosystem functioning.

The hydrology has been impacted with a loss in some hydrological processes while the gradual erosion that took place over the years has resulted in the areas adjacent to the wetland drying up faster than normal due to water leaching into the eroded channel embankment. The water quality is affected negatively due to agricultural practices. The vegetation is mostly natural with only the slight encroachment of terrestrial species (due to drier conditions along the embankment) affecting it negatively. This situation is expected to continue.

The ecosystem services provided by the wetland is regarded as moderate. This wetland plays a role in sediment, phosphate, and nitrate trapping and a minor role in the removal of toxicants. The wetland has a low value for tourism, cultivation and water supply and plays a minor role in the maintenance of biodiversity.





Figure 5.4: Delineated wetland: buffer and regulated areas

5.3.1.4 Avifauna

According to the Avifaunal Impact Assessment (Appendix D2), the proposed project is located within an area of moderate avifaunal diversity, however, it is near to an important flyway (the Vaal River, 2.3 km away at the closest point) and crosses a non-perennial stream and, therefore, has the potential to impact many large, fast-flying and otherwise powerline-sensitive species. The resident avifauna is also represented by relatively high species richness and abundance. A good baseline dataset was generated during the site surveys, supplemented by a comprehensive SABAP2 dataset.

The typical species occurring are common across the western highveld, with good representation from the widespread weavers, larks, pipits, longclaws, cisticolas, widowbirds, bishops and whydahs in particular. Aerial feeding bee-eaters, swallows and swifts were also well represented. Most expected palearctic migrants were present on the site, as were most intra-African migrants. Raptors were very poorly represented, as were gamebirds.

There are Red Data species that could possibly occur on site, even as vagrants. The potential red data species for the project are presented. No Red Data species were recorded during the surveys, although suitable habitat does exist on site for the following species – Secretarybird, Lanner Falcon, Red-footed Falcon, Cape Vulture, White-backed Vulture, Lappet-faced Vulture, Martial Eagle, African March Harrier, Black Harrier, White-bellied Bustard, African Grass Owl, Black-winged Pratincole and Caspian Tern.

In terms of range restricted or endemic species, the following endemic or near-endemic (most of the global range is within South Africa's borders) species were recorded either during prior SABAP2 assessments or during the assessment – Cloud Cisticola, Fiscal Flycatcher, Fairy Flycatcher, Pied Starling, South African Cliff Swallow, Karoo Thrush, Cape White-Eye and Cape Weaver.

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

5.3.1.5 Soil and Agriculture

When considering the results of the Screening Report (Appendix B) and the results of the Agricultural Compliance Statement the following must be considered.

The Screening Report indicates that majority of the project is located on land that is classified as cultivated land and allocated high agricultural sensitivity because of it. However, overhead power lines have no agricultural impact because the agricultural production potential is not affected underneath them. The agricultural sensitivity underneath the power lines is therefore irrelevant to the agricultural impact. Only the collector substations will slightly impact agricultural land. Refer to Figure 5.5.

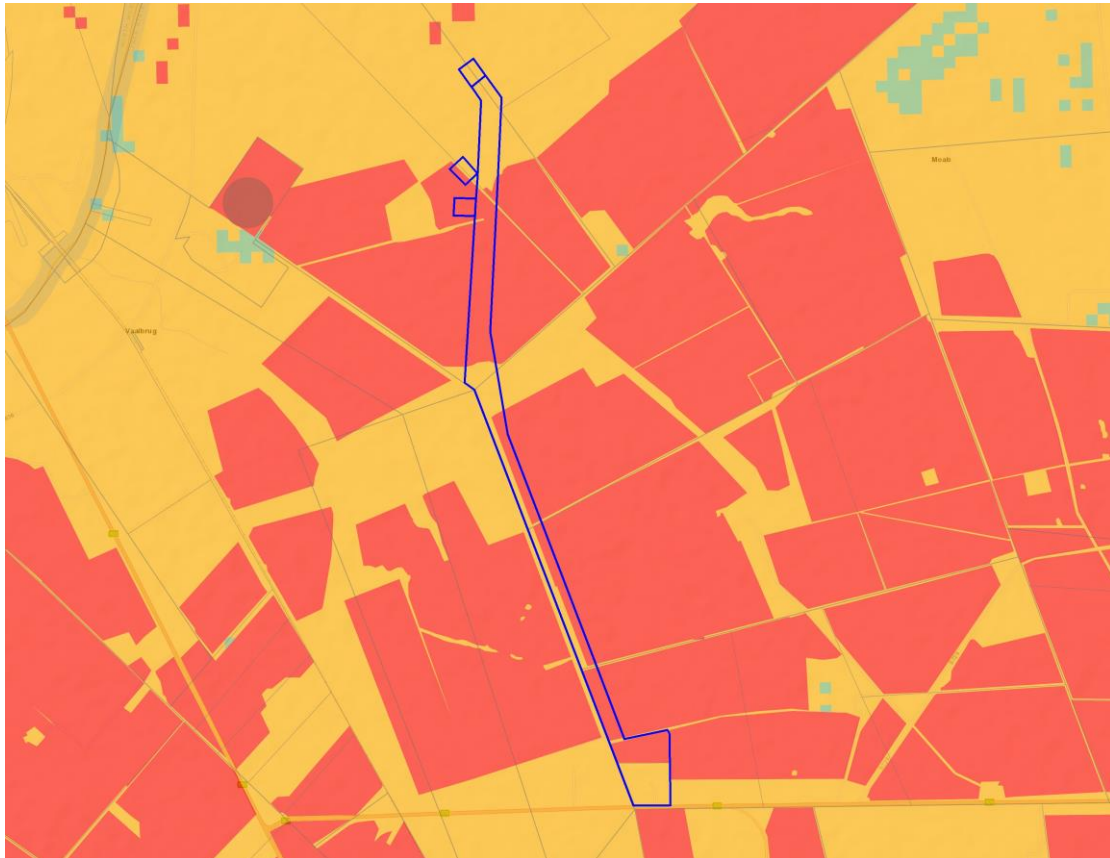


Figure 5.5: Agricultural sensitivity as per the results of the Screening Report (green = low; yellow = medium; red = high)

Two of the collector substation locations are indicated to be on land that is classified by the screening tool as cultivated land. However, the data on cultivation status on the screening tool is outdated. This land has not been under cultivation for an extended period of at least 10 years, according to historical imagery on Google Earth, and therefore should no longer be classified as cultivated land or allocated high sensitivity because of it.

