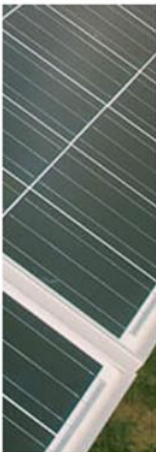


ENVIRONMENTAL IMPACT REPORT

Final – 7 September 2023

THE PROPOSED KHWEZI PHOTOVOLTAIC
SOLAR POWER PLANT NEAR EXCELSIOR,
FREE STATE PROVINCE



ENVIRONAMICS

PROJECT DETAIL

DFFE Reference No. : 14/12/16/3/3/2/2316

Project Title : The Proposed Khwezi Photovoltaic Solar Power Plant near Excelsior, Free State Province

Authors : Ms. Hanlie Stander

Reviewed : Ms. Carli van Niekerk

Client : Khwezi Solar PV (RF) (Pty) Ltd

Report Status : Final Environmental Impact Report

Submission date : 7 September 2023

When used as a reference this report should be cited as: Environamics (2023) Final Environmental Impact Report: The Proposed Khwezi Photovoltaic Solar Power Plant near Excelsior, Free State Province.

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TABLE OF CONTENTS

PROJECT DETAIL.....	1
TABLE OF CONTENTS.....	2
LIST OF TABLES	5
LIST OF FIGURES.....	7
PLATES 9	
APPENDICES	10
GLOSSARY OF TERMS AND ACRONYMS.....	11
CONTEXT FOR THE DEVELOPMENT	13
EXECUTIVE SUMMARY	15
1 INTRODUCTION	20
1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT	20
1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	21
1.3 DETAILS OF SPECIALISTS.....	22
1.4 STATUS OF THE EIA PROCESS	26
1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT.....	29
1.6 STRUCTURE OF THE REPORT	34
2 ACTIVITY DESCRIPTION	38
2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION	38
2.2 ACTIVITY DESCRIPTION.....	40
2.3 PHOTOVOLTAIC TECHNOLOGY.....	46
2.4 LAYOUT DESCRIPTION	48
2.5 SERVICES PROVISION.....	60
2.5.1 Water.....	60
2.5.2 Stormwater.....	60
2.5.3 Sanitation	60
2.5.4 Solid Waste.....	61

2.5.5	Electricity	61
2.6	DECOMMISSIONING OF THE FACILITY.....	61
3	LEGISLATIVE AND POLICY CONTEXT	63
3.1	INTRODUCTION	63
3.2	LEGISLATIVE CONTEXT.....	65
3.4	POLICY CONTEXT	71
3.5	OTHER LEGISLATION.....	83
3.6	RELEVANT GUIDANCE.....	83
3.7	CONCLUSION	84
4	THE NEED AND DESIRABILITY.....	85
4.1	THE NEED FOR THE PROPOSED ACTIVITY.....	85
4.2	THE DESIRABILITY OF THE PROPOSED ACTIVITY	86
5	DESCRIPTION OF ENVIRONMENTAL ISSUES.....	89
5.1	CONSIDERATION OF ALTERNATIVES.....	89
5.1.1	No-go Alternative	90
5.1.2	Location Alternatives.....	90
5.1.3	Activity Alternatives	91
5.1.4	Design and Layout Alternatives.....	93
5.1.5	Technology Alternatives.....	94
5.2	PUBLIC PARTICIPATION PROCESS.....	97
5.2.1	General	97
5.2.2	Consultation Process	99
5.2.3	Registered I&APs	101
5.2.4	Issues Raised by I&APs and Consultation Bodies	101
5.3	THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE	101
5.3.1	Biophysical Environment.....	101
5.3.2	Description of the Socio-Economic Environment.....	127

5.3.3	Cultural and Heritage Environment.....	129
5.4	SITE SELECTION MATRIX.....	135
5.5	CONCLUDING STATEMENT ON ALTERNATIVES	137
6	DESCRIPTION OF THE IMPACTS AND RISKS.....	138
6.1	SCOPING METHODOLOGY	139
6.1.1	Checklist Analysis.....	139
6.1.2	Matrix Analysis	142
6.2	KEY ISSUES IDENTIFIED	159
6.2.1	Impacts During the Construction Phase.....	159
6.2.2	Impacts During the Operational Phase	185
6.2.3	Impacts During the Decommissioning Phase	201
6.2.4	Impacts Associated with the Battery Energy Storage System (BESS).....	203
6.3	SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES	206
6.3.1.	Aquatic Ecological/Wetland Impacts.....	206
6.3.2.	Ecological Impacts	207
6.3.3.	Avifaunal Impacts	207
6.3.4.	Visual Impacts.....	208
6.3.5.	Agricultural / impacts on the soil	208
6.3.6.	Heritage and Archaeological Impacts.....	209
6.3.7.	Paleontological Impacts	209
6.3.8.	Socio-Economic Impacts.....	209
6.3.9.	Traffic Impacts	210
6.3.10.	Risk Assessment for Battery Storage System	211
6.4	METHOD OF ENVIRONMENTAL ASSESSMENT	211
1.1.1	Impact Rating System	212
7	CUMULATIVE EFFECTS ASSESSMENT	217
7.1	INTRODUCTION	217
7.2	GEOGRAPHIC AREA OF EVALUATION	217

7.3	TEMPORAL BOUNDARY OF EVALUATION.....	218
7.4	OTHER PROJECTS IN THE AREA	219
7.4.1	Existing projects in the area	219
7.5	SPECIALIST INFORMATION ON CUMULATIVE EFFECTS	220
7.5.1	Terrestrial Ecology.....	221
7.5.2	Visual	223
7.5.3	Soil and Agricultural Potential.....	223
7.5.4	Heritage	223
7.5.5	Palaeontology.....	223
7.5.6	Social Impact Assessment	224
7.5.7	Traffic.....	224
7.5.8	Avifauna.....	224
7.5.9	Wetland Baseline and Risk Assessment	225
7.6	IMPACT ASSESSMENT.....	225
7.6.1	Potential Cumulative Effects	225
7.7	CONCLUSION	228
8	ENVIRONMENTAL IMPACT STATEMENT	230
8.1	SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS.....	230
8.2	SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS	231
8.3	TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED.....	232
8.4	RECOMMENDATION OF EAP	233
9	REFERENCES.....	235

LIST OF TABLES

Table 1.1: Details of specialists.....	24
Table 1.2: Estimated timeframe for completion of the ‘scoping and EIA process’	26
Table 1.3: Estimated Timeframe for Completion of the ‘S&EIR Processes’ for Khwezi SPP	28

Table 1.4: Specialist studies identified by the DFFE screening tool for the PV facility and specialist studies completed	29
Table 1.5: Specialists studies identified by the DFFE Screening tool for the substation facility and specialist studies completed	32
Table 1.6: Structure of the report	34
Table 2.1: General site information.....	39
Table 2.2: Listed activities	40
Table 2.3: Technical details for the proposed facility.....	48
Table 2.4: Development co-ordinates	49
Table 3.1: Legislative context for the construction of photovoltaic solar plants.....	65
Table 3.2: Policy context for the construction of photovoltaic solar plants	71
Table 4.1: Published Draft IRP 2019 (Approved by Cabinet for Consultation).....	86
Table 5.1: Land capability for the soils within the project area	102
Table 5.2: Land potential for the soils within the project area	103
Table 5.3: Sensitivity summary of the habitat types delineated within the project area of influence	111
Table 5.4: Average ecosystem service scores for delineated wetlands	115
Table 5.5: The IS results for the delineated HGM units	117
Table 5.6: At risk species found in the surveys	119
Table 5.7: Summary of habitat delineated within the field assessment area of the project.....	120
Table 5.8: The fauna species recorded during the field survey.....	122
Table 5.9: ZTV Assumptions	123
Table 5.10: ZTV rating in terms of proximity to the SPP	123
Table 6.1: Environmental checklist.....	139
Table 6.2: Matrix analysis	143
Table 6.3: Impacts and the mitigation measures during the construction phase.....	161
Table 6.4: Impacts and the mitigation measures during the operational phase	186
Table 6.5: Impacts and the mitigation measures during the decommissioning phase.....	202
Table 6.6: Impacts associated with the BESS	203

Table 6.8: The rating system 212

Table 7.1: A summary of related projects that may have a cumulative impact, in a 30 km radius of the study area..... 219

Table 7.2: Loss of Central Free State Grassland habitat within a 30 km radius of the project ... 222

Table 7.3: Potential Cumulative Effects for the proposed project..... 226

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: Cumulative Impact Map

Figure G: Critical Biodiversity Map

Figure H1: Sensitivity Map

Figure H2: Layout and Sensitivity Map

Figure H3: Layout, Similar Projects and Sensitivity Map

Figure I: Final Proposed Layout Map

Figure 2-1: Typical example of solar PV array 47

Figure 2-2: Development area..... 56

Figure 2-3: Co-ordinate points of development area 1..... 56

Figure 2-4: Co-ordinate points of development area 2..... 57

Figure 2-5: Co-ordinate points of development area 3..... 57

Figure 2-6: Co-ordinates of Substation and Switching Station..... 58

Figure 2-7: Co-ordinate points of BESS and Construction Camp..... 58

Figure 2-8: Co-ordinate points of Supporting Infrastructures..... 59

Figure 2-9: Co-ordinates of Access Roads 59

Figure 5-1: Location of the single preferred property alternative. The development footprint is located within the assessed area.	91
Figure 5-2: Global horizontal irradiation values for South Africa (Solar GIS, 2021) and the Khwezi SPP development footprint	92
Figure 5-3: Final proposed layout plan for the Khwezi SPP.....	93
Figure 5-4: Bifacial vs Monofacial Solar Panel absorption.	97
Figure 5-5: Affected properties (Blue) in relation to surrounding landowners	100
Figure 5-6: The land capability sensitivity (DAFF, 2017).....	103
Figure 5-7: Crop boundary sensitivity (DEA Screening Tool, 2022).....	103
Figure 5-8: Photographs Illustrating Some of the Flora Species Recorded – A) <i>Ammocharis coranica</i> (protected); B) <i>Aloe maculata</i> (Protected); C) <i>Moraea simulans</i> ; D) <i>Nemesia fruticans</i> ; and E) <i>Lobelia erinus</i> ; and F) <i>Helichrysum argyrosphaerum</i> (Protected).....	106
Figure 5-9: Photographs Illustrating the Category 1b IAP Flora Species Recorded within the Project Area – A) <i>Agave americana</i> ; B) <i>Argemone mexicana</i> ; C) <i>Bidens pilosa</i> and D) <i>Opuntia ficus-indica</i>	107
Figure 5-10: Map illustrating the Free State Biodiversity Plan Relevance	108
Figure 5-11: Map illustrating the project area in relation to the Protected Areas	109
Figure 5-12: The project area in relation to the National Protected Area Expansion Strategy ..	110
Figure 5-13: Map illustrating the habitats identified in the project area.....	111
Figure 5-14: Map illustrating the sensitivities of the habitats delineated within the overall project area.....	112
Figure 5-15: Photographical Evidence of the Different Wetland Types Found Within the Project Area of Influence, A) Channelled Valley Bottom wetland, B & C) Unchanneled Valley Bottom wetlands, D) Drainage feature.	113
Figure 5-16: Delineation and location of the different HGM units identified within the PAOI ..	114
Figure 5-17: Average ecosystem services scores for the delineated wetlands.....	115
Figure 5-18: Overall Present Ecological State of delineated wetlands.....	116
Figure 5-19: Photographs illustrating a portion of the avifauna species recorded in the assessment area: A: Cape Longclaw (<i>Macronyx capensis</i>), B: Spur-winged Goose (<i>Plectropterus gambensis</i>), C: Long-tailed Widowbird (<i>Euplectes progne</i>), D: Northern Black Korhaan (<i>Afrotis afraoides</i>), E: Orange River Francolin (<i>Scleroptila gutturalis</i>), F: Yellow-billed Duck (<i>Anas undulata</i>)	118
Figure 5-20: Map illustrating the sensitivities of the habitats delineated within the overall Project Area of Influence	121

Figure 5-21: Zone of Theoretical Visibility (ZTV) for the SPP, topography view 125

Figure 5-22: Existing external road network surrounding the Khwezi PV SPP 126

Figure 5-23: Proposed site accesses..... 126

Figure 5-24: The project area on the 1965 version of the 1: 50 000 topographic map 130

Figure 5-25: Location of heritage sites in the project area 133

Figure 5-26: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences, Pretoria) indicating the proposed Khwezi SPP development near Excelsior in the Free State..... 135

Figure 7-1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines 218

Figure 7-2: Process flow diagram for determining cumulative effects 221

PLATES

Plate 1: The Google Earth Map of the Site with Sensitive Areas Demarcated

Plate 2: The site (taken towards the north-east)

Plate 3: The site (taken towards the east)

Plate 4: The site (taken towards the south-east)

Plate 5: The site (taken towards the south)

Plate 6: The site (taken towards the south-west)

Plate 7: The site (taken towards the west)

Plate 8: The site (taken towards the north-west)

Plate 9: The Khwezi River: The Klipsruit Splitting the Project into Three Sites

APPENDICES

Appendix A: EAP declaration & Curriculum Vitae

Appendix B: Screening report

Appendix C: Public Participation

Appendix C1: Proof of Pre-Application Meeting

Appendix C2: Press advertisement

Appendix C3: On site notice

Appendix C4: List of I&APs

Appendix C5: Proof of correspondence

Appendix C6: Written comments

Appendix C7: Comments and Responses Report

Appendix D: Site Verification Report

Appendix E: Specialist Reports

Appendix E1: Wetland Baseline and Risk Assessment

Appendix E2: Terrestrial Ecology Baseline & Impact Assessment

Appendix E3: Visual Impact Assessment

Appendix E4: Soil and Agricultural Assessment

Appendix E5: Heritage Impact Assessment

Appendix E6: Palaeontological Impact Assessment

Appendix E7: Social Impact Assessment

Appendix E8: Traffic Impact Assessment

Appendix E9: Avifaunal Impact Assessment

Appendix E10: Specialist Terms of Reference

Appendix F: Additional Information

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
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
IAP	Invasive Alien Plant
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilo Volt
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt

NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
PAOI	Project area of influence
POSA	Plants of South Africa
PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SPP	Solar Power Plant
VU	Vegetation Unit

CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fueled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

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

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programmes/opportunities to generate power in South Africa. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years. During the recent 2023 State

of the Nation Address, the government has embarked upon allowing private developers to generate electricity. There are now more than 100 projects, which are expected to provide over 9 000 MW of new capacity over time. A number of companies that have participated in the renewable energy programme will soon enter construction and deliver a total of 2 800 MW of new capacity. Through the Just Energy Transition Investment Plan, R1.5 trillion will be invested in our economy over the next five years in new frontiers such as renewable energy, green hydrogen and electric vehicles. A number of projects are already underway, including the development of a new facility by Sasol at Boegoebaai in the Northern Cape, the Prieska Power Reserve in the Free State, and the Hydrogen Valley initiative in Limpopo, Gauteng and KwaZulu-Natal.

In response to the above, Khwezi Solar PV (RF) (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located on the Farm Koppiesdam No. 511, Registration Division Winburg, Free State Province situated within the Mantsopa Local Municipality area of jurisdiction (refer to Figure A for the locality map). The project entails the generation of 300 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will be approximately 500 hectares (including supporting infrastructure) within the 750 hectares identified and assessed as part of the Environmental Impact Assessment (EIA) process. From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2025 kWh/m².

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Mantsopa Local Municipality faces a number of challenges in addressing the needs of sustainable growth and improved quality of life (IDP, 2021/2022). The Mantsopa Local Municipality Integrated Development Plan (2021/2022) identifies specific threats and weaknesses experienced in the municipal area which includes providing democratic and accountable government for local communities, to ensure the provision of services to communities in a sustainable manner, to promote a safe and healthy environment, to promote social and economic development, to encourage the involvement of communities and community organizations in the matters of local Government. In line with its developmental mandate, Mantsopa Local Municipality understands its service delivery objectives as set out in the developmental strategies. Therefore, the developmental strategies as espoused in the IDP are directly linked to a specific developmental needs and objectives which must be measured in the organizational Performance Management System (PMS) and give effect to Service Delivery and Budget Implementation Plan (SDBIP) targets/goals.

Khwezi Solar PV (RF) (Pty) Ltd intends to develop a 300 MW photovoltaic solar facility and associated infrastructure on the Farm Koppiesdam No. 511, situated within the Mantsopa Local Municipality area of jurisdiction. The town of Excelsior is located approximately 10 km southeast of the proposed development (refer to Figure A and B for the locality and regional map). The total footprint of the project will approximately be 500 hectares (including supporting infrastructure on site). The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., agricultural potential, ecological sensitivity and archaeology), proximity to the R703 (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 324-327, as amended (2017), Environmental Authorisation is required for the Khwezi Solar Power Plant (SPP). The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- Activity 11(i) (GN.R. 327): *“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —*
 - (a) temporarily required to allow for maintenance of existing infrastructure;*
 - (b) 2 kilometres or shorter in length;*
 - (c) within an existing transmission line servitude; and*
 - (d) will be removed within 18 months of the commencement of development.”*



- Activity 12(ii)(a)(c) (GN.R. 327): *“The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse or (c) if no development setback exists within 32 meters of a watercourse measured from the edge of a watercourse: — excluding—*
 - (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;*
 - (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;*
 - (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;*
 - (dd) where such development occurs within an urban area;*
 - (ee) where such development occurs within existing roads, road reserves or railway line reserves; or*
 - (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.”*
- Activity 19 (GN.R. 327): *“The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving—*
 - (a) will occur behind a development setback;*
 - (b) is for maintenance purposes undertaken in accordance with a maintenance management plan;*
 - (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;*
 - (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or*
 - (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.”*
- Activity 24(ii) (GN.R. 327): *“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters; but excluding a road—*
 - (a) which is identified and included in activity 27 in Listing Notice 2 of 2014;*
 - (b) where the entire road falls within an urban area; or*
 - (c) which is 1 kilometre or shorter.”*
- Activity 28(ii) (GN.R. 327): *“ Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;*

excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.”

- Activity 56(ii) (GN.R. 327): *“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.”*
- Activity 1 (GN.R. 325): *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs —*
 - (a) within an urban area; or*
 - (b) on existing infrastructure.*
- Activity 15 (GN.R. 325): *“The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—*
 - (i) the undertaking of a linear activity; or*
 - (ii) maintenance purposes undertaken in accordance with a maintenance management plan.*
- Activity 10(b)(i)(hh) (GN.R. 324): *“The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (b) Free State, (i) outside urban areas, (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”*
- Activity 12(b)(iv) (GN.R. 324): *“The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (b) Free State (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland”.*
- Activity 14(ii)(a)(c)(b)(i)(ff) (GN.R. 324): *“The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional.”*
- Activity 18 (b)(i)(hh) (GN.R. 324): *“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) Free State (i) Outside urban areas: (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”*

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

Regulation 21 of the EIA Regulations requires that an Environmental Impact Report (EIR) must contain the information set out in Appendix 3 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 3 of GN R.326 requires a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred site, the scope of the assessment, and the consultation process undertaken be set out in the EIR report.

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

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 12-18 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation and socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and temporary increase in traffic disruptions and movement patterns.

Impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, collision and electrocutions of avifauna and visual impact of sensitive visual receptors occurring for motorists that drive passed the proposed solar power plant. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development and social upliftment.

Impacts during the decommissioning phase:

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

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of Forestry, Fisheries and Environment (DFFE) database only two similar developments has been proposed in relatively close proximity to the proposed activity, of which one was withdrawn / lapsed.

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

Regulation 23 of the EIA Regulations determine that an EIA report must be prepared and submitted for the proposed activity after the competent authority accepts the final Scoping Report, including the Plan of Study for the EIA phase. The EIA report will evaluate and rate each identified impact and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Appendix 3 of the EIA Regulations. This is the Final EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE) for review and commenting on the Application for Environmental Authorisation.

1 INTRODUCTION

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

Appendix 3. (3) An environmental impact assessment report contains the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-(a) details of:

- (i) the EAP who prepared the report; and
- (ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant competent authority, the Department of Forestry, Fisheries and the Environment (DFFE). Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

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

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

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

This report is the Final Environmental Impact Report (EIR) that has been submitted to the Department of Environment, Forestry and Fisheries for decision making purposes. All comments received prior to and during the Scoping Phase of the project as well as during the circulation of the Draft EIA Report are available in the Comments and Response Report as referred to above, as well as Appendix C6 of this Final EIR.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person: Hanlie Stander
EAPASA Registration: 2019/1997
Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone: 082 412 5592 (Cell)
Electronic Mail: hanlie@solis-environmental.co.za

And/or

Contact person: Carli van Niekerk
EAPASA Registration: 2019/1742
Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531
Telephone: 082 220 8651 (Cell)
Electronic Mail: carli@Solis-Environmental.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the S&EIA 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 process is also summarized in the curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.1 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation (1). In terms of the independent status of the specialists, their declarations are attached as Appendix E to this report. The expertise of the specialists is also summarized in their respective reports.

Table 1.1: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Terrestrial Ecology Baseline and Impact Assessment	The Biodiversity Company	Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Avifaunal Scoping Assessment	The Biodiversity Company	Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Wetland Baseline and Risk Assessment	The Biodiversity Company	Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Soil and Agricultural Assessment	The Biodiversity Company	Andrew Husted	-	Cell: 081 319 1225	info@thebiodiversitycompany.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	Banzai Environmental (Pty) Ltd	Elize Butler	-	Cell: 084 447 8759	elizebutler002@gmail.com
Social Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	johan@donaway.co.za
Visual Impact Assessment	Donaway Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus 9515	Tel: 082 316 7749	johan@donaway.co.za



Traffic Impact Assessment	BVi Consulting Engineers	DJP van der Merwe	Edison Square c/o Edison Way & Century Avenue Century City 7441	-	-
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1.4 STATUS OF THE EIA PROCESS

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

- A site visit was conducted by the EAP on 07 October 2022.
- Site notices were erected on site on 07 October 2022 informing the public of the commencement of the EIA process.
- The Background Information Document (BID) was circulated to all I&APs and surrounding landowners on 07 October 2022.
- A newspaper advertisement was placed in the Bloemnuus on 13 October 2022, informing the public of the EIA process and for the public to register as I&APs.
- A pre-application meeting request was submitted to DFFE on 01 February 2023.
- The DFFE indicated that a pre-application meeting is not required, in an email dated 06 February 2023.
- An application form and the draft Scoping Report was submitted to DFFE on 24 February 2023.
- The Draft Scoping Report was made available for a 30-day review and comment period from 24 February 2023 to 26 March 2023.
- The Final Scoping Report was submitted to the DFFE on 12 April 2023 for decision-making and approval of the Plan of Study for the EIA.
- The DFFE accepted the Final Scoping Report (FSR) on 22 May 2023.
- The Draft EIR Report was submitted to DFFE (and registered I&APs) on 27 July 2023 for the 30-day review and comment period which will be from 27 July 2023 to 27 August 2023.
- The Final EIA Report was submitted to DFFE for decision making purposes on the 7th of September 2023.

It is envisaged that the EIA process should be completed within approximately four months of submission of the Final EIR, i.e. by December 2023 – see Table 1.2.

Table 1.2: Estimated timeframe for completion of the ‘scoping and EIA process’

Activity	Prescribed timeframe	Timeframe
Site visits	-	07 October 2022

Public participation (BID)	30 Days	07 October 2022 – 7 November 2022
Pre-application meeting	-	N/A
Conduct specialist studies	-	October 2022 – January 2023
Submit application form and DSR	-	24 February 2023
Public participation (DSR)	30 Days	24 February 2023 – 26 March 2023
Submit FSR	44 Days	12 April 2023
Department acknowledges receipt	10 Days	April 2023
Department approves/reject	43 Days	May 2023
Public participation (DEIR)	30 Days	27 July – 27 August 2023
Submit FEIR & EMPr	106 Days	7 September 2023
Department acknowledges receipt	10 Days	September 2023
Decision	107 Days	December 2023
Department notifies of decision	5 Days	December 2023
Registered I&APs notified of decision	14 Days	December 2023
Appeal	20 Days	December / January 2024

Table 1.3 below provides more detail on timeframes as well as process flow for the S&EIR process.

Table 1.3: Estimated Timeframe for Completion of the 'S&EIR Processes' for Khwezi SPP

Tasks to be performed	October				November				December				January				February				March				April				May				June				July				August				September				October				November			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
REGISTRATION PHASE																																																								
Pre-application meeting (DFFE)							X																																																	
Site visits	X																																																							
Public participation																																																								
- Press advertisement		X																																																						
- On site advertisement	X																																																							
- Distribution of notices							X																																																	
- Complete PP report												X																																												
Specialist inputs and reports																																																								
- Draft terms of reference			X																																																					
- Receive specialist studies											X																																													
'Draft' Scoping Report																																																								
- Information gathering															X																																									
- Report writing															X																																									
- Circulate 'Draft' Scoping Report																			X																																					
SCOPING PHASE																																																								
Complete and submit application																																																								
- Information gathering															X																																									
- Complete and submit															X																																									
Authority acknowledges receipt of																			X																																					
Final Scoping Report																																																								
- Information gathering																							X																																	
- Report writing																							X																																	
- Submission of Final Scoping																								X																																
- Approval																											X																													
EIA PHASE																																																								
Specialist inputs and reports																																																								
- Draft terms of reference																											X																													
- Receive specialist studies																												X																												
Draft EIR Report																																																								
- Circulate																																											X													
Final EIA Report & EMP																																																								
- Submission																																															X									

The competent authority has 107 days for decision-making after the EIR has been submitted and an additional 5 days to notify the applicant in writing of their decision. The applicant must within 14 days of the date of the decision notify registered I&APs of the decision. Registered I&APs are then provided 20 days in which to lodge appeals. The appeal period expires 20 days after registered I&APs have been informed of the decision according to GNR326, Regulation 7.

1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT

In terms of GN R960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulations and 21 – 24 of the EIA Regulations.

The requirement for the submission of a Screening Report for the Khwezi SPP is applicable as it triggers Regulation 21 of the EIA Regulations, 2014 (as amended). The Screening Report has been appended to the Application for EA as originally submitted to the DFFE on 24 February 2023 and updated again on 12 April 2023. The screening tool reports are also appended as Appendix B to this Final EIA Report.

The tables included below provides an indication of the specialist studies identified by the DFFE Screening Tool Report (Appendix B) within the different applicable categories, an indication of whether the studies were undertaken or not and a motivation or confirmation of the studies being included or not.

Table 1.4: Specialist studies identified by the DFFE screening tool for the PV facility and specialist studies completed.

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Appendix
Agricultural Impact Assessment Sensitivity: High	Yes	A Soil and Agriculture Potential Assessment is included in Appendix E4. The high sensitivity is disputed by the report.
Animal Species Assessment Sensitivity: Medium	Yes	The Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E2) includes the relevant Animal Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Wetland Baseline and Risk Assessment (refer to Appendix E1) has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.



Archaeological and Cultural Heritage Impact Assessment Sensitivity: Low	Yes	A Heritage Impact Assessment is included in Appendix E5.
Avian Impact Assessment Sensitivity: Low	Yes	An Avifauna Impact Assessment (refer to Appendix E9) has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Civil Aviation Assessment Sensitivity: Low	No	The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. No major or other types of civil aviation aerodromes were found to be located in close proximity of the site. The Civil Aviation Authority has been consulted regarding the development of the project since the commencement of the S&EIR Process. No specific negative impacts or issues have been raised to date by the CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Defence Theme Sensitivity: Low	No	The sensitivity for the entire extent of the site is low and therefore no assessment has been included. No defence base has been found to be located in close proximity to the project site. The South African National Defence Force (SANDF) has been consulted regarding the development of the project since the commencement of the S&EIR Process. No specific negative impacts or issues have been raised



		to date regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Landscape / Visual Impact Assessment Sensitivity: Very High	Yes	A Visual Impact Assessment is included in Appendix E3.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Palaeontological Impact Assessment is included in Appendix E6.
Plant species Assessment Sensitivity: Low	Yes	The Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E2) includes the relevant Plant Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
RFI Assessment Sensitivity: Low	No	The RFI theme sensitivity is low for the entire extent of the project. The South African Radio Astronomy Observatory (SARAO) has been consulted regarding the development of the project since the commencement of the S&EIR Process. No specific negative impacts or issues have been raised to date by the SARAO regarding the project.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E2) has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.

Geotechnical Assessment Sensitivity: Not indicated	No	The Geotechnical Assessment will be conducted before construction begins as part of the micro-siting of the facility layout. The consideration of geotechnical aspects is considered to be of a technical concern rather than an environmental concern.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E7.

Table 1.5: Specialists studies identified by the DFFE Screening tool for the substation facility and specialist studies completed.

Study identified in the DFFE Screening Tool and sensitivity	Study included?	Appendix
Agricultural Impact Assessment Sensitivity: High	Yes	A Soil and Agriculture Potential Assessment is included in Appendix E4. The high sensitivity is disputed by the report.
Animal Species Assessment Sensitivity: Medium	Yes	The Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E2) includes the relevant Animal Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Aquatic Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Wetland Baseline and Risk Assessment (refer to Appendix E1) has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Archaeological and Cultural Heritage Impact Assessment	Yes	A Heritage Impact Assessment is included in Appendix E5.

Sensitivity: Low		
Civil Aviation Assessment Sensitivity: Low	No	The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. No major or other types of civil aviation aerodromes were found to be located in close proximity of the site. The Civil Aviation Authority has been consulted regarding the development of the project since the commencement of the S&EIR Process. No specific negative impacts or issues have been raised to date by the CAA regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Defence Theme Sensitivity: Low	No	The sensitivity for the entire extent of the site is low and therefore no assessment has been included. No defence base has been found to be located in close proximity to the project site. The South African National Defence Force (SANDF) has been consulted regarding the development of the project since the commencement of the S&EIR Process. No specific negative impacts or issues have been raised to date regarding the project. The project is also not located within an area considered to be of a high sensitivity.
Palaeontological Impact Assessment Sensitivity: Very High	Yes	A Palaeontological Impact Assessment is included in Appendix E6.

Plant species Assessment Sensitivity: Low	Yes	The Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E2) includes the relevant Plant Species Assessment. This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Terrestrial Biodiversity Impact Assessment Sensitivity: Very High	Yes	A Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E2) has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report.
Socio-Economic Assessment Sensitivity: Not indicated	Yes	A Social Impact Assessment is included in Appendix E7.

Kindly refer to the Site Verification Report included under Appendix D of the current report. The site verification report further details reasons for exclusion of specialist studies where applicable.

1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 of Regulation No.326. It consists of seven sections demonstrating compliance with the specifications of the regulations as illustrated in Table 1.6.

Table 1.6: Structure of the report

Requirements for the contents of an EIR as specified in the Regulations		Section in report
Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-		
(a)	details of -	1
	(i) the EAP who prepared the report; and ii) the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	2
	(i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name;	

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

	<p>(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;</p> <p>(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;</p> <p>(viii) the possible mitigation measures that could be applied and level of residual risk;</p>	
(i)	<p>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-</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)	<p>an environmental impact statement which contains-</p> <p>(i) a summary of the key findings of the environmental impact assessment;</p> <p>(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</p> <p>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</p>	8
(m)	<p>based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and</p>	

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

2 ACTIVITY DESCRIPTION

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

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

(b) the location of the activity, including-

- (i) the 21-digit Surveyor General code of each cadastral land parcel;
- (ii) where available, the physical address and farm name;
- (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity 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 project entails the development of a photovoltaic solar power plant and associated infrastructure on Farm Koppiesdam No. 511, Registration Division Winburg, Free State Province situated within the Mantsopa Local Municipality area of jurisdiction. The proposed development is located in the Free State Province in central interior of South-Africa (refer to Figure B for the regional map). The town of Excelsior is located approximately 10 km southeast of the proposed development (refer to Figure A for the locality map).

The project entails the generation of 300 MW electrical power through the installation and operation of photovoltaic (PV) panels. The total area assessed as part of this EIA Report (hereafter referred to as the “development area”) is 750 ha. The development footprint for Khwezi Photovoltaic Solar Power Plant is proposed to be approximately 500 ha in extent. The full extent of the development area was considered during scoping with the aim of confirming the suitability from an environmental and social perspective. Based on the outcome of the findings of the Scoping Phase, a development footprint has been defined. Refer to Table 2.1 for general site

information. The property on which the facility is to be constructed will be leased by Khwezi Solar PV (RF) (Pty) Ltd from the property owner for the life span of the project (minimum of 20 years).

Energy generated by the facility will be transmitted from the facility substation/Eskom switching station to the Merapi Transmission Substation via a new 132kV powerline. A separate Basic Assessment is being undertaken to assess the grid connection infrastructure. Refer to Table 2.1 for the general site information.

Table 2.1: General site information

Description of affected farm portion	<ul style="list-style-type: none"> Farm Koppiesdam No. 511
Province	Free State
District Municipality	Thabo Mofutsanyana District Municipality
Local Municipality	Mantsopa Local Municipality
Ward numbers	Ward 9
Closest towns	Excelsior is located approximately 10 km southeast of the proposed development.
21 Digit Surveyor General codes	<ul style="list-style-type: none"> Farm Koppiesdam No. 511 F0420000000051100000
Title Deed	<ul style="list-style-type: none"> Farm Koppiesdam No. 511 <ul style="list-style-type: none"> T13257/2012
Photographs of the site	Included in Plates as an appendix to the Report
Type of technology	Photovoltaic solar facility
Structure Height	<ul style="list-style-type: none"> Panels ~4.5m Buildings ~ 6m Battery storage facility ~8m height
Battery storage	Within a 4 ha area within the development footprint
Surface area to be covered (Development footprint)	~500 ha
Structure orientation	Monofacial or Bifacial PV panels will be utilised. The panels will either be fixed to a single-axis and/or double

	horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
Laydown area dimensions (area assessed as part of the EIA)	Temporary laydown areas will occupy 6 hectares. Permanent laydown area will occupy up to 10ha which will include hard stand infrastructure i.e., BESS, facility substation and auxiliary buildings. The proposed PV facilities will occupy ~500 ha.
Generation capacity	300 MW
Expected production	2200kWh/kWp (Expected production by 300MW plant considering Bifacial and one-axis tracker). This may vary depending on the chosen technology.

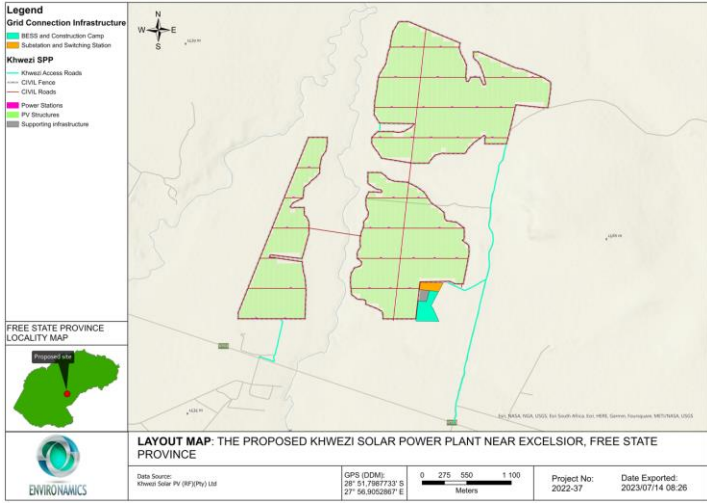
The site is located within a rural setting and is bordered by agricultural land uses, as well as mining activities. The site survey revealed that the land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use. Refer to plates 1 – 9 for photographs of the affected property and proposed development footprint area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
GNR. 327 (as amended in 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.” Activity 11(i) is triggered since the proposed photovoltaic solar facility includes an on-site HV/MV substation and switching station with a capacity of 132kV. It is expected that generation from the facility will tie in with the proposed Khwezi Grid Connection 132kV Overhead Power

		<p>Line. Note, the proposed overhead powerline will be assessed as a part of a separate BA process.</p>
<p>GNR. 327 (as amended in 2017)</p>	<p>Activity 12(ii)(a)(c)</p>	<ul style="list-style-type: none"> • <i>The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse or (c) if no development setback exists within 32 meters of a watercourse measured from the edge of a watercourse.”</i> • Activity 12(ii)(a)(c) is triggered based on the presence of various wetland types that are found within the project area of influence including a channelled valley bottom wetland and two (02) unchanneled valley bottom wetlands. An artificial dam has been found to be located within the unchanneled valley bottom wetland. The project lies within 32m from the watercourses/wetlands. Internal roads will also traverse watercourses. A pre-mitigation buffer of 30m has been recommended by the aquatic specialist, which can be decreased to 15 m with the additional of all prescribed mitigation measures. These buffers were implemented during the layout finalisation. The existing access roads that traverse watercourses will be expanded to suit the project needs. • Please refer to the following maps: <div>  <p>Legend</p> <ul style="list-style-type: none"> Grid Connection Infrastructure REIS and Construction Camp Substation and Switching Station Khwezi SPP Khwezi Access Roads CIVIL Fences CIVIL Roads Power Stations PV Structures Supporting Infrastructure <p>FREE STATE PROVINCE LOCALITY MAP</p> <p>LAYOUT MAP: THE PROPOSED KHEWZI SOLAR POWER PLANT NEAR EXCELSIOR, FREE STATE PROVINCE</p> <p>Data Source: Khwezi Solar PV (SPP/PP) Ltd</p> <p>GPS (ODM): 28° 51' 18.677333 S, 27° 56,9052887 E</p> <p>Scale: 0 275 550 1 100 Meters</p> <p>Project No: 2022-37 Date Exported: 2023/07/14 08:26</p> </div>

		<p>Legend</p> <p>Khwezi SPP</p> <ul style="list-style-type: none"> Khwezi Access Roads CIVIL Fence CIVIL Roads <p>BESS and Construction Camp</p> <ul style="list-style-type: none"> BESS PV Structures Substation and Switching Station Supporting Infrastructure <p>Project Area</p> <p>Heritage Sensitivity</p> <ul style="list-style-type: none"> Burial Site 32m Buffer <p>Restricted Areas</p> <ul style="list-style-type: none"> User Restricted Area <p>Ecological Sensitivity</p> <ul style="list-style-type: none"> High <p>Wetland and Riparian</p> <ul style="list-style-type: none"> Surface Water Features Artificial Wetlands Drainage Features HGM 1- Unchanneled Valley Bottom HGM 7- Channeled Valley Bottom HGM 8- Unchanneled Valley Bottom 32m Buffer <p>FREE STATE PROVINCE LOCALITY MAP</p> <p>LAYOUT AND SENSITIVITY MAP: THE PROPOSED KHWEZI SOLAR POWER PLANT NEAR EXCELSIOR, FREE STATE PROVINCE</p> <p>Data Source: Khwezi Solar PV (Pty) Ltd</p> <p>GPS (DDM): 28° 51' 7.887733" S, 27° 56' 30.028877" E</p> <p>Scale: 0 275 550 1 100 Meters</p> <p>Project No: 2022-37</p> <p>Date Exported: 2023/07/19 16:13</p>
<p>GNR. 327 (as amended in 2017)</p>	<p>Activity 19</p>	<ul style="list-style-type: none"> According to our calculations, the 32m buffer accounts for 11,4 ha. Please note that a 15m buffer was proposed by the Wetland Specialist. Thus, it is believed that approximately 6 ha (60 000m²) of the vegetation within the 32m buffer area may be impacted upon due to the construction of the PV array, roads and fencing. Note that none of the above will infringe on the 15m buffer, as determined by the Wetland Specialist. <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 metres from a watercourse.”</i> Activity 19 is triggered as the project area comprises of existing roads which traverse watercourses. The existing access roads that traverse watercourses will be expanded to suit the project needs and will require removal of more than 10 cubic metres of soil from a watercourse.
<p>GNR. 327 (as amended in 2017)</p>	<p>Activity 24(ii)</p>	<ul style="list-style-type: none"> <i>“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.”</i> Activity 24(ii) is triggered as the proposed main access road to Khwezi SPP will be widened to 12 m, and with the inclusion of side drains and gavel embankments, it will exceed the threshold of this activity.
<p>GNR. 327 (as</p>	<p>Activity 28(ii)</p>	<ul style="list-style-type: none"> <i>“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for</i>

amended in 2017)		<p><i>agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</i></p> <ul style="list-style-type: none"> • Activity 28(ii) is triggered as the total area to be developed for the PV facility and associated infrastructure is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture. The property will be re-zoned to “special” use. The proposed development footprint of the solar PV facility is ~500 ha.
GNR. 327 (as amended in 2017)	Activity 56(ii)	<ul style="list-style-type: none"> • <i>“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres.”</i> • Activity 56(ii) is triggered as the perimeter road required will be approximately 23km long and 12m wide while internal roads will be ~40km long and 12m wide. Existing roads will be lengthened by more than 1 kilometer.
GNR. 325 (as amended in 2017)	Activity 1	<ul style="list-style-type: none"> • <i>“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs —</i> <i>(a) within an urban area; or</i> <i>(b) on existing infrastructure.”</i> • Activity 1 is triggered since the proposed photovoltaic solar facility will generate 300 megawatts electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	<ul style="list-style-type: none"> • <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i> • Activity 15 is triggered as the cumulative area of indigenous vegetation to be cleared for the entire Project (excluding linear components) will exceed 20 hectares. The development footprint of the solar PV facility is ~500 ha.

