

Basic Assessment Report for Public Review

Proposed Ilanga Emoyeni Grid Connection for the Solar Energy Facility on the Remainder of Farm 3 (Schietkuil) in the Beaufort West Municipality of the Western Cape.

Seriti Green Developments South Africa (Pty) Ltd
Report date: 2023/03/02

DFFE Ref No: TBC

Document control record

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Document Control						
Project name		Proposed Ilanga Emoyeni Grid Connection for the Solar Energy Facility on the Remainder of Farm 3 (Schietskuil) in the Beaufort West Municipality of the Western Cape.				
Document number		TBC	Project number		1002066	
Client		Seriti Green Developments South Africa (Pty) Ltd				
Client contact				Client reference		
Rev	Date	Revision details/status	Author	Reviewer	Verifier (if required)	Approver
0	2022/10/28	Draft BAR for client review	C. Durr	P. Killick		P Killick
1	2023/03/02	Draft BAR for Public Review	ZP. Xakayi	C. Durr	J Chambers	P. Killick
Current revision		1				

Approval			
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NEMA requirements for Basic Assessment Reports

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Appendix 1	Content as required by NEMA	Section/Chapter
3(a)	(i) details of the EAP who prepared the report; and (ii) details of the expertise of the EAP, including a curriculum vitae.	Control sheet, Section 1.2 Annexure A
(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;	Section 5.1 N/A
(c)	a plan which locates the proposed activity or activities applied for 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;	Section, 1.1 and Section 5. Annexure I Chapter 5.4.1 and Annexure F NA
(d)	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Chapter 5 Section 2.2 Chapter 5.
(e)	a description of the policy and legislative context within which the development is proposed including i. an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process; ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Chapter 2
(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;	Section 5.9
(g)	a motivation for the preferred site, activity and technology alternative;	Chapter 6
(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including - (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Chapter 6 Section 4 and Annexure C Section 4.4, Annexure C Chapter 7 Chapter 7.

	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 3.2
	(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;	Chapter 7
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Chapter 7
	(ix) the outcome of the site selection matrix;	Chapter 5
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Chapter 6
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Chapter 6 and Chapter ►
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment 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;	Chapter 7
(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 avoided, managed or mitigated;	Chapter 7
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Chapter 7
(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;	Chapter 8
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Chapter 7
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 8.3
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 1.4
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter ►

(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	NA.
(r)	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Annexure A
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	NA
(t)	any specific information required by the competent authority; and	Email correspondence from the DFFE form part of Annexure B.
(2)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
BFD	Bird Flight Diverter
BLSA	Bird Life South Africa
CAA	Civil Aviation Authority
CBA	Critical Biodiversity Area
CRR	Comments and Response Report
DFFE	Department of Forestry, Fisheries and the Environment
DEA&DP	Department of Environmental Affairs and Development Planning (Western Cape)
DEDEA	Eastern Cape Department of Economic Development and Environmental Affairs
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
ECPHRA	Eastern Cape Provincial Heritage Resources Authority
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMI	Electromagnetic Interference
ESA	Ecological Support Area
GN	Government Notice
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilo Volt
LM	Local Municipality
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystems Priority Areas
NHRA	National Heritage Resources Act (No. 25 of 1999)
NMBM	Nelson Mandela Bay Municipality
NWA	National Water Act (Act 36 of 1998)
NWI	National Wetland Inventory
OHPL	Overhead Powerline (Transmission Line)
PES	Present Ecological State
PPP	Public Participation Process
RMIPPPP	Risk Mitigation Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SACNASP	South African Council for Natural Scientific Professions
SEF	Solar Energy Facility
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SRVM	Sundays River Valley Municipality
ToR	Terms of Reference
WEF	Wind Energy Farm
WULA	Water Use License Application

1 INTRODUCTION

Seriti Green Developments South Africa (Pty) Ltd (henceforth Seriti), formerly Windlab, appointed Zutari (Pty) Ltd (henceforth Zutari) as the independent Environmental Assessment Practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017).

Seriti is applying for Environmental Authorisation (EA) for **three** solar energy facilities (SEF) and an overhead powerline (OHPL) or “gridline” to connect with the National Grid. These projects are situated within a Renewable Energy Development Zone (REDZ) and the strategic transmission corridor or Electrical Grid Infrastructure (EGI) corridor and must undergo an expedited Basic Assessment (BA) process provided for in Government Notice 145 of 2021 (GN145/2021)¹.

The four Basic Assessment (BA) processes are undertaken in terms of regulations 19 and 20 of the 2014 NEMA EIA Regulations (As amended). All processes are run in parallel and share a Public Participation Process (PPP) comment period. The applications are collectively referred to as the Ilanga Emoyeni Solar Suite and are comprised of the following:

- iLanga Emoyeni PV 1 (PV1),
- iLanga Emoyeni PV 2 (PV2),
- iLanga Emoyeni PV 3 (PV3), and the;
- iLanga Emoyeni Gridline applications.

This report deals specifically with iLanga Emoyeni Gridline. Please refer to separate reports for specific details on the other applications.

The BA process entails several phases which are further detailed in Section 3. The purpose of this BAR² is to set out and assess the environmental outcomes, impacts and residual risks of the proposed activity. Accordingly, the BAR includes the following chapters:

- ▶ Section 1 – Introduction, context and overview.
- ▶ Section 2 – Legal framework
- ▶ Section 3 – EIA methodology and description of the BA process
- ▶ Section 4 – Public participation process (PPP) indicating the methodologies used in notifying the potential interested and affected parties (I&APs) and the PPP stages, with estimated dates.
- ▶ Section 5 – Detailed project description and provisional layout with additional details on the project components and requirements.
- ▶ Section 6 – Alternatives. Motivation and description for the approach to alternatives.
- ▶ Section 7 – Baseline description of the environment i.e. the current state of the environment, on-site and surrounds, and assesses the potential impacts on the environment that may be caused by the project.
- ▶ Section 8 – Impact Assessment. This Section provides an Environmental Impact Statement and summarises the outcomes of the impact assessment and key issues identified by the various specialists.
- ▶ Section 9 – Conclusion and recommendations. This Section provides concluding remarks and a way forward in terms of the application for Environmental Authorisation (EA)

¹ Government Notice 145 of 2021 (GN145/2021) - provides for an expedited BA process where renewable and transmission applications (with certain listed activities) are situated within a REDZ or EGI Corridor.

² Appendix 1 of amended EIA Regulations (GN R982) of NEMA lists the content required in a Basic Assessment Report. This has been listed for cross checking purposes on the page preceding the table of contents.

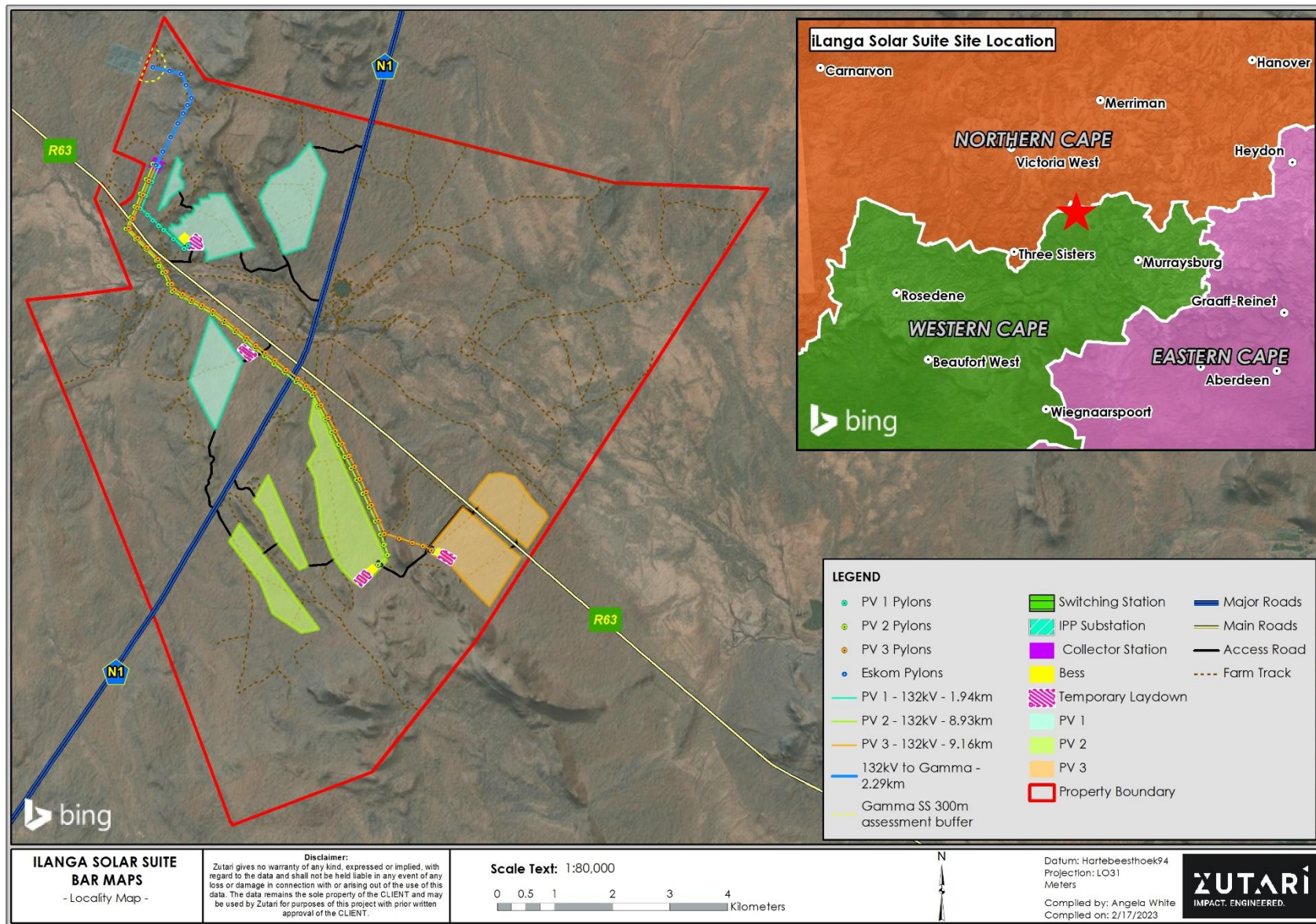


Figure 1-1: Project locality map for the iLanga Emoyeni Solar Suite

1.1 Project Overview

As illustrated in Figure 1-1, the iLanga Emoyeni Solar Suite project is situated on the 8,972ha Skietkuil Holiday Farm (Farm No 3, Schietkuil) at the intersection of the N1 and R63 routes, 40 km northwest of Murraysburg, on the border of the Western and North Cape Provinces, in the Beaufort West Local and Central Karroo District Municipalities. The Site is completely within a Beaufort West Wind and Solar Renewable Energy Development Zone (REDZ11) and the Central Electrical and Gas Infrastructure (EGI) Corridor. Consequently, these applications are required to follow the expedited Basic Assessment (BA) process as provided for in Government Notice 145 of 2021 (GN145/2021). The Department of Forestry, Fisheries and the Environment (DFFE) has been identified as the Competent Authority (CA) as Seriti intends to bid on the project in the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to provide power to the National Grid or pursue private offtake opportunities within the country.

The iLanga Emoyeni Gridline that will connect the proposed iLanga Emoyeni PV1, PV2 and PV3 SEFs with the National Grid will have a total disturbance footprint of **≤16ha** and will include powerlines, switching stations, a collector station and a construction yard, as illustrated in the provisional layout in Figure 1-2.

The homestead, workers' cottages, arable fields and facilities associated with the Skietkuil holiday farm would remain under the landowner's control.