Furthermore, a soil investigation conducted for the Paleso Solar Power Plant found all of the collector substation locations to be on soils that are unsuitable, or at best very marginal, for crop production because of surface rock outcrops and shallow soils on underlying rock. The high agricultural sensitivity attributed to the collector substation sites by the screening tool, as a result of cultivation status, is therefore disputed by this assessment.

The land capability of the entire site as varies from 6 to 8, which translates to a medium agricultural sensitivity.

This site sensitivity verification verifies all collector substation locations as being of medium agricultural sensitivity.

5.3.1.6 Climate

A summary diagram of the climate encountered in the area is shown in Figure 5.6. 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.

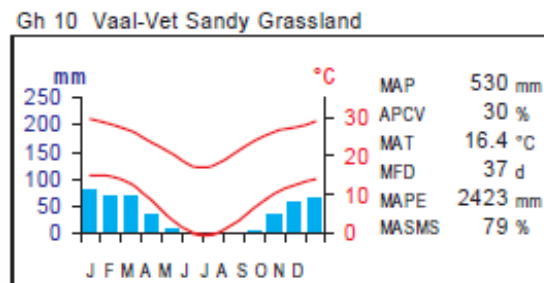


Figure 5.6: Climatic diagram of the area within which the grid connection corridor is located

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 5.1 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 5.7) give a clearer understanding of areas susceptible to line of sight of the project.

Table 5.1: ZTV Visibility Rating in terms of Proximity to the Power Line.

Radius	Visual Receptors	Visibility rating in terms of proximity
0-5km	<ul style="list-style-type: none"> - Stokkiesdraai Road - Kopanang Gold Mine - Vaalbrug Dolomite Mine - Visarend Caravan Park - Vaal River Boating Club - Orkney - R75 road - R30 road - Railway line - Homesteads on farms - Senwes Grain Link: Vierfontein - Agricultural developments 	Very High



	- Lodging facilities	
5-10km	<ul style="list-style-type: none"> - R30 road - R76 road - R502 road - Nologwa Gold Mine - Vaal Reefs Village - Vierfontein - Water Processing Plant - Agricultural Developments 	High
10-15km	<ul style="list-style-type: none"> - Agricultural Developments - Kanana Settlement - R502 Road 	Medium
15-20km	<ul style="list-style-type: none"> - Jouberton - Buffelsfontein Gold Mine - Agricultural Developments - R502 road - Stilfontein 	Low (Unlikely)

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.

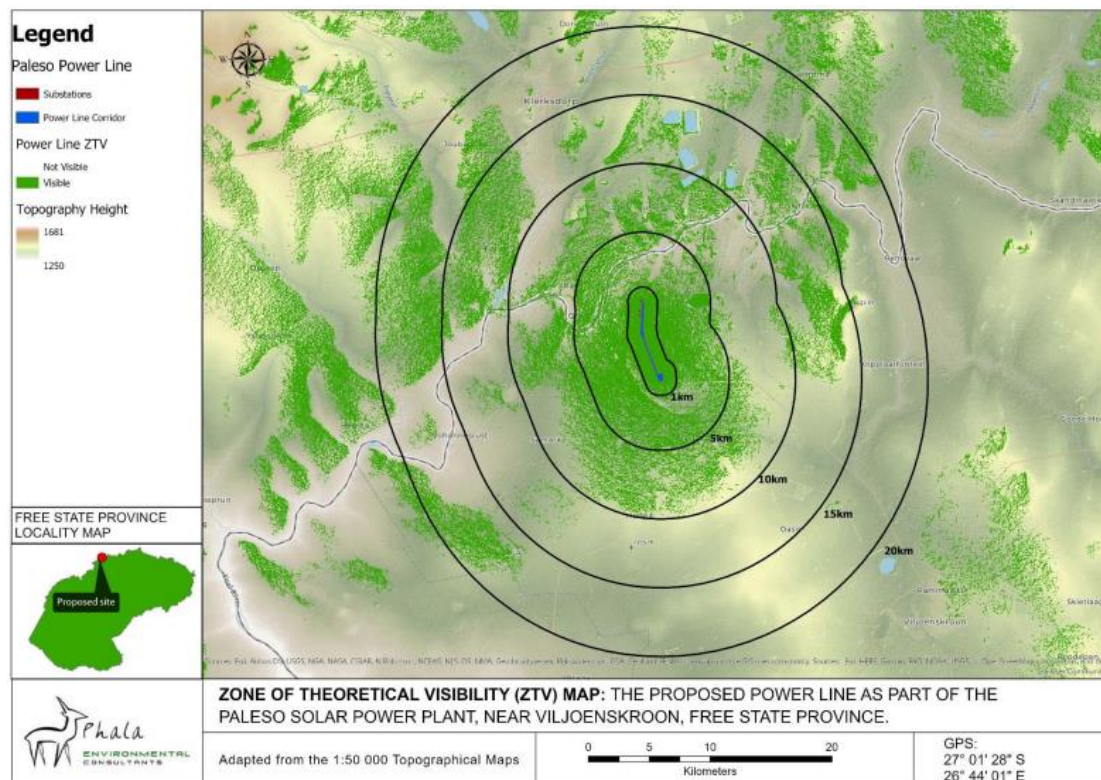


Figure 5.7: Zone of Theoretical Visibility (ZTV) for the Power Line – Hill shading



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 925m². 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 beliefs. 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 Elandsheuvell, belonging to C.M. du Plooy. This settlement, known as 'Oude Dorp', had its first landdrost 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 named 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

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

Palaeontology

According to the SAHRIS Palaeosensitivity map the proposed development is underlain by sediments with a Very High (red) and moderate (green) Palaeontological Significance (Figure 5.8).