<p>GNR. 324 (as amended in 2017)</p>	<p>Activity 10(b)(i)(hh)</p>	<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 (b) Free State, (i) outside urban areas, (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</i> • Activity 10(b)(i)(hh) is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and/or oils) in containers with a capacity exceeding 30 but not exceeding 80 cubic metres. According to the Wetland Baseline and Risk Assessment, a channelled valley bottom wetland and two (02) unchanneled valley bottom wetlands exists within the project area/site. An artificial dam is also found to be located within the unchanneled valley bottom wetland. A pre-mitigation buffer of 30m (and 15m buffer, post-mitigation) has been recommended by the aquatic specialist and this was taken into consideration during the final proposed layout. Access roads may traverse wetland features.
<p>GNR. 324 (as amended in 2017)</p>	<p>Activity 12 (b)(iv)</p>	<ul style="list-style-type: none"> • <i>“The clearance of an area of 300 square metres or more of indigenous vegetation (b) Free State (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland”.</i> • Activity 12 (b)(iv) is triggered since the project is located within the Free State Province and according to the Wetland Baseline and Risk Assessment, a channelled valley bottom wetland and two (02) unchanneled valley bottom wetlands exists within the project area/site. An artificial dam is also found to be located within the unchanneled valley bottom wetland. The project lies within 32m from the watercourses/wetlands. A pre-mitigation buffer of 30m (and 15m post-mitigation buffer) has been recommended by the aquatic specialist and it was implemented during layout finalisation. The development footprint for permanent hard stand areas is ~20 ha which converts to ~200 000m² of vegetation requiring clearing.

		<ul style="list-style-type: none"> According to our calculations, the 32m buffer accounts for 11,4 ha. Please note that a 15m buffer was proposed by the Wetland Specialist. Thus, it is believed that approximately 6 ha (60 000m²) of the vegetation within the 32m buffer area may be impacted upon due to the construction of the PV array, roads and fencing. Note that none of the above will infringe on the 15m buffer, as determined by the Wetland Specialist. Access roads may traverse wetland features.
GNR. 324 (as amended in 2017)	Activity 14(ii)(a)(c)(b)(i)(ff)	<ul style="list-style-type: none"> <i>“The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; (b) Free State, (i) Outside urban areas (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional.”</i> Activity 14(ii)(a)(c)(b)(i)(ff) is triggered since the project lies within 32m from the watercourses/wetlands. A pre-mitigation buffer of 30m (and 15m post-mitigation buffer) has been recommended by the aquatic specialist. The buffer was taken into consideration during the layout finalisation.
GNR. 324 (as amended in 2017)	Activity 18 (b)(i)(hh)	<ul style="list-style-type: none"> <i>“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) Free State (i) Outside urban areas: (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</i> Activity 18 (b)(i)(hh) is triggered as the perimeter road required will be approximately 23km long and 12m wide while internal roads will be approximately 40km and 12m wide. Existing roads will be lengthened by more than 1 kilometer. The project is proposed within the Free State province. According to the Wetland Baseline and Risk Assessment, a channelled valley bottom wetland and two (02) unchanneled valley bottom wetlands exists within the project area/site. An artificial dam is also found to be located within the unchanneled valley bottom wetland. The

		<p>project lies within 32m from the watercourses/wetlands. A pre-mitigation buffer of 30m (and 15 m post-mitigation buffer) has been recommended by the aquatic specialist. The buffer(s) was taken into consideration during the layout finalisation.</p>
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The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- Site clearing and preparation: Certain areas of the site and access road will need to be cleared of vegetation and some areas may need to be levelled.
- Civil works to be conducted:
 - Terrain levelling if necessary – Levelling will be minimal as the potential site chosen is relatively flat.
 - Laying foundation - The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
 - Construction of access and inside roads/paths – The majority of the access road will follow existing, gravel farm roads that may require widening to 10 m (inclusive of storm water infrastructure). Where new sections of road need to be constructed/lengthened, this will be gravel/hard surfaced access road and only tarred if necessary. A network of gravel internal access roads and a perimeter road of 40 km, each with a width of 12 m, will be constructed to provide access to the various components of the PV development.
 - Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layers where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

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

The key components of the proposed project are described below:

- PV Panel Array - To produce up 300 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the yield.



Figure 2-1: Typical example of solar PV array

- Wiring to Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the Grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. The project will entail the following:
 - Facility grid connection infrastructure, including:
 - 33 kV cabling between the project components and the facility substation.
 - A 132 kV facility substation.

- 33 kV or 132 kV cabling or powerline between the facility substation and the Eskom collector switching station.

Note: The grid connection will be assessed as a part of a separate Basic Assessment Application Process

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site: a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre. The project requires the need for both temporary and permanent laydown areas.
- Battery Storage – The Battery Storage Facility will occupy an area of 4 hectares with a maximum height of 8 m. The preferred technology is Lithium-ion solid state battery, however, due to the ever changing preferences and improvements to battery technology, the final selection of the type of battery technology to be used will only take place during the detailed design process and after the appointment of the battery supplier.
- Roads – The majority of the access road will follow existing, gravel farm roads that require widening of 12 m (inclusive of storm water infrastructure). Where new sections of road need to be constructed/lengthened, this will be gravel/hard surfaced access road and only tarred if necessary. A network of gravel internal access roads and a perimeter road of approximately 40 km, each with a width of 12 m, will be constructed to provide access to the various components of the PV development. Access will be obtained via the R703 Regional Road to the south of the site. The access and internal roads will be constructed within a 25-meter corridor.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 3.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan provided within this Final EIA Report will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site will be considered – refer to Figure H to L. The total surface area proposed for the layout includes the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power line, battery energy storage system, on-site substation and switching station and perimeter fences). Limited features of environmental significance exist on site. These features have been considered / avoided in the layout of the solar facility. A final layout plan is included as Figure M and Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE specifications.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	4.5 meters

Area of PV Array	~500 ha
Area occupied by inverter / transformer stations / substations / BESS	BESS: 4 ha Facility substation: 1 ha
Capacity of on-site substation	132kV
Capacity of the power line	132kV
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 10 Hectares Construction Laydown Area: ~6 Hectares Area of PV Array: ~500ha
Area occupied by buildings	Security Room, Office & Staff Locker and Changing Room: ~1.5 Hectares
Battery storage facility	The Battery Storage Facility will occupy an area 4 hectares. Maximum height of the BESS is 8 m.
Length of internal roads	Approximately 40 km
Width of internal roads	Approximately 12 meters. The main access roads may be widened to 12 meters.
Height of fencing	3.5m

Table 2.4 provides the co-ordinate points for the proposed project site and associated infrastructure.

Table 2.4: Development co-ordinates

Co-ordinates			
Site Boundary	A	28°52'55.59"S	26°56'3.18"E
	B	28°50'44.69"S	26°57'0.20"E
	C	28°51'41.27"S	26°59'12.66"E
	D	28°52'57.81"S	26°57'30.61"E
Development Area 1	A	28°52'54.67"S	26°56'4.88"E
	B	28°51'42.06"S	26°56'35.04"E
	C	28°51'41.99"S	26°56'43.47"E
	D	28°51'44.34"S	26°56'43.40"E
	E	28°51'47.65"S	26°56'42.66"E

	F	28°51'49.81"S	26°56'40.92"E
	G	28°51'56.36"S	26°56'40.03"E
	H	28°52'2.07"S	26°56'33.15"E
	I	28°52'6.35"S	26°56'32.80"E
	J	28°52'8.24"S	26°56'28.36"E _c
	K	28°52'9.81"S	26°56'27.29"E
	L	28°52'10.32"S	26°56'28.03"E
	M	28°52'10.01"S	26°56'29.47"E
	N	28°52'10.06"S	26°56'33.29"E
	O	28°52'13.14"S	26°56'33.45"E
	P	28°52'15.89"S	26°56'35.30"E
	Q	28°52'20.73"S	26°56'35.40"E
	R	28°52'30.54"S	26°56'32.39"E
	S	28°52'28.89"S	26°56'18.74"E
	T	28°52'29.80"S	26°56'18.40"E
	U	26°56'18.40"E	26°56'32.48"E
	V	28°52'38.22"S	26°56'33.63"E
W	28°52'42.67"S	26°56'34.15"E	
X	28°52'54.61"S	26°56'33.44"E	
Development Area 2	A	28°51'36.65"S	26°57'20.97"E
	B	28°51'36.27"S	26°57'6.28"E
	C	28°51'32.43"S	26°57'3.68"E
	D	28°51'17.64"S	26°57'5.45"E
	E	28°50'55.92"S	26°57'14.56"E
	F	28°50'55.63"S	26°57'19.13"E
	G	28°51'4.47"S	26°57'40.82"E
	H	28°51'6.58"S	26°57'40.50"E

I	28°51'12.91"S	26°57'43.66"E
J	28°51'19.42"S	26°57'43.97"E
K	28°51'19.42"S	26°57'44.64"E
L	28°51'17.66"S	26°57'45.59"E
M	28°51'17.63"S	26°57'49.67"E
N	28°51'20.80"S	26°57'51.31"E
O	28°51'20.51"S	26°57'52.08"E
P	28°51'11.95"S	26°57'48.85"E
Q	28°51'10.13"S	26°57'46.81"E
R	28°51'7.62"S	26°57'46.79"E
S	28°51'7.58"S	26°57'49.19"E
T	28°51'14.00"S	26°58'5.26"E
U	28°51'14.53"S	26°58'8.70"E
V	28°51'17.66"S	26°58'17.15"E
W	28°51'19.65"S	26°58'20.57"E
X	28°51'30.08"S	26°58'19.18"E
Y	28°51'29.12"S	26°58'5.42"E
Z	28°51'44.34"S	26°58'1.26"E
1	28°51'44.62"S	26°57'52.04"E
2	28°51'41.98"S	26°57'51.95"E
3	28°51'41.76"S	26°57'52.19"E
4	28°51'41.14"S	26°57'51.71"E
5	28°51'44.03"S	26°57'47.28"E
6	28°51'46.57"S	26°57'44.53"E
7	28°51'48.46"S	26°57'43.40"E
8	28°51'48.35"S	26°57'33.40"E
9	28°51'49.12"S	26°57'30.32"E

	10	28°51'51.29"S	26°57'28.20"E
	11	28°51'52.34"S	26°57'27.57"E
	12	28°51'52.37"S	26°57'20.11"E
	13	28°51'50.39"S	26°57'6.84"E
	14	28°51'44.46"S	26°57'2.62"E
	15	28°51'42.03"S	26°57'2.69"E
	16	28°51'39.56"S	26°57'5.16"E
	17	28°51'39.48"S	26°57'12.10"E
	18	28°51'39.93"S	26°57'14.27"E
	19	28°51'39.40"S	26°57'16.73"E
20	28°51'37.81"S	26°57'19.72"E	
Development Area 3	A	28°52'54.65"S	26°57'7.74"E
	B	28°52'51.61"S	26°57'7.22"E
	C	28°52'48.85"S	26°57'0.14"E
	D	28°52'47.39"S	26°56'59.84"E
	E	28°52'47.08"S	26°56'59.33"E
	F	28°52'46.85"S	26°56'56.55"E
	G	28°52'44.91"S	26°56'53.91"E
	H	28°52'40.55"S	26°56'53.43"E
	I	28°52'36.31"S	26°56'53.74"E
	J	28°52'34.20"S	26°56'55.12"E
	K	28°52'33.48"S	26°56'57.57"E
	L	28°52'31.74"S	26°56'58.24"E
	M	28°52'30.47"S	26°56'56.39"E
	N	28°52'28.05"S	26°56'56.37"E
O	28°52'25.71"S	26°56'57.77"E	
P	28°52'22.21"S	26°56'57.52"E	



Q	28°52'17.58"S	26°56'59.11"E
R	28°52'15.63"S	26°56'59.18"E
S	28°52'13.83"S	26°57'0.75"E
T	28°52'11.98"S	26°57'1.08"E
U	28°52'10.15"S	26°57'0.19"E
V	28°52'6.15"S	26°57'0.07"E
W	28°52'3.72"S	26°57'1.32"E
X	28°52'3.66"S	26°57'4.55"E
Y	28°52'3.85"S	26°57'5.30"E
Z	28°52'3.96"S	26°57'6.80"E
1	28°52'3.52"S	26°57'6.99"E
2	28°52'3.12"S	26°57'6.57"E
3	28°52'2.66"S	26°57'4.54"E
4	28°52'0.49"S	26°57'0.91"E
5	28°51'55.93"S	26°57'0.89"E
6	28°51'55.86"S	26°57'6.53"E
7	28°51'57.23"S	26°57'8.73"E
8	28°51'58.56"S	26°57'9.96"E
9	28°51'59.38"S	26°57'12.56"E
10	28°51'59.81"S	26°57'18.35"E
11	28°52'3.73"S	26°57'25.55"E
12	28°52'8.12"S	26°57'28.72"E
13	28°52'11.99"S	26°57'34.33"E
14	28°52'14.41"S	26°57'34.59"E
15	28°52'15.26"S	26°57'35.29"E
16	28°52'15.70"S	26°57'39.65"E
17	28°52'18.24"S	26°57'43.08"E

	18	28°52'22.68"S	26°57'43.10"E
	19	28°52'23.17"S	26°57'42.32"E
	20	28°52'24.95"S	26°57'44.90"E
	21	28°52'26.12"S	26°57'45.20"E
	22	28°52'28.45"S	26°57'45.19"E
	23	28°52'40.70"S	26°57'42.62"E
	24	28°52'40.71"S	26°57'39.02"E
	25	28°52'39.71"S	26°57'36.56"E
	26	28°52'39.93"S	26°57'23.82"E
	27	28°52'54.56"S	26°57'21.96"E
Substation and Switching Station	A	28°52'51.54"S	26°57'22.34"E
	B	28°52'50.68"S	26°57'29.98"E
	C	28°52'46.44"S	26°57'36.26"E
	D	28°52'44.47"S	26°57'42.39"E
	E	28°52'45.26"S	26°57'44.65"E
	F	28°52'55.98"S	26°57'32.00"E
	G	28°52'55.60"S	26°57'21.96"E
Battery Energy Storage Facility and Construction Camp	A	28°52'47.41"S	26°57'22.93"E
	B	28°52'47.70"S	26°57'26.45"E
	C	28°52'43.25"S	26°57'27.77"E
	D	28°52'43.76"S	26°57'31.85"E
	E	28°52'49.38"S	26°57'28.61"E
	F	28°52'55.63"S	26°57'31.98"E
	G	28°52'55.52"S	26°57'21.91"E
Supporting Infrastructure	A	28°52'43.01"S	26°57'23.41"E
	B	28°52'43.34"S	26°57'27.73"E
	C	28°52'47.69"S	26°57'26.15"E

	D	28°52'47.42"S	26°57'22.77"E
Access Road 1 - Start	A	28°53'10.27"S	26°56'13.85"E
Bend Point	B	28°53'9.88"S	26°56'14.12"E
Bend Point	C	28°53'11.84"S	26°56'20.35"E
Bend Point	D	28°53'10.10"S	26°56'20.12"E
Bend Point	E	28°53'9.10"S	26°56'20.75"E
Mid-Point	F	28°53'2.44"S	26°56'22.39"E
Bend Point	G	28°52'56.42"S	26°56'24.00"E
Access Road 1 - End	H	28°52'55.28"S	26°56'23.34"E
Access Road 2 - Start	I	28°53'36.32"S	26°57'38.57"E
Mid-Point	J	28°52'39.10"S	26°57'52.42"E
Access Road 2 - End	K	28°51'49.10"S	26°58'0.05"E
Bend Point	L	28°52'43.36"S	26°57'43.19"E
Bend Point	M	28°52'42.44"S	26°57'42.19"E
Access Road 3	N	28°51'39.29"S	26°57'6.16"E
	O	28°51'36.57"S	26°57'6.34"E

The Figures provided below correspond to the point location as presented on Table 2.4 above.

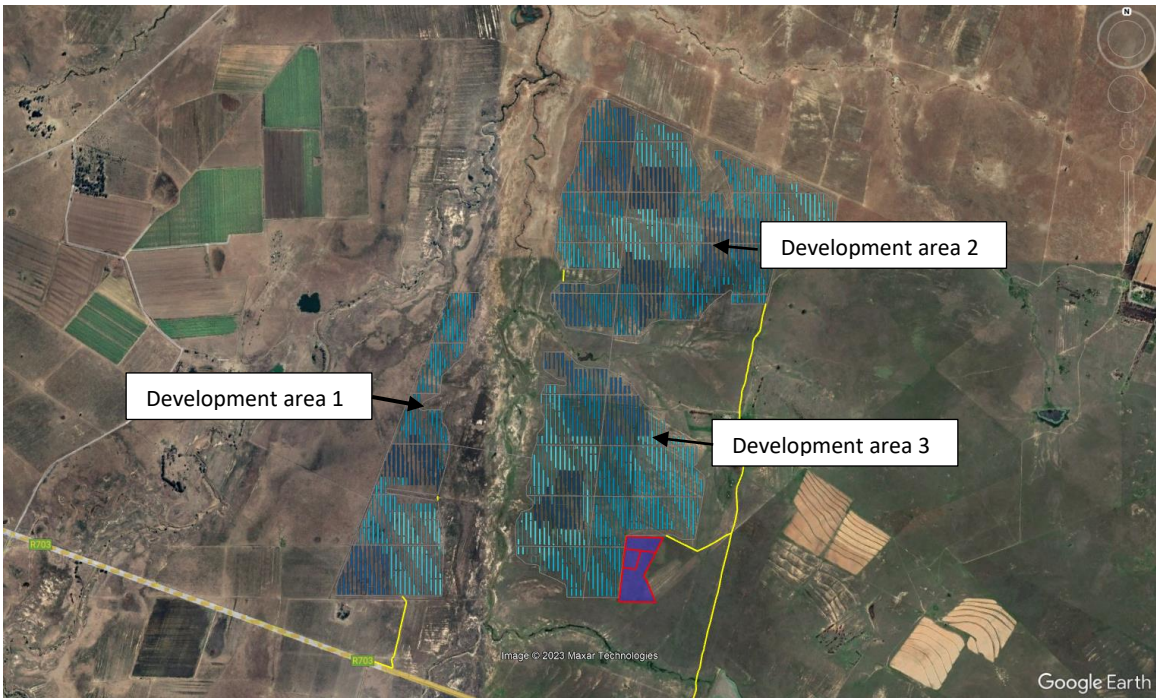


Figure 2-2: Development area

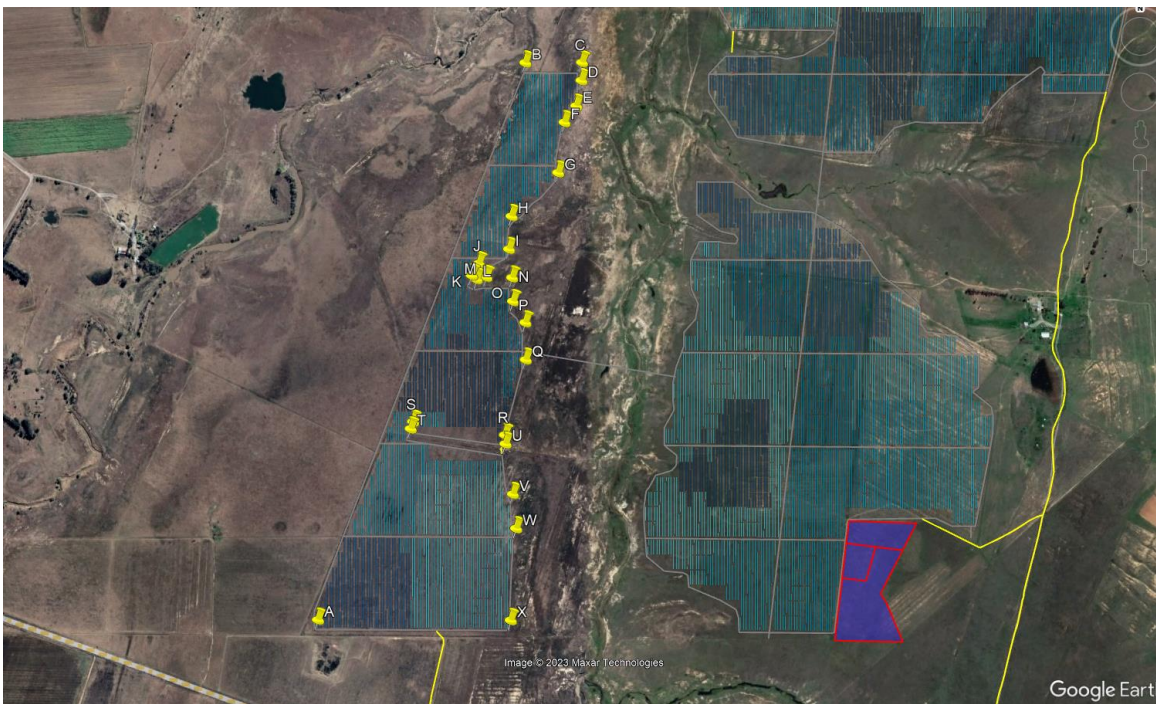


Figure 2-3: Co-ordinate points of development area 1

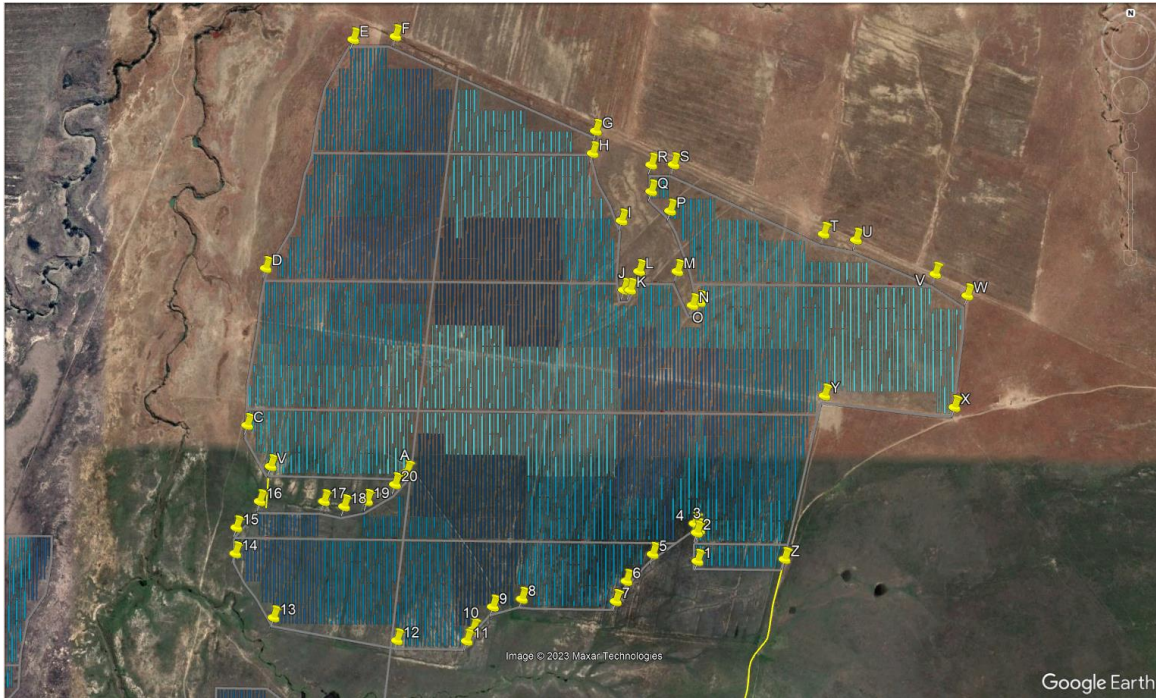


Figure 2-4: Co-ordinate points of development area 2

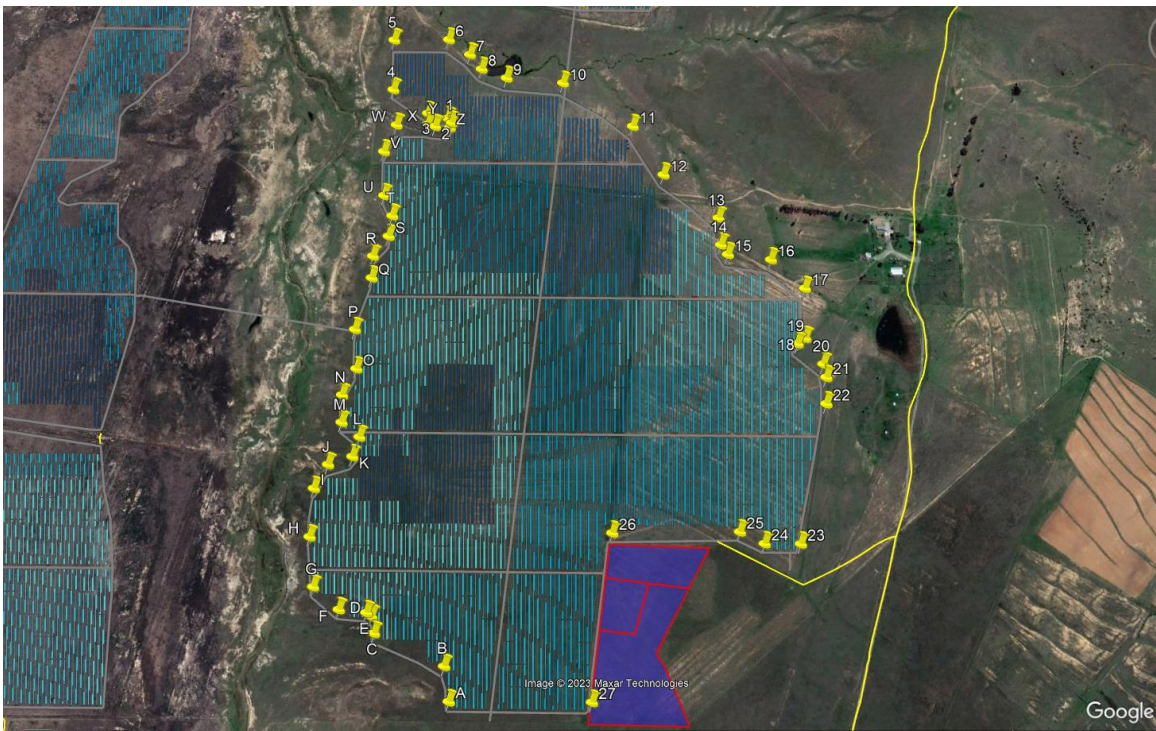


Figure 2-5: Co-ordinate points of development area 3



Figure 2-6: Co-ordinates of Substation and Switching Station



Figure 2-7: Co-ordinate points of BESS and Construction Camp



Figure 2-8: Co-ordinate points of Supporting Infrastructures

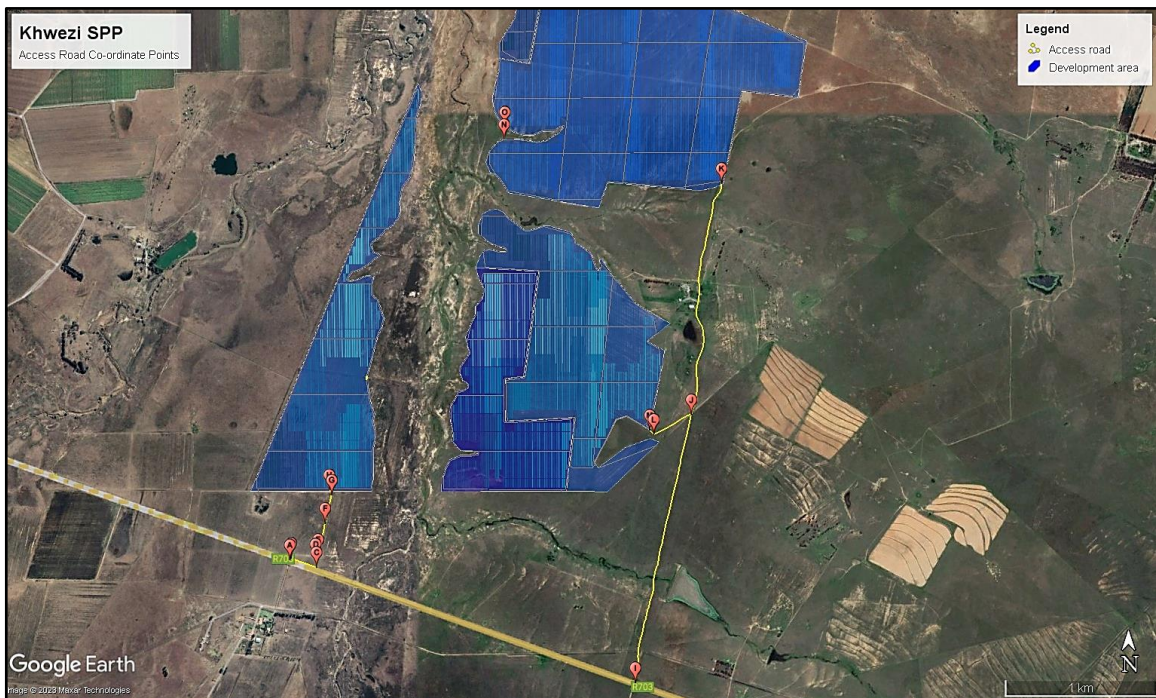


Figure 2-9: Co-ordinates of Access Roads

2.5 SERVICES PROVISION

The following sections provide 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. Four options will be considered, in order of priority by the Developer:

1. Supply from the Local Municipality (LM). The Developer will approach the Local Municipality to enquire whether they can provide all or part of the total water requirements of the Project. Specific arrangements will be agreed with the Local Municipality in a Service Level Agreement (SLA), following the appointment of preferred bidder during the financial close period.
2. Supply from a Private Contractor, which may include extraction from any bulk water supply lines nearby to the site.
3. An existing borehole on site, subject to NWA requirements.
4. A new borehole on site, subject to NWA requirements.
5. The estimated maximum amount of water required during construction is 34 100kl. The estimated maximum amount of water required during the operational phase is 6500 kl per annum.

2.5.2 Stormwater

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

2.5.3 Sanitation

During construction phase, portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Wastewater will be disposed of at a licensed landfill site. Should the contractor decide to install a conservancy tanks/s, this will be done in accordance with the NWA.

No effluent will be produced during operation of the facility, except for normal sewage from site and operations staff. This will be collected and treated as per normal standards using a septic or conservancy tank. In cases where the Local Municipality does not permit the use of septic tanks, sewage will be stored in conservancy tank and collected by means of a honey-sucker and treated at an approved facility off site.

2.5.4 Solid Waste

During the construction phase, solid waste will mainly be in the form of construction material, excavated substrate and domestic solid waste. All waste will be disposed of in scavenger proof bins and temporarily placed in a central location for removal by an appointed contractor. Any other waste and excess material will be removed once construction is complete and disposed of at a registered waste facility. The applicant will request confirmation from the municipality that they have sufficient capacity at their registered landfills for the solid waste.

During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality.

2.5.5 Electricity

Electricity supply during construction will be provided by either diesel generators or arranged with the Local Municipality or Eskom Distribution, via an 11 kV or 22 kV feeder line. During operation, the electricity will be supplied by the plant.

2.6 DECOMMISSIONING OF THE FACILITY

The operating period will be 20 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures to improve the efficiency of the facility as the technology improves. The specifications of these new panels will be the same as the current panels under consideration, but the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that is the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase.

The decommissioning process will consist of the following steps:

- The PV facility would be disconnected from the Eskom grid.
- The BESS, inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- Wastewater storage conservancy tank would be responsibly removed and area would be rehabilitated.

- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

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

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

3 LEGISLATIVE AND POLICY CONTEXT

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

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

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries and the Environment (DFFE) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in the IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed 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 (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Free State Provincial Spatial Development Framework (PSDF) (2012)
- Thabo Mofutsanyana District Municipality Final Integrated Development Plan (IDP) 2020 – 2021 (2021)
- Mantsopa Local Municipality Integrated Development Plan 2021/2022 (2022)
- Mantsopa Municipal Spatial Development Framework Phase 4 (SDF) (2020/2021 – 2024/2025) (2021)

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

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 Khwezi SPP and 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 Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the	1998	<p>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;</p>



	<p>Environment) and the Free State Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTE)</p>		<p>waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.</p> <p>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.</p> <p>The EIA process undertaken for the Khwezi SPP is in-line with the requirements of NEMA for the Application for Environmental Authorisation.</p>
<p>The National Energy Act (Act No. 34 of 2008)</p>	<p>Department of Mineral Resources and Energy</p>	<p>2008</p>	<p>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).</p> <p>Considering that the Khwezi SPP is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.</p>
<p>The National Water Act (Act No. 36 of 1998)</p>	<p>Department of Water Affairs (now known as Department of Water and Sanitation)</p>	<p>1998</p>	<p>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.</p> <p>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</p>



beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use.

The wetland study has identified a Channelled Valley Bottom wetland and two (02) Unchanneled Valley Bottom wetlands on the project site. An artificial dam was found to be located within the unchanneled valley bottom wetland.

In terms of Government Notice 509 of 2016 gazetted on 26 August 2016, any disturbance that takes place within the regulated area of a watercourse in terms of the Notice (in this case within 100 m of the edge of a watercourse OR within 500 m of a wetland) constitutes a water use that needs to be registered with the Department of Water and Sanitation. If the Risk Class of such a disturbance is found to be:

- LOW, then the water user is required to comply with the provisions of Government Notice 509 and is exempt from applying for a WUL; or
- MEDIUM or HIGH, then the water use is excluded from General Authorisation and the water user is required to comply with the conditions of a Water Use Authorisation Licence.

Since infrastructure associated with the project will occur within 500 m of a wetland/depression (wetland feature), a WUA process will need to be followed in accordance with the National Water Act.

National Environmental Management: Waste Act (Act No. 59 of 2008)	National Department of Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)	2008 NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may
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commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered.

<p>National Environment Management: Air Quality Act (Act No. 39 of 2004)</p>	<p>National Department of Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)</p>	<p>2004</p>	<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 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.</p>
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<p>The National Heritage Resources Act (Act No. 25 of 1999)</p>	<p>South African Heritage Resources Agency (SAHRA)</p>	<p>1999</p>	<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</p>
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listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected.

A case file with reference number 20122 has been opened on SAHRIS for the Khwezi SPP and all relevant documents were submitted for their comments and approval. The Heritage Impact Assessment undertaken for the SPP is included as Appendix E5, and the Palaeontological Impact Assessment is included as Appendix E6.

Conservation of Agricultural Resources Act (Act No. 85 of 1983) National Provincial Government and 1983

The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.

Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the DFFE) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long-term lease agreement. A Soils and Agricultural Assessment has been undertaken for the Khwezi SPP and included as Appendix E4.

The National Forests Act, 1998 (Act 84 of 1998) Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) of 1998

The purposes of this Act are to:

- (a) promote the sustainable management and development of forests for the benefit of all;
- (b) create the conditions necessary to restructure forestry in State forests;
- (c) provide special measures for the protection of certain forests and trees;
- (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.
- (e) promote community forestry;
- (f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.

Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree,



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

A Terrestrial Ecology Baseline and Impact Assessment has been undertaken for the Khwezi SPP and is included in Appendix E2.



3.4 POLICY CONTEXT

Table 3.2: Policy context for the construction of photovoltaic solar plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
<p>The White Paper on the Energy Policy of the Republic of South Africa</p>	<p>Department of Mineral Resources and Energy</p>	<p>1998</p>	<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> <p>The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:</p> <ul style="list-style-type: none"> • Minimal environmental impacts in operation in comparison with traditional supply technologies; and • Generally lower running costs, and high labour intensities. <p>Disadvantages include:</p> <ul style="list-style-type: none"> • 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.

Khwezi SPP is in line with this policy as it proposes the generation of renewable energy from the solar resource.

The White Paper on Renewable Energy	Department of Mineral Resources and Energy	2003	This White Paper on Renewable Energy supplements the <i>White Paper on Energy Policy</i> , which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government’s vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.
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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 Khwezi SPP is in line with this paper as it proposes the generation of renewable energy from the solar resource.

Integrated Resource Plan (IRP) for South Africa	Department of Mineral Resources and Energy	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a “living plan” which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030.
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“This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then “balanced” in accordance with qualitative measures such as local job creation”. In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables, which relates to the proposed Khwezi Solar Power Plant. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options (RSA, 2011a).

The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that:

“The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry; To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP; The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS” (RSA, 2011a:6).

“The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources” (RSA, 2011a:6).

The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is: *“Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment.”*

“Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely



manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed” (IRP, 2011a:17).

In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP was updated and was open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. For the revision scenario, analysis was conducted. The results revealed that for the period ending 2030 that: *“The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025”; “Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030”; and “the scenario without renewable energy annual build limits provides the least-cost option by 2030” (RSA, 2018:34).*

Lastly, the draft IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: *“Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050” (RSA, 2018:34–35).*

In the final IRP of 2019 key considerations were taken into account together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *“The application of renewable build limits ‘smooths out’ the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence”*. The decision stated against this key consideration is to *“retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan” (RSA, 2019:46).* Hereby the



IRP also recognises renewable technologies’ potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13).

The Khwezi SPP is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.

National Development Plan of 2030

The Presidency: -
National Planning Commission

The National Development Plan aims to “*eliminate poverty and reduce inequality by 2030*” (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a Draft National development Plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely, to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge.

Khwezi SPP will contribute to the intervention strategy as identified within the plan.

National Infrastructure Plan of South Africa

Presidential Infrastructure Coordinating Commission 2012

In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretch over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow:



- SIP 8: Green energy in support of the South African economy;
- SIP 9: Electricity generation to support socio-economic development; and
- SIP 10: Electricity transmission and distribution for all.

SIP 8 according to the Plan “support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities”. The purpose of SIP 9 according to the Plan is to “accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances”. SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to “expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development” (RSA, 2012:20).

The Khwezi SPP is in line with this plan as it proposes the generation of renewable energy from the solar resource which supports socio-economic development and will contribute to meeting the electricity demand of the country as set out in this plan.

New Growth Path Framework Department of - Economic Development

The New Growth Path was developed after 16 years of South Africa’s democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b).

This framework sets out the markers for job creation and growth and identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy in the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to:

- Identify the possible areas of employment creation; and



- Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b).

This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term.

Considering that the construction of and investment in renewable energy is a key area identified within the framework, the Khwezi SPP is considered to be in-line with the framework.

<p>Climate Change Bill</p>	<p>National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)</p>	<p>2018</p>	<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>The Khwezi SPP comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.</p>
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Climate Change Bill	National Department of Forestry, Fisheries and the Environment	2021	<p>The Department of Forestry, Fisheries and the Environment has published a new Climate Change Bill for public comment. The bill notes that climate change represents an urgent threat to human societies and the planet, and requires an effective, progressive and incremental response from both government and citizens.</p> <p>It recognises that South Africa has a global responsibility to reduce greenhouse gasses and that the anticipated impacts arising as a result of climate change have the potential to undermine achieving of the country’s developmental goals.</p> <p>The main objective of the bill is to enable the development of an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society, and to provide for matters connected therewith.</p> <p>The Khwezi SPP comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.</p>
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 Khwezi SPP 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.

The Khwezi SPP could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs

Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa

National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)

2014

The Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA were accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives.

This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs).

The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit.

The Khwezi SPP is not located within a REDZ, but the development will contribute to the expansion of renewable energy facilities and infrastructure within the country, and provide the positive opportunities associated with it.



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> <ul style="list-style-type: none">• 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. <p>The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed is. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.</p> <p>The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local.</p>
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The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges of our time, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology.

The development of the Khwezi SPP is in-line with the framework based on the contributions and opportunities presented by a development of this nature.

Thabo Mofutsanyana District Municipality Integrated Development Plan (IDP)	Thabo Mofutsanyana District Municipality	2021 – 2022 (2021)	<p>The long-term vision of the Thabo Mofutsanyana DM is: <i>“to create integrated, self-reliant and sustainable communities throughout the Thabo Mofutsantana highlands, with financially viable, participate and developmental local municipalities”</i>.</p> <p>The above stated vision defines what Thabo Mofutsanyana District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is that: <i>“Continuously improving and developing living conditions of our communities by providing efficient and effective bulk service and create a conducive environment for business opportunities and job creation”</i>.</p> <p>The strategic objectives are set to support the vision and mission. The Thabo Mofutsanyana DM has adopted Strategic objectives that will support its programmes to meet the government priorities. These key priorities are as follows:</p> <ul style="list-style-type: none"> • Sustainable infrastructure • Local Economic development, Job Creation and Tourism • Agriculture and Rural Development • Social Development, Sports, Arts, and culture. • Good Governance and Community participation • Financial Stability. <p>The development of the Khwezi SPP is in line with the plan, considering the relevant Key Performance Area stated in the IDP.</p>
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Mantsopa Local Municipality Integrated Development Plan (IDP)	Mantsopa Local Municipality	2021/2022	<p>The vision of the Mantsopa LM is <i>“Serving community with excellence.”</i> In order to achieve the vision, we have to start change processes immediately. This requires the development of a mission statement and the elucidation of the Strategic IDP Objectives. The Mission Statement is <i>“To achieve an accessible, integrated, sustainable and equitable social and economic development of the municipality”</i>.</p> <p>It further requires of municipality to structure and manage its administration, budgeting and planning processes to give priority to the basic needs of the community and to promote the social and economic development of the community whilst participating in national and provincial development programmes.</p> <p>The following Development Strategies has been put in place to support the above vision and mission statements:</p> <ul style="list-style-type: none">• To provide democratic and accountable government for local communities• To ensure the provision of services to communities in a sustainable manner• To promote a safe and healthy environment• To promote social and economic development• To encourage the involvement of communities and community organizations in the matters of local Government. <p>In line with its developmental mandate, Mantsopa Local Municipality understands its service delivery objectives as set out in the developmental strategies. Therefore, the developmental strategies as espoused in this IDP, are directly linked to a specific developmental needs and objectives which must be measured in the organizational Performance Management System (PMS) and give effect to Service Delivery and Budget Implementation Plan (SDBIP) targets/ goals.</p> <p>The development of the Khwezi SPP will contribute to the goals of the area, albeit to a limited extent.</p>
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3.5 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.

3.6 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)¹
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEA, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

¹ Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that the EPs will need to be complied with should funding for the project be required.

3.7 CONCLUSION

The S&EIR process was undertaken in accordance with the EIA Regulations (as amended) 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, as well as an indication of the need and desirability of the proposed development from a national, provincial and local level. For this reason, the proposed development project was assessed in terms of its fit with the key legislative, policy and planning documents discussed above.

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

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed Khwezi SPP is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

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

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

(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO₂ emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 an article confirmed that South Africa is the 12th highest greenhouse gas emitter in the world (source: <https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818>).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes/opportunities. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

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 that was made available for comment and updated to the draft IRP 2019 as per table 4.1 below:

Table 4.1: Published Draft IRP 2019 (Approved by Cabinet for Consultation)

	Coal	Coal (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	Gas & Diesel	Other (Distributed Generation, CoGen, Biomass, Landfill)
Current Base	37 149		1 860	2 100	2 912	1 474	1 980	300	3 830	499
2019	2 155	-2373					244	300		Allocation to the extent of the short term capacity and energy gap.
2020	1 433	-557				114	300			
2021	1 433	-1403				300	818			
2022	711	-844			513	400	1000	1600		
2023	750	-555				1000	1600			500
2024			1860				1600		1000	500
2025							1000	1600		500
2026		-3218					1600			500
2027	750	-847					1 600		2000	500
2028		-475					1000	1 600		500
2029		-1684			1575		1000	1 600		500
2030		-1050		2 500			1 000	1 600		500
TOTAL INSTALLED CAPACITY by 2030 (MW)		33364	1860	4600	5000	8288	17742	600	6380	
% Total Installed Capacity (% of MW)		43	2.36	5.84	6.35	10.52	22.53	0.76	8.1	
% Annual Energy Contribution (% of MWh)		58.8	4.5	8.4	1.2*	6.3	17.8	0.6	1.3	

Installed Capacity
 Committed / Already Contracted Capacity
 Capacity Decommissioned
 New Additional Capacity
 Extension of Koeberg Plant Design Life
 Includes Distributed Generation Capacity for own use

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW and 860MW from wind and solar has been rewarded as part of Bid window 5 and 6, respectively (latter announced in 2022).

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The facility’s contribution towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa’s dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of “securing” economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.

- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the SPP will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment. The location of the proposed development within the Mantsopa Local Municipality is desirable since the overall municipal unemployment rate was found to be 29.2% (Mantsopa IDP, 2020/2021).
- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of 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).
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in non-renewable electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the

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

- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. Approximately 1000 employment opportunities will be created during the construction and operational phases.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Predominantly because of the climate and soil limitations, the site is totally unsuitable for cultivated crops, and the viable agricultural land use is limited to grazing and rainfed crops only. The proposed development in this specific area will generate alternative land use income through rental for the proposed energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: Despite the abundant availability of coal, electricity generation and the development of related infrastructure has been inadequate in providing access to electricity for entire population of approximately 60 million people. South Africa has been described as a country with an energy-deprived population with more than 1.5 million households comprising approximately 5 million people that are without electricity. According to the Mantsopa LM IDP, the national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.
- Cumulative impacts of low to medium significance – Most cumulative impacts associated with the proposed project have a residual risk of low to medium. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

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

- (g) A motivation for the preferred development footprint within the approved site (i) details of all the alternatives considered;
- (h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –
 - (i) details of all the development footprint alternatives considered;
 - (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
 - (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
 - (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
 - (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and
 - (xi) a concluding statement indicating the preferred alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

The DEAT 2006 guidelines on assessment of alternatives and impacts proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only ‘feasible’ and ‘reasonable’ alternatives should be explored. It also recognises that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal.

An initial site screening was conducted on the Farm Koppiesdam No. 511 and the farm was found favorable due to its close proximity to grid connections, solar radiation, ecology and relatively flat terrain. Where specific features of environmental sensitivity are identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers will be considered by the developer to ensure that the facility layout is appropriate considering the sensitive features present. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site within the affected property.

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

5.1.1 No-go Alternative

This alternative considers the option of ‘do nothing’ and maintaining the status quo of the affected environment. The description provided in Section 5.3 of this report could be considered the baseline conditions (*status quo*) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for the current land uses present. The area associated with the development footprint has limited agricultural potential and is unsuitable for cultivation, with grazing and rainfed crop considered to be the only agricultural option. The potential opportunity costs in terms of alternative land use income through rental for the energy facility and the supporting social and economic development in the area would be lost if the *status quo* persists.

5.1.2 Location Alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Khwezi Solar PV (RF) (Pty) Ltd in the Excelsior area to potentially establish the Khwezi SPP. From a local perspective the Farm Koppiesdam No. 511 is preferred due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., low agricultural potential and archaeology), proximity to a grid connection point (i.e., for the purpose of electricity evacuation), as well as site access (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

Provision has been made in this Final EIA Report to consider the results of the specialist studies to exclude the sensitive areas presented, which includes any no-go buffer areas recommended by the specialists, for example, such as depression wetlands. The sensitive areas and associated buffers have been considered by the developer for the facility layout design to optimise the layout for avoidance of the environmental sensitivities identified. As part of the specialist studies undertaken, areas that will need to be avoided have been identified and buffers was indicated, where relevant. The development footprint is however large enough to ensure the avoidance of the sensitive features and the associated buffers by the facility layout and still provide an opportunity for the successful development and operation of the proposed PV facility from a technical perspective. Therefore, a single preferred location alternative was assessed.

Based on the above site-specific attributes, the study area is considered highly preferred in terms of the development of a solar PV facility. As such, no property / location alternatives will be considered. Refer to Figure 5.1.

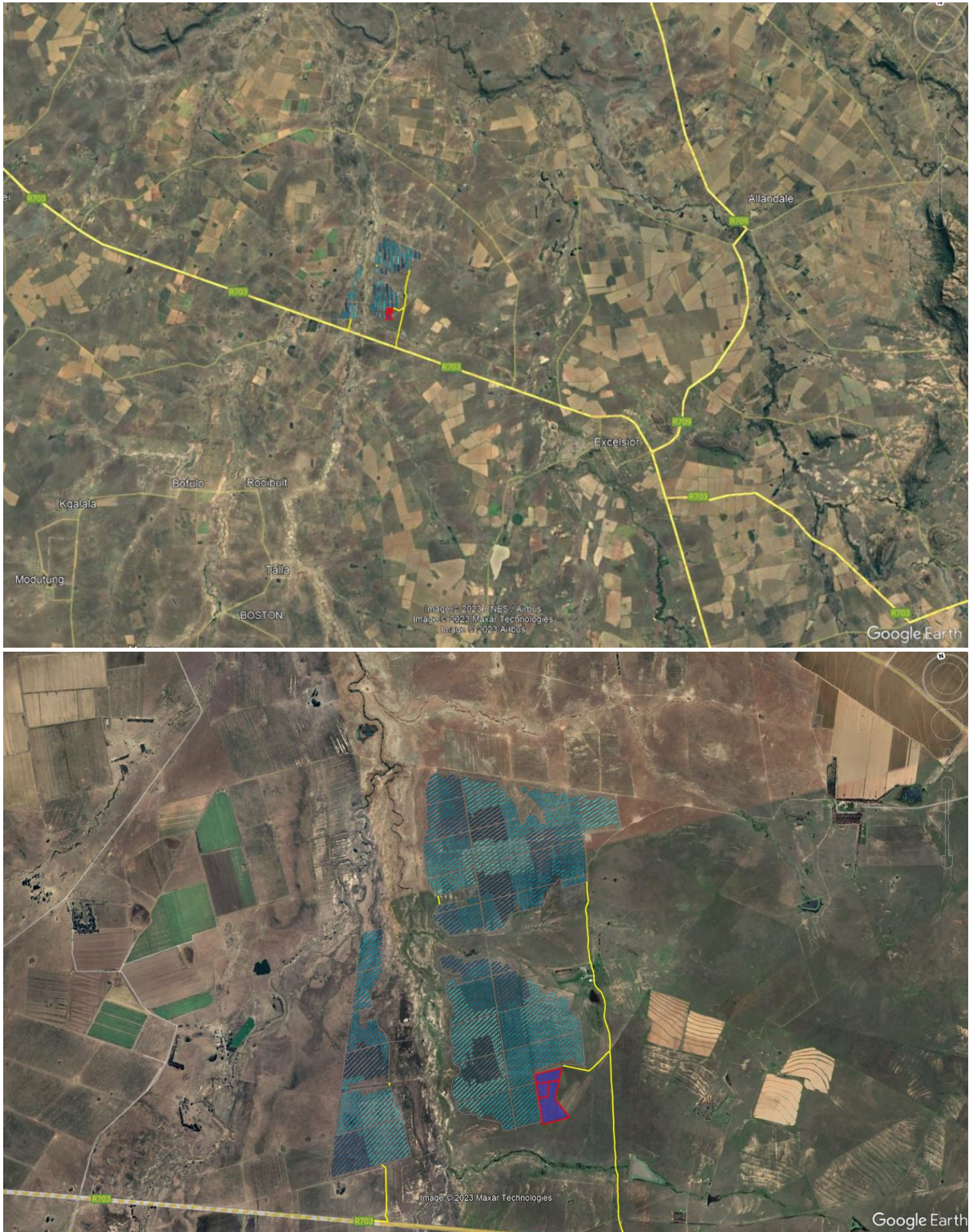


Figure 5-1: Location of the single preferred property alternative. The development footprint is located within the assessed area.

5.1.3 Activity Alternatives

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

- Photovoltaic (PV) solar facility – Khwezi Solar PV (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. The developer is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the proposed development area (Figure 5-2). The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all the components can be recycled.
- Wind energy facility - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines based on the renewable energy resource available for the area. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.
- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water, and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also within the local area. While the irradiation values are high enough to generate sufficient solar power (refer to Figure 5.2), the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP as part of the energy mix of the country. Therefore, this alternative will not be considered further in this report.

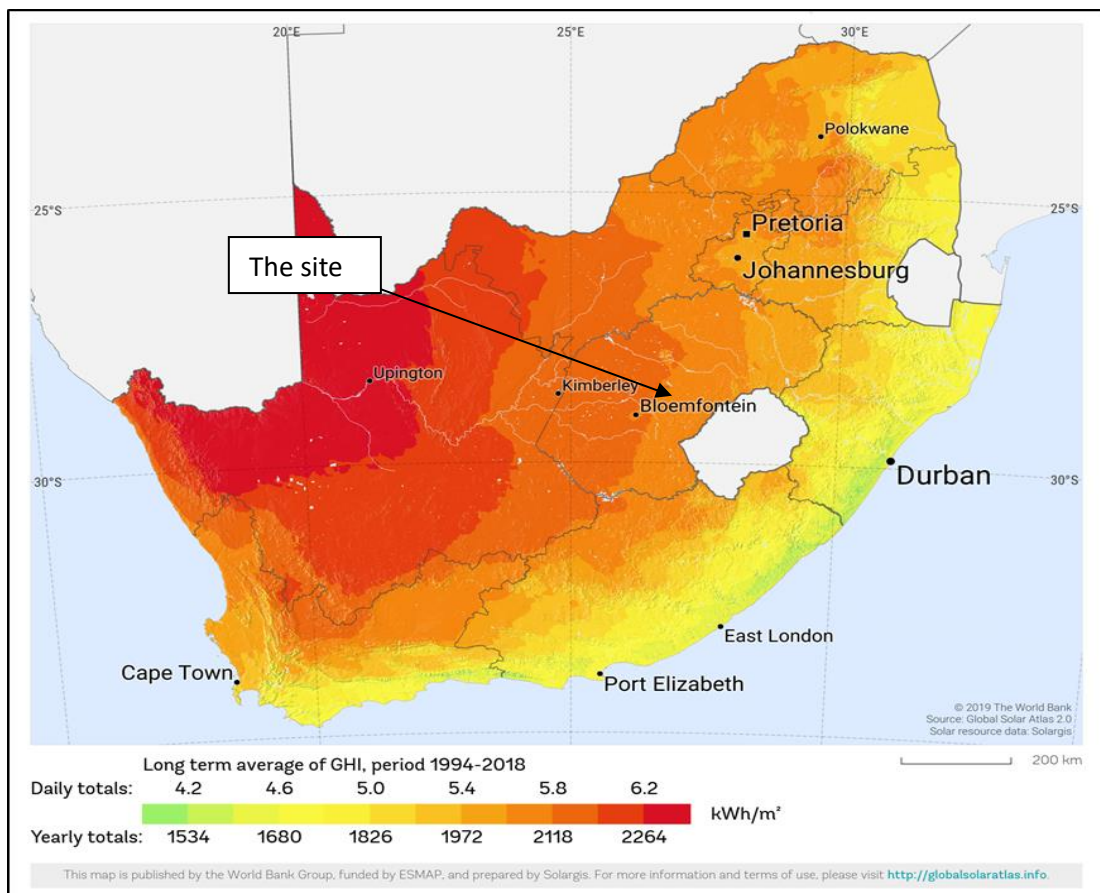


Figure 5-2: Global horizontal irradiation values for South Africa (Solar GIS, 2021) and the Khwezi SPP development footprint

5.1.4 Design and Layout Alternatives

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

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

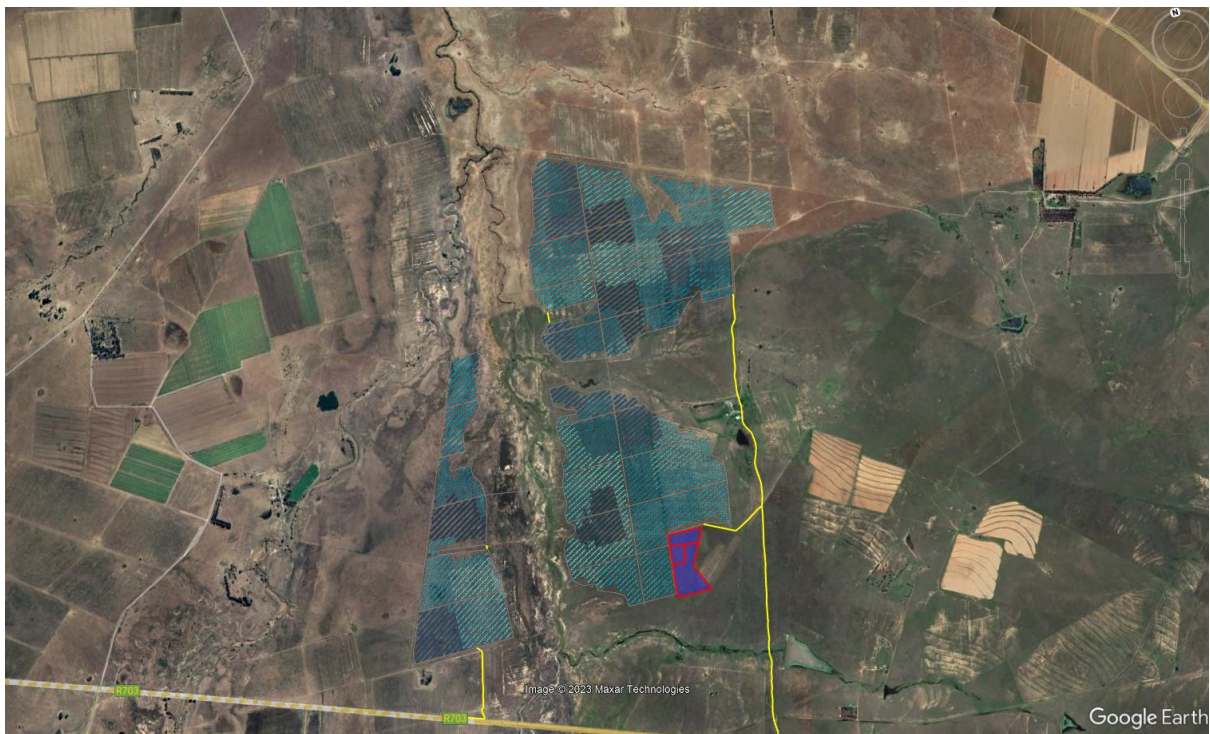


Figure 5-3: Final proposed layout plan for the Khwezi SPP

Note: It is customary to develop the final/detailed construction layout of the solar PV facility only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or an alternative programme, after which major contracts are negotiated and final equipment suppliers identified. For the purpose of the Environmental Impact Assessment (EIA), site layout alternatives will not be comparatively assessed, but rather a single layout will be refined as additional information becomes available throughout the EIA process (e.g., specialist input, additional site surveys, ongoing stakeholder engagement).

The development area presented in the Scoping Report and Environmental Impact Assessment (EIA), has been selected as a practicable option for the facility, considering technical preference and constraints, as well as initial No-Go layers informed by specialist site surveys.

5.1.5 Technology Alternatives

Battery Energy Storage Facility (BESS)

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives were considered:

- Solid state battery electrolytes; and
- Redox-flow technology.

Solid state battery electrolytes, such as lithium-ion (Li-ion), zinc hybrid cathode, sodium ion, flow (e.g., zinc iron or zinc bromine), sodium sulphur (NaS), zinc air and lead acid batteries, can be used for grid applications. Compared to other battery options, Li-ion batteries are highly efficient, have a high energy density and are lightweight. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019).

Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy. Considering the nature of the project, only a solid-state technology type would be envisaged for implementation.

PV Panels:

With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon and thin film. These technologies are discussed in more detail below:

- Crystalline (high efficiency technology at higher cost):

Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



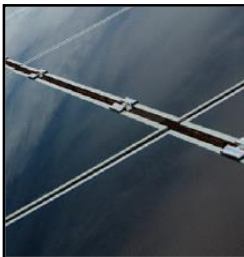
- Mono-crystalline Silicon - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.



- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

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

Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:



- Cadmium Telluride (CdTe) - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.



- Amorphous Silicon - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- Copper, Indium, Gallium, Selenide (CIGS) - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications and is considered a developing PV technology (First Solar, 2011).

- Bifacial panels:

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel. Refer to Figure 5.4 for an illustration of Bifacial versus Monofacial Solar Panel absorption.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves to be most feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

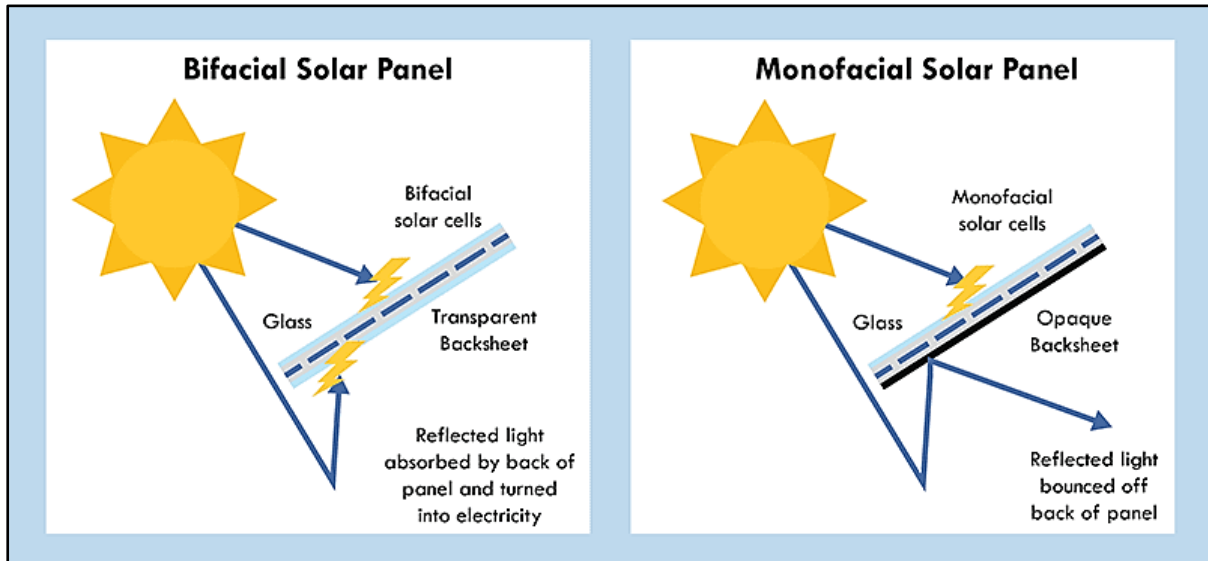


Figure 5-4: Bifacial vs Monofacial Solar Panel absorption.

5.2 PUBLIC PARTICIPATION PROCESS

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

5.2.1 General

The following three categories of variables were taken into account when deciding the required level of public participation:

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

Since the scale of anticipated impacts is low, the general land use of the area is related to mining and agriculture, the limited environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms are considered at this stage of the process. The following actions have already been undertaken:

➤ Site notices

Site notices (size 60cm x 42cm) were placed on site in Afrikaans and English on 07 October 2022 to inform surrounding communities and immediately adjacent landowners of the proposed development and the commencement of the S&EIR process. I&APs were given the opportunity to raise comments by 07 November 2022. Photographic evidence of the site notices is included in Appendix C3.

➤ Background Information Document (BID)

The release of a BID providing information on the proposed development, the Scoping process and inviting Interested and Affected Parties (I&APs) to register on the project's I&AP database was

sent to the identified I&APs, including the adjacent landowners, key stakeholders and relevant organs of state on 07 October 2022.

➤ Direct notification of identified I&APs

Identified I&APs, including key stakeholders representing various sectors, were directly informed of the EIA process on 07 October 2022 via registered post, telephone calls, WhatsApp's and emails (as relevant). The BID was distributed with the notification. For a complete list of I&APs with their contact details see Appendix C4 to this report. It was expected from I&APs to provide their inputs and comments by 07 November 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7).

➤ Direct notification of surrounding landowners and occupiers

Written notices were also provided via registered post, WhatsApp or email (as relevant) to all surrounding landowners and occupiers on 07 October 2022. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C4. The surrounding landowners were given the opportunity to raise comments by 07 November 2022. To date comments have been received from various parties that have an interest in the development (Appendix C5 – C7).

➤ 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 Bloemnuus Local Newspaper on 13 October 2022 (see Appendix C2) notifying the public of the S&EIR process and the (then) proposed application for Environmental Authorisation. The advertisement invited Interested and Affected Parties (I&APs) to register on the project I&AP database and submit any comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement (i.e., up until 11 November 2022).

➤ Circulation of Draft Scoping Report

Copies of the draft Scoping report were provided to all I&APs via courier, Dropbox and/or email (as relevant). Hard copies of the report were made available on request and where an I&AP did not have the resources to view the report on an online platform. I&AP's and organs of state were requested to provide their comments on the report from 24 February 2023 to 26 March 2023. All issues identified during the 30-day review and comment period were recorded and documented and compiled into a Comments and Response Report included as part of the Final Scoping Report for decision-making (Appendix C5 – C7).

➤ Submission of Final Scoping Report

The final Scoping Report was submitted to DFFE on the 12th of April 2023.

➤ Circulation of the Draft Environmental Impact Assessment Report

All registered I&APs and State Departments have been informed of the availability of the Draft EIR on 27 July 2023 and requested to provide their comments within 30 days (refer to Appendix C). The 30-day review and comment period are from 27 July 2023 up to and including 27 August 2023. All comments received during this period were included in the Final EIR. All comments received prior to the release of the Draft EIR have also been included in Appendix C of the current document. The Comments and Responses report are included as Appendix C7 of this Final EIR.

➤ Submission of the Final Environmental Impact Assessment Report

The final EIR was submitted to DFFE on the 7th of September, for decision making purposes.

➤ Circulation of decision and submission of appeals:

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

5.2.2 Consultation Process

Regulation 41 requires that the landowner, surrounding landowners, municipality, relevant ward councillor, any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C5 and C6. Refer to Figure 5.5 for the location of the surrounding landowners.

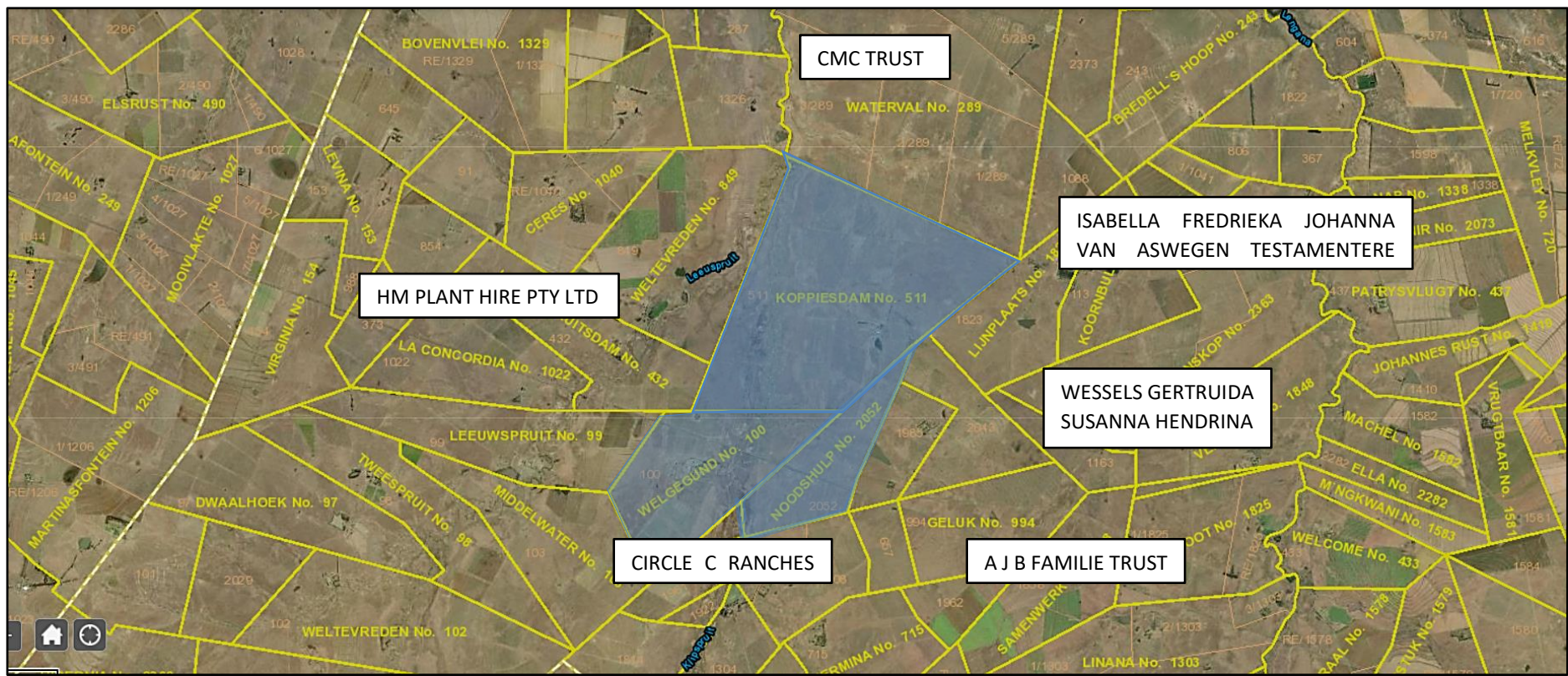


Figure 5-5: Affected properties (Blue) in relation to surrounding landowners

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.”*

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

All comments received during the Scoping Phase, and the Draft EIR have been included in this report as Appendix C5, Appendix C6 and Appendix C7. I&APs were provided an opportunity to confirm that their comments raised during the Scoping Phase has been included and considered as part of the EIA Phase.

5.2.4 Issues Raised by I&APs and Consultation Bodies

Several comments were received from I&APs and stakeholders including DFFE, DFFE Biodiversity and Conservation Unit, SAHRA and individual surrounding landowners. All comment received during the circulation of the Draft EIA Report were addressed accordingly in this Final EIA Report. Please refer to Appendix C5, Appendix C6 and Appendix C7 in this regard.

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributes associated with the preferred alternative (i.e., the location of the development footprint within the affected property).

5.3.1 Biophysical Environment

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to [Table 1.1](#).

However, due to the fact that the area proposed for development (i.e., the development footprint) exclusively consists of land used for grazing, limited sensitive areas from an ecological, heritage or conservation point have been identified apart from the wetland features and the burial site on the site. These features are described in more detail below.

5.3.1.1 Geology, Soils and Agricultural Potential

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Db 37 land type. This land type consists of prisma-cutanic and/or pedocutanic diagnostic horizons with the addition of one or more of the following. Additionally, vertic, melanic and red structured diagnostic horizons occur frequently within this land type.

The geology of this area is characterised by the Adelaide Subgroup's Sandstone and Sedimentary mudstone are found in the extreme northern section of this vegetation type together with that of the Ecca Group. This geology gives rise to Melanic, Vertic and red soils typically from the Dc land type (Mucina and Rutherford, 2006).

According to the Soil and Agricultural Assessment Report (attached in Appendix E4), agricultural potential is determined by a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long-term use of land under rain-fed conditions. The land capability is determined by the physical features of the landscape including the soils present. The land potential or agricultural potential is determined by combining the land capability results and the climate capability for the region.

Based on the methodology used within the Soil and Agricultural Assessment Report, the climate capability of the region falls within a Climatic Capability Class "C8" which has a very severe limitation rating. The class C8 rating is associated with very severely restricted choice of crops due to heat and moisture stress. Suitable crops are at high risk of yield loss.

In terms of the Land Capability of the project area, the most sensitive soil forms are restricted to land capability 4 and 6 classes as follows:

- Land capability class 4 – The land capability has severe limitations, low arable potential and is a high erosion hazard. The land is considered arable with a moderate sensitivity.
- Land capability class 6 – The land capability limitations preclude cultivation and the land is suitable for perennial vegetation.

Table 5.1: Land capability for the soils within the project area

Capability Class	Definition of Class	Conservation Need	Use-Suitability	Land Capability Group	Sensitivity
4	Severe limitations. Low arable potential. High erosion hazard.	Intensive conservation practice.	Long-term leys (75%)	Arable	Moderate
6	Limitations preclude cultivation. Suitable for perennial vegetation.	Protection measures for establishment, e.g., sod-seeding.	Veld, pastures, suitable for wildlife.	Non-Arable	Low

The following land potential levels have been determined:

- Land potential level 6 - This land potential level is characterised by very restricted potential. Regular and/or severe limitations exist due to soil, slope, temperatures or rainfall. The land is considered non-arable.
- Land potential level 7 - This land potential level is characterised by low potential. Severe limitations exist due to soil, slope, temperatures or rainfall. This land is considered non-arable.

Table 5.2: Land potential for the soils within the project area

Land Potential	Description of Land Potential Class	Sensitivity
6	Very restricted potential: Regular and/or moderate to severe limitations due to soil, slope, temperatures, or rainfall. Non-arable.	Moderate
7	Low potential. Severe limitations due to soil, slope, temperatures or rainfall. Non-arable.	Moderate
Disturbed	N/A	None

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which is predominantly covered by “Moderately Low” sensitivities, with small patches of “Very Low to Low” sensitivities. Refer to Figure 5.6 below.