The detailed project description provided in Section 5 on page 39 was disseminated to the ten project specialists and that informed the detailed impact assessment in Section 7 on Page 71. No project alternatives have been identified for assessment in this application (except the no-go option). The motivations for this and the approach taken to determine the project layout are described in section 6 on page 69. In keeping with best practice, for impact assessments, the No Go Alternative (or option) will be comparatively assessed which will assess the impacts should the project not proceed and existing land use remain in effect.

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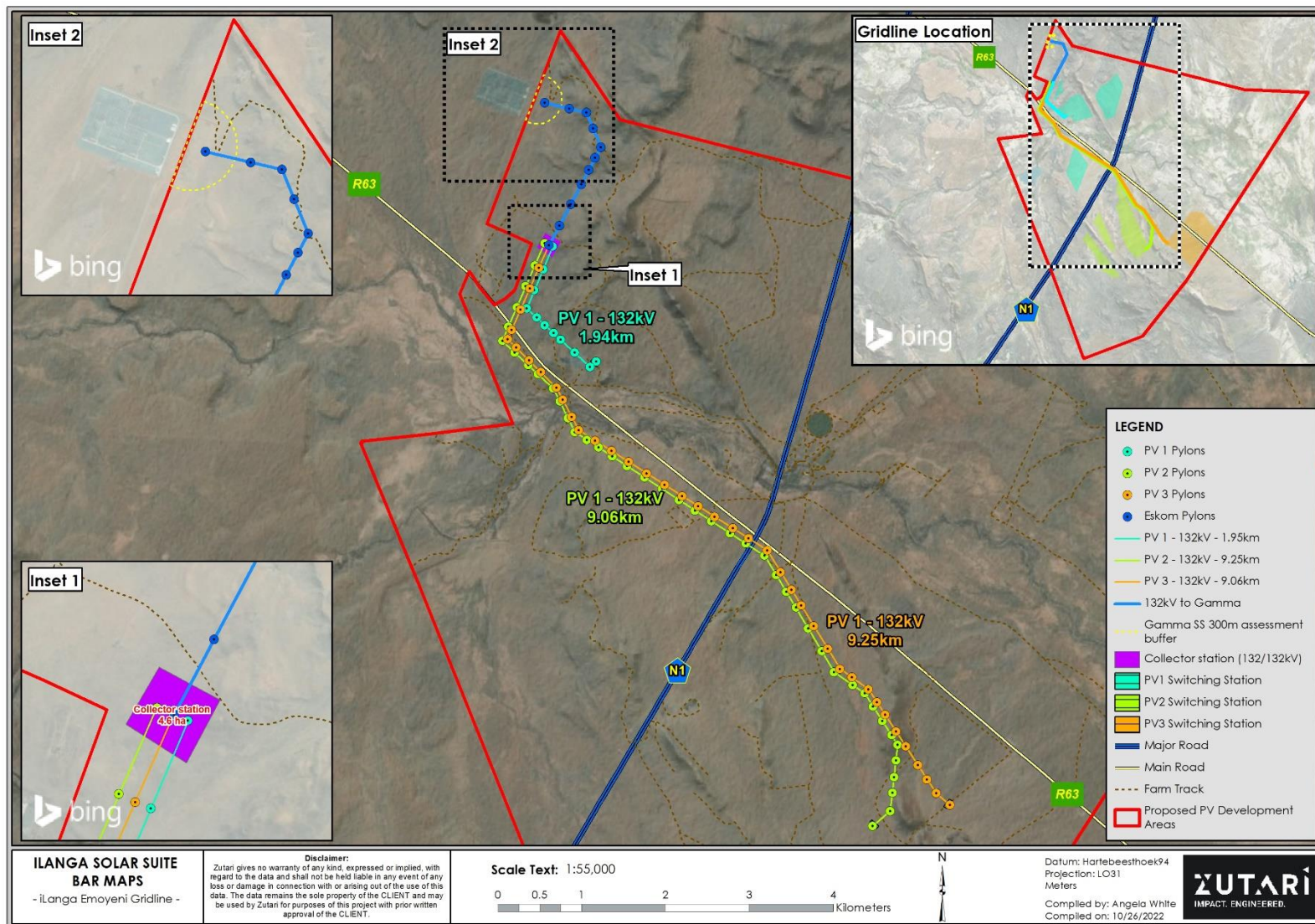


Figure 1-2: iLanga Emoyeni Gridline Infrastructure - Provisional layout

1.2 EIA Project Team

Zutari has selected a team of experienced specialists and multi-disciplinary practitioners to execute this project professionally. Please refer to Table 1-1 for the project team. Full CVs of the EAP and project management team are available in Annexure A. Specialist CVs are included in the respective specialist reports in Annexure D.

Table 1-1: BA Project Team

Role	Consultant	Company
EIA and Project Management		
Project Director	Stephan van den Berg	Zutari
Project Leader & Senior EAP	Patrick Killick	Zutari
Project Staff	Candice Dürr	Zutari
Project Staff	Zinzi Xakayi	Zutari
Sub-consulting Specialists		
Agricultural	Johann Lanz	Johann Lanz Consulting
Avifauna (birds)	Chris van Rooyen	CVRC
Defence	Patrick Killick	Zutari
Freshwater Ecological Assessment	Brian Colloety	EnviroSci
Geotechnical Desktop Assessment	Salona Naido	Zutari
Heritage, Archaeology and Palaeontology	Jayson Orton John Almond	ASHA Consulting NaturaViva
Radio Frequency Interference (RFI)	Callie Fouche	iTC Services
Socio-Economic Assessment	Alex Kempthorne	Urban-Econ
Terrestrial Biodiversity (Fauna and Flora)	Amber Jackson Tarryn Martin	Biodiversity Africa
Visual	Stephen van StadenStead	Visual Resource Management Africa (VRMA)

1.3 Independence

The amended 2014 EIA Regulations under NEMA, provide general requirements for EAPs and specialists to reduce the potential for bias in the environmental process. The first requirement is that the EAP should be independent (Regulation 13(1)(a) of GN R982, as amended).

Neither Zutari nor any of its sub-consultants are subsidiaries of Seriti, nor is Seriti a subsidiary of Zutari. The EAP and Specialists have provided declarations of independence, and these are appended to this report in Annexure J.

1.4 Assumptions, Limitations and Gaps in Knowledge

In undertaking the investigation and compiling the BAR, the following has been assumed:

- ▶ The information provided by the client is accurate and no information that could change the outcome of the BA process has been withheld.
- ▶ The scope of this investigation is limited to assessing the environmental impacts associated with the proposed construction of this PV SEF, as well as the larger iLanga Emoyeni project in terms of cumulative considerations.
- ▶ The BA process is based on Best Practice Guidelines which were available at the time of writing this report.
- ▶ Any requisite permits or authorisations in terms of other legislation will be dealt with by the developer.

Any gaps that have been encountered by the specialists are identified in their respective assessments (Annexure D).

The DFFE, and other authorities, will be requested to provide comments on the project and the BA and associated reports. The assumptions, limitations and gaps in knowledge will not affect the EAPs assessment or findings of the proposed PV SEF.

2 LEGAL AND PLANNING CONTEXT

There are a host of legal and policy documents and guidelines to consider when undertaking such a project. These have been detailed in the sections that follow.

2.1 Relevant Legislation

An overview of the relevant legislation is provided in Table 2-1.

Table 2-1: Legislation considered in the preparation of the BAR

Legal Requirements		
Legislation considered	Relevant Organ of State/authority	Aspect of Project
Astronomy Geographic Advantage (Act 21 of 2007)	Department of Science & Technology transitioning to the Department of Science and Innovation and the Square Kilometre Array (SKA)	Electromagnetic interference (EMI), also called radio-frequency interference (RFI) when in the radio frequency spectrum, is a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction. This aspect is of importance to the Radio telescopes associated with the Square Kilometre Array (SKA). According to the DFFE Screening Tool, the site is in a medium to low sensitive rating area at the edge of the Karoo Central Astronomy Advantage Area (KCAAA). Consequently, an RFI specialist has been commissioned and the report is appended as Annexure D.8.
Aviation Act (74 of 1962)	Civil Aviation Authority (CAA)	Tall electrical infrastructure can interfere with radio navigation equipment or present potential physical obstacles. The DFFE Screening tool identifies the area as a low-sensitivity site from an Aviation perspective and, per the "Protocol for The Specialist Assessment and Minimum Report Content Requirements For Environmental Impacts on Civil Aviation Installations" (GN 320 of 20 March 2020) no further assessment is necessary.
Conservation of Agricultural Resources Act, Act No. 43 of 1983 (CARA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to ensure that the natural agricultural resources of South Africa are conserved through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of water sources, protecting vegetation, and combating weeds and invader plants. As such, as part of the BA process, recommendations will be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. The Proponent together with the relevant farmers should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the regulation that may pose a problem because of the proposed project.

Environmental Conservation Act, Act No. 73 of 1989 (ECA)	Department of Forestry, Fisheries, and the Environment (DFFE)	Noise impacts associated with solar plants are generally confined to the construction phase and low-level noise “humming” during operation. In terms of section 25 of the ECA, the national Noise Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCR) were promulgated. The NCRs were revised under Government Notice Number R55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Currently, no approval is required. Mitigation measures are included in the EMPr.
Mineral and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA)	Department of Mineral Resources (DMR) transitioning to the Department of Mineral Resources and Energy (DMRE)	<p>The project is located in a shale gas area. Section 53 of the MPRDA, states that any person who intends to use the surface of any land in a manner which may be contrary to the objectives of the MPRDA or is likely to impede such objects must apply to the Minister for approval in the prescribed manner. While the solar facilities are unlikely to sterilise the possibility of shale gas exploration or extraction DMRE and existing licence holders for the Karoo shale gas licence areas 12/3/219 ER and 12/3/220 ER have been included as I&APs.</p> <p>As per the requirements of the MPRDA, all mining activities, including the extraction of material from borrow pits and quarries also require authorisation from DMRE. No mining permits for borrow pits have been included in this application however should the development go ahead and borrow pits are required, the appropriate approvals in terms of the MPRDA would need to be sought from the DMR.</p>
National Environmental Management Act, Act No. 107 of 1998 (NEMA), as amended	Department of Forestry, Fisheries, and the Environment (DFFE)	Several listed activities in terms of NEMA GN No R983 and R985 in the Government Gazette of 4 December 2014 (as amended on 7 April 2017), have been triggered and need to be authorised for the proposed project (also see Table 2-2). Based on the listed activities triggered, the application for environmental authorisation will follow the BA process as set out in Regulations 19-20 of GN R982.
National Environmental Management: Air Quality Act (39 of 2004)	Western Cape Government: Department of Environmental Affairs and Development Planning (DEA&DP)	The Act aims to regulate and protect the environment by providing reasonable measures for the prevention of air pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and matters incidental thereto. No activities are envisaged that would require an Atmospheric Emissions License