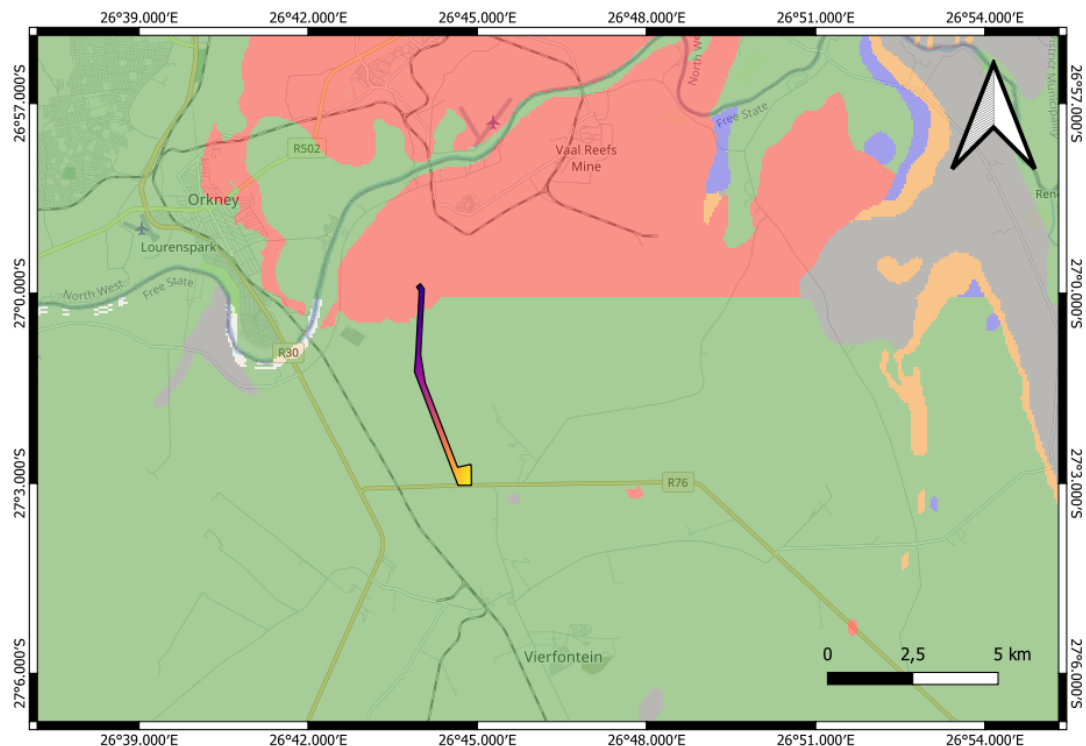


Figure 5.8: Palaeo-sensitivity Map

Only a small portion in the north of the grid connection corridor is underlain by the Precambrian dolomites and associated marine sedimentary rocks of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) while the southern portion is underlain by Quaternary aeolian sand. According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Malmani Subgroup is Very High while that of the Quaternary aeolian sand is moderate.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 6-7 November 2021. No fossiliferous outcrop was detected. 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.

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 R76 Regional Road.
- Grid connection: In order for the three PV facilities to connect to the national grid three collector substations and a double-circuit 132kV power line will be constructed within the identified corridor towards the existing Jersey Substation located to the



south. 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 three collector substations and the ~6km power line within an identified corridor stretching over various properties located between the Paleso, Siyanda and Ngwedi SPPs, towards the existing Jersey 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 channelled valley bottom wetland is located within the grid connection corridor (Ecological and 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		<p>No sites or features of cultural significance has been identified for the project (Heritage Impact Assessment Appendix D4).</p> <p>A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 6-7 November 2021 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.</p>
IV. Site of geological significance		X		None.
V. Areas of outstanding natural beauty		X		None.
VI. Highly productive agricultural land		X		None. The Agricultural Compliance Statement (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	×			According to the Ecology and Wetland Impact Assessment (Appendix D1) the southern section of the grid connection corridor is located within the Vaal-Vet Sandy Grassland.
X. Bird nesting sites		×		None.
XI. Red data species		×		No red listed plant species were identified and no suitable habitat exists.
XII. Tourist resort		×		None.
2. Will the project potentially result in potential?				
I. Removal of people		×		None.
II. Visual Impacts	×			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 R76 regional road.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.



VI. Accumulation of large workforce (>50 manual workers) into the site.	×		Approximately 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	×		Traffic will be generated during the construction and operation phases. With an increase in traffic on the R76 regional road.



X. Soil erosion	×			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		×		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	×			The Vaal River is located ~2.6km north of the grid connection corridor
II. A conservation or open space area	×			The grid connection corridor falls within areas classified as CBA1, ESA1 and ESA 2.



III. An area that is of cultural importance	X			<p>No sites or features of cultural significance has been identified for the project (Heritage Impact Assessment Appendix D4).</p> <p>According to the PalaeoMap of SAHRIS the Palaeontological Sensitivity of the Malmani Subgroup is Very High while that of the Quaternary aeolian sand is moderate.</p> <p>A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 6-7 November 2021 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 on the fossil heritage is low.</p>
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 are 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.)
Ecological and 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	
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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															
<p>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.”</p> <p>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.”</p> <p>Activity 14 (GN.R 327): The development and related operation of facilities or</p>	<p><u>Site clearing and preparation</u></p> <p>The proposed 132kV double circuit power line will connect the proposed Paleso, Siyanda and Ngwedi SPPs to the existing Jersey D.S 88/132 kV substation and subsequently, to the national grid.</p> <p>Power line tower footprints and the substation footprint will need to be cleared of vegetation and some areas may need to be levelled.</p> <p><u>Civil works</u></p> <p>The main civil works are:</p> <ul style="list-style-type: none">• Tower pegging• Terrain levelling if necessary– levelling will be minimal as the	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none">• Loss of plant species• Loss of rare/medicina species• Loss of animal species• Loss of biodiversity• Increased soil erosion		-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Ecology and Wetland impact Assessment (Appendix D1)
			Avifauna	<ul style="list-style-type: none">• Displacement of priority avian species from important habitats• Displacement of resident avifauna through increased disturbance• Loss of important avian habitats	-		S	S	D	PR	ML	Yes	- See Table 6.3	L	Avifauna Impact Assessment (Appendix D2)
			Air	<ul style="list-style-type: none">• Air pollution due to construction activities and the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-