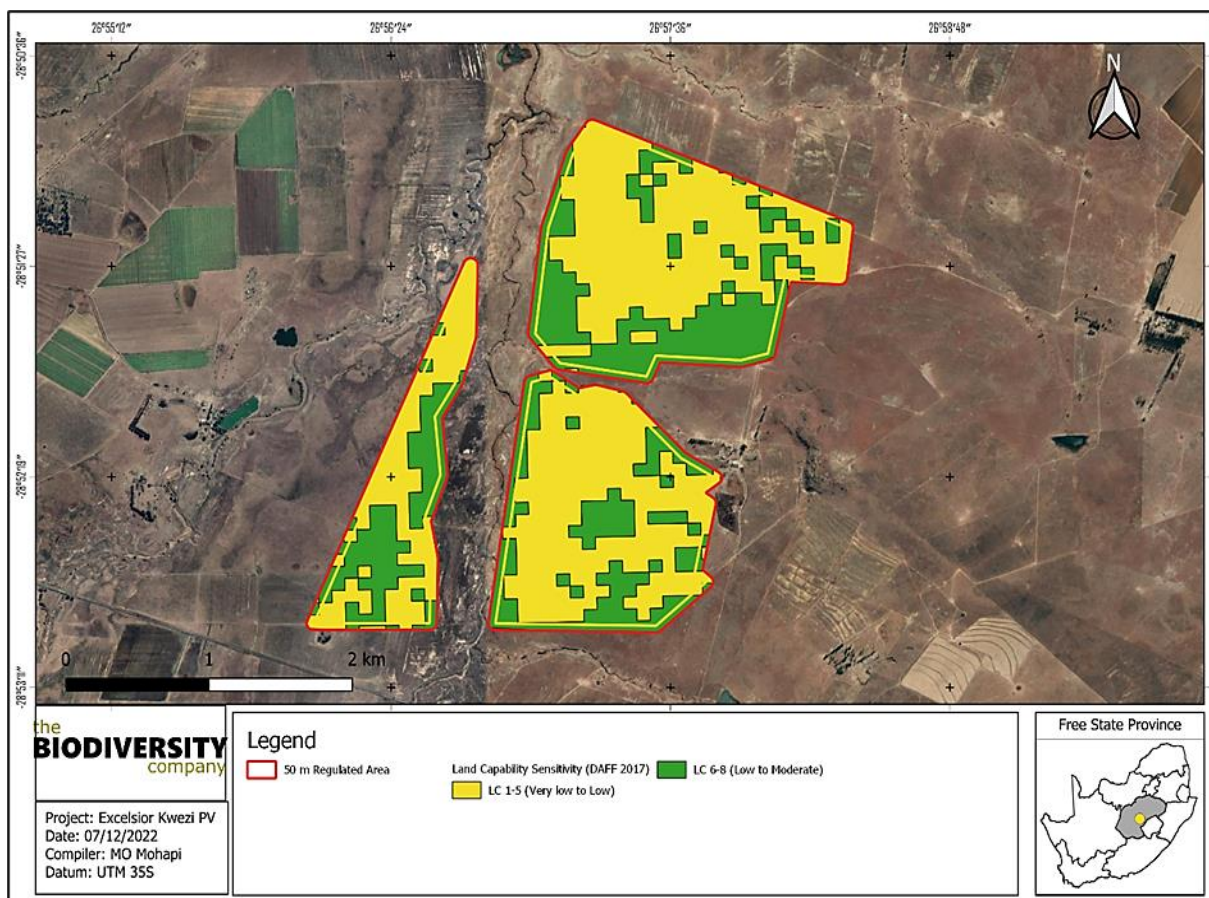


Figure 5-6: The land capability sensitivity (DAFF, 2017)

Furthermore, various crop field boundaries were identified by means of the DEA Screening Tool (2022), which are predominantly characterised by “High” sensitivities as per Figure 5-7. below.

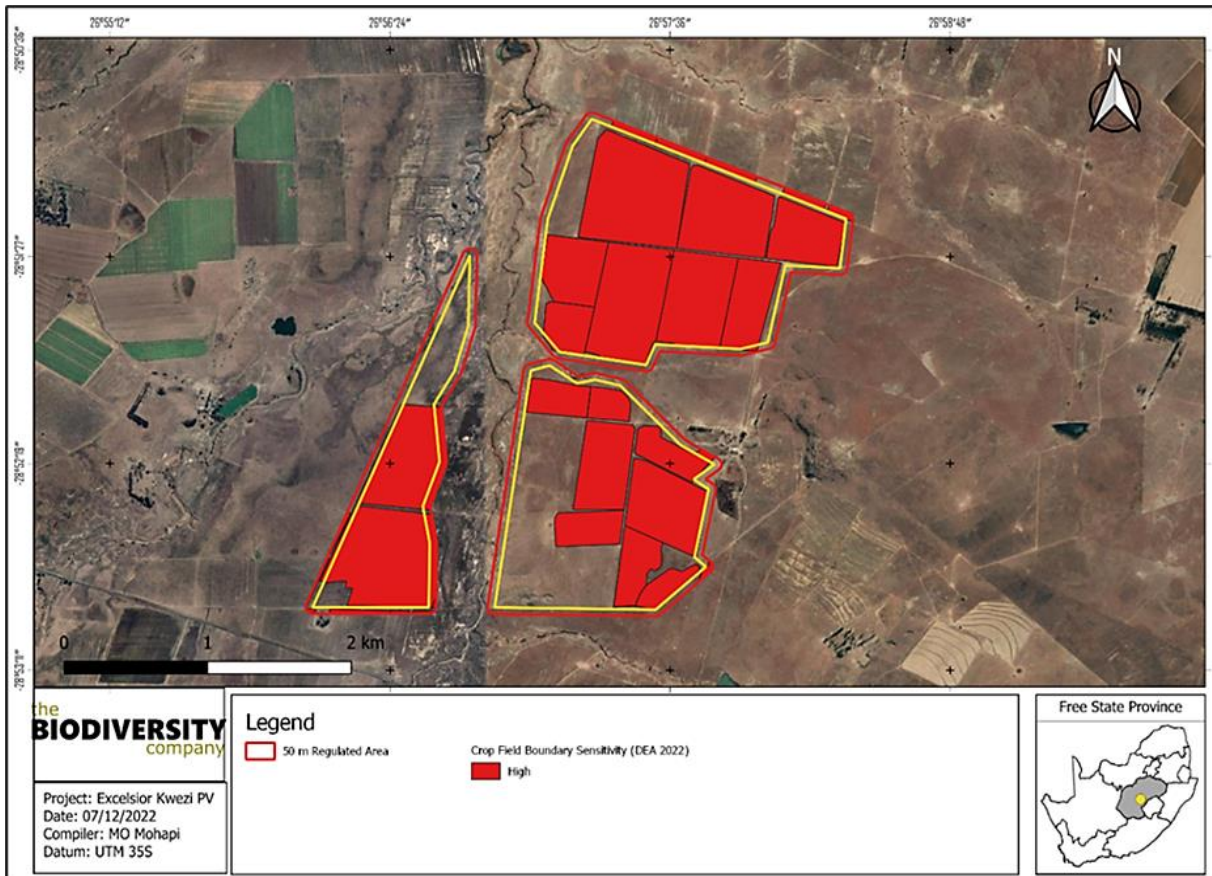


Figure 5-7: Crop boundary sensitivity (DEA Screening Tool, 2022)

The assessment area is associated with non-arable soils. The area consists of subsurface horizons with high clay content, resulting into restrictive permeability. Furthermore, the available climatic conditions of low annual rainfall and high evapotranspiration potential severely limits crop production significantly resulting in land capabilities with “Moderate” sensitivities. The land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use.

It is the specialist’s opinion that the proposed Khwezi PV facility project, associated infrastructure will have an overall low residual impact on the agricultural production ability of the land. It is, therefore, the specialist’s recommendation that the proposed Khwezi PV facility project and associate infrastructure may be favourably considered for development with implementation of mitigation measure to ensure low expected significant impacts occurrence.

5.3.1.2 Vegetation, Topography and Landscape Features

According to the Terrestrial Ecology Baseline and Impact Assessment (attached as Appendix E2), the project area is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Grassland Biome include summer to strong summer rainfall and winter drought;

and frost is common, fog is found on the upper slopes of the Great Escarpment and seaward scarps (Mucina & Rutherford, 2006).

Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types do occur (Mucina & Rutherford, 2006). The Grassland Biome is comprised of four (04) parent bioregions and a total of 72 different vegetation types. On a fine-scale vegetation type, the project area overlaps with the Central Free State Grassland vegetation type of the Dry Highveld Grassland Bioregion.

The Central Free State Grassland vegetation type occurs on undulating plains supporting short grassland, in natural condition dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Dwarf karoo bushes establish in severely degraded clayey bottomlands. (Mucina & Rutherford, 2006). This vegetation type occurs in the Free State Province and marginally in Lesotho within low-lying areas of the eastern regions of the province, covering the vicinities of Wepener (south), Petrus Steyn (north), Excelsior and east of Winburg (west) and Warden (east) and a thin extension between Maseru and Fouriesburg. Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

Conservation status of the vegetation type

According to Mucina and Rutherford (2006), this vegetation type is classified as Vulnerable (VU). The national target for conservation protection for both these vegetation types is 24%. Only small portions enjoy statutory conservation (Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves) as well as some protection in private nature reserves. Almost a quarter of the area has been transformed either for cultivation or by building of dams (Allemanskraal, Erfenis, Groothoek, Koppies, Kroonstad, Lace Mine, Rustfontein and Weltevrede).

Indigenous Flora

The vegetation assessment was conducted throughout the extent of the project area. Several indigenous species associated with the Central Free State Grassland vegetation type were observed across the project area. The dominant floral species observed included, *Asparagus larycinus*, *Gazania krebsiana*, *Felicia muricata*, *Aristida congesta*, *Eragrostis chloromelas*, *Eragrostis curvula* *Themeda triandra* and *Elionurus muticus*.

During the assessment *Ammocharis coranica*, *Aloe maculate*, *Helichrysum dregeanum* and *Helichrysum argyrosphaerum* listed as protected under Schedule 6 of the Free State Nature Conservation Ordinance 8 of 1969 were recorded within the project area. Refer to the Figure 5.8. for photos of flora species observed.

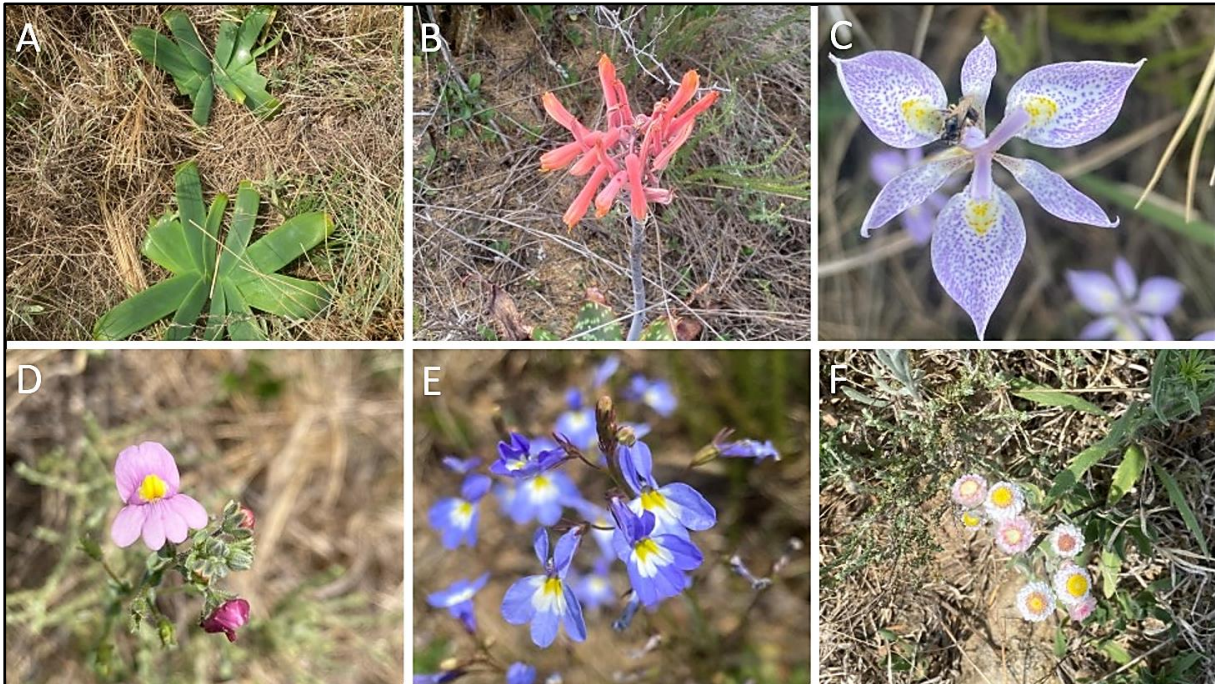


Figure 5-8: Photographs Illustrating Some of the Flora Species Recorded – A) *Ammocharis coranica* (protected); B) *Aloe maculata* (Protected); C) *Moraea simulans*; D) *Nemesia fruticans*; and E) *Lobelia erinus*; and F) *Helichrysum argyrosphaerum* (Protected)

Invasive Alien Plants (IAP)

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

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEM:BA:

- Category 1a: Invasive species requiring compulsory eradication. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.

- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones. Species existing outside of a regulated area shall be classified as category 1b.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as a gift - involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones as these will be classified as category 1b species.

Seven (7) IAP species were recorded during the field survey, of which two (2) are Category 1b species which must be controlled through the implementation of an IAP Management Programme. Photographs of the observed species are presented in Figure 5.9. below.

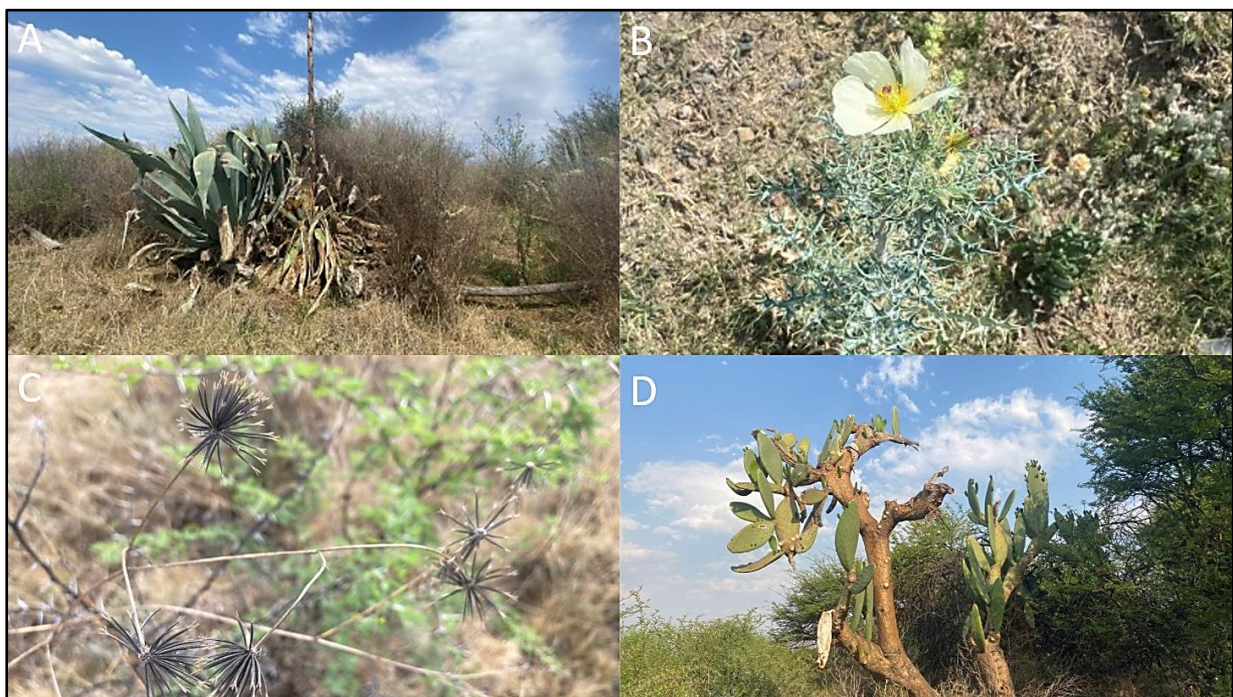


Figure 5-9: Photographs Illustrating the Category 1b IAP Flora Species Recorded within the Project Area – A) *Agave americana*; B) *Argemone mexicana*; C) *Bidens pilosa* and D) *Opuntia ficus-indica*.

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

The Free State Province Biodiversity Plan classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole.

- CBAs are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in

a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).

- ESAs are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as an ‘Irreplaceable Critical Biodiversity Area’ which usually represents pristine natural habitat that is very important for conservation.

According to the 2015 Free State CBA and ESA map dataset the project area overlaps with an Ecological Support Area 1 (ESA 1) and Ecological Support Area 2 (ESA 2) as per Figure 5.10. below. The following functional description can be noted for ESA 1 and 2 areas:

- ESA 1 sites are those with minimal degradation; and
- ESA 2 sites are more degraded (they can be totally degraded, but not totally transformed).

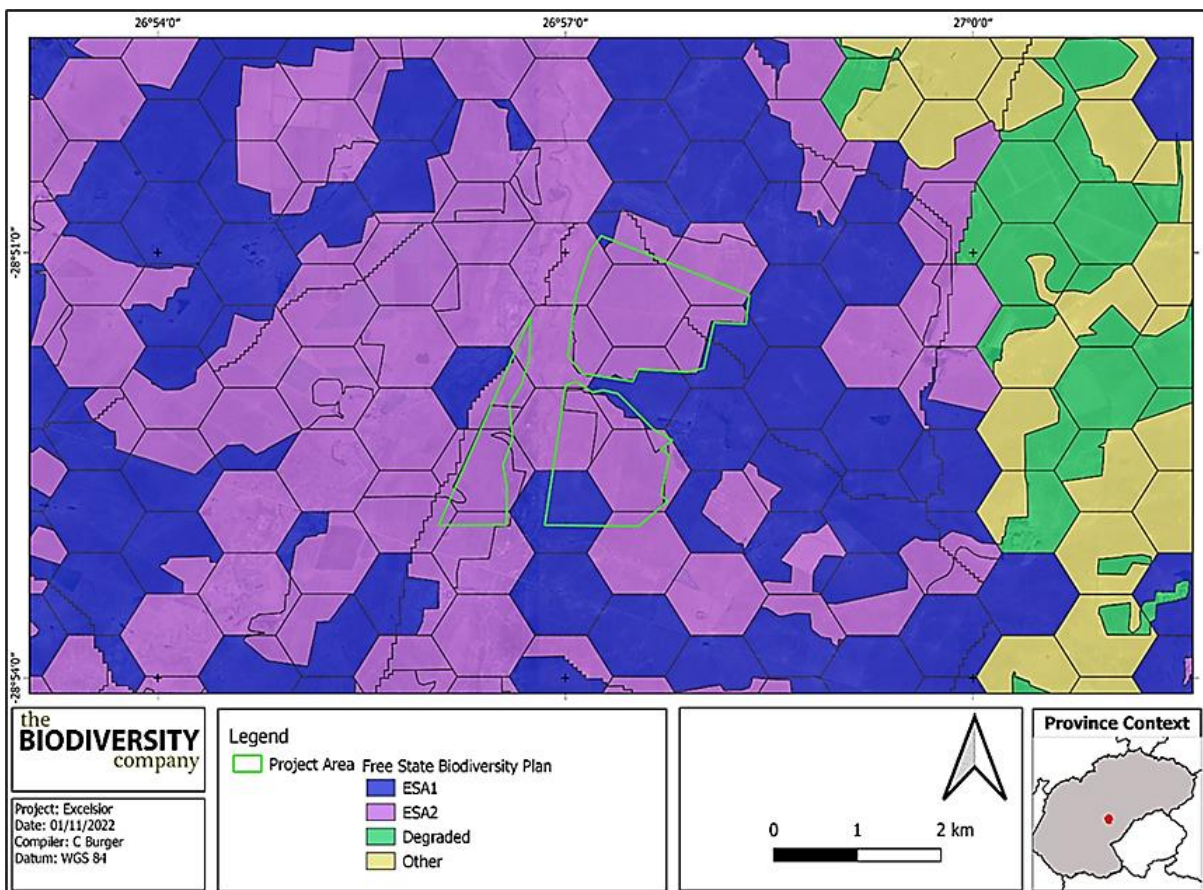


Figure 5-10: Map illustrating the Free State Biodiversity Plan Relevance

According to the 2018 National Biodiversity Assessment (NBA) spatial dataset the project area overlaps with a 'Least Concern' and 'Poorly Protected' ecosystem. A 'Least Concern' ecosystem type is one which has experienced little or no loss of natural habitat or deterioration in condition and a 'Poorly Protected' ecosystems are those which have between five and 50% of their biodiversity target included in one or more protected areas (SANBI, 2019).

According to the protected area spatial datasets from SAPAD (2022) and SACAD (2022), the project area is located 16 km east of the Bosbok Game Reserve and 24 km west of the Korannaberg Private Nature Reserve (i.e., outside of the 5 km regulated buffer of this protected area). Refer to Figure 5.11 below.

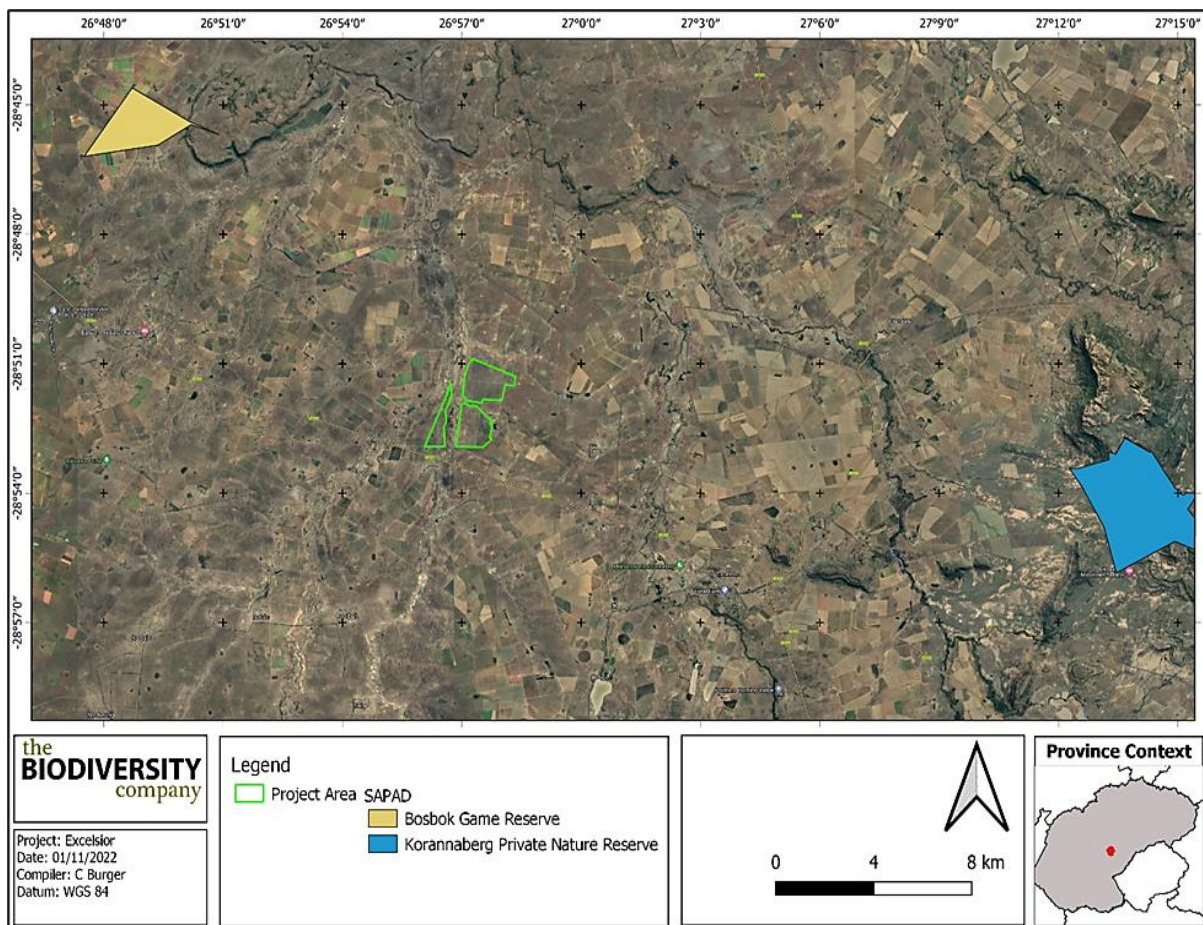


Figure 5-11: Map illustrating the project area in relation to the Protected Areas

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

The project area does not overlap with any NPAES areas, but is located approximately 2 km from the closest classified area.

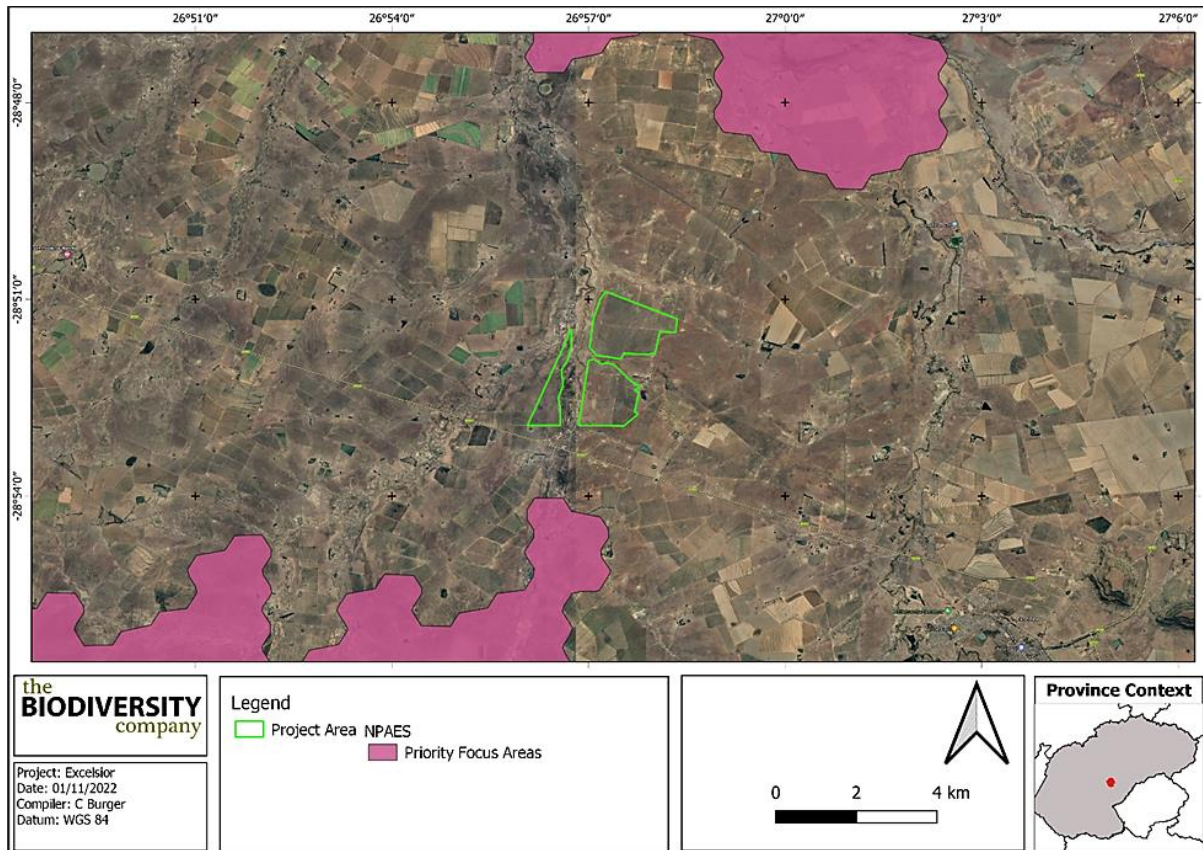


Figure 5-12: The project area in relation to the National Protected Area Expansion Strategy

Habitat Assessment

The following habitats were delineated across the project area:

- Secondary Grassland – Majority of the project area is comprised of secondary grassland habitat. Based on the current ecological condition of this habitat the driving forces are inconsistent due to the current land uses. The condition difference within this habitat depends on the extent of the disturbance in some areas being more severe, usually related to one being more overgrazed and exposed to current anthropogenic activities than the other.
- Degraded Grassland – The degraded grassland habitat can be found in the northern and western sections of the project area. These habitats aren't entirely transformed but in a constant disturbed state, as they can't recover to a more natural state due to ongoing disturbances and impacts as a result of grazing and anthropogenic related activities.
- Wetlands – The ecological integrity, importance and functioning of the wetland areas associated with the project area plays a crucial role as a water resource system and an important habitat for various fauna and flora.

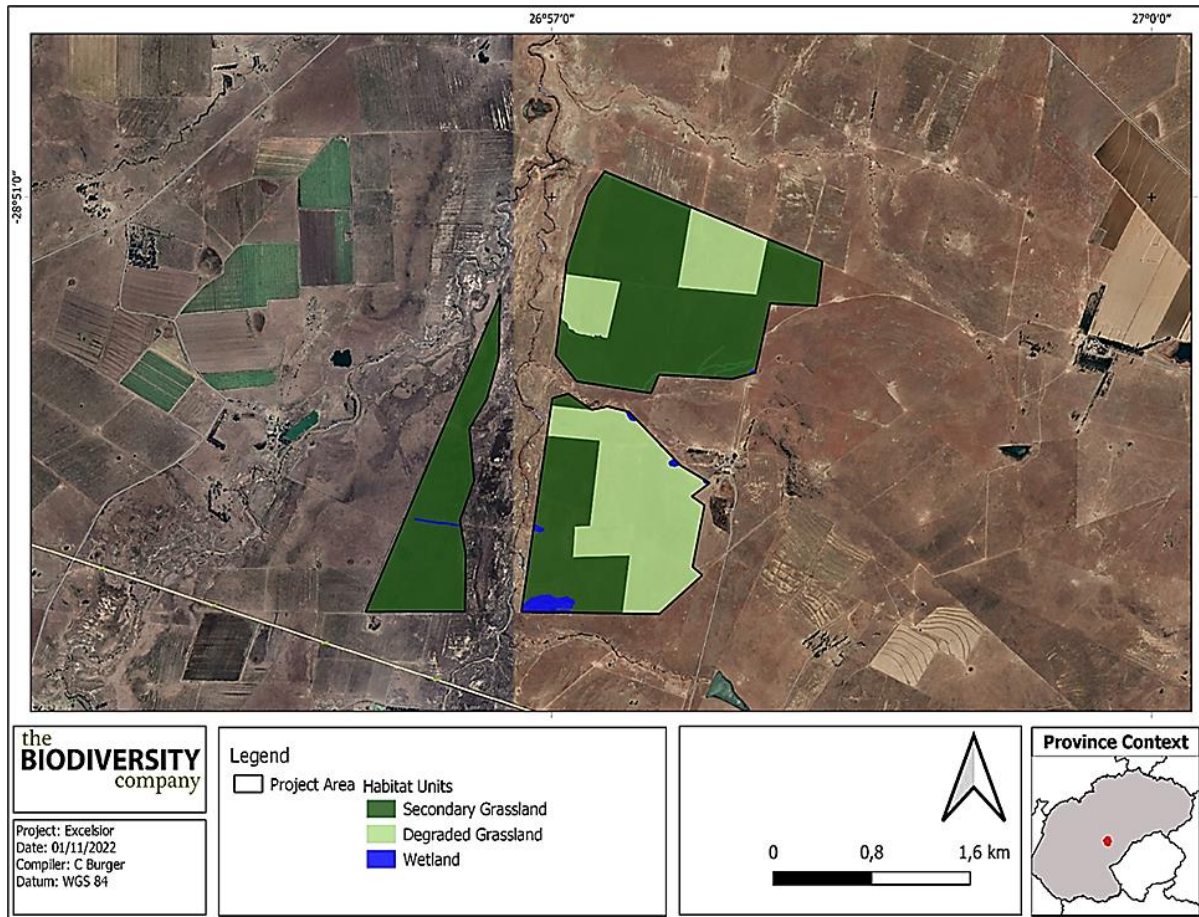


Figure 5-13: Map illustrating the habitats identified in the project area

The three delineated habitat types have each been allocated a sensitivity category, Site Ecological Importance (SEI).

Table 5.3: Sensitivity summary of the habitat types delineated within the project area of influence

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Wetland	Medium	High	Medium	Low	High
Secondary Grassland	Medium	Medium	Medium	Medium	Medium
Degraded Grassland	Low	Medium	Low	Medium	Low

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities (noted in conjunction with provincial guidelines pertaining to CBA and ESA areas):

- **Low:** Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
- **Medium:** Minimisation and restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities.
- **High:** Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities

In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped in Figure 5-14 below.

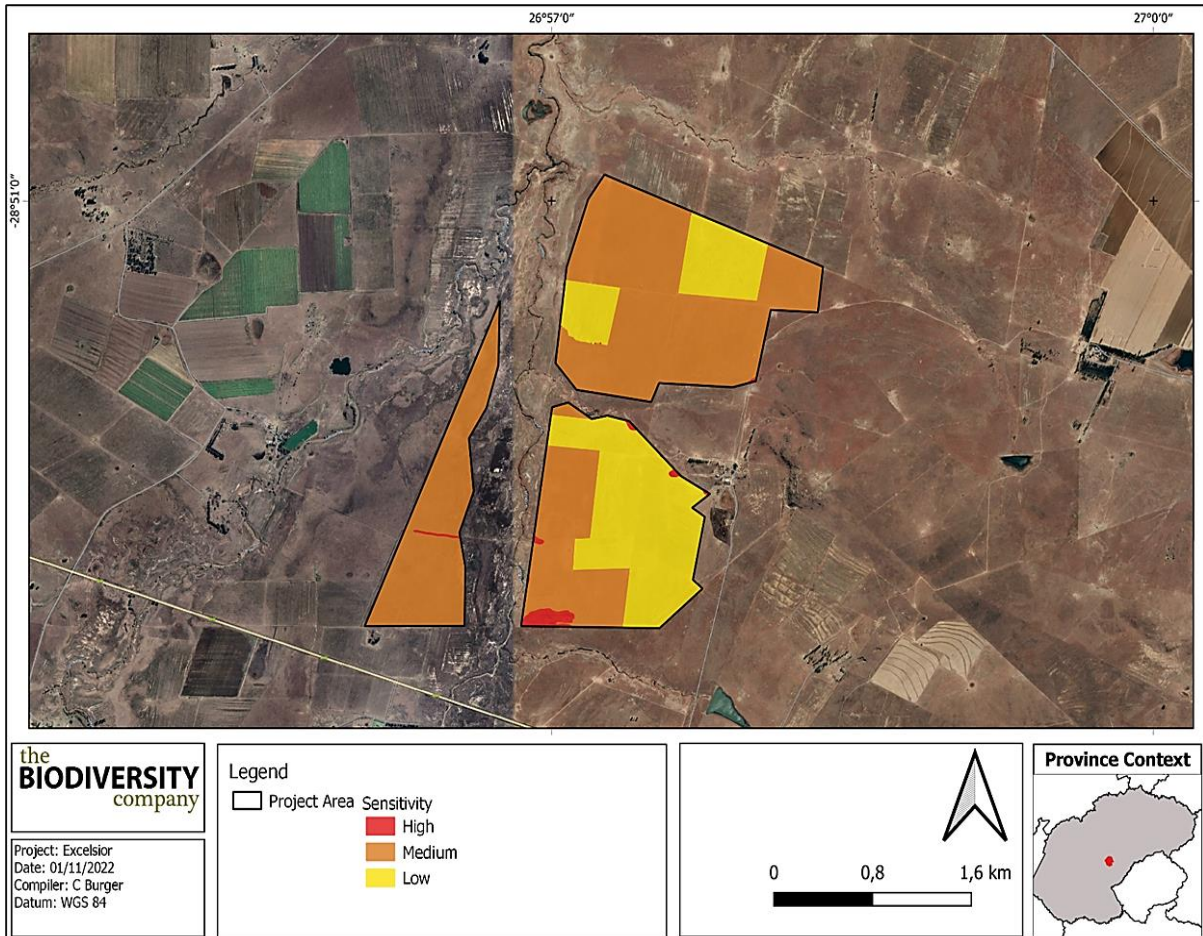


Figure 5-14: Map illustrating the sensitivities of the habitats delineated within the overall project area

The screening report classified plant species theme as being of a “Low” sensitivity. Following the findings of the field survey, the plant species theme should retain its “Low” sensitivity.

5.3.1.3 Wetlands and Riparian Features

According to the Wetland Baseline and Risk Assessment (attached as Appendix E1), three Hydrogeomorphic (HGM) units were identified within the Project Area Of Influence (PAOI). The wetland areas were delineated in accordance with the DWAF (2005) guidelines. HGM units have been classified as a Channelled Valley Bottom wetland and two (02) Unchanneled Valley Bottom wetlands. A single artificial wetland, namely a dam was identified within the PAOI. The delineation of the wetland systems and functional assessment have been completed for the unchanneled valley bottom wetland in which the dam is located.