		Specific to the project are the regulations about the control of fugitive noise and dust emissions that may arise from the project activities.
National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEMBA)	Department of Forestry, Fisheries, and the Environment (DFFE)	The act calls for the management of all biodiversity within South Africa. Sections of the proposed footprint fall within areas of medium sensitivity. Although the Eastern Upper Karoo and Upper Karoo Hardeveld vegetation types are listed as Least Concern in terms of conservation, the vegetation remains largely intact. The site contains indigenous vegetation and at least one critically endangered species. See 7.2 for the terrestrial ecology impact assessment summary.
National Environmental Management: Waste Act (Act 59 of 2008)	Western Cape Government: Department of Environmental Affairs and Development Planning (DEA&DP) (for general waste), DFFE (for hazardous waste) and Municipalities and their registered landfill and Waste Management facilities	<p>The Act aims to regulate waste management to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement, and to provide for matters connected therewith.</p> <p>The project would not trigger any waste management activities requiring a permit but must manage solid hazardous and domestic waste streams in phases of the project and wastes must be handled, stored and disposed of in a manner that is consistent with the provisions of this legislation.</p>
National Forests Act (84 of 1998), as amended (NFA)	Department of Forestry, Fisheries and the Environment (DFFE)	There are 47 protected tree species in terms of the NFA, that may not be cut, destroyed, damaged or removed unless a permit has been granted by the DFFE. To date, no protected tree species have been identified on the site.
National Heritage Resources Act, Act No. 25 of 1999 (NHRA)	South African Heritage Resources Agency (SAHRA), and Heritage Western Cape (HWC).	Section 38 of the NHRA is applicable since the DFFE screening tool indicates a high archaeological and cultural heritage theme sensitivity. As such, a Heritage Impact Assessment and Palaeontological Assessment (Appendix D) have been undertaken as required by the NHRA. Comment on the project will be obtained from Heritage Western Cape during the PPP and appropriate mitigation measures have been included in the BAR and EMPr.
National Protected Areas Expansion Strategy (2008) (NPAES) & National Environmental	Department of Forestry, Fisheries and the Environment (DFFE)	The NPAES for South Africa sets out targets for protected area expansion, identifies possible expansion areas and recommends a mechanism for protected area expansion. Protected areas in terms of the NEM: PAA are considered 'formal' protected areas in terms of the NPAES. The NPAES further identifies

Management: Protected Areas Act (Act 57 of 2003) (NEM: PAA)		<p>'National Parks', 'informal protected areas' and 'focus areas'.</p> <p>The proposed development does not intersect with any of the identified NPAES areas and is not located within 10km of any registered Protected or Conservation area.</p>
National Road Traffic Act, Act No. 93 of 1996 (NRTA)	Western Cape Department of Transport and Public works	Certain vehicles and loads cannot be moved on public roads without exceeding the limitations in terms of the dimensions and/or mass as prescribed in the Regulations of the NRTA. SANRAL and the Western Cape roads department will be provided with an opportunity to review and comment on this BA process.
National Veld and Forest Fire Act (101 of 1998)	Department of Forestry, Fisheries and the Environment (DFFE)	<p>The purpose of the Act is to prevent and combat veld, forest and mountain fires throughout South Africa. The Act applies to the open countryside beyond the urban limit and puts in place a range of requirements. Fire protection has been considered in the EMPr. The Act sets out the responsibilities of landowners or persons in control of the land which include:</p> <ol style="list-style-type: none"> 1. prepare firebreaks on their side of the boundary if there is a reasonable risk of wildfire 2. have such equipment, protective clothing and trained personnel for extinguishing fires as are: 3. prescribed (in the regulations) 4. if there are no regulations, reasonably required in the circumstances 5. take all reasonable steps to notify the FPO of the local FPA (if there is one) when a fire breaks out 6. do everything in their power to stop the spread of the fire.
National Water Act, Act No. 36 of 1998 (NWA)	Department of Water Affairs and Sanitation (DWS)	Section 21 of the NWA recognises water uses that require authorisation by DWS before commencement. Several freshwater features are located in and around the study area and the impact on these is considered in the freshwater impact assessment (Appendix D). Certain infrastructure may be located close to a defined watercourse and within the 500m, GN 509 zone of regulation and authorisation in the form of either a General Authorisation or Water Use License Application (WULA) may be required. The information required by the DWS for commenting purposes has been included in the aquatic ecology assessment in Appendix D. No water use may begin without the appropriate authorisation. The project may constitute the following water uses in terms of Section 21 of the Act:

		<p>(a) Abstraction of water from boreholes and rivers or dams;</p> <p>(b) Storage of water (dams or reservoirs);</p> <p>(c) Impeding or diverting flows when construction occurs within a watercourse or 500m of a wetland;</p> <p>(g) Storage of domestic waste in conservancy tanks; and</p> <p>(i) Alteration of the bed or banks of a watercourse of any activities within 500m of a wetland.</p> <p>The information in the freshwater specialist's report would inform any future Water Use Licence Applications (WULA).</p>
Subdivision of Agricultural Land Act (70 of 1970) (SALA)	Department of Agriculture, Land Reform and Rural Development (DALRRD)	The purpose of this Act is to control the subdivision and, in connection therewith, the use of agricultural land. While most of the land for SEF purposes would not require subdivision and would work on a long lease basis, substations or electrical infrastructure forming part of the national grid may require subdivision and rezoning. Subdivision applications should be made to DAFF to allow for long-term leases, the subdivision or rezoning of agricultural land, as well as other prohibited actions in terms of the Act. If required, an application will be submitted to DAFF for authorisation following the conclusion of the BA process. DAFF has been included in the BA process to obtain comments and in principle consent as part of the BA process.
The National Energy Act, Act No. 34 of 2008	Department of Energy (DoE)	The REIPPPP is guided by the National Energy Act, one of the purposes of which is to promote the sustainable development of renewable energy infrastructure.
Western Cape Biodiversity Spatial Plan (2017) (WCBSP)	<p>CapeNature</p> <p>South African National Biodiversity Institute (SANBI)</p> <p>Western Cape Government: Department of Environmental Affairs and Development Planning (DEA&DP)</p>	A systematic biodiversity planning product with the main purpose of ensuring that the most recent and best quality spatial biodiversity information can be accessed and used to inform land use and development planning, environmental assessments and authorisations, natural resource management and other multi-sectoral planning processes. Baseline spatial information for the project was obtained from the WCBSP and considered, where required, within the specialist assessments.
Western Cape Land Use Planning Act (3 of 2014) (LUPA)	Beaufort West Local Municipality	Should the proposed development go ahead the appropriate subdivision, rezoning or consent use applications in terms of LUPA must be undertaken with the Beaufort West Local Municipality.
Western Cape Land Use Planning Act (3 of 2014) (LUPA)	CapeNature	Should the proposed development go ahead, and protected plant species have been identified for removal, the necessary permits for such removal must be obtained from CapeNature.

2.2 Listed Activities in terms of NEMA

NEMA is the primary legislation tasked with the management of environmental resources and, accordingly, identifies activities that require authorisation prior to commencement. The two alternatives considered in this EIA process trigger different activities listed in the amended 2014 EIA Regulations (GN R982, as amended). These activities are detailed in Table 2-2 (preferred alternative).

Table 2-2: Listed activities triggered by the preferred alternative for the proposed project

Activity No(s):	Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of how the proposed project is applicable to the listed activity relates.
GN R983 Activity 11	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; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;	The proposed grid connection will consist of a 132 kilovolt (kV) overhead powerline. The power line will run within a rural and agricultural area. This would connect up to three collector substations with the Gamma MTS.
GN R983 Activity 12	The development of (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	A few drainage lines are scattered across the proposed property and one or more roads and / or other infrastructure will cross these lines and be within 32 m thereof.
GN R983 Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;	The infilling or depositing of any material of more than 10 m ³ into a watercourse will likely be triggered with the construction of internal service roads across drainage lines as well as the widening of the existing access road which crosses numerous small drainage lines.
GN R983 Activity 24	The development of a road - (ii) a road with a reserve wider than 13.5 metres, or where no reserve exists where the road is wider than 8 metres; but excluding a road - (c) which is 1 kilometre or shorter	Permanent roads of sufficient width (~6 to 10 m) for delivery and construction vehicles will be required for the proposed project. While existing roads would be used as far as possible new sections of roads will be required in a few locations and will be over 1 kilometre in length.
Activity No(s):	Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Description of how the proposed project is applicable to the listed activity relates.
GN R985 Activity 4	The development of a road wider than 4 metres with a reserve of less than 13,5 meters. i. Western Cape, ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation;	The construction of a road wider than 4m with a reserve of less than 13.5m (no reserve) will be required outside the urban area and within an area containing indigenous vegetation, as the existing access roads may need extension or widening in some places.
GN R985 Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation i. Western Cape ii. Within critical biodiversity areas identified in bioregional plans;	The clearance of more than 300 m ² of indigenous vegetation will be required for the project, since the disturbance footprint will be ≤16ha. Areas designated as Critical Biodiversity Areas fall within the project evaluation envelope.
GN R985 Activity 14	The development of —	Associated infrastructure (e.g., fencing, substation, transmission lines, roads etc) will be

	<p>(xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>i. Western Cape,</p> <p>i. Outside urban areas:</p> <p>(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>located within or within proximity to a watercourse.</p> <p>The project may be located in areas designated as Critical Biodiversity Areas. TBD at final layout.</p>
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In GN 2313 of 27 July 2022 the Department of Forestry, Fisheries and the Environment has developed the Standard for the Development and Expansion of Power Lines and Substations within Identified Geographical Areas based on two Strategic Environmental Assessment processes undertaken for the development of Electricity Grid Infrastructure in South Africa. The standard exempts the need to obtain environment authorisation where activities 11 or 47 of Listing Notice 1 and/or activity 9 of Listing Notice 2, and any listed or specified activity in Listing Notice 1, 2 or 3 and necessary for the realisation of such infrastructure, are triggered. However, the exemption does not apply where (1) any part of the infrastructure occurs on an area for which the environmental sensitivity for any environmental theme is identified as being very high or high by the national web-based environmental screening tool and confirmed to be such through the application of the procedures set out in the Standard. The DFFE Screening tool report identifies that the proposed powerline would cross Very high and High sensitivity areas and thus the exemption does not apply. Thus, in terms of GN113, the application is following the Basic assessment procedure as set out in the EIA Regulations (2014) but qualifies for a shortened decision-making timeframe of 57 days.

2.2.1 DFFE Screening Tool

Government Notice 960, gazetted on 05 July 2019, in accordance with the NEMA EIA Regulations 2014 (as amended) requires that a National web-based environmental screening tool is used to produce a report that should be submitted with an EA application to the DFFE from 05 October 2019.

This report shows, on a high level, the site's sensitivity to transmission line development based on different environmental themes (including, inter alia, terrestrial ecology, avifauna and heritage) and identifies assessment protocols that must be undertaken depending on the environmental theme's sensitivity rating within the development site. These have informed the selection of specialists commissioned for the project.

Assessment protocols that set out the "procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of the national environmental management act, 1998, when applying for environmental authorisation" were Gazetted on 20 March 2020. These protocols in terms of reporting of the identified environmental themes were met in terms of NEMA. The Screening Tool report is attached in Annexure E.

2.3 Relevant Policies and Guidelines

South Africa's Constitution (1997), together with the three policies indicated in Figure 2-1 below, have been key in developing South Africa's renewable energy industry. The white paper on renewable energy applies to this project.

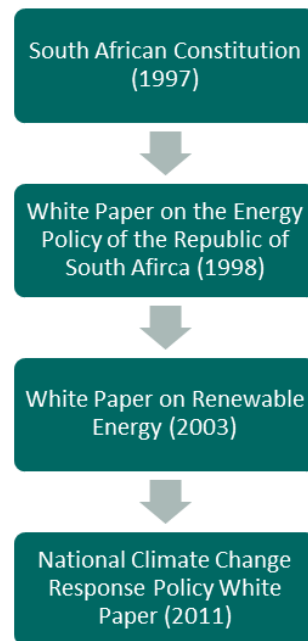


Figure 2-1: Key policies for initiating renewable energy in South Africa.