<p>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.</p> <p><u>Activity 19 (GN.R. 327):</u> “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”</p> <p><u>Activity 27 (GN.R. 327):</u> “The clearance of 1 hectares or more, but less than 20 hectares of indigenous vegetation.”</p> <p><u>Activity 4(b)(i)(ee)(gg) (GN.R. 324):</u> “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</p>	<p>potential site chosen is relatively flat.</p> <ul style="list-style-type: none"> Construction of foundations for pylons. Construction of the substation foundations Assembly and erection of towers. Stringing of conductors. Installation of the substation components. 		Soil/Agriculture	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<p>- The most effective mitigation will be the minimisation of the project footprint by using the existing infrastructure as much as possible.</p> <p>- 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.</p> <p>- Retention of vegetation where possible to avoid soil erosion.</p>	L	-
			Existing services infrastructure	<ul style="list-style-type: none"> 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. Increase in construction vehicles on existing roads. 	-		L	S	D	CR	NL	Yes	-	L	Confirmation from the Local Municipality
			Surface water (wetland / riparian areas)	<ul style="list-style-type: none"> Soil compaction, erosion and sedimentation of the wetland. Soils and water pollution for the wetland area. Spread and establishment of alien invasive species into the wetland. 	-		S/L	S	U	PR	NL	Yes	- See Table 6.3	L	Ecology and Wetland Impact Assessment (Appendix D1)



<p>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.”</p> <p>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.”</p> <p>Activity 12(b)(i)(ii)(iv) (GN.R 324): “The clearance of an area of 300 square meters or</p>		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Increase in construction vehicles. 	-		P	S	Pr	CR	NL	Yes	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Air/dust pollution. Road safety. Impacts associated with the presence of construction workers on site and in the area. Influx of job seekers to the area. Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of 		-	L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> Contractor to ensure that construction 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, 	L	-



<p>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.”</p> <p><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</p>				construction workers on the site.									with the exception of security personnel, should be permitted to stay over-night on the site.			
		Noise levels		<ul style="list-style-type: none">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		<ul style="list-style-type: none">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	N/A
		Heritage resources (including archaeology & palaeontology)		<ul style="list-style-type: none">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.Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	-		S	S	PO	BR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix D4) Palaeontological Impact Assessment (Appendix D5)	



from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.”															
OPERATIONAL PHASE															
<u>Activity 11(i) (GN.R. 327):</u> “The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.” <u>Activity 10(b)(i)(hh) (GN.R 324):</u> “The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic 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.”	<u>Connection to the grid</u> - 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 Jersey D.S. 88/132 kV substation is a feasible connection to the national grid.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none">• Soil erosion and pollution.• Spread and establishment of alien invasive plant species.• Negative effect of human activities on fauna and road mortalities.• Loss of biodiversity.		-	S	M	PO	PR	ML	Yes	- See Table 6.4	L	Ecology and Wetland Impact Assessment (Appendix D1)
			Avifauna	<ul style="list-style-type: none">• Displacement of priority avian species from important habitats• Displacement of resident avifauna through increased disturbance• Collision when flying into power line infrastructure• Electrocution when perched on power line infrastructure		-	L	L	PR	PR	ML	Yes	- See Table 6.4	M	Avifaunal Impact Assessment (Appendix D2)
			Air quality	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	Agricultural Compliance Statement (Appendix D6)
			Geology	<ul style="list-style-type: none">• 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 geological investigation should be implemented.	L	-
			Surface water (wetland / riparian area)	<ul style="list-style-type: none">• Erosion of wetland embankment.• Soil and water pollution		-	L	L	U	PR	ML	Yes	-See Table 6.4	L	Ecology and Wetland Impact Assessment



															(Appendix D1)
			Visual landscape	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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
			Electricity supply	<ul style="list-style-type: none"> Generation of additional electricity. The grid connection infrastructure will enable the evacuation of solar electricity that will be fed into the grid. 	+		I	L	D	I	N/A	Yes	-	N/A	-



			Electrical infrastructure	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Habitat destruction caused by clearance of vegetation. Soil and water pollution. Spread and establishment of a line invasive species. Negative effect of human activities on fauna and road mortalities. 	-		S	L	PO	PR	ML	Yes	- See Table 6.5	L	Ecology and Wetland Impact Assessment (Appendix D1)
			Avifauna	<ul style="list-style-type: none"> Displacement of priority avian species from important habitats Displacement of resident avifauna through increased disturbance 	-		S	S	Po	CR	NL	Yes	- No mitigation required due to low significance of the impact	L	Avifauna Impact Assessment (Appendix D2)
			Air quality	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	-
			Surface water (wetland / riparian area)	<ul style="list-style-type: none"> Erosion of wetland embankment. Soil pollution Increase in stormwater runoff 		-	L	S	Po	PR	ML	Yes	- See Table 6.5	L	Ecology and Wetland Impact Assessment (Appendix D1)
		SOCIAL/ECONOMIC ENVIRONMENT	Visual landscape	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	L	-



													residential areas should not take place over weekends.		
			Health & Safety	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> 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 archaeology & palaeontology)	<ul style="list-style-type: none"> 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. Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study 	-		S	S	PO	BR	ML	Yes	- See Table 6.4	L	Heritage Impact Assessment (Appendix D4) Palaeontological Impact Assessment (Appendix D5)
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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
Ecology Impact Assessment	Loss of plant species	Negative High	Negative Low	<ul style="list-style-type: none"> No development should be allowed in vegetation unit 7 (Wetland). The wetland area should be fenced off prior to construction and zoned as no-go area The entire area to be developed must be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. To minimise the effect on the vegetation, insects, small mammals, and environment it is recommended that the construction be done within the winter period as far as possible, when most plants are dormant and animals less active. Where vegetation of areas not to be developed (even if degraded) needs to be “opened” to gain access it is recommended that the herbaceous species are cut short rather than removing them. That will ensure that they regrow during the growing season. Vegetation clearance should be restricted to the approved development areas allowing remaining animals the opportunity to move away from the disturbance. The Environment Control Officer (ECO) should control these areas. No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. No hunting with firearms (shotguns, air rifles or
	Loss of rare / medicinal species	Negative Low	Negative Low	
	Loss of animal species	Negative Medium	Negative Low	
	Loss of biodiversity	Negative High	Negative Low	



	Increased erosion	soil	Negative Medium	Negative Low	<p>pellet guns) or catapults should be permitted on the property as well as neighbouring areas.</p> <ul style="list-style-type: none"> Storage of equipment, fuel and other materials should be limited to demarcated areas.
	Alien plant invasion		Negative Low	Negative Low	<ul style="list-style-type: none"> All temporary stockpile areas, litter and dumped material and rubble must be removed during and on completion of construction activities. No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site Where equipment or holes pose a risk to animal safety, they must be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. These areas should be monitored on a daily basis to ensure no animal is intentionally injured. A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen to rehabilitate areas that became degraded due to construction activities All stormwater and runoff generated by the development activities must be appropriately managed (see specialist report for more details). Adequate waste management measures must be implemented preventing possible illegal dumping and littering of adjacent sensitive areas especially the watercourse areas of the study site. Adequate toilet facilities must be provided for all staff to prevent pollution of the environment. The excavation and use of rubbish pits are forbidden.