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

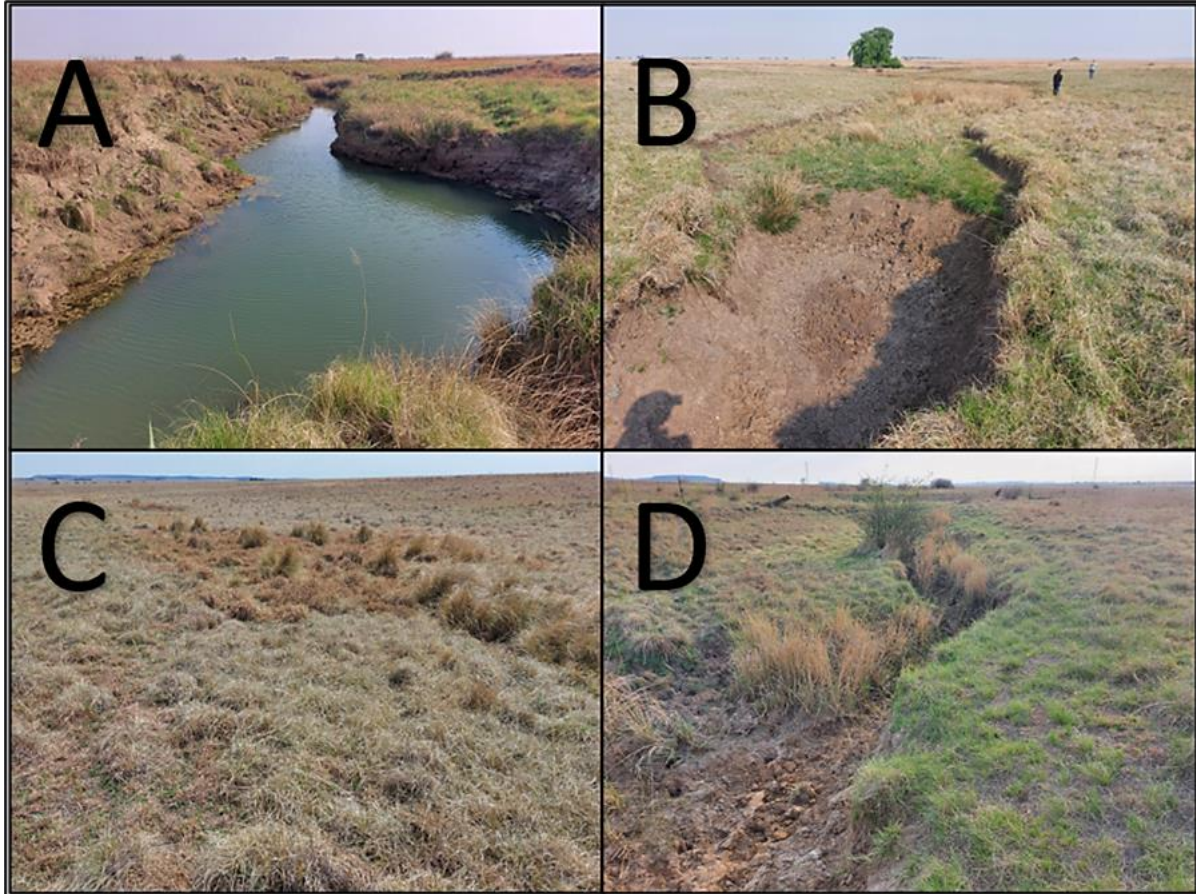


Figure 5-15: Photographical Evidence of the Different Wetland Types Found Within the Project Area of Influence, A) Channelled Valley Bottom wetland, B & C) Unchanneled Valley Bottom wetlands, D) Drainage feature.

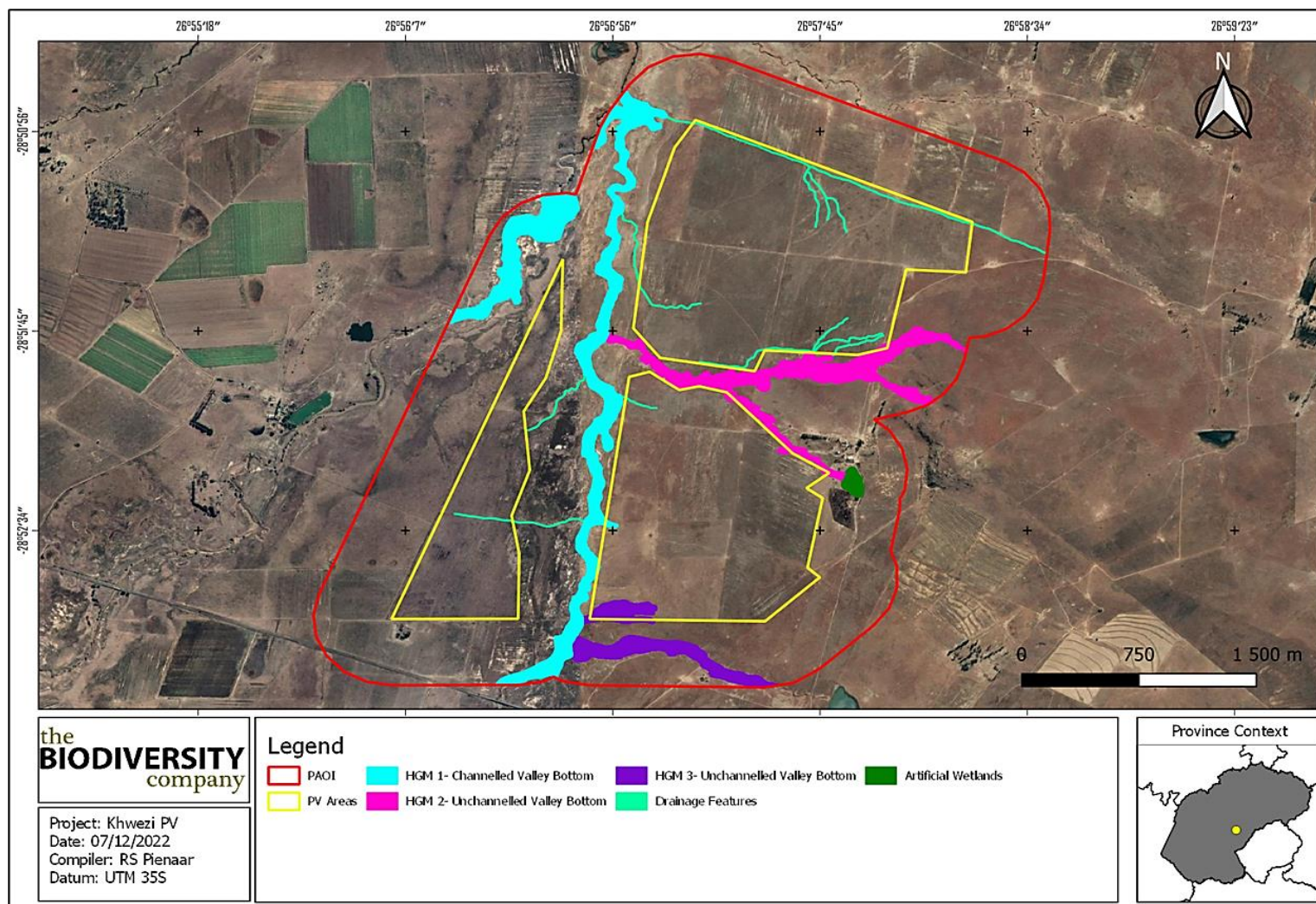


Figure 5-16: Delineation and location of the different HGM units identified within the PAOI

The ecosystem services provided by the wetland units identified on site were assessed and rated using the WET-EcoServices method (Kotze et al., 2008). The average ecosystem service scores for the delineated systems are illustrated in Table 5.4.

Table 5.4: Average ecosystem service scores for delineated wetlands

Moderately High	Intermediate
HGM 1	HGM 2
HGM 3	

HGM 2, is an unchanneled valley bottom system flowing through the middle of the PAOI and scored the lowest for ecosystem services from the identified wetlands. The wetland plays a role in sediment trapping and the assimilation of phosphates, nitrates and toxicant. The wetland scored lower ecosystem services due to the fact that the wetland drains into HGM 1 and will have little to no water during the dry seasons. Vegetation cover inside the wetland is moderately low which lower the wetland’s ability to provide resources.

The remaining wetlands score moderately high. These wetlands however have high vegetation cover which will play an important role in biodiversity maintenance providing habitat for a wide variety of fauna. The vegetation will also help with streamflow regulation and flood attenuation during the rainy season. Vegetation also plays a vital role in the assimilation of toxicants. HGM 1 will also have water for most of the year providing resources for human use.

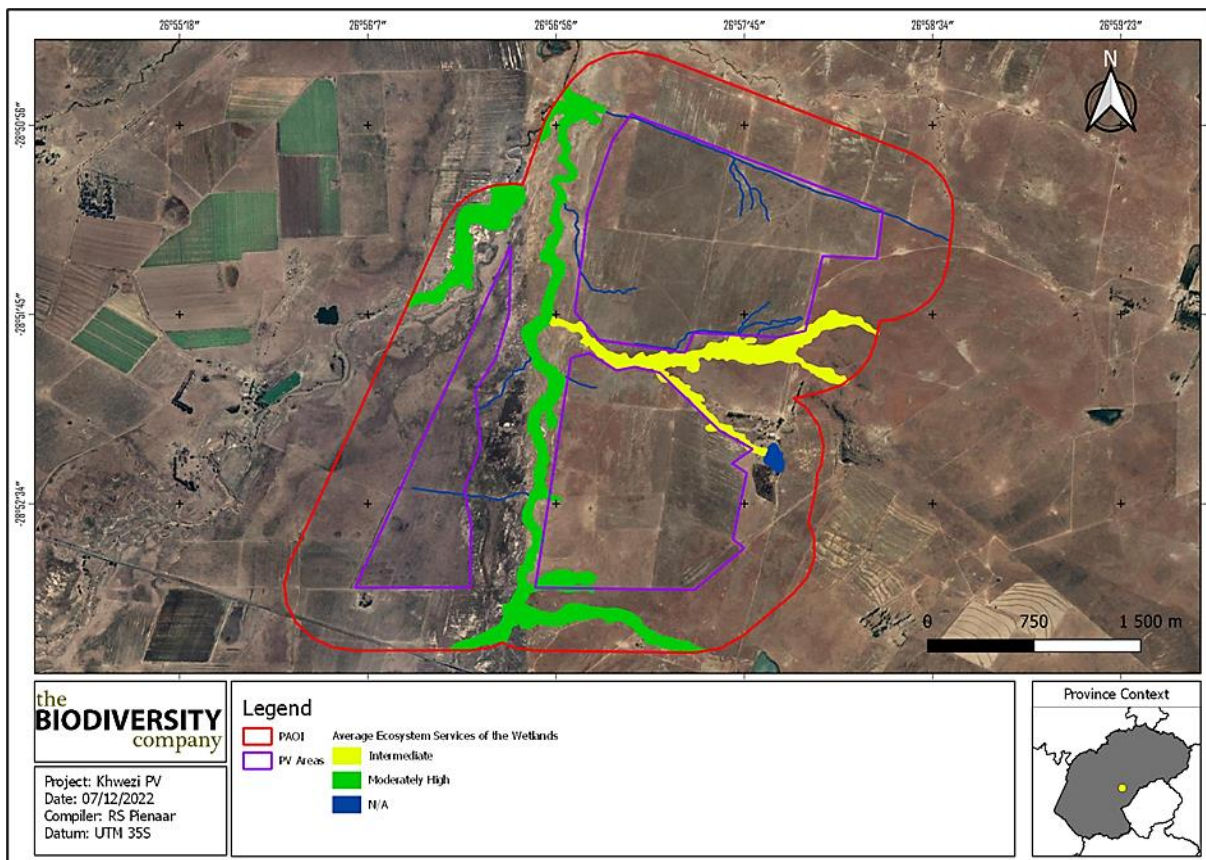


Figure 5-17: Average ecosystem services scores for the delineated wetlands

The delineated wetland systems have been scored overall PES (Present Ecological State) ratings ranging from moderately modified (class C) to largely modified (class D), depending on the level of modification. The findings from the PES assessment indicate significant disturbances to HGM 2, and 3 that has been rated a largely modified score.

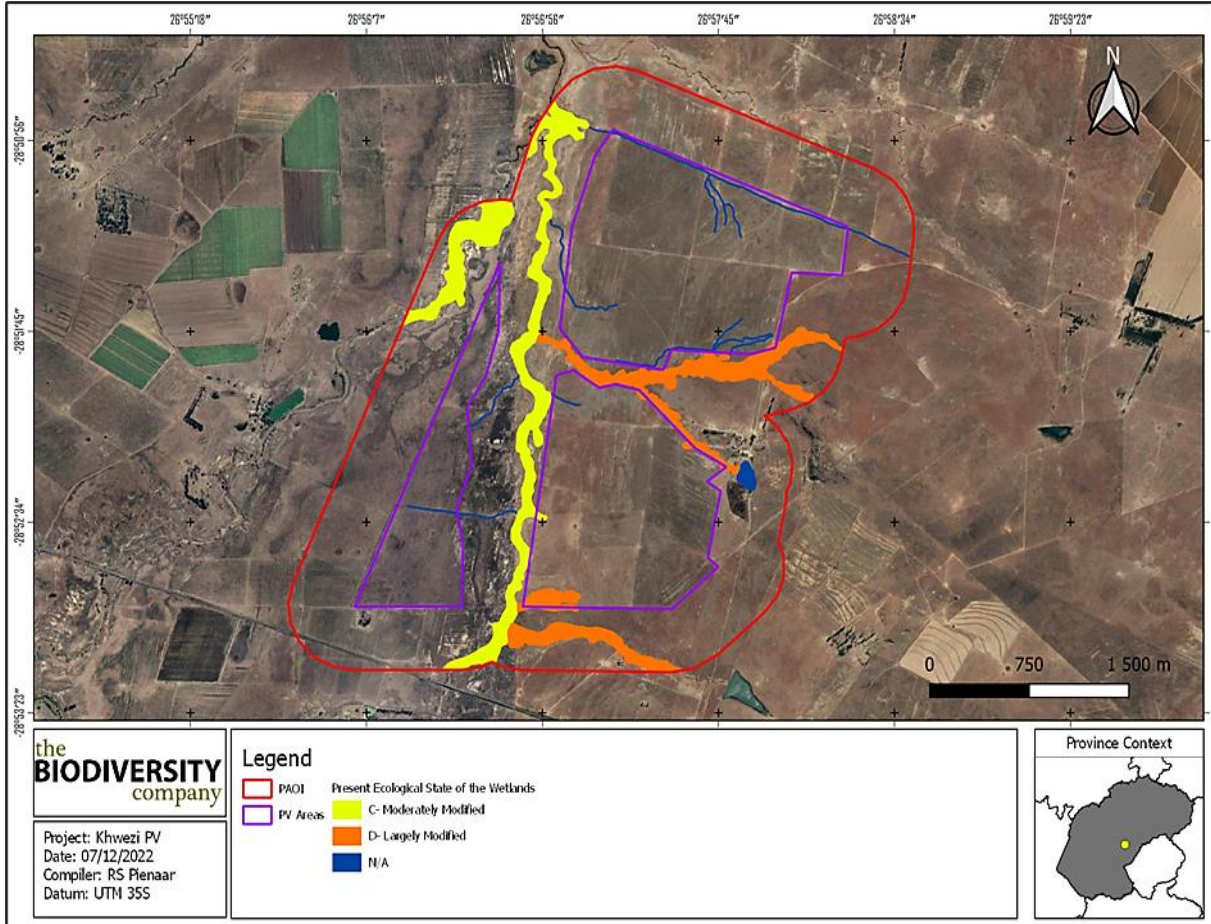


Figure 5-18: Overall Present Ecological State of delineated wetlands

The results of the ecological Importance and Sensitivity (IS) assessment are shown in Table 5.5. below. Various components pertaining to the protection status of a wetland are considered for the IS, including Strategic Water Source Areas (SWSA), the NFEPA wetland vegetation (wet veg) threat status and the protection status of the wetland. The IS for the channelled valley bottom was rated to be “High” and the unchannelled valley bottom wetland units have been calculated to be “Moderate”, which combines the relatively low threat status and protection level with the low condition and threat status of the wetland.

Table 5.5: The IS results for the delineated HGM units

HGM Type	NFEPA Wet Veg			NBA Wetlands		SWSA (Y/N)	Calculated IS	
	Type	Ecosystem Threat Status	Ecosystem Protection Level	Wetland Condition	Ecosystem Threat Status 2018			Ecosystem Protection Level
Channelled Valley Bottom	Dry Highveld Grassland Group 4	Critical	Not Protected	A/B Largely Natural	Critical	Not Protected	N	High
Unchannelled Valley Bottoms	Dry Highveld Grassland Group 4	Critical	Not Protected	A/B Largely Natural	N/A	N/A	N	Moderate

A pre-mitigation buffer zone of 30 m is recommended for the identified wetlands, which can be decreased to 15 m with the addition of all prescribed mitigation measures as per the wetland assessment.

Based on the results and conclusions presented in the wetland assessment, it is expected that the proposed activities will pose low residual risks on the wetlands and thus no fatal flaws were identified for the project.

5.3.1.4 Climate

The vegetation type is characterised by a summer rainfall with a Mean Annual Precipitation (MAP) of 560 mm which peaks in December and January. The Mean Annual Temperature has been calculated at approximately 15°C with a relatively high frost occurrence.

5.3.1.5 Biodiversity

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

Avifauna

According to the Avifaunal Impact Assessment (Appendix E9), the SABAP2 Data lists 217 avifauna species that could be expected to occur within the project area. Twelve (12) of these expected species are regarded as threatened. One of these species *Sagittarius serpentarius* (Secretarybird) has been recorded from the project area and is considered Confirmed. Three (3) species are considered as having a High likelihood of occurrence due to the presence of suitable extensive grassland and agricultural habitat.

During the field assessment conducted between the 31st of October and the 4th of November 2022, ninety-seven (97) bird species were recorded in and around the PAOI with 91 species recorded from point counts and an additional 6 species recorded as incidental sightings. Dominant avifaunal species within the assessment area as defined as those species whose relative abundances cumulatively account for more than 84% of the overall abundance shown alongside the frequency with which a species was detected among point counts. The Avifaunal data collected shows that the Cloud cisticola

(Cisticola textrix), South African Cliff Swallow (*Petrochelidon spilodera*) and Long-tailed Widowbird (*Euplectes progne*) were the most common species recorded in point counts.

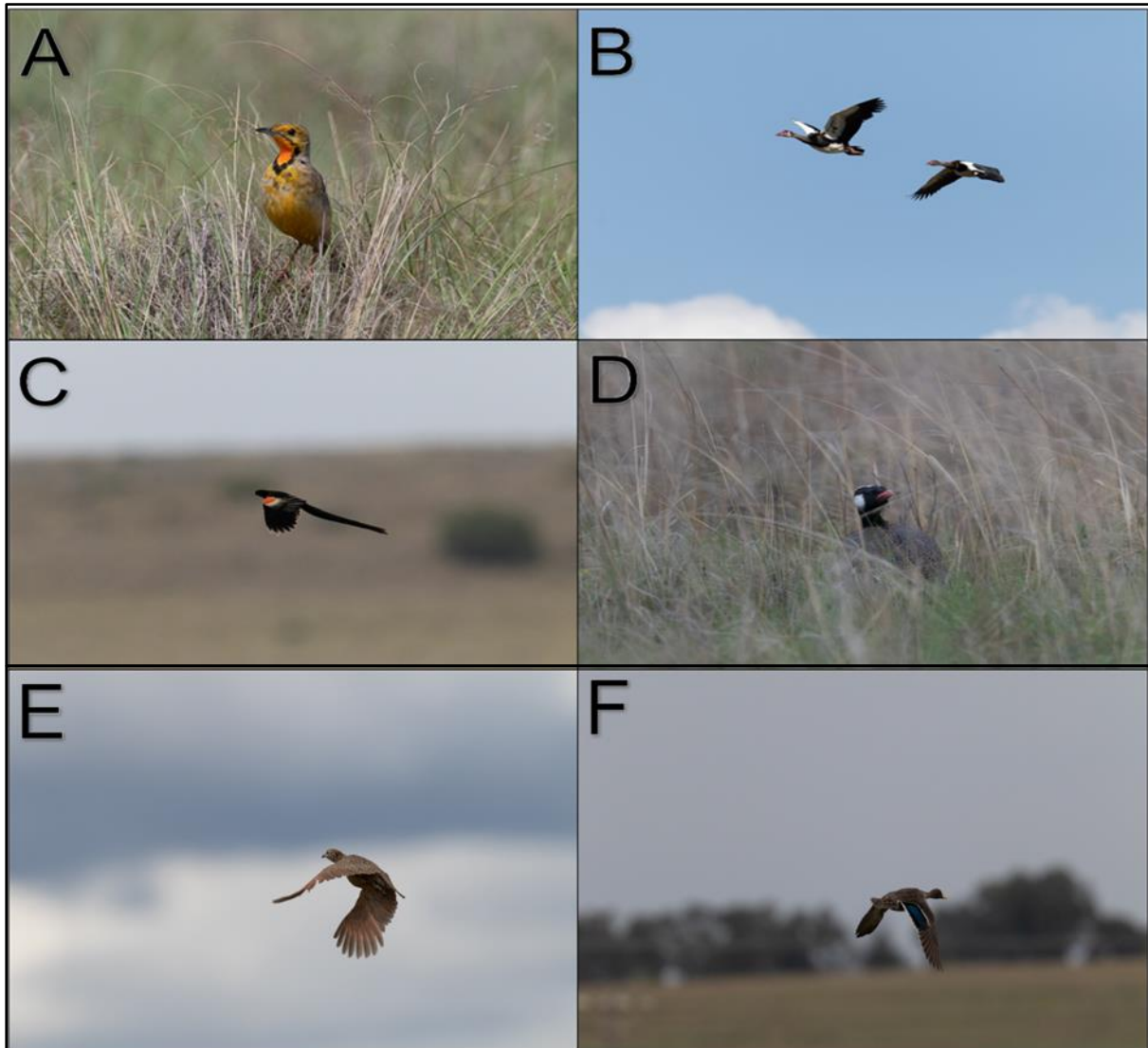


Figure 5-19: Photographs illustrating a portion of the avifauna species recorded in the assessment area: A: Cape Longclaw (*Macronyx capensis*), B: Spur-winged Goose (*Plectropterus gambensis*), C: Long-tailed Widowbird (*Euplectes progne*), D: Northern Black Korhaan (*Afrotis afraoides*), E: Orange River Francolin (*Scleroptila gutturalis*), F: Yellow-billed Duck (*Anas undulata*)

During the 19th and 22nd of February 2023, 68 species were recorded during the point counts (Appendix D) and 28 during the incidental counts (Appendix E). No SCCs were recorded during this assessment.

Species of Conservation Concern (SCC)

One (1) SCC was recorded from the PAOI during the first assessment, namely the *Sagittarius serpentarius* (Secretarybird). No SCC was recorded during the second assessment. The Secretarybird, which occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). The study area comprises extensive

grasslands and wetland areas, as well as the agricultural areas in which this species may forage. The likelihood of occurrence is rated as confirmed as this species has been recorded from the study area.

Risk Species

Risk species are species that would be sensitive to habitat loss, that are regarded as collision prone species and species that would have a high electrocution risk. These could be species that are not necessarily SCC but would be impacted on by this development. Even though the panels do not pose an extensive collision risk for larger birds, powerlines associated with the infrastructure, guidelines (anchor lines) and connection lines do pose a risk. The fence could also pose a collision risk for various species. Species that are found to be at risk are detailed in Table 5.6 below.

Table 5.6: At risk species found in the surveys

Scientific Name	Alphabetical Name	Collisions	Electrocution	Disturbance/ Habitat Loss
<i>Alopochen aegyptiaca</i>	Goose, Egyptian	X	X	
<i>Afrotis afraoides</i>	Northern Black Korhaan	X		X
<i>Anas sparsa</i>	African Black Duck	X		
<i>Ardea cinerea</i>	Grey Heron		X	
<i>Ardea melanocephala</i>	Heron, Black-headed	X	X	
<i>Ardea melanocephala</i>	Black-headed Heron	X	X	
<i>Bostrychia hagedash</i>	Hadedda Ibis	X	X	
<i>Bubulcus ibis</i>	Western Cattle Egret	X		
<i>Bubulcus ibis</i>	Western Cattle Egret	X		
<i>Buteo rufofuscus</i>	Jackal Buzzard	X	X	
<i>Ciconia ciconia</i>	White Stork	X		
<i>Corvus albus</i>	Pied Crow	X	X	
<i>Corvus capensis</i>	Cape Crow	X	X	
<i>Elanus caeruleus</i>	Kite, Black-winged	X	X	
<i>Elanus caeruleus</i>	Black-winged Kite	X	X	
<i>Falco rupicoloides</i>	Greater Kestrel	X		
<i>Fulica cristata</i>	Red-knobbed Coot	X		
<i>Haliaeetus vocifer</i>	African Fish Eagle	X	X	
<i>Haliaeetus vocifer</i>	African Fish-eagle	X	X	
<i>Melierax canorus</i>	Pale Chanting Goshawk	X		
<i>Microcarbo africanus</i>	Reed Cormorant	X		
<i>nas undulata</i>	Yellow-billed duck	X		
<i>Phalacrocorax lucidus</i>	White-breasted Cormorant	X		
<i>Plectropterus gambensis</i>	Spur-winged Goose	X	X	
<i>Plectropterus gambensis</i>	Spur-winged Goose	X	X	
<i>Pternistis swainsonii</i>	Swainson's Spurfowl	X		

<i>Sagittarius serpentarius</i>	Secretarybird	X		X
<i>Scopus umbretta</i>	Hamerkop	X	X	
<i>Tachybaptus ruficollis</i>	Little Grebe	X		

No nests of SCC were observed. The low number of species recorded nesting within the PAOI should be interpreted with caution because the survey was undertaken using point surveys, and the full assessment area was not covered. It is postulated that more species are likely to be nesting if an assessment of the full PAOI is done (walked over).

Habitat Sensitivity

Six (6) habitat types were subjected to the Site Ecological Importance (SEI) methods and were allocated a sensitivity category as per Table 5.7 below.

Table 5.7: Summary of habitat delineated within the field assessment area of the project

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed	Very Low	Very Low	Very Low	Very High	Very Low
Agriculture	Very Low	Very Low	Very Low	Very High	Very Low
Secondary grassland	Medium	Low	Low	High	Very Low
Degraded grassland	Medium	Medium	Medium	Medium	Medium
Koppie	Medium	Medium	Medium	Very Low	High
Water Resource	Very High	Medium	High	Medium	High

The habitat SEI can be interpreted as follows:

- Very Low: Minimisation mitigation – Development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Medium: Minimisation and restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities.
- High: Avoidance mitigation wherever possible.
 - Minimisation mitigation – changes made to project infrastructure design to limit the amount of habitat impacted;
 - Limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.

The Water Resource habitat is assigned a ‘High’ sensitivity rating largely because it is associated with several river systems which are listed as ‘Critically Endangered’ systems according to the NBA (2018) dataset. Additionally, in seasonally arid regions wetland and river systems such as these serve as

important movement and foraging corridors for regional fauna, which includes any local SCC mammals and carnivores that are likely to occur.

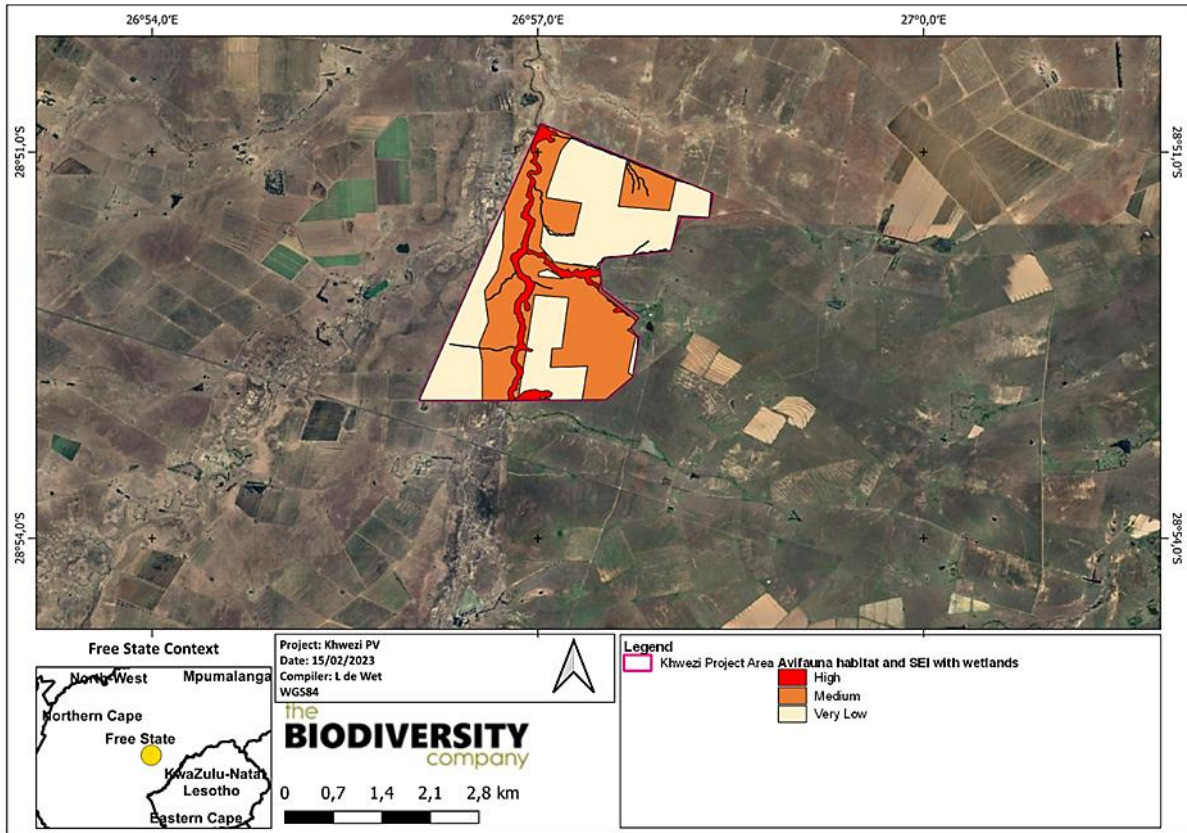


Figure 5-20: Map illustrating the sensitivities of the habitats delineated within the overall Project Area of Influence

In conclusion, six habitats were identified namely Transformed, Agriculture, Secondary Grassland, Degraded Grassland, Koppie and Water Resource. Three of these had a “Very Low” sensitivity, they were Transformed, Agriculture and Secondary Grassland. The Degraded Grassland had a “Medium” sensitivity while the Koppie and Water Resources both had a “High” sensitivity. The planned design does exclude the Water Resources, in addition to the avoidance of these areas the demarcation of them to negate any access would reduce the overall impact on them to Low. Should the mitigations, recommendations and monitoring be implemented the overall impacts can be reduced to a Low-Moderate level.

Fauna

According to the Terrestrial Ecology Baseline and Impact Assessment (attached as Appendix E2), fauna species include mammals, reptiles, and amphibians, where the likelihood of a particular species occurring within the project area. The IUCN Red List Spatial Data lists, the ReptileMap database and the AmphibianMap lists the following:

- 112 mammal species that could be expected to occur within the area. This excludes large mammal species that are typically limited to reserves. Nineteen (19) (small - medium non protected area restricted species) of these expected species are regarded as threatened,

twelve (12) of these have a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.

- 50 reptile species may be expected to occur within and nearby to the project area. Three (3) are regarded as SCC. Of the three species one has a low likelihood of occurrence based on the lack of suitable habitat and food sources in the project area.
- 20 amphibian species are expected to occur within the area. One (1) is regarded as threatened. Due to several rivers and wetlands present within the vicinity of the project area the likelihood of occurrence is rated as moderate.

During the fauna survey, mammal activity was moderate, where nine (9) mammal species were recorded, either through direct observations or evidence of species. Two (2) reptile species were recorded and no amphibian species were observed during the survey.

Table 5.8: The fauna species recorded during the field survey

Species	Common Name	Conservation Status	
		SANBI (2022)	IUCN (2021)
Mammals			
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC
<i>Atilax paludinosus</i>	Water Mongoose	LC	LC
<i>Orycteropus afer</i>	Aardvark	LC	LC
<i>Xerus inauris</i>	Cape Ground Squirrel	LC	LC
<i>Phacochoerus africanus</i>	Common Warthog	LC	LC
<i>Suricata suricatta</i>	Suricate	LC	LC
Reptiles			
<i>Stigmochelys pardalis</i>	Leopard Tortoise	LC	LC
<i>Bitis arietans arietans</i>	Puff Adder	LC	Unlisted

The screening report classified the animal species them as “Medium” sensitivity. Following the findings of the field survey, the animal species theme (from a mammal and herpetofauna perspective) should retain its “Medium” sensitivity.

5.3.1.6 Visual Landscape

Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or from parks and conservation areas, highways and travel routes, and important cultural features and historic sites.

Visual Receptors

According to the Visual Impact Assessment (attached as Appendix E3), visual receptors can be defined as: “Individuals, groups or communities who are subject to the visual influence of a particular project”. Possible visual receptors identified within the 10km radius landscape, which due to its land use could be sensitive to landscape change. They include:

- **Area Receptors** which include:
 - Mahlatswetsa.
 - Rooibult.
- **Linear Receptors** which include:
 - R703 regional road.
- **Point Receptors** which include:
 - Homesteads on farms.

Zone of Theoretical Visibility (ZTV) Model

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

Table 5.9: ZTV Assumptions

Radius	Impact Magnitude
0-1km	Very High
1-3km	High
3-5km	Medium
5-10km	Low

Table 5.10 below reflects the visibility rating in terms of proximity on sensitive receptors of the SPP.

Table 5.10: ZTV rating in terms of proximity to the SPP

Radius	Visual Receptors	Visibility rating in terms of proximity
0-1km	<ul style="list-style-type: none"> - Two homesteads on farms. - R703 regional road. Coverage: 84%	Very High
1-3km	<ul style="list-style-type: none"> - Three homesteads on farms. - R703 regional road. Coverage: 48%	High
3-5km	<ul style="list-style-type: none"> - Two homesteads on farms. - R703 regional road. Coverage: 26%	Medium

5-10km	<ul style="list-style-type: none"> - Eight homesteads on farms. - R703 regional road. <p>Coverage: 12%</p>	Low
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Figures 5.21 and 5.22 illustrates the theoretical visibility as listed in Table 5.10.

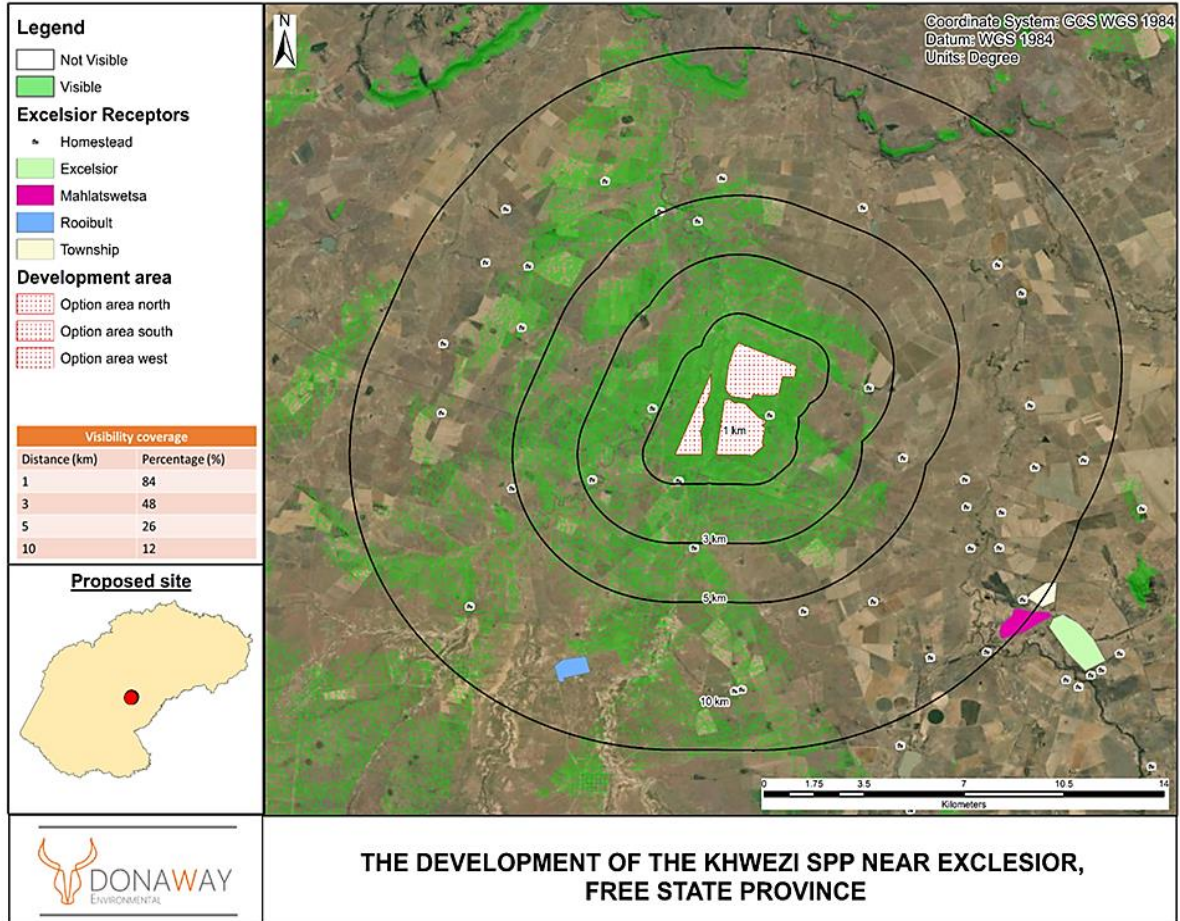


Figure 5-21: Zone of Theoretical Visibility (ZTV) for the SPP, satellite view

The significance of the visual impact will be a “Negative Low Impact”. The only receptors likely to be impacted by the proposed development are the nearby property owners and people travelling on the R703 regional road. A large part of the visual landscape is reflecting a farming landscape with a better visual appearance.