2.4 Relevant Guidelines

This BA process is informed by the series of national Environmental Guidelines where applicable and relevant:

- ▶ EIA Guideline for Renewable Energy Projects (DEA, 2015).
- ▶ Integrated Environmental Information Management (IEIM), Information Series 5: Companion to the NEMA EIA Regulations of 2010 (DEA, 2010).
- ▶ IEIM, Information Series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT), 2002).
- ▶ IEIM, Information Series 3: Stakeholder Engagement (DEAT, 2002).
- ▶ IEIM, Information Series 4: Specialist Studies (DEAT, 2002).
- ▶ IEIM, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004).
- ▶ IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004).
- ▶ IEM Guideline Series 7: Public Participation in the Environmental Impact Assessment Process (DEA, 2012)
- ▶ Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, Pretoria, South Africa (DFFE, 2017)

The following guidelines from the Department of Environmental Affairs and Development Planning (Western Cape) (DEA&DP) were also taken into consideration as best-practice:

- ▶ Guideline for involving biodiversity specialists in EIA process (Brownlie. 2005).
- ▶ Guideline for involving heritage specialists in the Environmental Impact Report process (June Winter & Baumann, 2005).
- ▶ Guideline for involving visual and aesthetic specialists in the Environmental Impact Report process (Oberholzer.2005).
- ▶ Guideline for Environmental Management Plans (Lochner, 2005).
- ▶ Guideline for determining the scope of specialist involvement in EIA Processes (2005).
- ▶ Guideline for the review of specialist input into the EIA Process (June 2005).
- ▶ Guideline on Alternatives, EIA Guideline and Information Document Series. (DEA&DP, 2011).
- ▶ Guideline on Need and Desirability, EIA Guideline and Information Document Series. (DEA, 2012).

- ▶ Guideline on Public Participation, EIA Guideline and Information Document Series. (DEA&DP, 2011).
- ▶ Western Cape Land Use Planning Guidelines, 2019 (DEA&DP, 2019)

3 EIA PROCESS AND METHODOLOGY

The formal BA process is outlined in Figure 3-1 with the stipulated timeframes. The formal BA process commences with the submission of the Application form and is immediately followed by the 30-day comment period on the draft BA. A description of the activities which have been, and will be, undertaken during each phase is provided in the following sections.

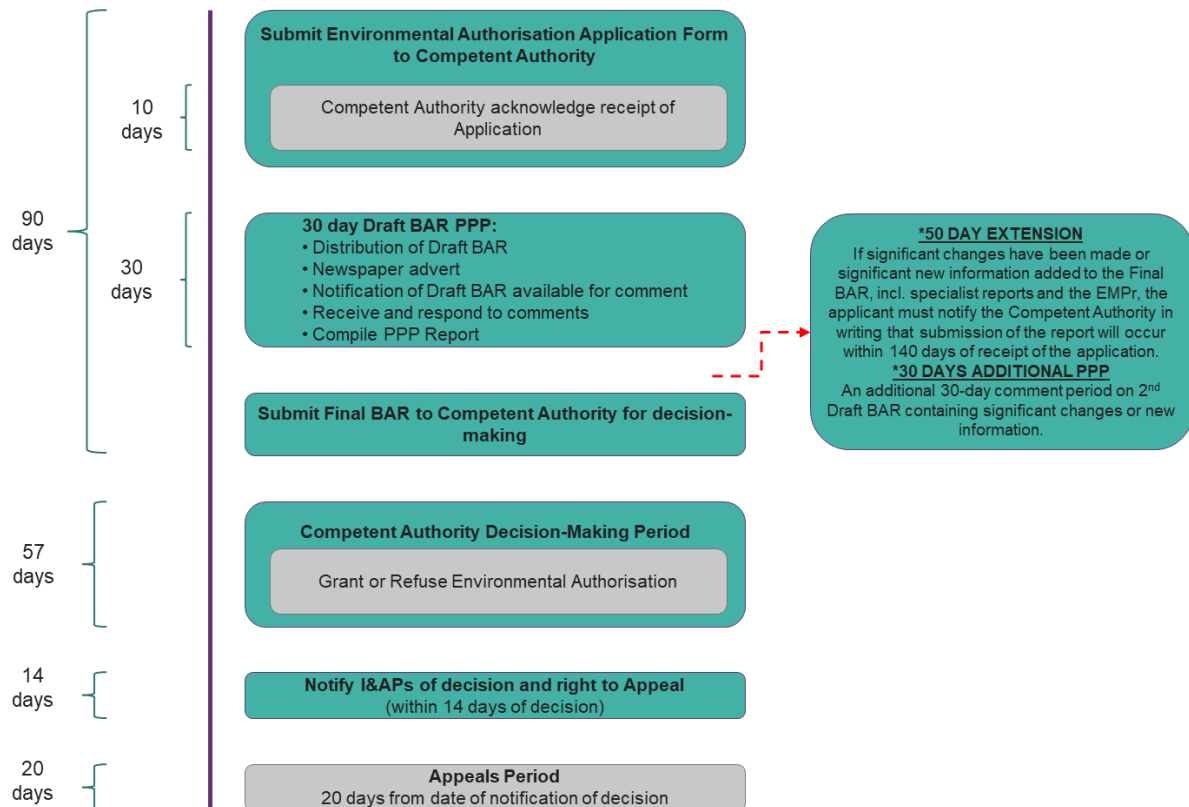


Figure 3-1: The BA process in terms of NEMA.

As illustrated in Figure 3-1, only one stage of public participation is included in a BA process, i.e. comment period on the Draft BAR. More information on the Public Participation Process (PPP) is included in Section 4.

3.1 Phases of the BA Process

3.1.1 The Pre-application meeting with DFFE

A pre-application meeting was undertaken on 14 June 2022, firstly, to confirm and agree on the activities triggered and which EIA process is required and, secondly, to confirm the list of specialist assessments required for the application. The iLanga Emoyeni Solar Suite project was discussed with the DFFE and it was agreed that four separate BA processes with a combined PPP would be acceptable. The proposal to conduct these applications as an “envelope” approach was discussed, whereby Zutari explained to the DFFE that the applicant has identified areas within Farm 3 which will be acceptable for the development of the solar facilities. Essentially there would be three separate applications for three separate footprints and a fourth application for the grid connection infrastructure. The layout within those SEF footprints would not be fixed at this stage of the design process. In terms of the project description

and impact assessment, Zutari and the specialists would assess a worst-case scenario layout which is to be defined by the respective specialist fields.

DFFE confirmed that BA processes must be followed since the PV SEFs are within a REDZ area.

All correspondence with the DFFE, including the notes of the pre-application meeting, are attached in Annexure B.

3.1.2 Screening phase

The Applicant wanted to understand the environmental constraints of the site to inform the provisional layout and project design. A screening exercise was undertaken by the various project specialists, which entailed:

1. Specialists undertook desktop and site visits (where necessary) to ground truth the site DFFE sensitivity report and map the site features and areas.
2. Specialists identified and mapped all sensitive features and areas of the site and provided suitable buffers for these areas/features and all the sensitive areas (including buffers) were categorised into one of the following sensitivity categories, Very High, High, Medium, Low or not sensitive (or uncategorised). With notes regarding
3. The Applicant used the screening information from the specialists to identify suitable development areas on the site, avoiding areas or features of very high and high sensitivity as far as possible and designed the provisional layout for assessment with a revised project description (referred to as a design freeze). Finally, the applicant negotiated the alignment of the Gridline with the landowner when reaching the preferred alternative. Refer to Section 5 for the revised project description and provisional layout.
4. An iterative approach has been used to identify a preferred alternative layout / alignment. It has been informed by specialist, technical and landowner constraints. While there were earlier layout alternatives, these are not carried into the Basic Assessment for assessment as alternatives as they were discarded for a reason and in favour of a refined or preferred alternative

3.1.3 The pre-application Phase of the draft BAR

To ensure the public and authorities have ample opportunity to input and comment on the project and BAR, and ensure that the Applicant has sufficient time to deal with possible substantive comments / issues and consider and incorporate resultant changes to the project layout and design, the Applicant has elected to undertake a voluntary pre-application phase. This phase takes place before the submission of the application form and the commencement of the formal BA process shown in Figure 3-1. The following activities were undertaken in the pre-application phase:

1. Specialists undertook site visits and environmental monitoring (Avifauna and terrestrial biodiversity) to collect data for and understand the baseline environmental conditions and to verify the site sensitivity as compared with the DFFE screening report.
2. Following the screening phase, a provisional project layout and description were provided to the specialists who have assessed (see the project description and layout in section 5) and presented their findings in the assessments in Section 7.
3. A pre-application draft of BAR and EMPr has been compiled to consolidate the information and has been made available for public review and comment. The pre-application draft BAR will also be sent to the relevant authorities and key stakeholders for comment.
4. A comment and responses report will be produced and circulated with a draft BAR in the second comment period. The comments and responses report will form part of the formal PPP record and will be submitted to the DFFE with the final BA, together with any additional comments received in the formal BA phase.

5. Where required, the project layout and description and the BAR and associated documents (including specialist reports) will be updated or changed to reflect the comments received.

Summary of the key dates of the pre-application draft BAR process:

- 1 Site visit – July and August 2022
- ▶ PP Plan approved by DFFE (14 June 2022)
- ▶ Placement of Site notices - 28 November 2022
- ▶ Advertisement in Die Courier and Die Burger Newspapers – 28 November 2022
- ▶ Lodging a hard copy of the Draft BAR at the Murraysburg public library and making a digital copy available online via Google Drive – 28 November 2022
- ▶ Notification of potential I&APs, affected landowners, neighbouring landowners and state departments of availability of the Draft BAR for review and comment – 28 November 2022
- ▶ Last day to submit a comment on Draft BAR – 19 January 2022

3.1.4 Basic Assessment Phase

The objective of the basic assessment process are to, through a consultative process -

- a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- b) identify the possible feasible and reasonable alternatives, including the activity, location, and technology alternatives;
- c) describe the need and desirability of the proposed project and alternatives;
- d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of the impact of the proposed activity and technology alternatives on these aspects to determine –
 - i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and;
 - ii) 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;
- e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to i) identify and motivate a preferred site, activity and technology alternative;
 - i) identify suitable measures to avoid, manage or mitigate identified impacts; and
 - ii) identify residual risks that need to be managed and monitored.

Various methods and sources were utilised to identify the potential social and environmental aspects associated with the proposed project and to develop the ToRs for the specialist studies. The sources of information for the preparation of this report include, inter alia, the following:

- ▶ Collection of information specific to the project, as provided by the Applicant;
- ▶ Project description;
- ▶ Basic methodology for the construction of the various project components;
- ▶ Basic methodology during operations and decommissioning;
- ▶ The expected timeframe for project development;
- ▶ Maps and figures, outlining the proposed facilities;
- ▶ Technical descriptions relating to the function and layout of project components;
- ▶ Other relevant BARs/ EIRs prepared for BAs/EIAs undertaken in the area;

- ▶ Environmental baseline literature and desktop spatial surveys for this site and surrounding areas;
- ▶ Environmental baseline surveys for this site and surrounding areas from site visits by specialists;
- ▶ Consultation with the project team (including specialists); and
- ▶ Consultation with I&APs, including authorities.

An application form for the project will be submitted to DFFE (to register the project on the Department's database) along with the revised draft BAR which will be circulated for a further 30-day public comment period. All additional comments received will be recorded and responded to in a Comments and Response Report (Annexure C), and the BAR will be updated to address I&AP comments, where appropriate. The final BAR will be submitted to DFFE for decision-making, with the final BAR being submitted no later than 90 days from the receipt of the application form. The competent authority must then decide within 57 days of receipt of the final BAR and EMP, in writing –

- (a) Grant environmental authorisation in respect of all or part of the activity applied for; or
- (b) Refuse environmental authorisation.

Summary of the key dates of the formal BAR process:

- ▶ Lodging a hard copy of the Draft BAR at the at the Murraysburg public library and making a digital copy available online via Google Drive – January 2023
- ▶ Notification of potential I&APs, affected landowners, neighbouring landowners and state departments of availability of the Draft BAR for review and comment – end January 2023 (TBD)
- ▶ Last day to submit comment on Draft BAR – end February 2023 (TBD)
- ▶ Submit Final BAR to DFFE – March 2023 (TBD)
- ▶ DFFE provide decision on application – 57-days from date of submission of Final BAR to issue decision.
- ▶ Notification of registered I&APs of DFFE decision and appeal process – upon receipt of DFFE decision.