				<ul style="list-style-type: none"> Burning of waste on the site is forbidden. A fenced area must be allocated for waste sorting and disposal. Individual skips for different types of waste (e.g. 'household' type refuse, building rubble, etc.) should be provided. The alien invasive weed <i>Datura stramonium</i> should be manually removed due to only a few single individuals being present within vegetation unit 4. Follow-up maintenance can be conducted once a month during the growing season to remove and individuals that germinated from seeds. Monitoring of all these activities must be done on a weekly basis by the ECO during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area. Any transgressing of rules must be reported to and by the ECO. The ECO should keep a daily register of activities and reports.
Wetland Impact Assessment	Loss of plant species	Negative High	Negative Low	<ul style="list-style-type: none"> No development should be allowed within the Wetland (vegetation unit 7) area or its 32m buffer zone. Area should be fenced off prior to construction and declared as a No-Go area. No hazardous materials should be stored within 300 m of the wetland area. No cleaning of equipment should be done closer than 300m of the edge of the buffer zone. This includes the establishment of temporary and permanent offices and ablution facilities
	Loss of rare / medicinal species	Negative Low	Negative Low	
	Loss of animal species	Negative Medium	Negative Low	



	Loss of biodiversity	Negative High	Negative Low	<ul style="list-style-type: none"> If development is to occur close to the wetland it is recommended that sandbags are placed all along the watercourse buffer zone during the wet season to prevent soil erosion into these areas
	Increased soil erosion	Negative Medium	Negative Low	<ul style="list-style-type: none"> All vehicles and equipment should be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area at least 300m away from the edge of the river buffer zone to prevent ingress of hydrocarbons into topsoil.
	Alien plant invasion	Negative Low	Negative Low	<ul style="list-style-type: none"> Where fuel/oil leaks have occurred, it should be reported and contained and the contaminated soil removed and discarded using correct practices. No dumping of waste should take place within the or closer than 300m from the wetland area.
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Low	<ul style="list-style-type: none"> Limit the construction footprint. Retain indigenous vegetation wherever possible. Limit access to remainder of area. Avoid construction during the breeding season (summer). Laydown areas to be placed on only disturbed zones. Construct in shortest timeframe. Control noise to minimum. Maintain single access and maintenance road within the power line servitude.
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	<ul style="list-style-type: none"> No mitigation required due to the low significance of impact



	Loss of important avian habitats	Negative Low	Negative Low	<ul style="list-style-type: none"> No mitigation required due to the low significance of impact
Visual Impact Assessment	Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed project	Negative Low	Negative Low	<ul style="list-style-type: none"> 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	Impacts on heritage and palaeontological objects	Negative Medium	Negative Low	<ul style="list-style-type: none"> Those cultural resources that cannot be avoided and are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.



			<ul style="list-style-type: none">• The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.• Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible.• All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken.• Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.• Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).• A person or entity, e.g. the ECO, should be tasked to take responsibility for the maintenance heritage sites.• In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.• Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. The appropriate steps to take are indicated in Section 9 of the Heritage Impact Assessment (Appendix D4), as well as in the
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				<p>Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5 of the HIA.</p> <ul style="list-style-type: none"> • If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Section 12 of the Palaeontological Impact Assessment) must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist. • 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	<ul style="list-style-type: none"> • 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.



			<ul style="list-style-type: none">• 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.
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				<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • There are no additional mitigation measures required, over and above what has already been included in the Generic EMP 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 and activities of construction workers.



	Heavy vehicles and construction activities	Negative Low	Negative Low	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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.



				<ul style="list-style-type: none">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.
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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
Ecology Impact Assessment	Soil erosion and pollution	Negative Medium	Negative Low	<ul style="list-style-type: none"> All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded with in an environmentally friendly way Undeveloped areas that were degraded due to human activities must be rehabilitated. Hazardous chemicals must be stored on an impervious surface and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom Limit human activity in the no-developed areas as well as the completed areas to the minimum required for ongoing operation Any alien plant observed should be reported to the environmental manager and should be removed as soon as possible. Regular monitoring (monthly) for damage to the environment as well as establishment of alien plant species must be conducted.
	Spread and establishment of alien invasive plant species	Negative Medium	Negative Low	
	Negative effect of human activities on fauna and road mortalities	Negative Medium	Negative Low	
	Loss of biodiversity	Negative Medium	Negative Low	



				<ul style="list-style-type: none">• All vehicles should be inspected for oil and fuel leaks on a regular basis.
Wetland Impact Assessment	Erosion of wetland embankment	Negative High	Negative Low	<ul style="list-style-type: none">• No development allowed within the wetland area• Drainage must be controlled to ensure that runoff from the site will not culminate in off-site pollution or result in rill and gully erosion or any erosion of the watercourses• All vehicles and equipment should be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area at least 300m away from the



	Soil and water pollution	Negative Medium	Negative Low	<p>edge of the wetland buffer zone to prevent ingress of hydrocarbons into topsoil.</p> <ul style="list-style-type: none">• Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage• The release of storm water must be designed such that the force of the water is reduced to prevent unnecessary erosion• No dumping of waste should take place within the wetland area. If any spills occur, they should be cleaned up immediately.• Adequate toilet facilities must be provided for all staff to prevent pollution of the environment
Avifauna Impact Assessment	Collision when flying into power line infrastructure	Negative Very High	Negative Medium	<ul style="list-style-type: none">• Undertake a walk-through after pole positions are determined to demarcate sections requiring bird deterrents/flappers.• Install flappers on all required sections of power lines (as directed by avifaunal specialist) on or directly adjacent to site. More prominent power line markers are required at the no-go avifaunal sites to ensure that the power line is visible, especially in low light conditions.