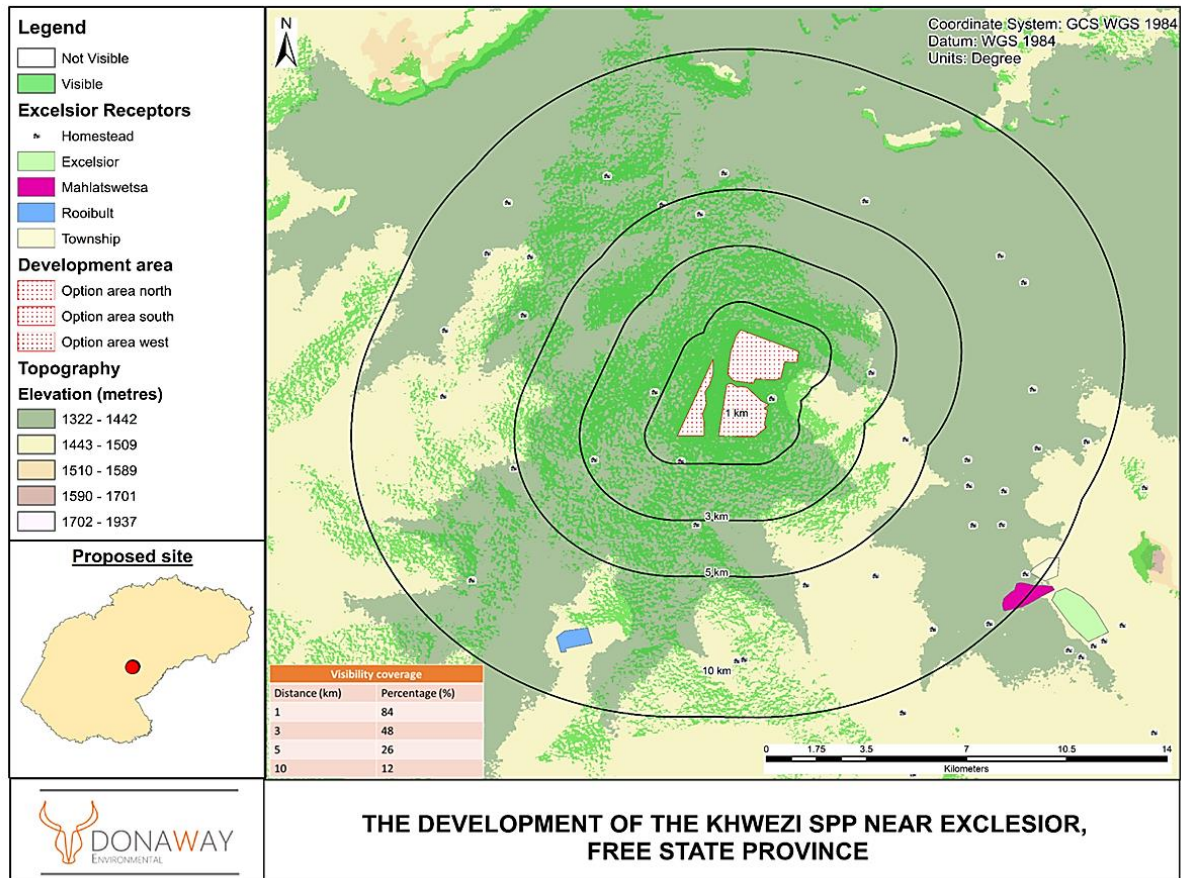


Figure 5-21: Zone of Theoretical Visibility (ZTV) for the SPP, topography view

5.3.1.7 Traffic Consideration

According to the Traffic Impact Assessment (Appendix E8), the existing external road network includes the R703 which is a surfaced two lane, two-way roadway and is classified as a Class 3 Rural Minor Arterial in the vicinity of the proposed development site. The road extends between Dealesville (in the west) and Clocolan (in the east) and is approximately 200 km to 250 km in length. The S476 is a two lane, two-way (undivided) unsurfaced roadway and in classified as a Class 4 Rural Local Road. This road section forms a loop (with the R703) and is located to the north of the R703. The Unnamed Access Road is an existing two lane, two-way roadway that can accommodate two vehicles passing one another simultaneously (no lane markings) and is classified as a Class 5 Rural Local Road. The road serves to provide direct access to the existing surrounding farms. It should be noted that approximately 100 m of this road section, to the north of R703, is surfaced and the remainder of the roadway is unsurfaced. Refer to Figure 5.23.

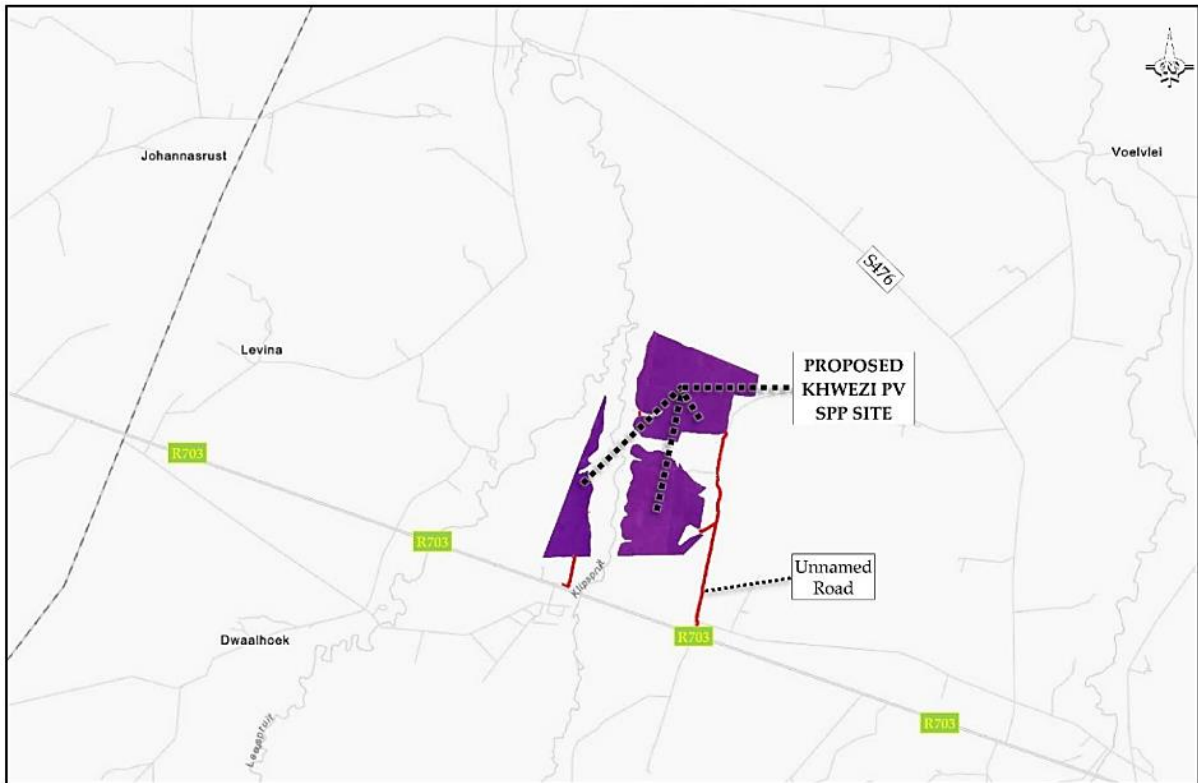


Figure 5-22: Existing external road network surrounding the Khwezi PV SPP

Proposed Site Access

Access to the proposed Khwezi PV SPP site will be via two existing unsurfaced roadways that connect to the external road network at the R703 as shown in Figure 5.24 below.

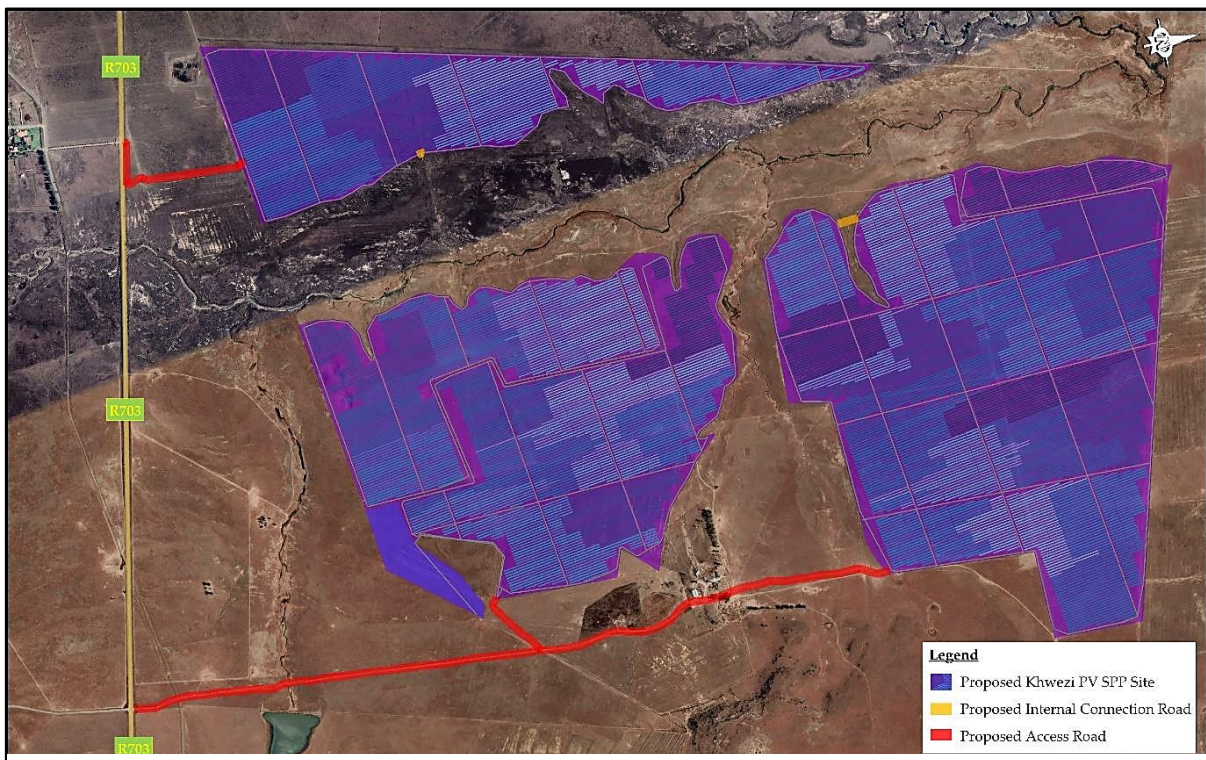


Figure 5-23: Proposed site accesses

The proposed eastern-most site access currently connects to the R703 via a formalised intersection, while the western-most access is a lower-order farm access road. An accurate assessment of the condition of the eastern-most intersection could not be confirmed and the intersection therefore may require resurfacing/upgrading. The western-most access will need to be formalised and upgraded to the minimum standards as detailed in Annexure A of the Traffic Impact Assessment. This may likely be a requirement as part of the wayleave application approval of the Mantsopa Local Municipality, Thabo Mofutsanyana District Municipality and Free State: Department of Police, Road and Transport.

Internal Road Network

The initial technical information received indicates that the site will have an internal road network with proposed roadway widths of 12 m. This is considered acceptable and a gravel road structure would be suitable for this development. The total length of the internal road network is estimated at 40 km.

The regional construction trips generated by the proposed development are not considered significant in comparison to the Average Daily Traffic (ADT) and will not affect the existing Level of Service. The development of the Khwezi PV SPP, located on the Farm Koppiesdam No. 511 (PV facility) in the Free State Province is supported from a traffic and transportation perspective.

5.3.2 Description of the Socio-Economic Environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

5.3.2.1 Socio-Economic Conditions

The Social Impact Assessment (attached as Appendix E7) explains that 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. The Free State is situated in the heart of the country, between the Vaal River in the north and the Orange River in the south, bordered by the Northern Cape, Eastern Cape, North West, Mpumalanga, KwaZulu-Natal and Gauteng provinces, as well as Lesotho. The Free State is a rural province of farmland, mountains, goldfields, and widely dispersed towns. This province is an open, flat grassland with plenty of agriculture that is central to the country's economy. Mining is its largest employer. Bloemfontein is the capital and is home to the Supreme Court of Appeal, as well as the University of Free State and the Central University of Technology. The province also has 12 gold mines, producing 30 percent of South Africa's output.

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

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. Other mineral resources – gold, diamonds, and low-grade coal – are also important to the province; mining contributed 9% to the local economy and employed some 33 000 people in 2010. Other commodities include clay, gypsum, salt, and uranium. Manufacturing also features in the provincial economic profile. This sector makes up 14% of the provincial output, with petro-chemicals (via Sasol) taking account of more than 85% of the output.

The Free State is strategically placed to take advantage of the national transport infrastructure. Two corridors are of particular importance: the Harrismith node on the N3 corridor between Gauteng and KwaZulu-Natal and the N8. The N1 joins Gauteng to the Western Cape. Bloemfontein International Airport handles about 250 000 passengers and about 221 000 tons of cargo a year. Important towns include Welkom, the heart of the goldfields; Odendaalsrus, another gold-mining town; Sasolburg; Kroonstad; Parys; and Phuthaditjhaba. The Free State is also home to the Vredefort Dome, the largest visible meteor-impact site in the world, which was formed two billion years ago when a meteorite 10 kilometres wide slammed into Earth. The Vredefort Dome is one of South Africa’s seven UNESCO World Heritage sites. In the north-eastern Free State is the Golden Gate Highlands National Park, which is the province’s prime tourist attraction.

Thabo Mofutsanyana DM

The Thabo Mofutsanyana District Municipality is a Category C municipality located in the eastern Free State Province, and borders on Lesotho and the provinces of KwaZulu-Natal and Mpumalanga. The district makes up almost a third of the geographical area of the province. It comprises six local municipalities: Setsoto, Dihlabeng, Nketoana, Maluti-A-Phofung, Phumelela and Mantsopa. It is named after Edwin Thabo Mofutsanyana, a stalwart of the communist party.

Despite all the socio-economic challenges facing this district, the area has huge potential for tourism development because of its scenic beauty and its rich cultural heritage. The N3 and N5 National Roads pass through the district, and the famous Golden Gate is found in the area on the slopes of the Drakensberg Mountains. The DM consists of an area of 32 730km² and includes the following towns: Arlington, Bethlehem, Clarens, Clocolan, Excelsior, Ficksburg, Fouriesburg, Golden Gate Highlands National Park, Harrismith, Hobhouse, Kestell, Ladybrand, Lindley, Marquard, Memel, Paul Roux, Petrus Steyn, Phuthaditjhaba, Reitz, Rosendal, Senekal, Thaba Patchoa, Tweespruit, Vrede, Warden.

The main economic sectors include Agriculture and tourism and in 2011 the Municipality had a population of 735 679.

Mantsopa Local Municipality

The Mantsopa Local Municipality is a Category B municipality situated within the Thabo Mofutsanyana District in the eastern Free State Province. It borders Masilonyana and Setsoto to the north, the Kingdom of Lesotho to the east, and Mangaung Metropolitan Municipality to the west. It is the smallest of six municipalities in the district, making up 13% of its geographical area. The area is

accessible via the N8 and R26 roads, which transverse the area. A railway line that runs along these routes' services the area. The municipality incorporates five small towns, which accommodate a large proportion of the total population of Mantsopa. These small towns serve the surrounding rural community. The main economic sectors in the municipality are Commercial farming, private sector, public sector, tourism.

The Mantsopa LM has a youth population (0-14 years) of 30%, working age population (15-64 years) of 65.1% and an elderly population (65+ years) of 4.9%. The economically active population represents the largest proportion of the population, which means that focus needs to be placed on employment creation. The Mantsopa LM had a dependency ratio of 53.6 in 2016, implying that for every 100 people within the Mantsopa LM, 53.6 (i.e., over a half) of them are considered dependent. Of the total number of people in the Mantsopa LM, those aged 20 years and older, 6.4% have completed primary school, 32.6% have some secondary education, 31.3% have completed matric and 1.2% have some form of higher education. 4.6% of those aged 20 years and older have no form of schooling. In the Mantsopa LM there are 65.1% economically active (employed or unemployed but looking for work) people, and of these 4888 are unemployed. The Mantsopa LM has a very large portion of households live within the poverty level (72.6%) which has an annual income of less than R38 200. Only 3.3% of the households have an annual income of more than R307 201.

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

5.3.3 Cultural and Heritage Environment

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a very limited pre-colonial Stone Age and Iron Age occupation. The second and much later component is a colonial farmer one, with a very limited urban component consisting of a number of smaller towns, most of which developed during the last 120 to 150 years.

From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing or the making of agricultural fields. The only built features is the current farmstead, which is excluded from the project area (Figures 5.24 and 5.25).

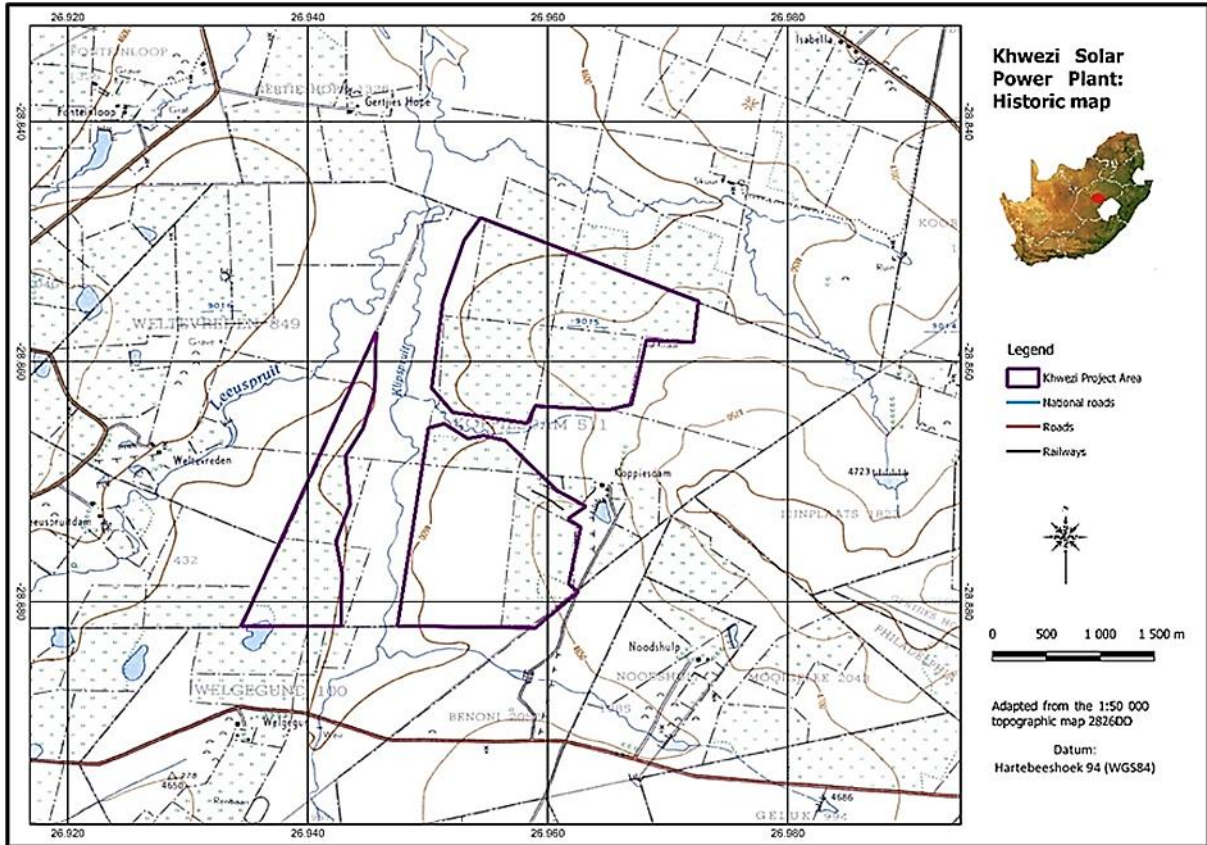


Figure 5-24: The project area on the 1965 version of the 1: 50 000 topographic map

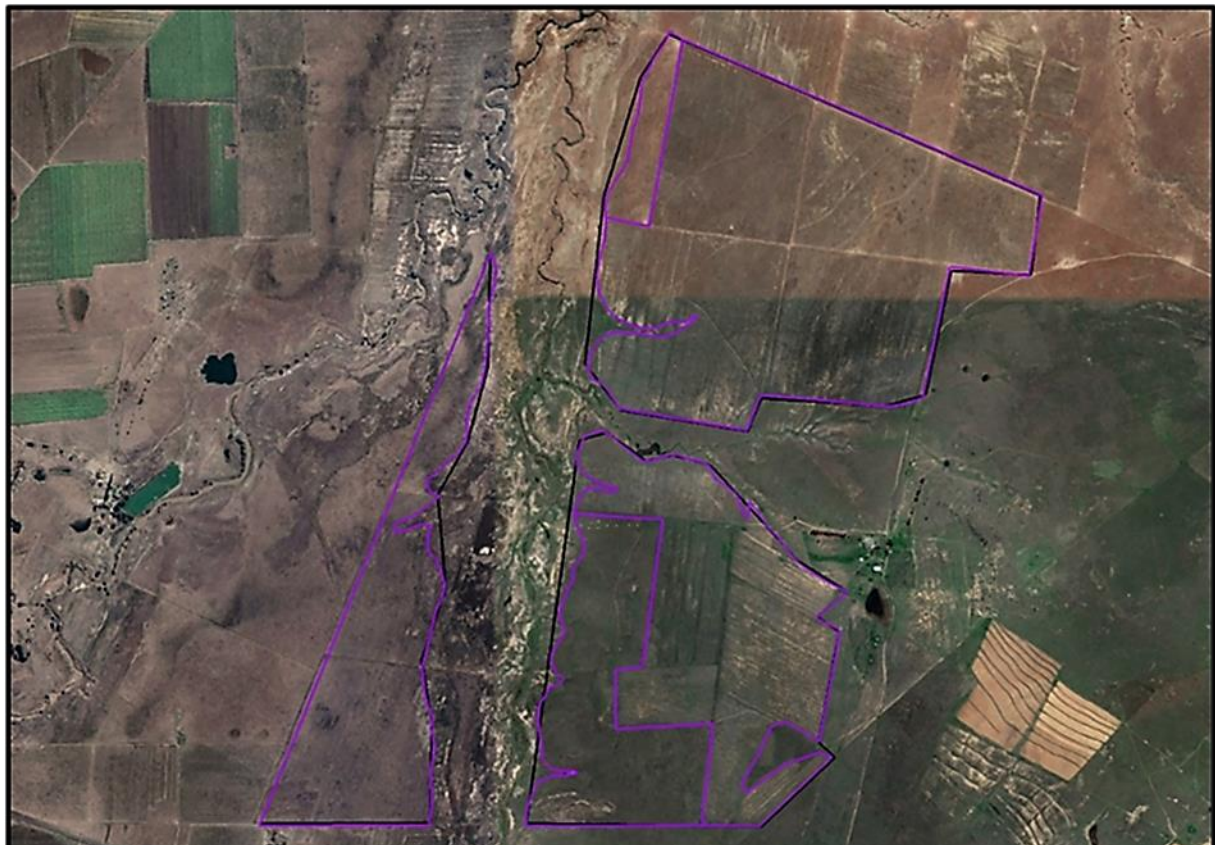


Figure 5-25: Aerial view of the project area dating to 2022

During the survey, the following sites, features and objects of cultural significance were identified in the project area.

Stone Age

Very little information regarding the Stone Age settlement in the region is available, probably as no intensive survey has been done in the region. Sealed, stratified sites, many containing rock art abound within Lesotho and the Free State and occur on both sides of the border between the two regions (Herbert 1998). Most, if not all, painted and archaeological shelter sites are located in the sandstones of the Clarens Formation of the Karoo System.

There are no known sealed, stratified sites dating to any phase of the Stone Age known in the immediate region of the project area. However, Mauermanshoek Shelter, approximately 20km northeast of Excelsior, was successively occupied from 3500 to 200 BP by San, Kora stock raiders and Sotho (Wadley 2001).

No sites, features or objects of cultural significance dating to the Stone Age were identified in the project area.

Iron Age

According to various sources, e.g., Ellenberger (1912), Legassick (2011) the Sotho stem from four parent groups: Hurutshe, Kgatla, Fokeng and Rolong. By 1500 they had already settled in the areas what was to become North-West Province and it was from this area that large numbers of groups hived off forming new clans and family lines, some of which eventually came to settle in what was to become the Free State and Lesotho. In addition to the Sotho-speakers, groups speaking Nguni-languages and originated on the banks of the Tugela River, also entered the region, settling first in the Witsies Hoek region and later in the Caledon valley. Others moved further east settling in the central region of Lesotho.

Due to their specific settlement requirements, Late Iron Age people preferred to settle on the steep slope of a mountain, possibly for protection, or for cultural considerations such as grazing for their enormous cattle herds. Because of the lack of trees, they built their settlements in stone.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. This resulted from the fact that 16th century the climate become warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the Witwatersrand and the treeless, windswept 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. This was also a period of great military tension. Armed Qriqua and Korana raiders on horseback were active in the northern Cape and Orange Free State by about 1790. The Xhosa were raiding across the Orange River about 1805. 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.

No sites, features or objects of cultural significance dating to the Iron Age were identified in the project area.

Historic Period

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

The settling of the Eastern Free State and Transgariep areas did not occur without conflict however, as the permanent settling of Europeans and the start of the Groot Trek out of the Cape colony meant that Moshoeshoe, although originally amicable towards the settlers, was suddenly faced with a much larger number of European farmers than originally anticipated. Towards the end of 1865 in the Caledon River district the Smithfield commando annexed the land of the Baphuti headman Moorosi. This area of land, widely known as the "Verowerde Gebied" (Conquered Territory) was the homeland of numerous Sotho / Tswana chiefs, and due to this military action the eastern border between the Free State and Lesotho was pushed further east than originally delineated by either Grey (1858) or Wodehouse (1864), and for the first time since the start of the prolonged unrest all the current towns and districts in the Eastern Free State Border became part of the Boere Republic. By the 23rd of October 1865 the Verowerde Gebied formally became part of the OVS and during the sitting of the Volksraad in February 1866 this annexation was ratified (Eloff 1980).

The architecture of the farmsteads can be described as an eclectic mix of styles modified to adapt to local circumstances. Farm buildings were generally single storied. Walls were thick and built-in stone. The roof was either flat or ridged and thatched or tiled and was terminated at either end by simple linear parapet gables.

In some cases, outbuildings would be in the same style as the main house, if they date to the same period. However, they tend to vary considerably in style and materials used as they were erected later as and when they were required.

During the site visit, an informal burial site containing the graves of former farm labourers were identified. At least five graves could be identified. The site is very neglected, making it difficult to determine the names and the death dates. One grave date to 1998.

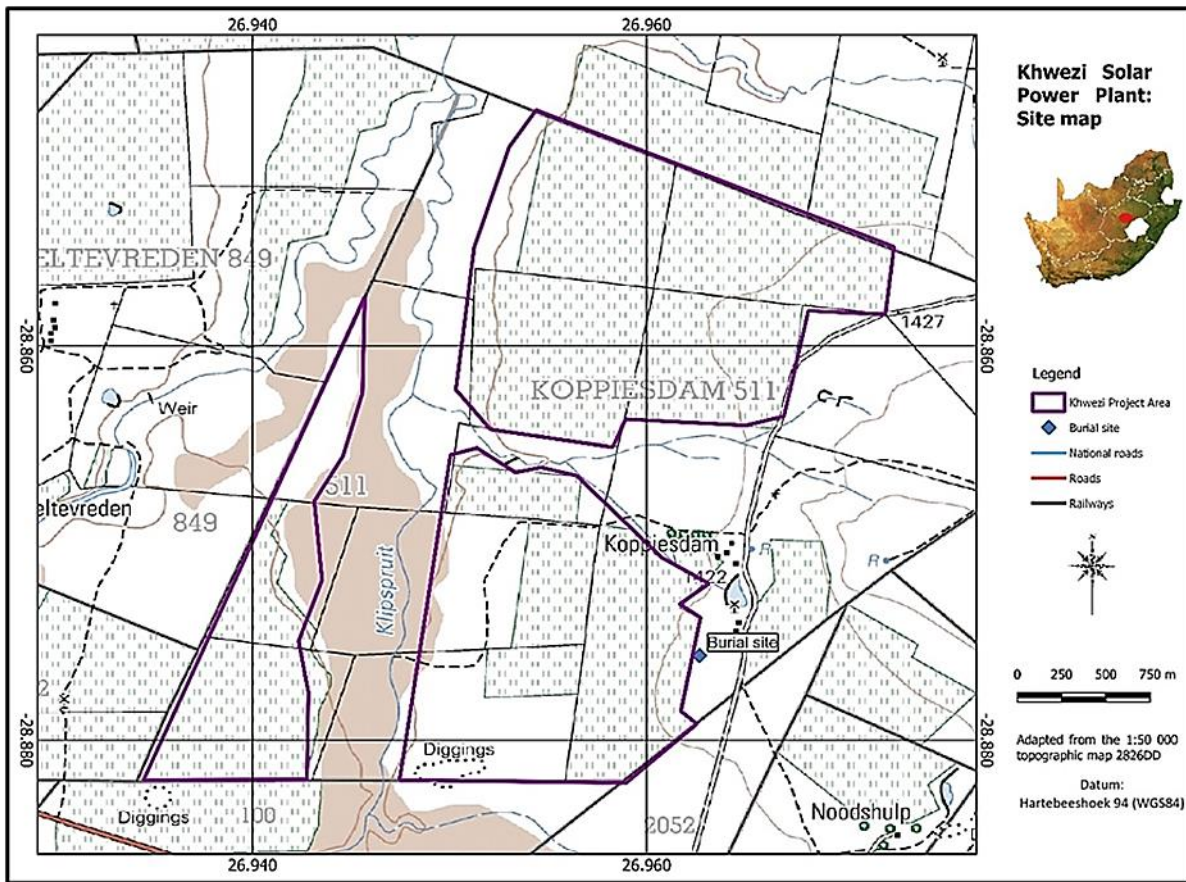


Figure 5-25: Location of heritage sites in the project area

NHRA Category		Graves, Cemeteries and Burial Grounds - Section 36
Type: Burial site. Farm: Koppiesdam No 511. Coordinates: S 28,87571; E 26,96269		
Description: Informal burial site containing the graves of former farm labourers. At least five graves could be identified. The site is very neglected, making it difficult to determine the names and the death dates. One grave date to 1998.		
Significance of site/feature	Generally protected 4A: High/medium significance - Should be mitigated before destruction.	
Reasoned opinion: Burial sites are viewed as having high emotional and sentimental value. However, mitigation is possible if proper procedures have been followed.		
References: -		



Figure 5-27: Views over the burial site and one of the graves

From a heritage point of view, it is recommended that the proposed project be allowed to continue on condition that construction works must immediately stop should archaeological sites or graves be exposed during construction. Siting of archaeological sites must be immediately reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

Palaeontology

According to the Palaeontological Impact Assessment (refer to Appendix E6), the proposed Khwezi SPP is barely underlain by Quaternary alluvium on the riverbanks of the Klipspruit while the rest of the development is underlain by Permian aged sandstone and shale of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of Quaternary alluvium is Moderate, while that of the Adelaide Subgroup (Beaufort Group) is Very High (Almond and Pether, 2009; Almond et al., 2013, Groenewald et al 2014). Updated Geology (Council of Geosciences) refined the geology and indicates that the proposed development is mainly underlain by the Balfour Formation of the Adelaide Subgroup. The Very High Palaeontological Sensitivity of the Balfour Formation triggered a site investigation.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 3 December 2022. No fossiliferous outcrops were identified during the site visit. The development has a low topography mantled by thick grass, and outcrops were not detected. Several pebble-sized fragments of petrified wood reworked from the bedrocks into the overlying soils and surface gravels were identified. However, these derived fossils are commonly found in the Karoo Basin and are of Low conservational value. These fragments do thus not require mitigation. As no other fossils were recorded in the proposed development a Low palaeontological Significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

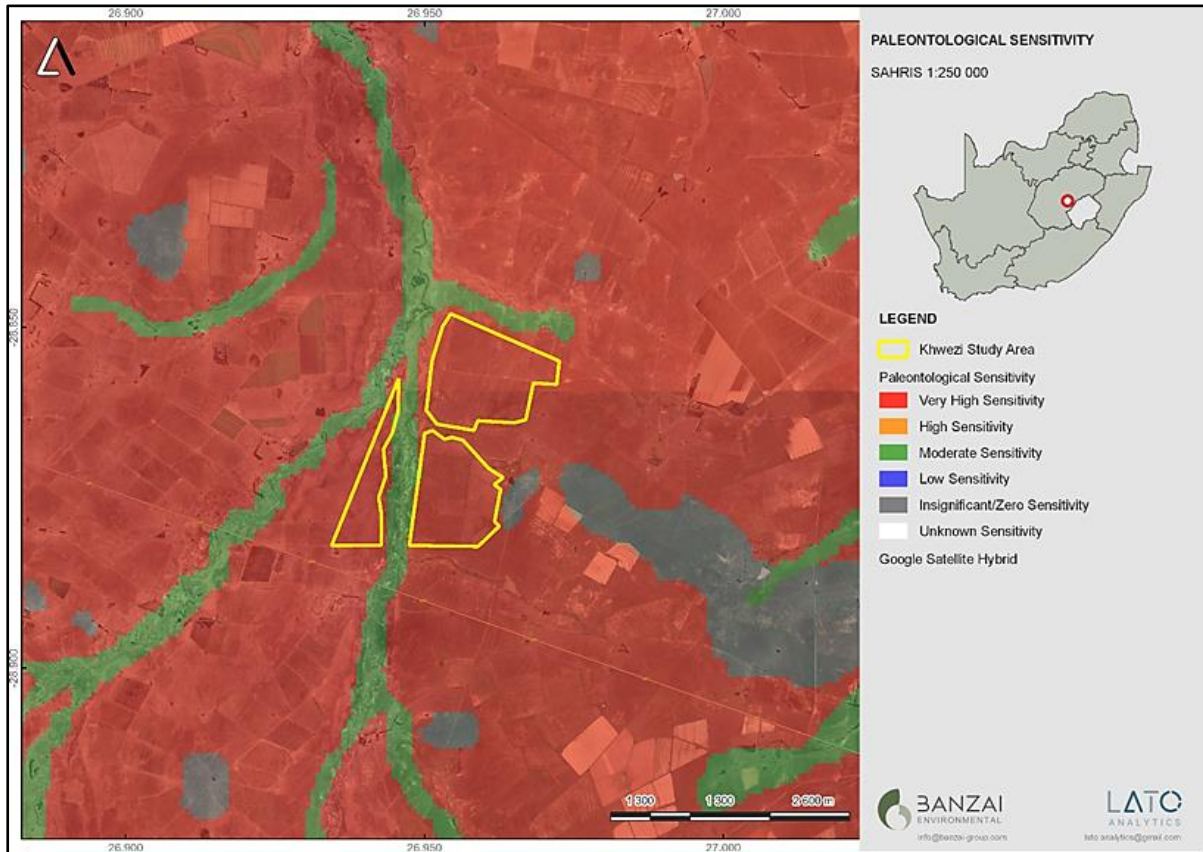


Figure 5-26: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences, Pretoria) indicating the proposed Khwezi SPP development near Excelsior in the Free State

5.4 SITE SELECTION MATRIX

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

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities (i.e., the grid connection points are located within the affected property which minimises the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). The Farm Koppiesdam No. 511 where the project is proposed to be located is considered favorable and suitable from a technical perspective due to the following characteristics:

- **Climatic conditions:** Climatic conditions determine if the project will be viable from an economic perspective as the SPP is directly dependent on the annual direct solar irradiation values of a particular area. The Free State receives high averages of direct normal and global horizontal irradiation daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the

region. The Global Horizontal Radiation value is around 2025 kWh/m² per annum is relevant in the area.

- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur. The topographic conditions, which are favourable, minimises the significance of the impact that will occur during the clearing and leveling of the site for the construction activities.
- Extent of the site: A significant portion of land is required to evacuate to 300 MW and space is a constraining factor in PV facility installations. Provision was made to assess a larger area than is required for the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. The Farm Koppiesdam No. 511 and the development footprint assessed therein is considered to provide an opportunity for the successful construction and operation of a SPP with a capacity of up 300 MW, as well as opportunities for the avoidance and mitigation of impacts on the affected environment and sensitive environmental features.
- Site availability and access: The land is available for lease by the developer. Reluctant farm owners or farmers over capitalising hamper efforts to find suitable farms. Access to the site is readily available via the R703.
- Grid connection: In order for the PV facility to connect to the national grid the facility will have to construct an on-site substation, Eskom switching station and a power line from the project site to connect to the Eskom grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site. The proposed Khwezi overhead power line route will follow an existing powerline route and will connect directly into the existing Merapi Substation. The grid connection will be assessed by means of a separate application. A single preferred alternative for the power line has been identified based on the location of the connection point into the national grid in relation to the proposed SPP. The proposed 132kV overhead power line will be approximately 16 km long and will be constructed within the identified grid connection corridor (to be assessed in a separate Basic Assessment process).
- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable in terms of geology, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape despite some of the environmental sensitivities identified (refer to Section 5.3.1 of this report). The area proposed for development exclusively consists of land used for agriculture, but wetland features are located on the development footprint. Burial sites located approximately 38 m outside the project area was also observed. These environmental sensitive features will need to be considered by the developer. The environmental sensitive areas should be avoided as far as practicable, for the placement of the facility infrastructure within the development footprint.

It is evident from the discussion above that Farm Koppiesdam No. 511, may be considered favourable and suitable in terms of the site and environmental characteristics. As mentioned previously, no alternative areas on the property have been considered for the placement of the development footprint as the assessed development footprint avoids areas that are under cultivation within the affected property. The development footprint of this project will cover a significant portion of the farm; however, provision has been made to exclude any sensitive areas from the facility layout to be developed within the development footprint.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria, the site is identified as preferred due to fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of high environmental sensitivity. Therefore, development of the up 300 MW Khwezi SPP on the Farm Koppiesdam No. 511 is the preferred option.

No other possible sites were identified for the Khwezi SPP. This site is referred to as the preferred site. Additional land (if any) will be acquired to generate additional capacity in the future. The Merapi Substation is located approximately 16 km from the preferred site. Connection to the grid plays a vital role in the site location for renewable energy facilities as there is a shortage of grid connection space. The location of the preferred site shortens the length of the required grid connection in order to evacuate energy into the national grid. There are sensitive features that occur on the site. However, the site is still viable. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the EIA process and will ensure that potential impacts are adequately mitigated.

Considering the environmental sensitive features present within the development footprint, the Applicant has proposed a facility layout which considers these features, and thereby aim to avoid any direct impact on these features. The final proposed layout is included as part of this Final EIR (refer to Figures G, H and I).