3.2 Methodology

3.2.1 Specialist Assessments

To provide a scientific assessment that is transparent and robust, a clear methodology is required. Although each specialist required a methodology that was specific to their investigation (detailed in their reports in Annexure D), they were each given the following Terms of Reference (ToR):

- ▶ Undertake a site investigation to determine the status quo and identify any sensitive features or no-go areas;
- ▶ Provide shapefiles of all sensitive features;
- ▶ Assess all impacts associated with the proposed project and the no go alternative;
- ▶ Make use of the Zutari Impact Assessment Methodology (explained below in Section 3.2.2) when assessing the impacts of the proposed project, as well as cumulative impacts (detailed below in Section 3.2.3);
- ▶ Provide a detailed description of appropriate mitigation measures that can be adopted to reduce or avoid negative impacts and improve positive impacts for each phase of the project. Indicate the level of significance of impacts pre- and post-mitigation;
- ▶ Provide a summary of succinct and practical recommendations based on mitigation measures identified to form the basis of environmental authorisation requirements, should the development be authorised;
- ▶ Comply with the content requirements for specialist reports listed in Appendix 6 of the 2014 EIA Regulations (GN R982 of 2014). (These have been updated where required to consider the amendments made to the Regulations on 7 April 2017); and

- Comply with procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for environmental authorisation (GN R320, of 20 March 2020).

3.2.2 Assessment Methodology

This section outlines the proposed method for assessing the significance of the potential environmental impacts. For each predicted impact, criteria are ascribed, and these include the intensity (size or degree scale), which also includes the type of impact, being either a positive or negative impact; the duration (temporal scale); and the extent (spatial scale), as well as the probability (likelihood). The methodology is quantitative, whereby professional judgement is used to identify a rating for each criterion based on a seven-point scale (refer to Table 3-1); and the significance is auto-generated using a spreadsheet through the application of the calculations in Table 3-2. Specialists can comment where they disagree with the auto-calculated impact significance rating.

Calculations

For each predicted impact, certain criteria are applied to establish the likely **significance** of the impact, firstly in the case of no mitigation being applied and then with the most effective mitigation measure(s) in place.

These criteria include the **intensity** (size or degree scale), which also includes the **type** of impact, being either a positive or negative impact; the **duration** (temporal scale); and the **extent** (spatial scale). These numerical ratings are used in an equation whereby the **consequence** of the impact can be calculated. Consequence is calculated as follows:

$$\text{Consequence} = \text{type} \times (\text{intensity} + \text{duration} + \text{extent})$$

To calculate the significance of an impact, the **probability** (or likelihood) of that impact occurring is applied to the consequence.

$$\text{Significance} = \text{consequence} \times \text{probability}$$

Depending on the numerical result, the impact would fall into a significance category as negligible, minor, moderate or major, and the type would be either positive or negative.

Table 3-1: Calculation of significance

Table 3-2: Assessment criteria for the evaluation of impacts

Criteria	Numerical Rating	Category	Description
Duration	1	Immediate	Impact will self-remedy immediately
	2	Brief	Impact will not last longer than 1 year
	3	Short term	Impact will last between 1 and 5 years
	4	Medium term	Impact will last between 5 and 10 years
	5	Long term	Impact will last between 10 and 15 years
	6	On-going	Impact will last between 15 and 20 years
	7	Permanent	Impact may be permanent, or in excess of 20 years
Extent	1	Very limited	Limited to specific isolated parts of the site
	2	Limited	Limited to the site and its immediate surroundings
	3	Local	Extending across the site and to nearby settlements
	4	Municipal area	Impacts felt at a municipal level
	5	Regional	Impacts felt at a regional level
	6	National	Impacts felt at a national level
	7	International	Impacts felt at an international level
Intensity	1	Negligible	Natural and/ or social functions and/ or processes are negligibly altered

Criteria	Numerical Rating	Category	Description
	2	Very low	Natural and/ or social functions and/ or processes are slightly altered
	3	Low	Natural and/ or social functions and/ or processes are somewhat altered
	4	Moderate	Natural and/ or social functions and/ or processes are moderately altered
	5	High	Natural and/ or social functions and/ or processes are notably altered
	6	Very high	Natural and/ or social functions and/ or processes are majorly altered
	7	Extremely high	Natural and/ or social functions and/ or processes are severely altered
Probability	1	Highly unlikely / None	Expected never to happen
	2	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	Probable	Has occurred here or elsewhere and could therefore occur
	5	Likely	The impact may occur
	6	Almost certain / Highly probable	It is most likely that the impact will occur
	7	Certain / Definite	There are sound scientific reasons to expect that the impact will definitely occur

When assessing impacts, broader considerations are also taken into account. These include the level of confidence in the assessment rating; the reversibility of the impact; and the irreplaceability of the resource as set out in Table 3-3, Table 3-4, and Table 3-5, respectively.

Table 3-3: Definition of confidence ratings

Category	Description
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 3-4: Definition of reversibility ratings

Category	Description
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 3-5: Definition of irreplaceability ratings

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

3.2.3 Assessment of Cumulative Effects

Cumulative effects are commonly understood to be impacts from different projects that combine to result in significant change, which could be larger than the sum of all the individual impacts. Two approved solar PV facilities have been identified within 30km of the site, a 19MW facility on the Farm Biesjesfontein 270, on the R63 near Victoria West (20 km Northwest of the iLanga Project) and 20 MW Biesiepoort PV Facility (8km west of the iLanga site). In addition, specialists are asked to also consider the other iLanga Solar Suite projects and the existing Eskom powerlines and substations in the cumulative assessment (see Figure 3-2). Impacts contributing to such cumulative impacts are found in Section 7 of this BAR.

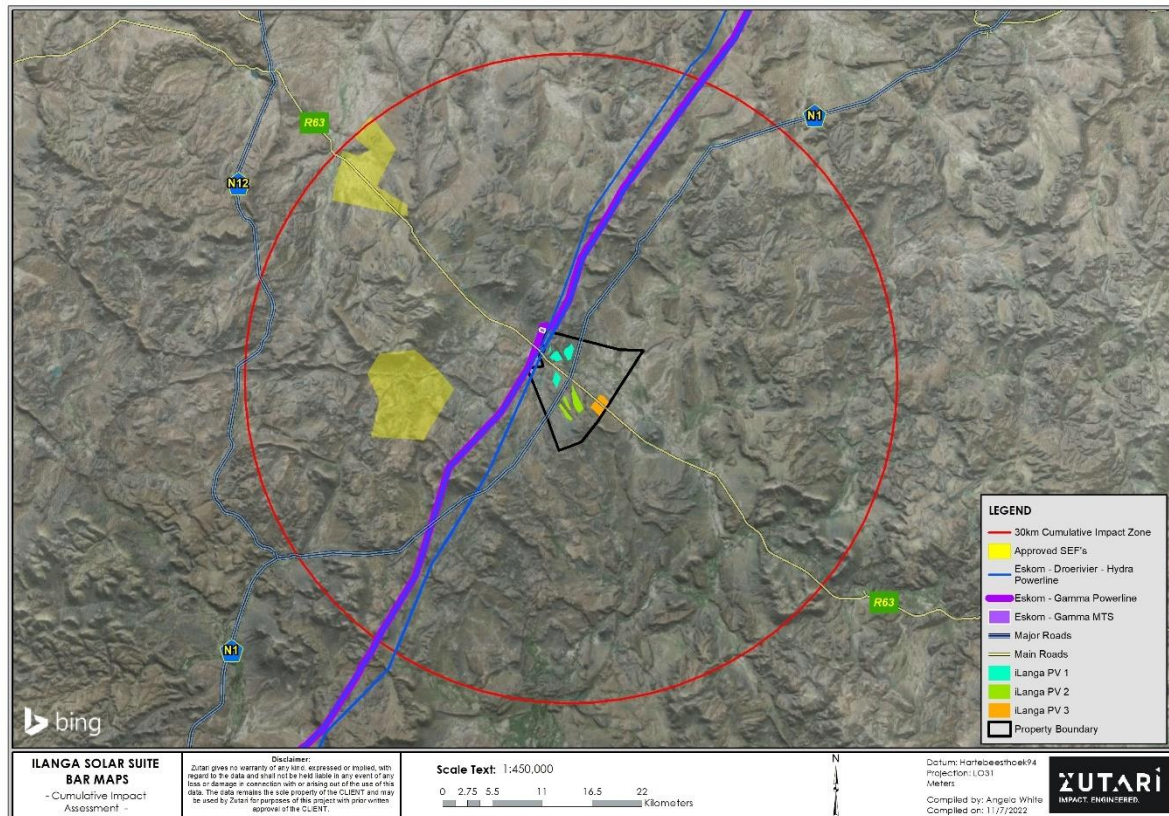


Figure 3-2: Cumulative impact assessment

The Western Cape Province Department of Environmental Affairs and Development Planning (DEA&DP) submitted a comment on the Pre-Application Basic Assessment Report (BAR) as it relates to the cumulative assessment for the proposed iLanga PV1, PV2 and PV3.

In its comment, the DEA&DP noted that the avifaunal impact assessment specifically stated that approved solar as well as wind energy projects within a 30km radius of the iLanga projects were considered in the cumulative impact assessment. The DEA&DP stated that the Draft BAR and all specialist studies must identify and provide a cumulative impact assessment for all types of renewable energy projects within a 30km radius of the proposed iLanga projects. The specialists have considered the DEA&DP's comment and confirmed that expanding the list of projects to include all renewable energy project types in the cumulative assessment would have no material impact on the outcome of the cumulative assessment already presented. A statement in this regard has been appended to the back of each specialist report in Annexure D.

4 PUBLIC PARTICIPATION

PPP is a broad, inclusive and continuous process of communication between a Proponent of a project, and those potentially affected by the activities of the proposed development. This can include a wide range of activities that are relevant to the entire life of a project. During the BA process, the aim is to provide an opportunity for stakeholders to be (1) informed of projects occurring in their area which may affect them directly or indirectly and (2) provide an accessible and meaningful opportunity for people to ask questions, raise concerns or grievances and (3) to ensure that these are used to guide the new development, and planned operations, in a responsible manner that complements the local socio-economic environment, reduces environmental impact and enhances the benefits of the project.

South African legislation and guidelines (refer to Section 2) have formalised the Public Participation Process (PPP) for BA. PPP forms an integral component of this process and enables interested and affected parties (I&APs) to identify issues, and concerns, and make suggestions during the BA process. This PPP is structured to provide I&APs with the opportunity to learn about the proposed project, to provide input through the review of documents/ reports, and to voice any issues of concern at various stages throughout the BA process. These stages are described below.

Proof of Public Participation actions and documents are included in Annexure C and will be added to as the project proceeds.

4.1 Public Participation Process

A combined Public Participation Process (PPP) will be run for the iLanga Solar Suite projects. The iLanga Solar Suite is comprised of the iLanga Emoyeni PV1, iLanga Emoyeni PV2, iLanga Emoyeni PV3 and iLanga Emoyeni Gridline applications and are being run in parallel. The PPP will involve the following:

- ▶ Pre-application phase (voluntary phase)
 - **Notifications:** the following methods of notification are used
 - **Advertisements** - Adverts were placed in the die Courier (local) and die Burger (regional) newspapers on 28 November 2022. These inform the reader of the project, how to register, the availability of the pre-application draft BAR and where to access it and where to send a comment.
 - **Site Notices (x2):** were erected on the fence of the site. These inform the reader of the project, how to register, the availability of the pre-application draft BAR and where to access it and where to send a comment.
 - **Written notice** - Written notices were sent to affected landowners, key stakeholders and pre-registered I&APs. These inform the reader of the project, the availability of the pre-application draft BAR, where to access it and where to send a comment.
 - **Information for review:** All project information for review and copy will be made available during the comment period as:
 - **Hardcopy:** draft BAR will be available at the **Murraysburg public library** on Beaufort Street, Murraysburg for viewing.
 - **Electronic copy:** can be accessed via either of the following links:
 - Dropbox: www.tinyurl.com/iLanga1Dropbox
 - Google Drive: www.tinyurl.com/iLanga1GoogleDrive
 - **Comment period:** The pre-application draft BAR will be available for comment for 30-days from 28 November to 19 January 2022.