				<ul style="list-style-type: none"> Power line markers, such as flappers or large PVC spiral-type bird flight diverters at least every 5 m on earth and live wires are an absolute requirement. Undertake quarterly fatality monitoring and record keeping throughout the project life.
	Electrocution when perched on power line infrastructure	Negative High	Negative Medium	<ul style="list-style-type: none"> Pole designs to discourage bird perching and to be signed off by avifaunal specialist. Undertake quarterly fatality monitoring and record keeping throughout the project life.
Visual Impact Assessment	Potential visual impacts on sensitive visual receptors located within a 5km radius.	Negative Low	Negative Low	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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



				<p>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.</p> <ul style="list-style-type: none"> • Implement good housekeeping measures.
Other	Soil erosion	Negative Low	Negative Low	<ul style="list-style-type: none"> • There are no additional mitigation measures required, over and above what has already been included in the Generic EMP 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • The development footprint must be maintained.
	Change in the sense of place	Negative Low	Positive Low	<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none">• 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
Ecology Impact Assessment	Habitat destruction caused by clearance of vegetation	Negative Low	Negative Low	<ul style="list-style-type: none"> All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded with in an environmentally friendly way Undeveloped areas that were degraded due to human activities must be rehabilitated. Hazardous chemicals must be stored on an impervious surface and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom Any alien plant observed should be reported to the environmental manager and should be removed as soon as possible. All vehicles should be inspected for oil and fuel leaks on a regular basis. No activity allowed within the wetland and its buffer zone Drainage must be controlled to ensure that runoff from the site will not culminate in off-site pollution or result in rill and gully erosion or any erosion of the watercourses
	Soil and water pollution	Negative Low	Negative Low	
	Spread and establishment of alien invasive species	Negative Low	Negative Low	
	Negative effect of human activities on fauna and road mortalities	Negative Low	Negative Low	
Wetland impact Assessment	Erosion of wetland embankment	Negative Medium	Negative Low	<ul style="list-style-type: none"> The release of storm water must be designed such that the force of the water is reduced to prevent unnecessary erosion



	Soil pollution	Negative Medium	Negative Low	<ul style="list-style-type: none">No dumping of waste should take place within 300m of the wetland area. If any spills occur, they should be cleaned up immediately.Remove all substances which can result in groundwater (or surface water) pollution
	Increase in stormwater runoff	Negative Medium	Negative Low	
Other	Generation of waste	Negative Medium	Negative Low	<ul style="list-style-type: none">All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept.There are no additional mitigation measures required, over and above what has already been included in the Generic EMP 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.
	Soil erosion	Negative Low	Negative Low	



6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- Ecological and Wetland Impact Assessment – conducted by Envirogaud Ecological Services (see Appendix D1).
- Avifauna Impact Assessment – conducted by Agreenco (see Appendix D2).
- Visual impact assessment - conducted by Phala Environmental Consultants (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).
- Agricultural Compliance Statement – conducted by Johann Lanz Soil Scientist (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 medium 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: Ecological and Wetland 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, including surface water features?”

The Ecology and Wetland Impact Assessment (Appendix D1) concluded that the area proposed for development (i.e. the grid connection corridor) is mostly degraded due to agricultural practices and surrounding mining operations in the west and east.

Vegetation units 1 – 4 are all in various stages of degradation, while vegetation units 5 and 6 are cultivated fields (past and current) where the vegetation is either destroyed (unit 5) or transformed (unit 6). All these units consist of mainly pioneer and secondary successional plant species indicative of disturbance. The vegetation has a low species richness and forbs are prominent in some sections. These areas do not resemble the native vegetation that originally occurred in the area.

Vegetation unit 7 (wetland) is regarded as having a high conservation value. The wetland has been variously impacted due to anthropogenic activities in and around the ecosystem. These include sand mining, planting of crops and the application of herbicides and fertilisers that eventually leaches via underground water movement, into the wetland. The wetland's geomorphology, hydrology and water quality has as a result been negatively affected although the vegetation has remained largely natural. The wetland achieved a moderate PES score of C while its EIS also indicated it to have a medium to high ecological sensitivity. The system has been modified, but a large amount of the ecosystem functions has remained intact. The area does provide habitat for various aquatic plant and animal species and plays a role in water purification. It is therefore recommended that no development is allowed within the wetland and its associated 32m buffer zone.

In terms of the impacts on both ecology and the wetland, the impacts are mostly of a low significance, before mitigation, except for the impacts to the wetland which are identified as being of a medium and high significance. The specialist has recommended specific mitigation measures which reduces the impact significance to a low or negligible significance which is considered to be acceptable. Therefore the development is considered to be acceptable from a ecology and wetland perspective.

6.3.3 Issue 3: 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 Agricultural Compliance Statement (Appendix D6), the proposed development will not have an unacceptable negative impact on the agricultural production capability of the affected area. The proposed development is therefore acceptable. This is substantiated by the following points:



- Overhead power lines have no agricultural impact because all agricultural activities that are viable in this environment, can continue completely unhindered underneath power lines and there is therefore no loss of agricultural production potential underneath power lines.
- The substations will occupy land that is of limited land capability and is not suitable for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agriculture is not therefore a priority.
- Each substation will occupy only an insignificantly small footprint of 2.5 hectares, which will have an insignificant effect on agricultural production.

All impacts associated with agriculture is of a low significance. Therefore, from an agricultural impact point of view, it is recommended that the development be approved.

6.3.4 Issue 4: Avifaunal Impacts

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

“How will the proposed development impact on the avifauna?”

According to the Avifauna Impact Assessment (Appendix D2) the proposed project is situated in an area of moderate avifaunal diversity, however it is near to an important flyway, the Vaal River, and therefore has the potential to impact many large, fast-flying and otherwise powerline-sensitive species.

There are individual impacts that are relatively high, however most can be effectively mitigated through the controls prescribed in this report. The overall mitigated impacts can result in the project having an overall Low-Negative impact rating on avifauna.