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

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

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

(v) the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;

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

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

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

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

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

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

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

(i) cumulative impacts;

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

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

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

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

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

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

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

6.1 SCOPING METHODOLOGY

The contents and methodology of the scoping report aims 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 07 October 2022. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the study area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and to assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un- sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland	X			The Wetland Baseline and Risk Assessment has identified one (01) Channelled Valley Bottom wetland and two (02) Unchanneled Valley Bottom wetlands. An artificial dam was identified within the Unchanneled Valley Bottom wetland.
II. A conservation or open space area		X		The project area overlaps with an ESA 1 (sites with minimal degradation) and ESA 2 (sites are more degraded).

III. An area that is of cultural importance	X			An informal burial site containing the graves of former farm labourers were identified. At least five graves could be identified.
IV. Site of geological significance		X		None.
V. Areas of outstanding natural beauty		X		None.
VI. Highly productive agricultural land	X			The land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use.
VII. Floodplain		X		None.
VIII. Indigenous Forest		X		None.
IX. Grass land	X			According to the Terrestrial Ecology Baseline and Impact Assessment, the project area is situated within the Grassland Biome.
X. Bird nesting sites		X		The Avifaunal assessment noticed that no bird nests were observed.
XI. Red data species		X		Sagittarius serpentarius has been recorded in the PAOI and is considered confirmed.
XII. Tourist resort		X		None.
2. Will the project result in potential negative impact?				
I. Removal of people		X		None.
II. Visual Impacts	X			The significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and people travelling on the R703 regional road.
III. Noise pollution	X			Construction activities will result in the generation of noise over a period of 12-18 months. The noise impact is unlikely to be significant.
IV. Construction of an access road	X			Access will be obtained via a gravel road off the R703 regional road.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		X		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	X			Approximately 200 employment opportunities will be created during the construction phase and 50 employment opportunities during the operation phase of the SPP project.

VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	X			The estimated maximum amount of water required during the facility's 20 years of production is approximately 6500kl per annum.
VIII. Job creation	X			Approximately 1000 employment opportunities will be created during the construction and 50 employment opportunities during the operational phases for the SPP project.
IX. Traffic generation	X			The estimated trip generation during the construction phase averages at 186 daily trips which includes normal heavy load (solar panels); normal heavy load (construction materials); and Private vehicles (staff).
X. Soil erosion	X			The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		X		None.
3. Is the proposed project located near the following?				
I. A river, stream, dam or wetland	X			The Wetland Baseline and Risk Assessment has identified one (01) Channelled Valley Bottom wetland and two (02) Unchanneled Valley Bottom wetlands. An artificial dam was identified within the Unchanneled Valley Bottom wetland.
II. A conservation or open space area		X		The project area overlaps with an ESA 1 (sites with minimal degradation) and ESA 2 (sites are more degraded).
III. An area that is of cultural importance	X			An informal burial site containing the graves of former farm labourers were identified. At least five graves could be identified.

IV. A site of geological significance		X		None.
V. An area of outstanding natural beauty		X		None.
VI. Highly productive agricultural land	X			The land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use.
VII. A tourist resort		X		None.
VIII. A formal or informal settlement	X			The closest town to the project is Excelsior, located approximately 10 km southeast of the proposed site.

6.1.2 Matrix Analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in-depth assessment during the EIA process (current process). An indication is provided of the specialist studies being conducted and which informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

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

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

Please refer to **Appendix E** (specialist studies) a more in-depth assessment of the potential environmental impacts.

Table 6.2: Matrix analysis

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

Low significance		Medium significance		High significance		Positive impact	
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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><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.”</p> <p><u>Activity 12(ii)(a)(c) (GN.R. 327):</u> “The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse.”</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,</p>	<p><u>Site clearing and preparation</u></p> <p>Certain areas of the site 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"> • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths – existing paths will be used where reasonably possible. 	BIOPHYSICAL ENVIRONMENT	Terrestrial Ecology	<ul style="list-style-type: none"> • Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community. 	-	L	L	D	BR	SL	Yes	- See Table 6.3	M	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)
			Terrestrial Ecology	<ul style="list-style-type: none"> • Introduction of IAP species and invasive fauna. 	-	L	L	D	PR	SL	Yes	- See Table 6.3	L	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)
			Terrestrial Ecology	<ul style="list-style-type: none"> • Destruction of protected plant species 	-	L	L	D	BR	SL	Yes	- See Table 6.3	L	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)
			Terrestrial Ecology	<ul style="list-style-type: none"> • Displacement of the indigenous faunal community (including possible SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, 	-	P	Pr	P	BR	SL	Yes	- See Table 6.3	M	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)

<p>pebbles or rock of more than 10 cubic metres from a watercourse.”</p> <p><u>Activity 24 (ii) (GN.R 327):</u> “The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters.”</p> <p><u>Activity 28 (ii) (GN.R. 327):</u> “Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</p> <p><u>Activity 56 (ii) (GN.R 327):</u> “The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”</p> <p><u>Activity 1 (GN.R. 325):</u> “The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more...”</p>	<p>Additionally, the turning circle for trucks will also be taken into consideration.</p> <p><u>Transportation and installation of PV panels into an Array</u></p> <p>The panels are assembled at the supplier’s premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw.</p> <p><u>Wiring to the Central Inverters</u></p> <p>Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.</p>		noise, dust, light, vibration, and poaching).												
		Air	<ul style="list-style-type: none"> Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities. 	-		S	S	D	CR	NL	Yes	-	Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-
		Soil and Agriculture	<ul style="list-style-type: none"> Loss of Land Capability 		-	L	M	D	PR	SL	Yes	-	See Table 6.3	L	Soil and Agricultural Assessment (Appendix E4)
		Geology	<ul style="list-style-type: none"> Collapsible soil. Seepage. Active soil (high soil heave). Erodible soil. Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. The presence of undermined ground. Instability due to soluble rock. Steep slopes or areas of unstable natural slopes. Areas subject to seismic activity. 	-		S	S	Pr	CR	NL	Yes	-	The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted.	L	-
		Existing services infrastructure	<ul style="list-style-type: none"> Generation of waste that need to be accommodated at a licensed landfill site. 	-		L	S	D	PR	ML	Yes	-		L	Confirmation from the Local Municipality

<p><u>Activity 15 (GN.R. 325):</u> "The clearance of an area of 20 hectares or more of indigenous vegetation..."</p> <p><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 metres (b) in the Free State, (i) outside urban areas, (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."</p> <p><u>Activity 12 (b)(vi) (GN.R 324):</u> "The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation in (b) Free State (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland".</p> <p><u>Activity 14 (ii)(a)(c)(b)(i)(ff) (GN.R 324):</u> "The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within</p>				<ul style="list-style-type: none"> • Generation of sewage that need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads. 											
	Groundwater			<ul style="list-style-type: none"> • Pollution due to construction vehicles and the storage and handling of dangerous goods. 	-	S	S	Pr	CR	ML	Yes	<ul style="list-style-type: none"> - A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. - Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognised standards. 	L	-	
	General Environment (risks associated with BESS)			<ul style="list-style-type: none"> • Mechanical breakdown / Exposure to high temperatures • Fires, electrocutions and spillage of toxic substances into the surrounding environment. • Spillage of hazardous substances into the surrounding environment. 	-	S	M	Pr	PR	ML	Yes	- See Table 6.6	L	-	

<p>a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.”</p> <p>Activity 18 (b)(i)(hh) (GN.R 324): “The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) in the Free State (i) outside urban areas, within (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</p>			<ul style="list-style-type: none"> • Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. • Water Pollution – spillages into surrounding watercourses as well as groundwater. • Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water. • Generation of hazardous waste 										
		Aquatic Resources	<ul style="list-style-type: none"> • Direct disturbance / degradation to wetland soils or vegetation due to the construction of the solar facility. 	-		L	M	Pr		Yes	- See Table 6.3	L	Wetland Assessment (Appendix E1)
			<ul style="list-style-type: none"> • Increased erosion and sedimentation. 	-		L	L	Pr		Yes	- See Table 6.3	L	Wetland Assessment (Appendix E1)
		Water runoff from construction site	<ul style="list-style-type: none"> • Potential contamination of wetlands with machine oils and construction materials. 	-		S	M	Pr		Yes	- See Table 6.3	L	Wetland Assessment (Appendix E1)
		Avifauna: Habitat destruction within the project footprint	<ul style="list-style-type: none"> • Habitat destruction of the proposed development is inevitable. Pre-mitigation the significance of the impact is a Negative Very High Impact but with the implementation of mitigation measures can be reduced to a Negative Medium Impact. 			L	L	D	PR	IR	Yes	- See Table 6.3	
	Avifauna: Destruction, degradation and	<ul style="list-style-type: none"> • Construction activities can lead to destruction of surrounding habitats 			L	L	D	PR	IR	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E9)

		fragmentation of surrounding habitats														
		Avifauna: Displacement/emigration of avifauna community (including SCC) due to noise pollution	<ul style="list-style-type: none"> Noise pollution generated from construction activities will lead to the displacement/emigration of the local avifauna community including the proximal surrounding area 	-	L	M	D	PR	ML	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E9)			
		Avifauna: Direct mortality from persecution or poaching of avifauna species and collection of eggs	<ul style="list-style-type: none"> There is the possibility of construction staff poaching avifauna species and collecting eggs from the project footprint and proximal surrounding area. There is also the possibility of persecution of species that are deemed as negative in folklore 	-	L	M	Pr	CR	ML	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E9)			
		Avifauna: Direct mortality from increased vehicle and heavy machinery traffic	<ul style="list-style-type: none"> The increased vehicle and heavy machinery traffic associated with construction activities will lead to roadkill 	-	L	M	Pr	BR	SL	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E9)			
	SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	<ul style="list-style-type: none"> Creation of direct and indirect employment opportunities 	+	L	S	D	CR	NL	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E7)			
		Economic multiplier effects	<ul style="list-style-type: none"> Significance of the impact from the economic multiplier effects from the use of local goods and services. 	+	P	S	Pr	CR	NL	Yes	- See Table 6.3	M	Social Impact Assessment (Appendix E7)			
		Improvements on shared infrastructure	<ul style="list-style-type: none"> Investment into upgrading and maintain shared infrastructure such as 	+	P	S	Pr	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E7)			

			roads and stormwater infrastructure on farms may benefit farming operations													
		Potential loss of productive farmland	<ul style="list-style-type: none"> The potential loss in productive farmland during the construction phase, due to factors such as the construction of roads, the preparation of foundations, power lines, offices etc. 	-	S	S	Pr	BR	NL	Yes	-	See Table 6.3	L	Social Impact Assessment (Appendix E7)		
		Influx of jobseekers and change in population	<ul style="list-style-type: none"> In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure 	-	L	P	Pr	IR	ML	Yes	-	See Table 6.3	L	Social Impact Assessment (Appendix E7)		
		Safety and security impacts	<ul style="list-style-type: none"> Temporary increase in safety and security concerns associated with the influx of people during the construction phase 	-	L	S	Pr	CR	NL	Yes	-	See Table 6.3	L	Social Impact Assessment (Appendix E7)		
		Impacts on daily living and movement patterns	<ul style="list-style-type: none"> Temporary increase in traffic disruptions and movement patterns during the construction phase. 	-	P	S	Pr	PR	ML	Yes	-	See Table 6.3	L	Social Impact Assessment (Appendix E7)		
		Nuisance impacts (noise and dust)	<ul style="list-style-type: none"> Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site 	-	L	S	D	CR	NL	Yes	-	See Table 6.3	L	Social Impact Assessment (Appendix E7)		
		Increased risk of potential veld fires	<ul style="list-style-type: none"> The potential loss of livestock, crops, and farmsteads in the area. This also includes the damage and loss of farm 	-	L	S	Pr	PR	SL	Yes	-	See Table 6.3	L	Social Impact Assessment (Appendix E7)		

			infrastructure and the threatening of human lives that are associated with the increased risk of veld fires												
		Visual and sense of place impacts	<ul style="list-style-type: none"> Intrusion impacts from construction activities will have an impact on the area's "sense of place". 	-		L	S	D	PR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E7)	
		Visual landscape	<ul style="list-style-type: none"> Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP 		-	L	S	D	PR	ML	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E3)	
		Access requirements and internal road infrastructure	<ul style="list-style-type: none"> Construction and maintenance of gravel roads in vicinity of the site The construction traffic accessing the site would be traveling along roads that are proposed to be unsurfaced for the development. The movement of heavy vehicles along the gravel roads, especially close to the boundaries of the site, may cause excessive dust in the area. Deterioration of gravel-roads may also occur after wet seasons, leading to poor road conditions for transportation on site 	-		L	S	Pr	CR	NL	Yes	- See Table 6.3	L	Traffic Impact Assessment (Appendix E8)	
		Haulage traffic	<ul style="list-style-type: none"> Increased traffic on haulage routes During the construction phase (18 months), the road network leading to the Khwezi PV SPP will include national and regional roads from the Port of Durban 	-		P	S	Pr	CR	NL	Yes	- See Table 6.3	L	Traffic Impact Assessment (Appendix E8)	

			(recommended) and Johannesburg.												
			<ul style="list-style-type: none"> There will be an increase in traffic volumes, for both light and heavy vehicles, influencing traffic congestion and road safety. 												
		Localised traffic (construction workers)	<ul style="list-style-type: none"> Increased traffic on local routes The road network, surrounding the proposed Khwezi PV SPP site, will be affected. There will be an increase in traffic, influencing traffic congestion and road safety. However, vehicles used during the operations-and maintenance phases will be light vehicles. The extent of the road network that will be affected is small, as staff will be living in neighbouring towns, i.e., Excelsior, Verkeerdevlei, Thaba Nchu, Bothshabelo and possibly Bloemfontein. The new vehicle trips generated during the operations-and maintenance phases will only be temporary and no major traffic impact is anticipated on the road network 	-	L	S	Pr	CR	NL	Yes	-	See Table 6.3	L	Traffic Impact Assessment (Appendix E8)	
		Tourism industry	<ul style="list-style-type: none"> Since there are no sensitive tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

			Heritage resources	<ul style="list-style-type: none"> Burial site This site is located approximately 38m outside the boundary of the proposed development area. Due to its location, it probably would not directly be impacted on by the proposed development 	-		S	P	Po	CR	ML	Yes	-	See Table 6.3	L	Heritage Impact Assessment (Appendix E5)
			Palaeontological Resources	<ul style="list-style-type: none"> Disturbance, damage or destruction of legally protected fossil heritage within the development footprint during the construction phase 	-		S	P	U	IR	IR	Yes	-			See Palaeontological Report (Appendix E6)

OPERATIONAL 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 1 (GN.R. 325): "The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."</p> <p>Activity 10 (b)(i)(hh) (GN.R. 324): "The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in</p>	<p>The key components of the proposed project are described below:</p> <ul style="list-style-type: none"> <u>PV Panel Array</u> - To produce 300 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun. <u>Wiring to Central Inverters</u> Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current 	BIOPHYSICAL ENVIRONMENT	Terrestrial Ecology	<ul style="list-style-type: none"> Continued fragmentation and degradation of natural habitats and ecosystems. 	-		L	L	PR	PR	SL	Yes	-	See Table 6.4	L	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)
			Terrestrial Ecology	<ul style="list-style-type: none"> Continuing spread of IAP and weed species. 	-		L	L	PR	PR	SL	Yes	-	See Table 6.4	L	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)
			Terrestrial Ecology	<ul style="list-style-type: none"> Ongoing displacement and direct mortalities of the faunal community (including possible SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.). 	-		P	P	PR	BR	SL	Yes	-	See Table 6.4	L	Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)
			Air quality	<ul style="list-style-type: none"> The proposed development will not result 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<p>containers with a combined capacity of 30 but not exceeding 80 cubic metres (b) in the Free State, (i) outside urban areas, (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</p>	<p>(DC) electricity to alternating current (AC) electricity at grid frequency.</p> <ul style="list-style-type: none"> • <u>Connection to the grid</u> - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage of 132kV, after which the power will be evacuated into the national grid. • <u>Supporting Infrastructure</u> – The following auxiliary buildings including a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre. The project requires the need for both temporary and permanent laydown areas • <u>Roads</u> – Access will be obtained via the existing R703 Regional Road. An internal site road network will also be required to provide access to the solar field and associated 														
		Soil and Agriculture	<ul style="list-style-type: none"> • Loss of Land Capability, Soil erosion and compaction effects 	-		S	L	PR	PR	SL	Yes	- See Table 6.4	L	Soil and Agricultural Assessment (Appendix E4)	
		Geology	<ul style="list-style-type: none"> • Collapsible soil. • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding. 	-		S	S	PO	PR	ML	Yes	<ul style="list-style-type: none"> - Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented. 	L	-	
		Groundwater	<ul style="list-style-type: none"> • Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies. 	-		L	L	PO	PR	ML	Yes	<ul style="list-style-type: none"> - All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater. 	L	-	
		Hardened surfaces	<ul style="list-style-type: none"> • Potential for increased stormwater runoff leading to increased erosion and sedimentation. 	-		S	M	PO			Yes	- See Table 6.4	L	Wetland Assessment (Appendix E1)	
Contamination	<ul style="list-style-type: none"> • Potential for increased contaminants entering the wetland systems 	-		L	M	PO			Yes	- See Table 6.4	L	Wetland Assessment (Appendix E9)			

<p>infrastructure. All site roads will require a width of 12 m.</p> <ul style="list-style-type: none"> <u>Fencing</u> - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. 	<p>Avifauna: Collisions with infrastructure associated with the SPP Facility</p>	<ul style="list-style-type: none"> The proposed project comprises of components that pose a collision risk to avifauna species. This includes collisions with solar panels and fences. 	-	L	P	PR	I	IR	Yes	- See Table 6.4	M	Avifaunal Assessment (Appendix E9)
	<p>Avifauna: Electrocutation due to infrastructure associated with the SPP Facility</p>	<ul style="list-style-type: none"> Electrocutation with SEF connections poses a lower risk than that of powerlines that are generally associate with the SEF developments 	-	S	L	PO	BR	SL	Yes	- See Table 6.4	L	Avifaunal Assessment (Appendix E9)
	<p>Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs</p>	<ul style="list-style-type: none"> There is the possibility of operational staff poaching avifauna species and collecting eggs from the project footprint and proximal surrounding area. There is also the possibility of persecution of species that are deemed as negative in folklore 	-	L	M	PR	BR	SL	Yes	- See Table 6.4	L	Avifaunal Assessment (Appendix E9)
	<p>Pollution of water sources and surrounding habitat due to cleaning products of the solar panels</p>	<ul style="list-style-type: none"> It is likely that the panels will be cleaned with chemicals in addition to water to ensure they function optimally 	-	L	L	PR	BR	SL	Yes	- See Table 6.4	L	Avifaunal Assessment (Appendix E9)
	<p>Heat radiation from the BESS and solar panels</p>	<ul style="list-style-type: none"> Heat radiation form the infrastructure can result in an overall increase of temperature in the surrounding area, it can also lead to veld fires 	-	S	L	PO	BR	SL	Yes	- See Table 6.4	L	Avifaunal Assessment (Appendix E9)
	<p>Encroachment of Invasive Alien Plants into disturbed areas</p>	<ul style="list-style-type: none"> Invasive Alien Plants (IAPs) tend to encroach into disturbed areas and outcompete/displace indigenous vegetation and influence the avifauna communities. This will lead to a shift in the vegetation 	-	L	P	D	BR	IR	Yes	- See Table 6.4	L	Avifaunal Assessment (Appendix E9)

			composition and structure, and consequently will cause a negative shift in the wellbeing of the avifauna community.														
SOCIAL/ECONOMIC	Direct and Indirect employment opportunities and skills development	<ul style="list-style-type: none"> The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy 	+		P	L	Pr	BR	NL	Yes	-	See Table 6.4	M	Social Impact Assessment (Appendix E7)			
	Development of non-polluting, renewable energy infrastructure	<ul style="list-style-type: none"> Development of non-polluting, renewable energy infrastructure 		+	I	L	D	CR	ML	Yes	-	See Table 6.4	M	Social Impact Assessment (Appendix E7)			
	Potential loss of agricultural land	<ul style="list-style-type: none"> Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property 		-	S	L	Pr	PR	ML	Yes	-	See Table 6.4	L	Social Impact Assessment (Appendix E7)			
	Contribution to Local Economic Development (LED) and social upliftment	<ul style="list-style-type: none"> Contribution to LED and social upliftment during the operation of the project 		+	I	L	D	PR	NL	Yes	-	See Table 6.4	H	Social Impact Assessment (Appendix E7)			
	Impact on tourism	<ul style="list-style-type: none"> The potential impact on tourism due to the establishment of the Khwezi SPP 	-			L	L	Pr	CR	NL	Yes	-	See Table 6.4	L	Social Impact Assessment (Appendix E7)		
	Visual and sense of place impacts	<ul style="list-style-type: none"> Visual impacts and sense of place impacts associated with the operation phase of Khwezi SPP. 		-	L	L	Pr	CR	SL	Yes	-	See Table 6.4	L	Social Impact Assessment (Appendix E7)			
	Increase in household earnings	<ul style="list-style-type: none"> The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the 	+		P	L	Pr	BR	NL	Yes	-	See Table 6.4	M	Social Impact Assessment (Appendix E7)			

			project would create an opportunity for an increase in household earnings												
		Visual landscape	<ul style="list-style-type: none"> Visual impact on sensitive visual receptors within a 1km radius from the SPP. 	-		L	L	D	PR	ML	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Visual landscape	<ul style="list-style-type: none"> Visual impact on sensitive visual receptors between a 1km and 3km radius from the SPP. 	-		L	L	Pr	PR	ML	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Visual landscape	<ul style="list-style-type: none"> Visual impact on sensitive visual receptors within a 3-5km radius from the SPP. 	-		L	L	Po	PR	ML	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Visual landscape	<ul style="list-style-type: none"> Visual impact on sensitive visual receptors within a 5-10km radius from the SPP. 	-		L	L	Po	PR	ML	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Visual landscape	<ul style="list-style-type: none"> Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility. 	-		L	L	Po	IR	ML	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Visual landscape	<ul style="list-style-type: none"> Visual impacts of glint and glare as a visual distraction and possible air travel hazard. 	-		L	L	U	CR	NL	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Visual landscape	<ul style="list-style-type: none"> Visual impacts on sense of place associated with the operational phase of the SPP. 	-		L	L	Po	PR	ML	Yes	-	See Table 6.4	L	Visual Impact Assessment (Appendix E3)
		Traffic generated due to operations	<ul style="list-style-type: none"> Increased traffic on local routes The current traffic will increase slightly due to the employees on site during the operational phase. The traffic generated during this phase will be minimal and will have not have any impact on the surrounding road network. 	-		L	L	Pr	CR	NL	No	-	-	L	Traffic Impact Assessment (Appendix E8)

			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
			Noise levels	<ul style="list-style-type: none"> Increase in noise levels, should generators be used. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Avifaunal Impact Assessment (Appendix E9)
			Electricity supply	<ul style="list-style-type: none"> Generation of additional electricity. The power line will transport generated electricity into the grid. 		+	I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	<ul style="list-style-type: none"> Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations. 		+	I	L	D	I	N/A	Yes	-	N/A	-

DECOMMISSIONING PHASE															
-	<p><u>Dismantlement of infrastructure</u></p> <p>During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled.</p> <p><u>Rehabilitation of biophysical environment</u></p> <p>The biophysical environment will be rehabilitated.</p>		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	-
			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 needs to be accommodated at a licensed landfill site. 	-		L	S	D	I	NL	Yes	-	L	-

			<ul style="list-style-type: none"> • Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles. 												
		Groundwater	<ul style="list-style-type: none"> • Pollution due to construction vehicles. 	-		S	S	Pr	CR	ML	Yes	-	L	-	
		Surface water	<ul style="list-style-type: none"> • Increase in stormwater run-off. • Pollution of water sources due to soil erosion. 		-	L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> - Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater (or surface water) contamination. 	M	-	
		Traffic generated due to decommissioning of site	<ul style="list-style-type: none"> • Increased traffic during decommissioning phase • The road network, surrounding the proposed Khwezi PV SPP site, will be affected. • There will be an increase in traffic influencing traffic congestion and road safety. • However, the extent of the impact will be very small and local of nature. • The traffic during the decommissioning phase will only be temporary and have an insignificant 			L	S	Pr	CR	NL	No	- N/A	L	Traffic Impact Assessment (Appendix E8)	

			impact on the road network													
		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	N/A	N/A
		Direct mortality due to earthworks, vehicle collisions and persecution	<ul style="list-style-type: none"> Decommissioning activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions and persecution 		-	L	M	PR				Yes	See Table 6.5.	L	Avifaunal Report (Appendix E9)	
		Rehabilitation	<ul style="list-style-type: none"> Potential loss or degradation of nearby wetlands through inappropriate closure. 		-	L	L	D				Yes	See Table 6.5.	L	Wetland Assessment (Appendix E1)	

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;	(IR) Irreversible
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 are addressed in more detail in this EIA report.

6.2.1 Impacts During the Construction Phase

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

- Activity 11(i) (GN.R. 327): *“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts...”*
- Activity 12(ii)(a)(c) (GN.R. 327): *“The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse or (c) if no development setback exists within 32 meters of a watercourse measured from the edge of a watercourse...”*
- Activity 19 (GN.R. 327): *“The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse...”*
- Activity 24(ii) (GN.R. 327): *“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters...”*
- Activity 28(ii) (GN.R. 327): *“ Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare...”*
- Activity 56(ii) (GN.R. 327): *“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”*
- Activity 1 (GN.R. 325): *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more...”*
- Activity 15 (GN.R. 325): *“The clearance of an area of 20 hectares or more of indigenous vegetation...”*
- Activity 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 metres (b) in the Free State, (i) outside urban areas,(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 and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”

- Activity 12(b)(iv) (GN.R. 324): *“The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (b) Free State (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland”.*
- Activity 14(ii)(a)(c)(b)(i)(ff) (GN.R 324): *“The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (b) within the Free State, (i) outside urban areas within (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (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.”*
- Activity 18 (b)(i)(hh) (GN.R 324): *“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (b) Free State (i) Outside urban areas, within: (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 area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”*

During the construction phase temporary negative impacts are foreseen over the short term. Table 6.3 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

Table 6.3: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Wetland Baseline and Risk Assessment (Appendix E1)	Direct disturbance/ degradation to wetland soils or vegetation due to the construction of the solar facility.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area. • When clearing vegetation, allow for some vegetation cover as opposed to bare areas. • Minimize the disturbance footprint and the unnecessary clearing of vegetation outside of this area. • Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 15 m from the edge (this is the buffer zone). Label these areas as environmentally sensitive areas, keep out. • Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan. • All unauthorised activities (including driving) must adhere to the 15 m buffer area. The proposed access road is permitted (authorised) to traverse the watercourse. All essential activities and aspects required for the construction phase of the road are permitted within the watercourse and buffer. • Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed.

				<ul style="list-style-type: none"> • All alien vegetation should be managed. Implement an alien vegetation control and eradication programme. • Landscape and re-vegetate all denuded areas as soon as possible.
	Increased erosion and sedimentation.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Limit construction activities near (< 50m) wetlands to winter (as much as possible) when rain is least likely to wash concrete and sand into the wetland. Activities in black turf soils can become messy during the height of the rainy season and construction activities should be minimised during these times to minimise unnecessary soil disturbances. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • No unauthorised activities are permitted within the wetland and associated buffer areas. • Landscape and re-vegetate all unnecessarily denuded areas as soon as possible
	Potential contamination of wetlands with machine oils and construction materials.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately stockpile topsoil cleared from the project area. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands. • No unauthorised activities are permitted within the wetland and associated buffer areas

Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)	Destruction, loss and fragmentation of habitats, ecosystems and the vegetation community.	Negative High	Negative Medium	Vegetation and Habitats <ul style="list-style-type: none"> • Ensure that the site footprint is as small as possible and responsibly positioned, the development area must be properly fenced off during construction. • Protected flora must be avoided or responsibly transplanted according to a search and rescue plan and a permit must be obtained prior to the relocation. • Land clearing must be done over at least three days and conducted linearly and successively from the north to south. • No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard. • Brush cutting should be implemented beneath the panels. • Vegetation clearing should be limited where possible. • Areas rated as High sensitivity and their buffers in proximity to the development areas should be avoided as much is feasible. Infrastructure spanning delineated watercourses to prevent hydrological barriers is considered avoidance. Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery. Mitigated development in medium sensitivity areas is permissible. • Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	
	Destruction of protected plant species	Negative Medium	Negative Low	
	Displacement of the indigenous faunal community (including possible SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative High	Negative Medium	



				<ul style="list-style-type: none">• All laydown, chemical toilets etc. should be restricted to low and very low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials where possible. No storage of vehicles or equipment will be allowed outside of the designated project areas.• Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. All protected plants should be relocated where feasible. If the plants cannot be relocated seed must be collected and utilised as part of the rehabilitation process.• Existing access routes, especially roads, must be made use of.• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.
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				<ul style="list-style-type: none"> • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all refuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.
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				<ul style="list-style-type: none"> • A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas. • All construction waste must be removed from site at the closure of the construction phase. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted. <p>Fauna</p> <ul style="list-style-type: none"> • A qualified Environmental Control Officer must be on site when construction begins. A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season. In situations where the protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • Clearing and disturbance activities must be conducted in a progressive linear manner, from the north to the south of the
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				<p>project area and over several days, so as to provide an easy escape route for all small mammals and herpetofauna.</p> <ul style="list-style-type: none"> • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. • Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight.
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				<p>Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in, and subsequently inspected prior to backfilling.</p> <ul style="list-style-type: none"> • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed every 50m, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. <p>Alien Species:</p> <ul style="list-style-type: none"> • An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all
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				<p>waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas.</p> <ul style="list-style-type: none"> • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests <p>Dust:</p> <ul style="list-style-type: none"> • Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. • No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources. <p>Waste Management:</p> <ul style="list-style-type: none"> • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. • Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan. • Cement mixing may not be performed on the ground. A non-porous material, such as liners should be used. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained
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				<p>and isolated from the natural environment, before being removed from site.</p> <ul style="list-style-type: none"> • A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least. • Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days. <p>Environmental Awareness Training:</p> <ul style="list-style-type: none"> • All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. • Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of sensitive flora and fauna species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.
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				<ul style="list-style-type: none"> Contractors and employees must all undergo the induction and must be made aware of the sensitive areas to be avoided. <p>Erosion:</p> <ul style="list-style-type: none"> Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. Only existing access routes and walking paths may be made use of as far as possible. Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc. A stormwater management plan must be compiled and implemented.
Visual Impact Assessment (Appendix E3)	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	<p>Planning</p> <ul style="list-style-type: none"> Retain and maintain natural vegetation immediately adjacent to the development footprint. <p>Construction</p> <ul style="list-style-type: none"> 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.

				<ul style="list-style-type: none"> • 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.
Soil and Agricultural Assessment (Appendix E4)	Loss of Land Capability	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Avoidance of all actively cultivated areas, where avoidance is not feasible stakeholder engagement should occur to compensate affected landowners. • Make use of existing roads or upgrades tracks before new roads are constructed. The number and width of internal access routes must be kept to a minimum. • A stormwater management plan must be implemented for the development. The plan must provide input into the road network and management measures. • Substation foundation and pylons placement must be (preferably) located in already disturbed areas that are not actively cultivated. • Rehabilitation of the area must be initiated from the onset of the project. Soil stripped from infrastructure placement can be used for rehabilitation efforts. • Vegetate or cover all stockpiles after stripping/removing soils

				<ul style="list-style-type: none"> • Storage of potential contaminants should be undertaken in bunded areas • All contractors must have spill kits available and be trained in the correct use thereof. • All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good “housekeeping”. • No cleaning or servicing of vehicles, machines and equipment may be undertaken in water resources. • Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems. • A spill response kit must be available at all times. The incident must be reported on and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Heritage Impact Assessment (Appendix E5)	Burial site	Negative Low	Negative Low	<ul style="list-style-type: none"> • Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.
Palaeontological Impact Assessment (Appendix E6)	Disturbance, damage or destruction of legally protected fossil heritage	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The ECO for this project must be informed that the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) has a Very High Palaeontological Sensitivity.

	within the development footprint during the construction phase			<ul style="list-style-type: none"> • If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out. • Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012). • These recommendations should be incorporated into the Environmental Management Plan for the Khwezi Solar Power Plant.
Social Impact Assessment (Appendix E7)	Direct and indirect employment opportunities and skills development	Positive Low	Positive Medium	<ul style="list-style-type: none"> • A local employment policy should be adopted to maximise opportunities made available to the local labour force. • Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Mantsopa LM, Thabo Mofutsanyana DM, Free State Province, South Africa, or elsewhere. • Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase.

				<ul style="list-style-type: none"> As with the labour force, suppliers should also as far as possible be sourced locally. As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
	Economic multiplier effects from the use of local goods and services.	Positive Low	Positive Medium	<ul style="list-style-type: none"> It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
	Improvements on shared infrastructure.	Positive Low	Positive Low	<ul style="list-style-type: none"> The project would contribute to an upgrade in the shared infrastructure of the LM as well as in the maintenance of this infrastructure. The LM would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved.

				<ul style="list-style-type: none"> • A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created (or sourced from the local Municipality, where available) and companies listed thereon should be invited to bid for project-related work where applicable and this would include the maintenance of this shared infrastructure.
	Potential loss in productive farmland.	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The proposed site for the Khwezi SPP needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. • Livestock grazing on the proposed site need to be relocated. • All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO). • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.
	Influx of jobseekers and change in population in the study area.	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Develop and implement a local procurement policy which prioritises “locals first” to prevent the movement of people into the area in search of work. • Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. • Provide transportation for workers (from Excelsior and surrounds) to ensure workers can easily access their place of

				<p>employment and do not need to move closer to the project site.</p> <ul style="list-style-type: none"> • Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Compile and implement a grievance mechanism. • Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour. • Prevent the recruitment of workers at the project site. • Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. • Establish clear rules and regulations for access to the proposed site. • Ensure that workers do not remain onsite after working hours. • Inform local community organisations and policing forums of construction times and the duration of the construction phase. • Establish procedures for the control and removal of loiterers from the construction site.
	<p>Temporary increase in safety and security concerns associated with the influx of people</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. • Provide transportation for workers to prevent loitering within or near the project site outside of working hours. • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.

				<ul style="list-style-type: none"> • The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. • Access in and out of the construction site should be strictly controlled by a security company appointed to the project. • A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. • The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. • The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. • The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
	<p>Temporary increase in traffic disruptions and movement patterns.</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> • All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. • Heavy vehicles should be inspected regularly to ensure their road worthiness. • Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the R703 regional road onto the gravel road to warn road users of the construction activities taking place for the duration of the

				<p>construction phase. Warning signs must be always visible, especially at night.</p> <ul style="list-style-type: none"> • Implement penalties for reckless driving to enforce compliance to traffic rules. • Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work). • The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. • The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. • The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. • A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
	Nuisance impact (noise and dust)	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.

				<ul style="list-style-type: none"> • Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. • A CLO should be appointed, and a grievance mechanism implemented.
	Increased risk of potential veld fires.	Negative Medium	Negative Low	<ul style="list-style-type: none"> • A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. • No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas. • Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. • Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. • The project will adhere to National Veld and Forest Fire Act as well as management plans to reduce risk. It is, however, advisable for the project proponent to join the local fire association of the area.
	Impacts on the sense of place	Negative Low	Negative Low	<ul style="list-style-type: none"> • Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. • Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays.

				<ul style="list-style-type: none"> • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. • All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. • Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the study area.
Traffic Impact Assessment (Appendix E8)	Construction and maintenance of gravel roads in vicinity of the site	Negative Low	Negative Low	<ul style="list-style-type: none"> • Maintenance to lower order roads can be incorporated into the schedule, especially the maintenance of the road accessing the site. • The site access road would require construction at the start of the construction project to safely transport the sensitive cargo through the site. • A gravel roads maintenance programme for the gravel roads on site is recommended.
	Increased traffic on haulage routes	Negative Low	Negative Low	<ul style="list-style-type: none"> • The impact of the increased traffic on regional routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic.
	Increased traffic on local routes	Negative Low	Negative Low	<ul style="list-style-type: none"> • The impact of the increased traffic on local routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic.