- **Comments and responses report:** all comments will be captured and responded to in a comments and responses report (CRR). The CRR will be appended to the BAR and will be submitted with the final application. Where appropriate the BAR, project description or layout may change as a result of comments received.
- **Draft BAR (formal phase)**
- **Notifications:** the following methods of notification are used
 - **Written notice** - Written notices are to be sent to registered I&APs. This notification will inform the reader of the availability of the draft BAR, where and when to access it and where to send a comment.
 - **Information for review:** the draft BAR will be accessible during the Comment period as follows:
 - **Hardcopy: Murraysburg public library** on Beaufort Street, Murraysburg.
 - **Electronic copy:** can be accessed via either of the following links:
 - Dropbox: www.tinyurl.com/iLanga1Dropbox
 - Google Drive: www.tinyurl.com/iLanga1GoogleDrive
 - **Comment period:** The draft BAR will be available for comment for 30-days (Dates to be confirmed)
 - **Comments and responses report:** all comments will be captured and responded to in a second comments and responses report (CRR). The CRR will be appended to the final BAR and submitted to the DFFE as part of the final application. Where appropriate the final BAR may be revised in response to comments received.
- **Decision phase**
- Following submission of the final BAR the DFFE have 57-days to reach and issue a decision.
 - Registered I&APs will be notified in writing within 14-days of the decision. I&APs will be informed of the right to appeal and the procedure to follow.
 - I&AP will have 20-days from the date of the written notification to lodge an appeal.

4.2 Identification of Stakeholders

A database of I&APs has been developed using landowner contact details obtained by the Applicant and other means for the affected and neighbouring properties. Landowners will be asked to forward details of all occupiers for registration and share the notification with them. The database was initiated by including the details of the following affected parties:

- Landowners, adjacent landowners and occupiers;
- Relevant district and local municipal officials and ward councillor/s;
- Relevant national and provincial government departments; and
- Relevant environmental bodies or organisations.

Site notices, written notices and newspaper advertisements will inform the reader of the opportunity and manner to register as an I&AP for the projects. This I&AP database will be updated as new I&APs are identified throughout the project lifecycle. The list of I&APs is included in Annexure C.

4.3 Authority Involvement

In terms of Section 24O (2) and (3) of the NEMA, the following state departments and/or parastatal bodies will be sent a copy of the draft BAR for comment.

- National, Provincial and local authorities, and parastatal organisations:
 - Beaufort West Local Municipality (LM);
 - BirdLife South Africa; and
 - CapeNature
 - Central Karoo District Municipality (DM);
 - Civil Aviation Authority (CAA);
 - Conservation agencies: WESSA, EWT.
 - Department of Agriculture, Land Reform and Rural Development (DALRRD)
 - Department of Environmental Affairs and Development Planning (DEADP)
 - Department of Water and Sanitation (DWS);
 - DFFE: Biodiversity Conservation
 - DFFE: Integrated Environmental Management
 - Endangered Wildlife Trust (EWT); and
 - Eskom;
 - Heritage Western Cape
 - South African National Roads Agency (SANRAL);
 - Western Cape Department of Agriculture
 - Western Cape Roads Department
- Other national/ provincial departments, where deemed necessary.

4.4 Summary of Comments and Responses

All comments received during the 30-day comment period will be responded to in a CRR and appended to the BAR and ultimately be submitted with the final BAR to inform the decision-making. All CRRs will be found in Annexure C after the commenting period is complete.

The basic assessment report, specialist reports and EMPRs have been updated where appropriate to accommodate issues raised in the pre-application phase. The following changes arose from the pre-application phase:

1. The gridline alignment was modified to accommodate recommendations by the visual specialist. All specialist reports have been updated where necessary to reflect and assess the change. The change did not impact any of the other specialists' impact significance ratings. His recommendations were –
 - a. to adjust the position of the pylons to set them back further from the N1 to lower visual impact on road users.



- b. to re-align the PV2 and PV3 gridline alignments to avoid crossing a prominent ridgeline.



Any new comments arising from the draft basic assessment phase comments will be responded to and included in the final submission to DFFE.

5 DESCRIPTION OF THE PROPOSED PROJECT

The following subsections provide more information on the project context, location, components, activities and alternatives of this grid connection project.

5.1 Site location and extent

The project is situated on the 8,972ha Skietkuil holiday Farm (Farm No 3, Schietkuil) at the intersection of the N1 and R63 routes, 40 km northwest of Murraysburg, on the border of the Western and Northern Cape Provinces, in the Beaufort West Local and Central Karoo District Municipalities (See Figure 5-1). The site is completely within the Beaufort West Wind and Solar REDZ(11) and central strategic corridor (EGI) (See Figure 5-2 and Figure 5-3).

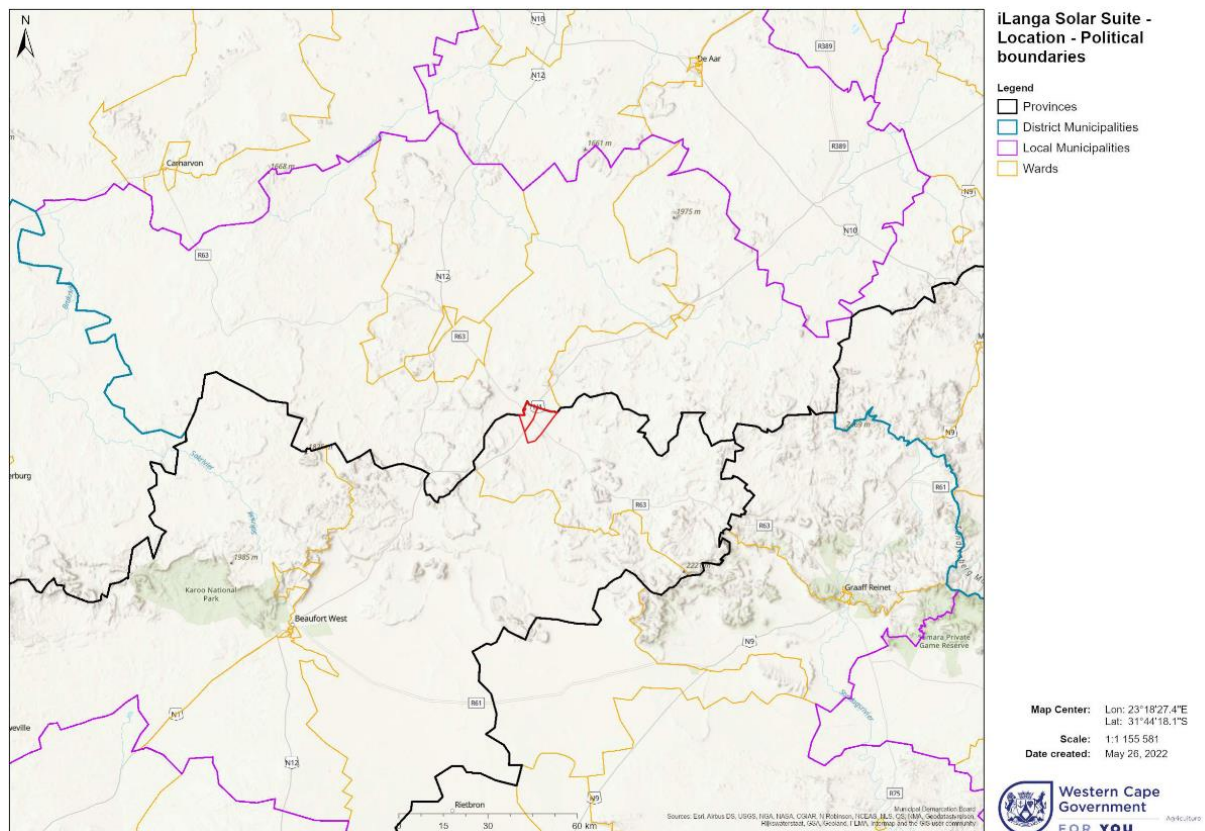


Figure 5-1: Location map (site boundaries in red)

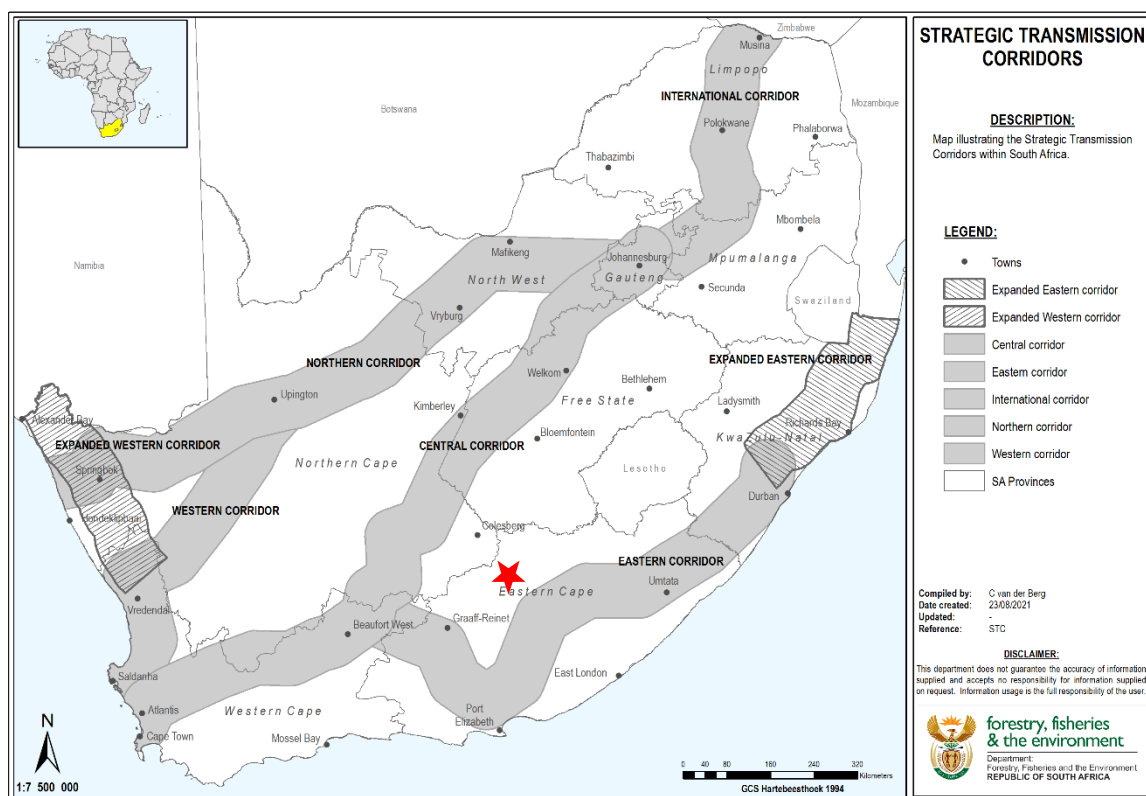


Figure 5-2: EGI of South Africa. The iLanga project falls within the central EGI corridor (see Red star) (DFFE, 2023)