The single greatest impact for the project is the potential collisions with the power line. Power line markers, such as flappers or large PVC spiral-type bird flight diverters at least every 5 m on earth and live wires are an absolute requirement. Another possibility is the avoidance of earth wires, where possible. Due to the proximity of the power line to the Vaal River (a major avifaunal flyway) and the large number of power line-susceptible species present in the wider area that will utilise the airspace, it is suggested that the entire power line length be fitted with bird flight diverters. Implementing this mitigation should reduce the collision impact by 57% and achieve an anticipated Medium-Negative impact rating.

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



6.3.5 Issue 5: Visual Impacts

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

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

The Visual Impact Assessment (Refer to Appendix 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 Ecological and Wetland Impact Assessment (Appendix D1) and the Avifauna Impact Assessment (Appendix D2). The area is a wetland feature (Channelled



Valley bottom Wetland) located within the northern section of the corridor which will need to be traversed by the power line.

The Ecological and Wetland Impact Assessment indicates that the feature provides habitat for various aquatic plant and animal species and plays a role in water purification. Therefore, this feature has been identified as no-go and a 32m buffer has been recommended by the specialist. No development is therefore allowed in the wetland and the associated buffer.

The Avifauna Impact Assessment indicates that the drainage line habitat (i.e. Channelled Valley bottom Wetland) harbours greater species richness and abundance than any other, and is a flyway utilised by species that are prone to power line collisions, and therefore has the potential for the greatest impacts if extensive disturbances take place, or if insufficient mitigations are implemented. The biggest concern is collision impacts, which should be mitigated additionally with large ball-diverters to mark the power line here, in addition to the smaller PVC-spirals required for the remainder of the line. The second major concern is the siting of pylons, which should not be sited within the drainage line and wetland no-go sites.

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 32m 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 result 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.

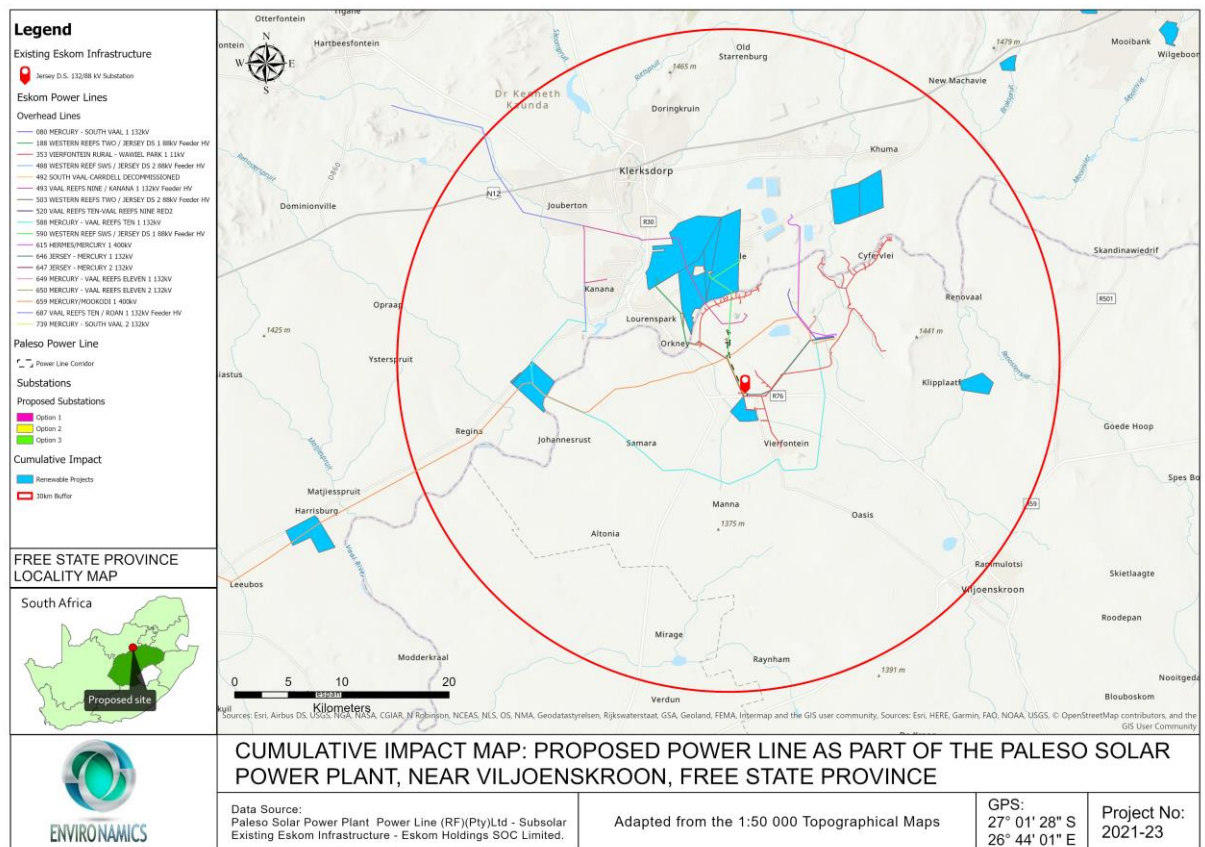


Figure 7.1: Geographic area of evaluation with utility-scale renewable energy generation sites (assuming the presence of required associated grid connection infrastructure)

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 ⁶	0.8km	150MW	14/12/16/3/3/1/2365	Basic Assessment	Approved
Siyanda SPP	0km	150MW	14/12/16/3/3/1/2369	Basic Assessment	Approved
Kabi Vaalkop PV 3	1.4km	75 MW	12/12/20/2513/3	Scoping and EIA	Approved
Kabi Vaalkop PV 2	5.4 km	75 MW	12/12/20/2513/2	Scoping and EIA	Approved

⁶ Environamics was the EAP responsible for the Basic Assessments for the Paleso and Siyanda Solar Power Plants.