<p>Avifaunal Impact Assessment (Appendix E9)</p>	<p>Habitat destruction within the project footprint</p>	<p>Negative High</p>	<p>Negative Medium</p>	<ul style="list-style-type: none"> • Demarcation and avoidance of the riparian area must be done by using safety tape to ensure a known barrier is present that may not be crossed; • If possible solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigeic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas; • Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • Vegetation clearing to commence only after the necessary permits have been obtained; • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities; • Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place
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	Destruction, degradation and fragmentation of surrounding habitats	Negative High	Negative Low	<ul style="list-style-type: none"> • Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc; • All solid waste must be managed in accordance with a Solid Waste Management Plan. Recycling is encouraged; • All construction activities and roads to be within the clearly defined and demarcated areas; • Temporary laydown areas must be clearly demarcated and rehabilitated with indigenous vegetation subsequent to end of use; • Appropriate dust control measures to be implemented; • Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act; • Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place; and • All hazardous materials, if any, must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.
	Displacement/emigration of avifauna community (including SCC) due to noise pollution	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Construction activity should be restricted to daylight hours, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes. However, low impact and low noise construction activities with minimal light might be considered during nighttime;

				<ul style="list-style-type: none"> • All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected; and • If generators are to be used these must be soundproofed. Reduce the decibel level of a generator by 15-30 decibels
	Direct mortality from persecution or poaching of avifauna species and collection of eggs	Negative Medium	Negative Low	<ul style="list-style-type: none"> • All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting species and collecting eggs; • Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area; and • Any avifauna threatened by the construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist.
	Direct mortality from increased vehicle and heavy machinery traffic	Negative Medium	Negative Low	<ul style="list-style-type: none"> • All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and • All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected;

6.2.2 Impacts During the Operational Phase

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

- Activity 11(i) (GN.R. 327): *“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts, excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —*
 - (a) temporarily required to allow for maintenance of existing infrastructure;*
 - (b) 2 kilometres or shorter in length;*
 - (c) within an existing transmission line servitude; and*
 - (d) will be removed within 18 months of the commencement of development.”*
- Activity 1 (GN.R. 325): *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs —*
 - (a) within an urban area; or*
 - (b) on existing infrastructure.*
- Activity 10(b)(i)(hh) (GN.R. 324): *“The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres*
 - (b) Free State, (i) outside urban areas, (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 20-year period. Table 6.4 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Wetland Baseline and Risk Assessment (Appendix E1)	Potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Design and Implement an effective stormwater management plan. • Promote water infiltration into the ground beneath the solar panels • Release only clean water into the environment. • Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in). • Re-vegetate denuded areas as soon as possible • Regularly clear drains. • Minimise the extent of concreted / paved / gravel areas. • A covering of soil and grass (regularly cut and maintained) below the solar panels is ideal for infiltration. If not feasible then gravel is preferable over concrete or paving. • Avoid excessively compacting the ground beneath the solar panels
	Potential for increased contaminants entering the wetland systems.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Where possible, minimise the use surfactants to clean solar panels and herbicides to control vegetation beneath the panels. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events.
	Continued fragmentation and	Negative Medium	Negative Low	Vegetation:

Terrestrial Ecology Baseline and Impact Assessment (Appendix E2)	degradation of natural habitats and ecosystems.			<ul style="list-style-type: none"> • Ensure that the site footprint is as small as possible and responsibly positioned, the development area must be properly fenced off during construction. • Protected flora must be avoided or responsibly transplanted according to a search and rescue plan and a permit must be obtained prior to the relocation. • Land clearing must be done over at least three days and conducted linearly and successively from the north to south. • No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard. • Brush cutting should be implemented beneath the panels. Vegetation clearing should be limited where possible. • Areas rated as High sensitivity and their buffers in proximity to the development areas should be avoided as much is feasible. Infrastructure spanning delineated watercourses to prevent hydrological barriers is considered avoidance areas. Avoided areas must be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent access to these areas from construction workers and machinery. Mitigated development in medium sensitivity areas is permissible. • Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. It is recommended that areas to be developed be specifically demarcated so that during the
	Continuing spread of IAP and weed species.	Negative Medium	Negative Low	
	Ongoing displacement and direct mortalities of the faunal community (including possible SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.).	Negative High	Negative Low	

				<p>construction phase, only the demarcated areas be impacted upon.</p> <ul style="list-style-type: none"> • All laydown, chemical toilets etc. should be restricted to low and very low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials where possible. No storage of vehicles or equipment will be allowed outside of the designated project areas. • Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. High visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. All protected plants should be relocated where feasible. If the plants cannot be relocated seed must be collected and utilised as part of the rehabilitation process. • Existing access routes, especially roads, must be made use of. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The
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				<p>Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.</p> <ul style="list-style-type: none">• Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.• No servicing of equipment on site unless necessary.• All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.• Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.• All vehicles and equipment must be maintained, and all refuelling and servicing of equipment is to take place in demarcated areas outside of the project area.• It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.• A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas.• All construction waste must be removed from site at the closure of the construction phase. <p>Fauna</p>
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				<ul style="list-style-type: none"> • A qualified Environmental Control Officer must be on site when construction begins. A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season. In situations where the protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed
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				<p>away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.</p> <ul style="list-style-type: none"> • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. • Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in, and subsequently inspected prior to backfilling. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed every 50m, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically
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				<p>and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed.</p> <p>Alien Species:</p> <ul style="list-style-type: none"> • An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests <p>Waste Management:</p> <ul style="list-style-type: none"> • Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible.
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				<ul style="list-style-type: none"> • Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan. • A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least. • Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits. • Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days. <p>Erosion:</p> <ul style="list-style-type: none"> • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • Only existing access routes and walking paths may be made use of as far as possible.
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				<ul style="list-style-type: none"> • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc. • A stormwater management plan must be compiled and implemented.
Visual Impact Assessment (Appendix E3)	Visual impact on sensitive visual receptors within a 1km radius from the SPP.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient • Maintain general appearance of the facility as a whole.
	Visual impact on sensitive visual receptors between a 1km and 3km radius from the SPP.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient • Maintain general appearance of the facility as a whole.
	Visual impact on sensitive visual receptors within a 3-5km radius from the SPP.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. • Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient • Maintain general appearance of the facility as a whole.
	Visual impact on sensitive visual	Negative Low	Negative Low	<ul style="list-style-type: none"> • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.

	receptors within a 5-10km radius from the SPP.			<ul style="list-style-type: none"> Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient Maintain general appearance of the facility as a whole.
	Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility.	Negative Low	Negative Low	<p>As far as practically possible:</p> <ul style="list-style-type: none"> Shield the source of light by physical barriers (walls, vegetation etc.) Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. Make use of minimum lumen or wattage in fixtures. Make use of down-lighters, or shield fixtures. Make use of low-pressure sodium lighting or other types of low impact lighting. Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. The use of night vision or thermal security cameras are very effective and can replace security lighting entirely.
	Visual impacts of glint and glare as a visual distraction and possible air travel hazard.	Negative Low	Negative Low	<ul style="list-style-type: none"> No mitigation measures are required.
	Visual impacts on sense of place associated with the operational phase of the SPP.	Negative Low	Negative Low	<ul style="list-style-type: none"> It is believed that renewable energy resources are essential to the environmental well-being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure

				<p>pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity.</p> <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 energy. This can be achieved by also hosting an ‘open day’ where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area. Implement good housekeeping measures.
Soil and Agricultural Assessment (Appendix E4)	Loss of Land Capability	Negative Medium	Negative Low	<ul style="list-style-type: none"> Continuously monitor erosion on site Monitor compaction on site
Social Impact Assessment (Appendix E7)	Direct and indirect employment opportunities and skills development	Positive Low	Positive Medium	<ul style="list-style-type: none"> It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. Vocational training programs should be established to promote the development of skills.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	<ul style="list-style-type: none"> None identified
	Loss of agricultural land and overall productivity	Negative Medium	Negative Low	<ul style="list-style-type: none"> The proposed mitigation measures for the construction phase should have been implemented at this stage.

	as a result of the operation of the proposed project on an agricultural property			<ul style="list-style-type: none"> Mitigation measures from the Agricultural and Soil Report, should also be implemented.
	Contribution to LED and social upliftment during the operation of the project	Positive Medium	Positive High	<ul style="list-style-type: none"> A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).
	The potential impact on tourism due to the establishment of the Khwezi SPP	Positive Low	Positive Low	<ul style="list-style-type: none"> Mitigation measures regarding the visual impacts will set out in the standalone Visual Impact Assessment report, but the subjectivity towards the PV panels can be influenced by creating a “Green Energy” awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa’s movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. This could be implemented by constructing a visitor’s centre on the property allocated to the proposed
		Negative Low	Negative Low	

				solar farm which should be opened to school fieldtrips, the local community, and tourists
	Visual impacts and sense of place impacts associated with the operation phase of Khwezi SPP.	Negative Low	Negative Low	<ul style="list-style-type: none"> To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the development of the Khwezi SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.
	The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increase in household earnings	Positive Low	Positive Medium	<p>Enhancement:</p> <ul style="list-style-type: none"> It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. With the recruitment of the local community for job creation and increase in household earnings will automatically be seen in the area surrounding the development.
Traffic Impact Assessment (Appendix E8)	Increased traffic on local routes	Negative Low	Negative Low	<ul style="list-style-type: none"> The impact of the increased traffic during the operational phase is negligible due to the expected number of employees. The shift work provides a mitigation and

				reduces the expected number of employees, especially during peak hours.
Avifaunal Impact Assessment (Appendix E9)	Collisions with infrastructure associated with the SPP Facility	Negative High	Negative Medium	<ul style="list-style-type: none"> • Non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun et al, 2021). This is especially pertinent to waders and aquatic species that may recognise the panel array as water bodies (lake effect as described above) and collide with the panels, causing mortality; • Fencing mitigations: <ul style="list-style-type: none"> - Top 2 strands must be smooth wire; - Routinely retention loose wires; - Minimum distance between wires is 300 mm; and - Place markers on fences
	Electrocution due to infrastructure associated with the SPP Facility	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; and • Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts (Prinsen et al, 2012).
	Direct mortality from roadkills, persecution or poaching of avifauna	Negative Medium	Negative Low	<ul style="list-style-type: none"> • All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting avifauna species and collecting eggs. • Signs must be put up to enforce this, should someone be caught a R1000 fine must be enforced.

	species and collection of eggs			<ul style="list-style-type: none"> • All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and • All vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected
	Pollution of water sources and surrounding habitat due to cleaning products of the solar panels	Negative High	Negative Low	<ul style="list-style-type: none"> • Only environmentally friendly chemicals are to be used for cleaning of the panels
	Heat radiation from the BESS and solar panels	Negative Medium	Negative Low	<ul style="list-style-type: none"> • The BESS must be enclosed in a structure with a non-reflective surface; • A fire management plan needs to be put in place; and • Existing vegetation should be kept under the panels to ensure that additional reflection is not taking place from the surface below the panels.
	Encroachment of Invasive Alien Plants into disturbed areas	Negative High	Negative Low	<ul style="list-style-type: none"> • An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation; • All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

6.2.3 Impacts During the Decommissioning Phase

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

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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Wetland Baseline and Risk Assessment (Appendix E1)	Potential loss or degradation of nearby wetlands through inappropriate closure.	Negative Low	Negative Low	<ul style="list-style-type: none"> Develop and implement a rehabilitation and closure plan. Appropriately rehabilitate the project area by ripping, landscaping and re-vegetating with locally indigenous species.
Traffic Impact Assessment (Appendix E8)	Increased traffic during decommissioning phase	Negative Low	Negative Low	<ul style="list-style-type: none"> The impact of the increased traffic during the decommissioning phase is negligible due to the expected number of employees
Avifaunal Impact Assessment (Appendix E9)	Direct mortality due to earthworks, vehicle collisions and persecution	Negative Medium	Negative Low	<ul style="list-style-type: none"> All personnel should undergo environmental awareness training including educating about not harming or collecting avifauna species Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate; Any avifauna threatened by the construction activities must be removed safely by an appropriately qualified environmental officer or removal specialist; All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected; All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the

				<p>site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner;</p> <ul style="list-style-type: none"> All infrastructure must be removed if the facility is decommissioned; and The PAOI must be rehabilitated, and a management plan must be in place to ensure that it is done successfully to restore the avifauna community and their associated habitat.
	Continued habitat degradation due to Invasive Alien Plant encroachment and erosion	Negative High	Negative Low	<ul style="list-style-type: none"> Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase as developed by a specialist;

6.2.4 Impacts Associated with the Battery Energy Storage System (BESS)

Table 6.6: Impacts associated with the BESS

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
General Environment (risks associated with BESS)	Mechanical breakdown / Exposure to high temperatures Fires, electrocutions and spillage of toxic substances into the	Negative Medium	Negative Low	<p>Operators are trained and competent to operate the BESS. Training should include the discussion of the following:</p> <ul style="list-style-type: none"> Potential impact of electrolyte spills on groundwater; Suitable disposal of waste and effluent; Key measures in the EMPr relevant to worker's activities; How incidents and suggestions for improvement can be reported. Training records should be kept on file and be made available during audits.

	<p>surrounding environment.</p> <p>Spillage of hazardous substances into the surrounding environment.</p> <p>Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas.</p> <p>Water Pollution – spillages into surrounding watercourses as well as groundwater.</p> <p>Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.</p>			<ul style="list-style-type: none"> • Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. • Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times. • Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.). • Firefighting equipment should readily be available at the BESS area and within the site. • Maintain strict access control to the BESS area. • Ensure all maintenance contractors / staff are familiar with the supplier’s specifications. • Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these. • Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices. • Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. • The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed.
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	<p>Generation of hazardous waste</p>			<ul style="list-style-type: none"> • Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. • The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS. • Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS. • Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. • The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.
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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:

- Wetland Baseline & Risk Assessment For The Proposed Khwezi Solar Power Plant – TBC (See Appendix E1)
- The Terrestrial Ecology Baseline & Impact Assessment For The Proposed Khwezi Solar Power Plant - TBC (See Appendix E2)
- Visual Impact Assessment: The Development Of The Khwezi Solar Power Plant Near Excelsior, Free State Province – Donaway (See Appendix E3)
- Soil And Agricultural Assessment Report For The Proposed Khwezi Solar Power Plant – TBC (See Appendix E4)
- Phase 1 Cultural Heritage Impact Assessment: The Development Of The Khwezi Solar Power Plant, Near Excelsior, Free State Province – Ja Van Schalkwyk (See Appendix E5)
- Palaeontological Impact Assessment The Development Of The Khwezi Solar Power Plant Near Excelsior, In The Free State Province – Banzai (See Appendix E6)
- Social Impact Assessment: The Development Of The Khwezi Solar Power Plant Near Excelsior, Free State Province – Donaway (See Appendix E7)
- Traffic Impact Assessment For The Transportation Of Solar Energy Equipment To The Khwezi Solar Power Plant Located Near Excelsior, Free State Province – Bvi (See Appendix E8)
- The Avifauna Assessment For The Proposed Khwezi Solar Power Plant – TBC (See Appendix E9)
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics, in conjunction with the project specialists (refer to Section 7 of this report).

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

6.3.1. Aquatic Ecological/Wetland Impacts

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

“How will the proposed development impact on wetlands?”

According to the Aquatic Ecological Assessment (Appendix E1), three HGM units were identified within the PAOI. The wetland areas were delineated in accordance with the DWAF (2005) guidelines. HGM

units have been classified as a channelled valley bottom wetland and two unchannelled valley bottom wetlands. A single artificial wetland, namely a dam was identified within the PAOI.

The delineated wetland systems have been scored overall PES ratings ranging from moderately modified (class C) to largely modified (class D), depending on the level of modification. The findings from the PES assessment indicate significant disturbances to HGM 2, and 3 that has been rated a largely modified score.

Sensitivity ratings were assigned to the identified features. The IS for the channelled valley bottom was rated to be “High” and the unchannelled valley bottom wetland units have been calculated to be “Moderate”, which combines the relatively low threat status and protection level with the low condition and threat status of the wetland. During this phase of the investigation, it was found that the greatest number of impacts could occur within the construction phase, but as the High sensitivity / No-Go areas are avoided, the impacts are limited on the aquatic environment. The specialist has no objection to the authorisation of the proposed activities assuming that all mitigations especially within the buffer zones are implemented.

6.3.2. Ecological Impacts

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

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

The Terrestrial Ecological Report (Appendix E9) confirmed that the proposed development site is situated within the Grassland Biome. The Site Ecological Importance (SEI) for this vegetation type was found to be of low sensitivity meaning that construction within these areas is permissible from an ecological perspective.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from ‘Medium’ – ‘High’ to ‘Medium-Low’). Considering that this area that has been identified as being significant for biodiversity maintenance and ecological processes (Moderate and High sensitivity), development may proceed but with caution and only with the implementation of mitigation measures.

6.3.3. Avifaunal Impacts

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

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

The PAOI overlaps with an ESA classified area, in this area a total of 217 avifauna species are expected to occur of which twelve (12) are regarded as threatened. Three (3) species are considered as having a High likelihood of occurrence, a further four have a moderate likelihood of occurrence and one was confirmed. Two field surveys were performed for this regime 2 assessment. During the first survey ninety-seven (97) bird species were recorded in and around the PAOI. This included the *Sagittarius serpentarius* (Secretarybird) that is classified as Vulnerable on a regional scale and Endangered on a

global scale. During the second survey 68 species were recorded during the point counts and 28 during the incidental counts. No SCCs were recorded during this assessment. Six habitats were identified namely Transformed, Agriculture, Secondary Grassland, Degraded Grassland, Koppie and Water Resource. Three of these had a “Very Low” sensitivity, they were Transformed, Agriculture and Secondary Grassland. The Degraded Grassland had a “Medium” sensitivity while the Koppie and Water Resources both had a “High” sensitivity. The planned design does exclude the Water Resources, in addition to the avoidance of these areas the demarcation of them to negate any access would reduce the overall impact on them to Low. Should the mitigations, recommendations and monitoring be implemented the overall impacts can be reduced to a Low- Moderate level.

6.3.4. Visual Impacts

Due to the extent of the proposed PV facility, it is expected that the facility 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 will the landscape provide any significant visual absorption capacity”.

According to the Visual Impact Assessment (Appendix E3), when all the positive factors of such a development including economic factors, social factors and sustainability factors, especially in a semi-arid country is considered, the visual impact of this proposed development will be insignificant and it is suggested that the development commence, from a visual Khwezi SPP June 2023 Visual Impact Assessment (VIA) impact point of view.

6.3.5. Agricultural / impacts on the soil

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

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

It is the specialist’s opinion that the proposed Khwezi SPP facility project, associated infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed activities will result in the segregation of some high production agricultural land. In areas where these crop fields are still under high production, stakeholder engagement must be undertaken to compensate landowners for high crop field land use where necessary. Stakeholder engagement for compensation of landowners for these crop field lands in the project area may not be necessary as they have consented and communicated support for the land use. It is, therefore, the specialist’s recommendation that the proposed Khwezi SPP facility project and associated infrastructure may be favourably considered for development with implementation of mitigation measures to ensure low expected significant impacts occurrence. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

6.3.6. Heritage and Archaeological Impacts

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

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

From a heritage point of view, it is recommended that the proposed project be allowed to continue, should the mitigation measures stipulated in the report be implemented.

6.3.7. Paleontological Impacts

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

“How will the proposed development impact on the Palaeontological resources?”

Several pebble-sized fragments of petrified wood reworked from the bedrocks into the overlying soils and surface gravels were identified. However, these derived fossils are commonly found in the Karoo Basin and are of Low conservational value. These fragments do thus not require mitigation. As no other fossils were recorded in the proposed development a Low palaeontological Significance has been allocated to the development. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

6.3.8. Socio-Economic Impacts

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

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

According to the Social Impact Assessment (Appendix E7), there are some vulnerable communities within the project area that may be affected by the proposed development and its associated

infrastructure. Traditionally, the construction phase of a PV solar development is associated with most social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. During the assessment of the potential social impacts, it was determined that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

- Based on the social impact assessment, the following general conclusions and findings can be made: The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion, and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks) and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local businesses are involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project’s location within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society. When considering Khwezi SPP, it is also important to consider the cumulative social impacts that may arise with other proposed solar PV projects in the area.
 - o It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.
- The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts associated with the project.

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

6.3.9. Traffic Impacts

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

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

According to the Traffic Impact Assessment (Appendix E8), the major traffic impact occurs during the construction phase of the project. The impact of the construction trip generation, on the predicted traffic volumes on the local and the regional transportation routes are expected to be low. The Specialist noted that the proposed project is supported from a traffic and transportation perspective.

6.3.10. Risk Assessment for Battery Storage System

The preferred technology is Lithium-ion solid state battery, however, due to the ever changing preferences and improvements to battery technology, the final selection of the type of battery technology to be used will only take place during the detailed design process and after the appointment of the battery supplier.

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

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

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

6.4 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could 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 6.8.

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 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		
<p>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.</p>		
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		
<p>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.</p> <p>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.</p>		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.

29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

7 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the requirements of Section 2 of the NEMA to consider cumulative impacts as part of any environmental assessment process.

7.1 INTRODUCTION

The EIA Regulations (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 Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact (refer to Appendix E). This chapter analyses the 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 project area 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 30 km radius surrounding the proposed development (refer to Figure 7.1 below).

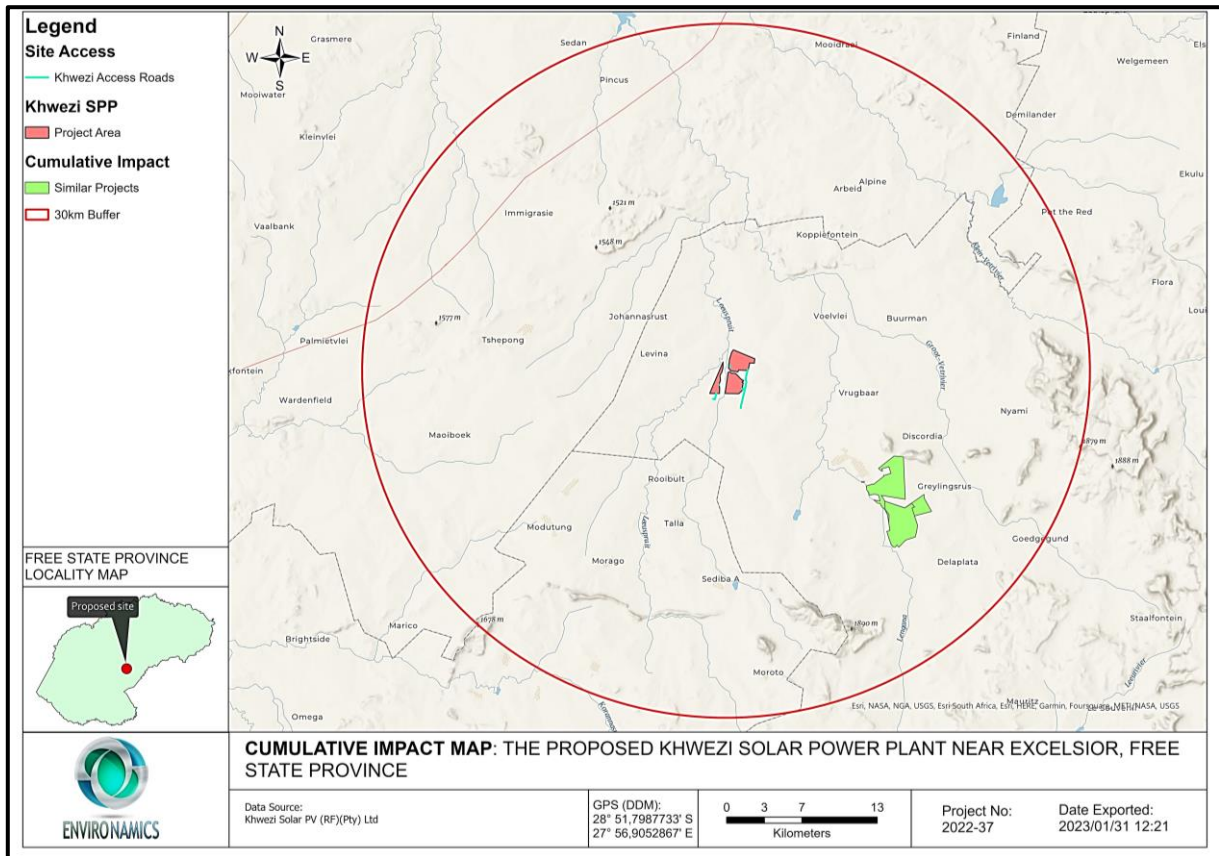


Figure 7-1: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30 km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Free State Provinces. 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 this cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2024 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

7.4 OTHER PROJECTS IN THE AREA

7.4.1 Existing projects in the area

According to the DFFE's database, 2 solar PV plant applications have been submitted to the Department within the geographic area of investigation (refer to Table 7.1).

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

Site name	Distance from study area	Proposed generating capacity	DFFE reference	EIA process	Project status
Lengana Solar PV (RF) (Pty) Ltd	15km	320 MW	TBC	Scoping and EIA	In Process
Solaire Direct Southern Africa (Pty) Ltd	0km	46MW	14/12/16/3/3/2/364	Scoping and EIA	Withdrawn/Lapsed

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

Energy generated by the facility will be transmitted from the facility substation / Eskom switching station to the Merapi Transmission Substation via a new 132kV powerline. A separate Basic Assessment is being undertaken to assess the grid connection infrastructure. The Specialist Reports associated with the proposed grid connection infrastructure is not currently available. However, it is anticipated that:

- The overall visual impact of the proposed powerline will be Negative Low, and the Cumulative impact of the project and other projects in the area will be Negative Medium.
- The overall impact of the proposed powerline on water resources will be Negative Low and the Cumulative Impact of the project and other projects in the area will be Negative Medium.
- The overall impact of the proposed powerline on soil and agricultural activities will be Negative Low and the Cumulative impact of the project and other projects in the area will be Negative Medium.
- The overall impact of the proposed powerline on the ecology will be Negative Low and the Cumulative impact of the project and other projects in the area will be Negative Medium.

- The overall impact of the proposed powerline on the avifaunal community will be Negative Low and the Cumulative impact of the project and other projects in the area will be Negative Medium.
- The overall impact of the proposed powerline on heritage resources (archaeological and palaeontological) will be Negative Low and the Cumulative impact of the project and other projects in the area will be Negative Low.
- The overall impact of the proposed powerline on Traffic in the area will be Negative Low and the Cumulative impact of the project and other projects in the area will be Negative Low.

By taking the above into consideration, it is evident that the proposed powerline will not change the significance of the cumulative impact of the developments to an unacceptable degree.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, 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 (refer to Figure 7.2 for process flow). The following sections present their findings.



Figure 7-2: Process flow diagram for determining cumulative effects

7.5.1 Terrestrial Ecology

The Terrestrial Ecology Baseline and Impact Assessment (refer to Appendix E1), states that the impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project’s impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts pre-existing in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on local fauna and flora specifically.

Cumulative impacts are assessed within the context of the extent of the proposed project area, other similar developments and activities in the area (existing and in-process), and general habitat loss and transformation resulting from any other activities in the area. Localised cumulative impacts include those from operations that are close enough (within 30 km) to potentially cause additive effects on

the local environment or any sensitive receptors (relevant operations include nearby large road networks, other solar PV facilities, and power infrastructure). Relevant impacts include the overall reduction of foraging and nesting/burrowing habitat, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, and groundwater and surface water quality depletion.

Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

In order to spatially quantify the cumulative effects of the proposed development, the project in isolation is compared with the overall effects of surrounding development (including total transformation and transformation as a result of new and proposed developments of a similar type, i.e., solar).

According to the 2018 National Biodiversity Assessment, the total amount of Central Free State Grassland habitat within 30 km of the project amounts to 207 383,4 ha, but when considering the transformation that has taken place within this radius – only 141 202,7 ha remains. Therefore, the area within 30 km of the project has experienced approximately 68,08% loss in natural habitat. Considering this context, the project footprint is 576,8 ha (assuming the total extent of the project area is developed), and one (1) additional similar project exists in the 30 km region measuring a maximum of 1207,5 ha (as per the latest South African Renewable Energy EIA Application Database). This means that the total amount of remaining habitat lost as a result of solar projects in the region amounts to 1,26 % (the sum of all related developments as a percentage of the total remaining habitat). Table 7.2 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 7.2: Loss of Central Free State Grassland habitat within a 30 km radius of the project

	Total Habitat (ha)	Tot. Remaining Habitat (ha)	Total Historical Loss	Project Footprint (ha)	Similar Projects (ha)	Cumulative Habitat Lost
Solar development cumulative effects (Spatial)	207 383,4	141 202,7	68,08%	576,8	1207,5	1,26%

The overall cumulative impact assessment is presented in Table 7.3 below. Note that this also accounts for the relative importance of the habitats within and adjacent to the project area, in the context of the value of the regional habitat.

Approximately 68,08% of the Central Free State Grassland vegetation type has been lost, and as discussed above the proposed development will result in a further loss of approximately 1,26 % from only similar developments (Solar) in the area, as such the cumulative impact from the proposed development is rated as “high” since a large area of natural habitat has already been lost. As such it is, imperative that careful spatial management and planning of the entire region be a priority, and existing large infrastructure projects must be carefully monitored over the long term.

7.5.2 Visual

The Visual Impact Assessment (refer to Appendix E3) states that according to the DFFE's database, two solar PV plant applications, of which one has lapsed, have been submitted to the Department within the geographic area of investigation. The cumulative impact might be a negative medium impact due to the fact that the landscape is visually pleasant reflecting a farming landscape.

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

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

7.5.3 Soil and Agricultural Potential

According to the Soil and Agricultural Assessment (Appendix E4), the cumulative impacts have been scored "Medium," indicating that the potential incremental, interactive, sequential, and synergistic cumulative impacts. It is probable that the impact will result in spatial and temporal cumulative change.

7.5.4 Heritage

According to the Heritage Impact Assessment (Refer to Appendix E5), heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the proposed 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 low significance. This can further be lowered 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.

7.5.5 Palaeontology

According to the Palaeontological Impact Assessment (refer to Appendix E6), solar facilities to the south east of the Khwezi SPP will have a Zero to Very High Palaeontological Sensitivity. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are

carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between Low and Medium.

7.5.6 Social Impact Assessment

The Social Impact Assessment (refer to Appendix E7) states that the potential for cumulative impacts to occur as a result of the identified projects is likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the area's sense of place.

7.5.7 Traffic

According to the Traffic Impact Assessment (refer to Appendix E8), the concurrent construction of one other solar farm (Lengana PV SPP) in a 30 km radius of the site has also been considered and is deemed to have a low impact as. Mitigation measures that may be considered, should concurrent construction occur, include the staggering of trips at the site and the implementation of a road's maintenance programme.

7.5.8 Avifauna

Cumulative impacts are assessed within the context of the extent of the proposed PAOI, other developments and activities in the area (existing and proposed) and general habitat loss and disturbance resulting from any other anthropogenic activities in the area. The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on the local and regional avifauna community. Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, other SPP facilities, and power infrastructure).

Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

A total area of 30 km surrounding the PAOI were used to assess the total habitat loss in the area and subsequently the cumulative impact. To determine the intact remnant habitat the NBA (2018) remnant spatial data was utilised. The future renewable energy projects were also considered by utilising the REEA Q4 (2022) spatial dataset. In order to remove any duplication, only the areas that overlap with the remanence areas were considered. The total cumulative loss was found to be 68%.

The proposed SPP in isolation has a Negative Low impact significance. In consideration of the aforementioned information, the cumulative impact was determined to be of a Negative medium significance.

7.5.9 Wetland Baseline and Risk Assessment

During the site assessment, three HGM units were identified and assessed within the project area of influence. These comprise of two unchanneled valley bottoms and one channelled valley bottom wetland. The wetlands scored an overall PES scores ranging from C- “Moderately Modified” to D – “Largely Modified” due to the modification to both the hydrology and vegetation of the wetlands through anthropogenic activities. The wetlands scored “High” importance and sensitivity scores due to the low protection level of both the wetland vegetation and units. The average ecosystem service score was determined to range between “Intermediate” and “Moderately High”. A 15 m post mitigation buffer was assigned to the wetland systems.

A risk assessment was completed for this project to assess risks to the wetlands. These SPP areas are considered to pose low residual risks and avoidance can be met by adhering to the mitigations provided.

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 7.3. There have been specific VECs identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.3 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.3: Potential Cumulative Effects for the proposed project

	Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase			
Terrestrial Ecology and Baseline Assessment	Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	The construction phase of the development and associated infrastructure will result in loss of and damage to natural habitats if the vegetation is cleared for the development of the solar plant. Rehabilitation of some areas would be possible but there is likely to be long-term damage in large areas. Most habitat destruction will be caused during the construction phase.	- High
Agricultural and Soils	Loss of land capability, soil erosion and compaction effects	The cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area.	- Medium
Social Impact Assessment	Cumulative impacts of employment opportunities, business opportunities and skills development	Khwezi SPP and the establishment of one other solar power project within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Khwezi SPP alone.	+ Medium
	Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area	While the development of a single solar power project may not result in a major influx of people into an area, the development of one other project may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals	- Medium

		<p>to the area in search of better employment opportunities and higher standards of living.</p> <p>It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.</p>	
Traffic Impact Study	Increased traffic on regional haulage routes	The haulage routes for heavy vehicles for the shipment of solar panels and major components include regional routes that would be impacted by the simultaneous construction of similar projects within 30 km of the development. This cumulative scenario is expected to slightly increase the average daily traffic of the routes used over the construction period.	- Low
	Increased traffic on regional haulage routes	The immediate road network, surrounding the proposed Khwezi PV SPP site, will be influenced by the proposed neighbouring Lengana PV SPP development. There will be a slight increase in traffic, influencing traffic congestion and road safety. However, the extent of the impact will be very small and local of nature. This cumulative scenario is expected to nominally increase the average daily traffic of the routes used over the construction period.	- Low
Avifauna	Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	The proposed SPP in isolation has a Negative Low impact significance. In consideration of the aforementioned information, the cumulative impact was determined to be of a Negative medium significance	-Medium
Operational Phase			
Visual Impact Assessment	Cumulative visual impacts related to the SPP	The anticipated cumulative visual impact for the SPP is expected to include the change in sense of place, as well as the precedent being set for SPP's in the area where currently there is only a precedent for agricultural related activities. Further construction and operation of the SPP in the area is likely to have a negative impact	- Medium

Avifauna	Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	The proposed SPP in isolation has a Negative Low impact significance. In consideration of the aforementioned information, the cumulative impact was determined to be of a Negative medium significance	-Medium
Decommissioning Phase			
General	Generation of waste	During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area.	- Medium

7.7 CONCLUSION

This chapter of the Final EIR addressed the cumulative environmental effects of the construction, operation and decommissioning project. The information to date has shown that most adverse residual impacts are unlikely, should proper mitigation measures be implemented. However, cumulative impacts could arise as other similar projects are constructed in the area / could be constructed in future closed to the assessed area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
 - Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.). (- High)
 - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
 - Impact with large-scale in-migration of people (- Medium)
 - Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.). (-Medium)
- Cumulative effects during the operational phase:
 - Visual intrusion (- Medium)
 - Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.). (-Medium)
- Cumulative effects during the decommissioning phase:
 - Generation of waste (- Medium)

The cumulative impact for the proposed development is high to low. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment.

Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. No cumulative impacts with a high residual risk have been identified.

In terms of the need and desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one (where the landscape has already experienced degradation), than to lose land with a higher environmental value elsewhere in the country.

8 ENVIRONMENTAL IMPACT STATEMENT

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

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

- (l) an environmental impact statement which contains-
 - (i) a summary of the key findings of the environmental impact assessment;
 - (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
 - (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
- (m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;
- (p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;
- (q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which were addressed in this EIA report: *(Note the pre-mitigation impact rating is included here)*

- Impacts during construction phase:
 - Direct habitat destruction (- High pre-mitigation, - Medium after mitigation)
 - Habitat Fragmentation (- High pre-mitigation, - Medium after mitigation)
 - Direct disturbance/ degradation to wetland soils or vegetation due to the construction of the solar facility. (-Low pre-mitigation, -Low after mitigation)
 - Creation of direct and indirect employment opportunities (+ Low pre-mitigation, + Medium after mitigation)
 - Economic multiplier effects from the use of local goods and services (+ Low pre-mitigation, + Medium after mitigation)
 - Impacts on daily living patterns (- Medium pre-mitigation, - Low after mitigation)

- Impacts during the operational phase:
 - Habitat destruction and fragmentation (- High pre-mitigation, -Medium after mitigation)
 - Ongoing displacement and direct mortalities of the faunal community (including possible SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, erosion, etc.). (-High pre-mitigation, -Low after mitigation)
 - Direct disturbance/ degradation to wetland soils or vegetation due to the construction of the solar facility. (-Low pre-mitigation, -Low after mitigation)
 - Creation of employment opportunities and skills development. (+Low pre-mitigation, +Medium after mitigation)
 - Development of non-polluting, renewable energy infrastructure. (+ Medium pre-mitigation, +Medium after mitigation)
 - Contribution to LED and social upliftment (+Medium pre-mitigation, +High after mitigation)
- Impacts during the decommissioning phase:
 - Improvement of habitat through revegetation / succession over time (+ Medium)
- Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.
 - 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 most cumulative impacts will be of a medium or low significance.

8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

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

The main features to be avoided are:

- Buffer area concerning the surface water resources
- Depressions
- Un-channelled valley-bottom wetland
- Heritage features (burial site)

These areas have been avoided by the proposed layout as per Figures G - I.

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

8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- PV Panel Array - To produce up 300 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the yield.
- Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480 V up to 33 kV to 132 kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480 V and this is fed into step up transformers to 132 kV. An onsite substation will be required to step the voltage up to 132 kV, after which the power will be evacuated into the national grid. The project will entail the following:
 - Facility grid connection infrastructure, including:
 - 33 kV cabling between the project components and the facility substation
 - A 132 kV facility substation

Note: The grid connection will be assessed as a part of a separate Basic Assessment Application Process.

- Supporting Infrastructure – The following auxiliary buildings including a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre will be required with basic services including water and electricity. The project requires the need for both temporary and permanent laydown areas.
- Battery storage –The Battery Storage Facility will occupy an area of 4 hectares. The preferred technology is Lithium-ion solid state battery, however, due to the ever changing preferences and improvements to battery technology, the final selection of the type of battery technology to be used will only take place during the detailed design process and after the appointment of the battery supplier.
- Roads – The majority of the access road will follow existing, gravel farm roads that may require widening of 12 m (inclusive of storm water infrastructure). Where new sections of road need to be constructed/lengthened, this will be gravel/hard surfaced access road and only tarred if necessary. A network of gravel internal access roads and a perimeter road of 33 km, each with a width of 12 m, will be constructed to provide access to the various components of the PV development. Access will be obtained via the R709 road.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 3.5 m will be used.

8.4 RECOMMENDATION OF EAP

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

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 EIA Regulations (as amended in 2017) – already approved by the environmental authority.
- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017) – already approved by the environmental authority.
- The EIA process has been conducted as required by the EIA Regulations (as amended in 2017), Regulations 23 and Appendix 3.
- The EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations (as amended in 2017).
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and therefore, no terms of reference are provided for such studies.

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

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

The final recommendation of the EAP is that:

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

- Implementation of the proposed mitigation measures set out in the EMPs (Appendix F)
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMP should not be neglected and a copy of the EMP should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- The required biodiversity walk-throughs must be undertaken prior to construction after which time an Alien Invasive Management Plan must be compiled and sent to this Department for approval prior to construction activities being undertaken.
- The period for which the Environmental Authorisation is required is 10 years (December 2033). This is based on the fact that the project is proposed to be bid as part of the DMRE REIPPP Programme, with there being uncertainty regarding the announcement of the next bidding rounds, and the need for a valid Environmental Authorisation. It must however be noted that the project will also participate in other programs/opportunities to generate power in South Africa, as available. It is anticipated that construction activities will cease within 24 months (December 2035) from the start of the construction activities.

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

Ms. Hanlie Stander

Environamics Environmental Consultants



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