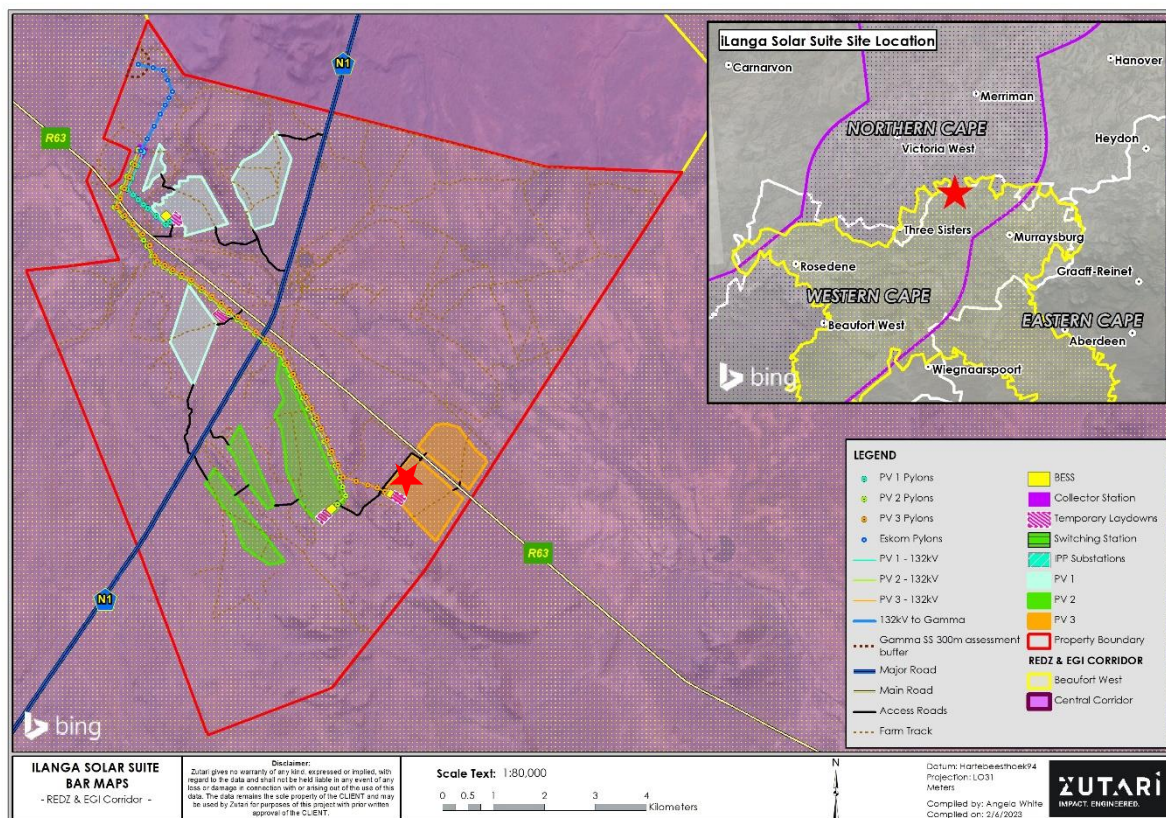


Figure 5-3: A closer view of the REDZ and EGI corridor in relation to the overall project site.

Located in the semi-arid karoo the site is comprised of wide, open plains covered with grasses and low woody scrub or open ground with intermittent rocky outcroppings, ridges, low inselbergs, and hills (See Figure 5-4).



Figure 5-4: Sense of place (site photos) (VRMA, 2022)

5.2 Description of the larger iLanga Emoyeni Solar Suite project

Seriti is applying for Environmental Authorisation (EA) for three PV SEFs and an OHPL or “gridline” to connect with the National Grid (refer to Figure 1-1 on page 13. These four components are collectively known as the iLanga Emoyeni Solar Suite project. The four components are being undertaken as separate “projects” by conducting four separate BA processes, namely:

- ▶ iLanga Emoyeni PV 1 (PV1),
- ▶ iLanga Emoyeni PV 2 (PV2),
- ▶ iLanga Emoyeni PV 3 (PV3), and the;
- ▶ **iLanga Emoyeni Gridline applications (this report).**

This report deals specifically with iLanga Emoyeni Gridline. Section 5.3 and 5.4 contain more detail on the specific project descriptions of the Gridline.

Figure 5-5 illustrates the expected flow diagram for connectivity of the grid connection powerlines with the three SEFs.

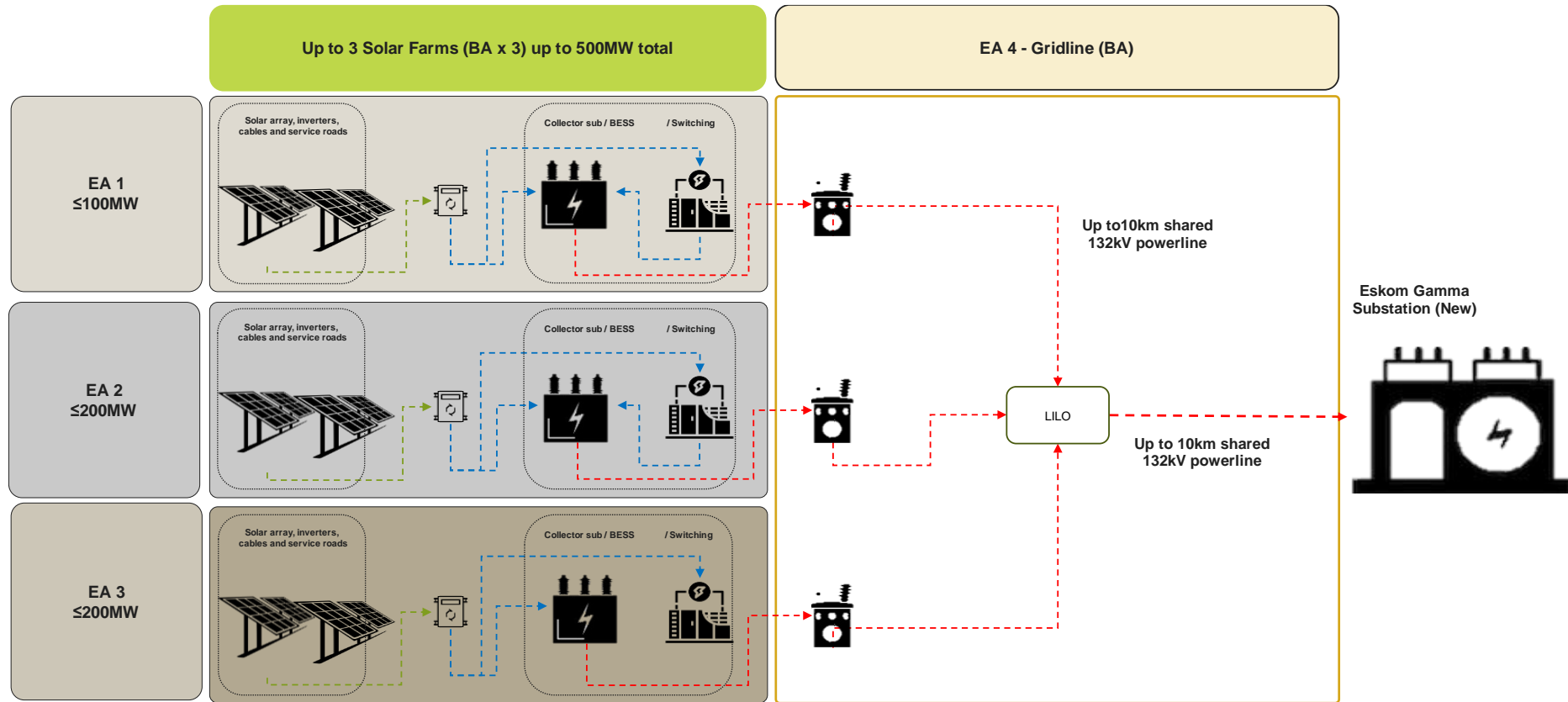


Figure 5-5: Flow diagram of grid connection between the Gamma MTS and the three proposed SEFs

5.3 Description of the preferred alternative

The iLanga Emoyeni Gridline will connect the proposed iLanga Emoyeni PV1, PV2 and PV3 SEFs with the National Grid. The application provides a separate connection for each SEF; however, some components may be shared if all three are constructed. Following the construction of the gridline, all components will be ceded to Eskom and become part of the National Grid. The project will have a total disturbance footprint of **≤16ha** and will include the following key components as illustrated in (Figure 5-6):

- **Powerlines** (8.6ha): The Gridline will comprise four powerline sections, one connecting each Independent Power Producer (IPP) substation to the Collector Substation and one connecting the collector station with the existing Eskom Gamma Main Transmission Substation (MTS). All powerlines are ≤132kV capacity and will use the standard suite of free-standing monopole pylons ≤32m tall and acceptable to Eskom. Anchored pylons or other variations may be required where the powerlines change direction or for any long spans (i.e. spanning valleys or ridge slopes). Pylons are typically spaced at 200m – 250m intervals in a straightaway, on level ground but could be greater or lesser depending on alignment and topography. Each powerline will have a 31m (15.5m on each side) servitude. The following powerline sections may be required (depending on which SEFs are approved):
 - (a) **PV1 powerline (≤1.92km)**: A ≤1.92km long powerline connecting the IPP substation to the collector station. Requiring ≤15 pylons with a disturbance footprint of 0.03ha. This may require up to 2.2km of ≤3m wide (0.66ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site.
 - (b) **PV2 powerline (≤8.9km)**: A ≤8.9km long powerline connecting the IPP substation to the collector substation. Requiring ≤55 pylons with a disturbance footprint of 0.12ha. This may require up to 10.7km of ≤3m wide (3.3ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site.
 - (c) **PV3 powerline (≤9.2km)**: A ≤9.2km long powerline connecting the IPP substation to the collector station. Requiring ≤55 pylons with a disturbance footprint of 0.11ha. This may require up to 11km of ≤3m wide (3.3ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site.
 - (d) **Collector station powerline (≤2.27km)**: A ≤2.27km long powerline connecting the collector station to the Gamma Main Transmission Station. Requiring ≤15 pylons with a disturbance footprint of 0.3ha. This may require up to 2.72km of ≤3m wide (0.82ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site. Note this is a shared infrastructure and would only be required if more than one facility is developed.
- **Switching stations** (≤0.75ha): A switching station located at each IPP substation will allow Eskom to isolate a de-energise each section of the powerline for maintenance and repair purposes. The switching stations are co-located with the IPP substations. Three switching stations will be required, detailed as follows:
 - (a) **PV1 Switching station (≤0.25ha)**: A ≤0.25ha electrical yard, co-located with the PV1 IPP substation, containing switchgear and a control room.
 - (b) **PV2 Switching station (≤0.25ha)**: A ≤0.25ha electrical yard, co-located with the PV2 IPP substation, containing switchgear and a control room.
 - (c) **PV3 Switching station (≤0.25ha)**: A ≤0.25ha electrical yard, co-located with the PV3 IPP substation, containing switchgear and a control room.
- **Collector station** (≤4.58ha): Power generated by up to three solar facilities will be conveyed to the collector station where it will be combined into a single 132kV powerline connected to Eskom's Gamma MTS. This facility will contain a control room and various busbars and switchgear necessary

for the isolation of the various powerlines in the operations and maintenance phase. Note this is shared infrastructure and will only be required if two or more of the iLanga SEFS are approved and constructed.

- **Construction yards** ($\leq 2\text{ha}$): Temporary laydown areas required for the construction of the gridline will be situated inside the collector station.



5.4 Components of the Grid Connection Infrastructure

The components listed in Section 5.2 are described in more detail under respective headings to follow.

5.4.1 Powerlines (8.6ha)

The Gridline will comprise four powerline sections, one connecting each IPP substation to the Collector Substation and one connecting the collector station with the existing Eskom Gamma MTS.