Kabi Vaalkop PV ⁷	1.4 km	75 MW	12/12/20/2513/4	Scoping and EIA	Approved
Kabi Vaalkop PV 1	1.4 km	75 MW	12/12/20/2513/1	Scoping and EIA	Approved
Buffels Solar PV 1	15.3 km	100MW	14/12/16/3/3/2/777	Scoping and EIA	Approved
Buffels Solar PV 2	16 km	100 MW	14/12/16/3/3/2/778	Amendment	Approved
Witkop Solar ⁸	2 km	61 MW	12/12/20/2507/2	Scoping and EIA	In Process
Rietvlei solar	7 km	-	14/12/16/3/3/2/450	Scoping and EIA	Withdrawn/Lapsed
Genesis Orkney Solar (Pty) Ltd	14 km	100MW	14/12/16/3/3/2/954	Scoping and EIA	Approved
Afropulse 538 Pty Ltd	22 km	50MW	12/12/20/2280	BAR	Withdrawn/Lapsed
Ngwedi Solar Power Plant	0 km	150MW	TBC – Application for EA only recently submitted to the DFFE	BAR	In Process

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

⁷ The application was only for transmission infrastructure (i.e. substation and power lines) and not a PV solar power plant.

⁸ There is uncertainty regarding the project and whether the EIA process was completed. This is based on the lack of information available for the 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 two (2) other projects in close proximity to the 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 to the north of 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 Ecology and Wetlands

The Ecology and Wetland Impact Assessment (refer to Appendix D1) confirmed that the impacts associated with the proposed grid connection infrastructure will include loss of plant species, loss of rare/medicinal species, loss of animal species, loss of biodiversity, increased soil erosion and alien plant invasion. Majority of the impacts will be low to negligible, except when considering the wetland feature present within the corridor. Impact would be of a high and medium significance within the implementation of the appropriate mitigation measures, after which impacts are reduced to a low acceptable impact.

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

7.5.2 Avifaunal

The Avifauna Impact Assessment (Appendix D2) indicates this it is the cumulative impacts, when considering the existing transformation of the threatened habitats to croplands and mining, in addition to the prevalence of planned solar developments, that increase the cumulative risks and, therefore, warrant mitigations. Mitigating the cumulative impacts would require limiting the impact of the grid connection solution to an absolute minimum, which is not necessarily feasible but should be pursued.

The mitigations to reduce cumulative impacts involve limiting the disturbance footprint (overall size), limiting human activity and noise throughout the project life, disturbing as little natural vegetation as possible, retaining the natural vegetation beneath the pylons and around infrastructure, limiting the extent and width of roadways, reducing the speeds that vehicles travel, and then thoroughly rehabilitating the entire footprint back to natural grassland representing the Vaal-Vet Sandy Grassland and Vaal Reefs Dolomite Sinkhole Woodland after decommissioning. Implementing successful mitigations along the power line should reduce the impact rating for cumulative displacement of resident avifauna by 19% down to an acceptable low-negative score, however cumulative displacement of priority avian species would reduce by 28% but would still be in the medium-negative category.



To reduce some of the anticipated cumulative impacts associated with power line collisions, it is recommended that the ESKOM-EWT Strategic Partnership be engaged to investigate mitigating the existing 132 kV lines that will run parallel to the proposed power line by fitting bird flight diverters, at sections as directed by an avifaunal specialist. Implementing this mitigation should reduce the collision impact by 49% and achieve an anticipated medium-negative impact rating.

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 area due to other power line infrastructure in the area already present (and possibly 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 Agricultural Compliance Statement (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.

Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use can confidently be assessed as not having an unacceptable negative impact on the agricultural production capability of the area. In terms of cumulative impact, the proposed development is therefore acceptable and it is therefore recommended that it be approved.

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 or fragmentation of indigenous natural fauna and flora	The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on avifauna.	- Low
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 viz: collision, avoidance and displacement.	- Medium
Loss or fragmentation of habitats	Removal of large areas of habitats may have a significant effect on loss of habitats.	- Medium
Impacts to freshwater 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. .	- Medium
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.	- Medium
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 upgrade and improve skills levels in the area.	+ Low
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	- Low



	mitigated with the placement of the grid connection corridor adjacent to property 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	- Low



	farming and people using the existing roads 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:
 - Avifauna (- Medium)
 - Loss or fragmentation of habitats (- Medium)
 - Impacts to freshwater features (- Medium)
 - Soil erosion (- Medium)
- 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. No cumulative impacts with a high residual risk have been identified. 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):

➤ Impacts during construction phase:

- Loss of plant species, rare /medicinal species, animal species and biodiversity (- Low)
- Increased soil erosion (- Low)
- Alien plant invasion (- Low)
- Displacement of priority and resident avian species (- Low)
- Loss of important avian habitats (- 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)
- Loss of farm land (- Low)

➤ Impacts during the operational phase:

- Soil erosion and pollution (- Low)
- Spread and establishment of alien invasive plant species (- Low)
- Erosion of wetland embankment (- Low)
- Collision of avifauna when flying into power line infrastructure (- Medium)
- Electrocution of avifauna when perched on power line infrastructure (- Medium)
- 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)

➤ Impacts during the decommissioning phase:

- Habitat destruction (- Low)
- Soil and water pollution (- Low)
- Spread and establishment of alien invasive species (- Low)
- Erosion of wetland embankment (- Low)
- Increased soil erosion and sedimentation (-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 all cumulative impacts will be of a medium or low significance, with no impacts expected to be of a high and unacceptable significance.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

Only two specialist fields identified an area of high sensitivity which need to be considered for the placement of infrastructure. This includes the Ecological and Wetland Impact Assessment (Appendix D1) and the Avifauna Impact Assessment (Appendix D2). The area is a wetland feature (Channelled Valley bottom Wetland) located within the northern section of the corridor which will need to be traversed by the power line.

The Ecological and Wetland Impact Assessment indicates that the feature provides habitat for various aquatic plant and animal species and plays a role in water purification. Therefore, this feature has been identified as no-go and a 32m buffer has been recommended by the specialist. No development is therefore allowed in the wetland and the associated buffer.

The Avifauna Impact Assessment indicates that the drainage line habitat (i.e. Channelled Valleybottom Wetland) harbours greater species richness and abundance than any other, and is a flyway utilised by species that are prone to power line collisions, and therefore has the potential for the greatest impacts if extensive disturbances take place, or if insufficient mitigations are implemented. The biggest concern is collision impacts, which should be mitigated additionally with large ball-diverters to mark the power line here, in addition to the smaller PVC-spirals required for the remainder of the line. The second major concern is the siting of pylons, which should not be sited within the drainage line and wetland no-go sites.

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 32m 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 and Siyanda Solar Power Plants, as well as the proposed Ngwedi Solar Power Plant (should it be authorised). 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 three 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.

Christia van Dyk

Environamics - Environmental Consultants



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