All powerlines are $\leq 132\text{kV}$ capacity and will use the standard suite of free-standing monopole pylons $\leq 32\text{m}$ tall and acceptable to Eskom.

Anchored pylons or other variations may be required where the powerlines change direction or for any long spans (i.e. spanning valleys or ridge slopes). Pylons are typically spaced at $200\text{m} - 250\text{m}$ intervals in a straightaway, on level ground but could be greater or lesser depending on alignment and topography.

Each powerline will have a 31m (15.5m on each side) servitude. The following powerline sections may be required (depending on which SEFS are approved):

5.4.1.1 PV1 powerline ($\leq 1.92\text{km}$):

A $\leq 1.92\text{km}$ long powerline connecting the IPP substation to the collector station. Requiring ≤ 15 pylons with a disturbance footprint of 0.03ha . This may require up to 2.2km of $\leq 3\text{m}$ wide (0.66ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site.

5.4.1.2 PV2 powerline ($\leq 9.2\text{km}$):

A $\leq 9.2\text{km}$ long powerline connecting the IPP substation to the collector substation. Requiring ≤ 55 pylons with a disturbance footprint of 0.12ha . This may require up to 11km of $\leq 3\text{m}$ wide (3.3ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site.

5.4.1.3 PV3 powerline ($\leq 9\text{km}$):

A $\leq 9\text{km}$ long powerline connecting the IPP substation to the collector station. Requiring ≤ 55 pylons with a disturbance footprint of 0.11ha . This may require up to 10.8km of $\leq 3\text{m}$ wide (3.24ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site.

5.4.1.4 Collector station powerline ($\leq 2.27\text{km}$):

A $\leq 2.27\text{km}$ long powerline connecting the collector station to the Gamma Main Transmission Station. Requiring ≤ 15 pylons with a disturbance footprint of 0.3ha . This may require up to 2.72km of $\leq 3\text{m}$ wide (0.82ha) construction and maintenance cross-country track running mostly beneath the powerline or connecting with existing tracks on site. Note this is a shared infrastructure and would only be required if more than one facility is developed.

5.4.2 Switching stations ($\leq 0.75\text{ha}$):

A switching station located at each IPP substation will allow Eskom to isolate and de-energise each section of the powerline for maintenance and repair purposes. The switching stations are co-located with the IPP substations. Three switching stations will be required, details as follows:

- ▶ PV1 Switching station (≤ 0.25 ha): A ≤ 0.25 ha electrical yard within the IPP substation containing switchgear and control room.
- ▶ PV1 Switching station (≤ 0.25 ha): A ≤ 0.25 ha electrical yard containing switchgear and control room.
- ▶ PV1 Switching station (≤ 0.25 ha): A ≤ 0.25 ha electrical yard containing switchgear and control room.

5.4.3 Collector station (≤ 4.58 ha):

Power generated by up to three solar facilities will be conveyed to the collector station where it will be combined into a single 132kV powerline connected to Eskom's Gamma MTS. This facility will contain a control room and various busbars and switchgear necessary for the isolation of the various powerlines in the operations and maintenance phase. Note this is shared infrastructure and will only be required if two or more of the iLanga SEFS are approved and constructed.

5.4.4 Construction yards (≤ 2 ha):

Temporary laydown areas required for the construction of the gridline will be situated inside the collector station (i.e., the 2 ha yard forms part of the collector station footprint) Laydown areas for the construction of the iLanga Solar PV1, PV2 and PV3 facilities would serve as laydown areas for the development of the powerlines and electrical yards, but those areas are applied for under the associated iLanga Solar PV applications.

5.5 Access

The preliminary planning of the access roads for the gridline infrastructure have used existing farm roads and tracks as far as possible but will be lengthened to reach the gridline development areas and widening to safely accommodate construction traffic, with maintenance tracks developed beneath the powerlines for maintenance purposes. Figure 5-7 shows the developments zones and access roads. The total extent of the access infrastructure is up to 4.1ha for the entire iLanga Emoyeni Solar Suite project.

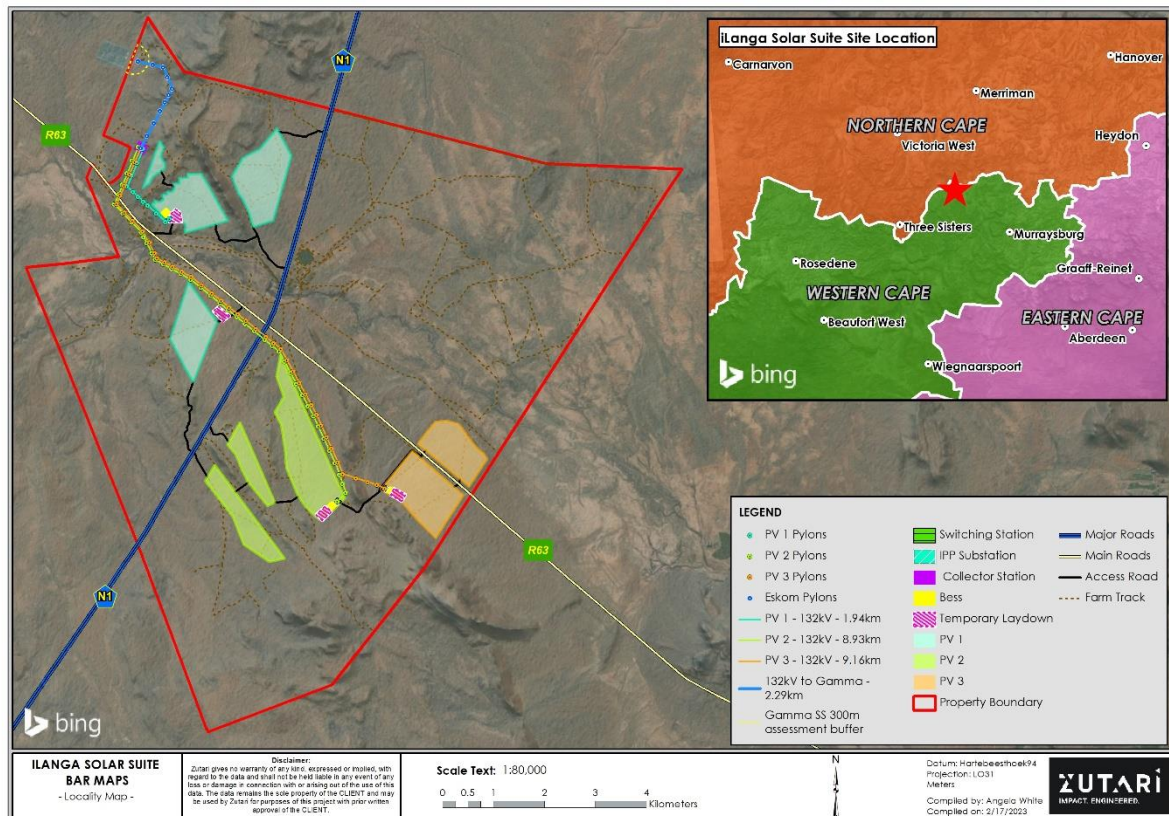


Figure 5-7: Access roads for the project are indicated by black lines

5.6 Temporary construction yard

5.7 A temporary laydown area of 2 ha inside the collector substation footprint will serve the construction yard for the proposed powerlines before being developed into the collector substation. The temporary construction yards for the iLanga Solar PV 1, 2 and 3 may also be used for staging and construction of the powerlines, switching substations and collector substation these areas are not included in this application Provision of services required during construction

5.7.1 Employment

The construction phase would endure for approximately 14 months; however, this would vary depending on the seasonal and environmental conditions at the time of construction. Temporary employees will be required during the construction phase. During construction phase, direct job creation opportunities related to the construction of the development and indirectly through expenditure on sectors supplying goods and services will contribute toward the creation of employment. During the operational phase,

operational expenditure on the proposed development is expected to continue employment creation. Such jobs will be made up of both highly skilled, skilled, and unskilled employment opportunities. The unskilled labourers are generally trained by the contractors and sourced from local communities. The provision of employment opportunities would improve the income levels of the employees thus, in turn, improving on their standard of living.

The project should utilise semi- and unskilled workers from within Beaufort West Local Municipality to alleviate local unemployment. Knowledge sharing and on the job, training should be viewed as a prerequisite, where feasible, for all service contractors/service providers working on the development and employing local labour.

Should the project be bid into the REIPPPP, local employment requirements of the bid window in question will be met. If the project pursues a private offtake opportunity however, the developer will ensure that the creation of local employment, both the skilled and unskilled, as well as the upskilling of the local labour force is carried out. Seriti has a strong track record of this in South Africa and is committed to following through and honouring its relationships with local stakeholders and communities. The specific quantum of jobs which will be created is not available at this time and will be addressed as the project approaches financial close.

5.7.2 Water supply

The iLanga Gridline project will require 17,300m³ of water per year during the construction phase (should all three solar PV facilities services by the powerline be constructed at one time) for concrete, dust suppression and drinking water for the construction workers and general use. No water use is expected in the operational phase. Water will be sourced from the iLanga facilities (PV1, PV2, PV3) supply or other private or commercial sources within their abstraction rights. The value stated here (17,300m³/year) is a "worst-case scenario" as it is unlikely that the iLanga PV 1, 2 and 3 projects will all reach Financial Close during the same immediate period.

This is subject to the necessary agreements with the landowners concerned, water quality assessments and necessary authorisation from the Department of Water and Sanitation (DWS) as part of the iLanga Solar Facilities. The contractor appointed for the construction phase will be responsible for sourcing water for the construction phase from a sustainable source and with the necessary approvals in place.

Should the groundwater be used for potable water, it must first be tested and treated to the SANS potable water standards.

5.7.3 Waste

► General waste

Rubbish bins will be placed at key locations around the site in both the construction and operations phases. Solid waste would be collected as needed and returned to a central waste area at the construction yard in the construction phase or O&M area in the Operations phase. As soon as a truck load of waste has accumulated, this will be transported to the nearest registered landfill for disposal. The EMPr will make recommendations regarding the reduction, reuse and recycling of solid waste.

► Hazardous waste

Hazardous wastes produced in the construction phase, i.e. paint, fuel, lubricant or other construction chemical residues and packaging or contaminated soil will be collected for disposal and an appropriate facility, where a certificate of disposal can be issued, or returned to the suppliers for disposal or reuse.

► Sewage

Portable toilets will be used across the site in the construction and operations phases and sewage will be collected and transported to a sewage treatment plant. In the operational phase the project would use a conservancy tanks. Sewage associated with the construction and operational phases would not be significant and would be disposed of via one of the municipal waste water facilities or via an existing

commercial service provider with established agreements with the municipality. Groundwater is a critical resource in the arid karoo and every effort must be taken to avoid contamination of the surface and groundwater resources with sewage or other contaminants.

5.8 Project Phases

From a practical perspective, the project lifecycle will likely be phased as follows:

- ▶ Post EIA
- ▶ Pre-Construction
- ▶ Construction
- ▶ Operation
- ▶ Decommissioning

5.8.1 Post EIA

Following the receipt of an EA, the iLanga Emoyeni Gridline project has two potential routes to offtake and construction:

1. The Applicant could prepare the project for a BID submission into the Government's Renewable Energy Independent Power Producer and Procurement Program (REIPPPP), where it will compete with other projects. Bidders with the highest combined price and economic development scores are selected as the preferred bidders (DMRE, 2022). An Independent Bid Evaluation Committee is convened to evaluate the BIDs (DMRE, 2022):
2. The Applicant may choose to pursue private offtake opportunities following recent amendments made to the Electricity Regulation Act (Act 4 of 2006, as amended).

Should the project be submitted into the REIPPPP, the following process and requirements shall be adhered to:

- ▶ Legal Environment
 - Environmental Authorization
- ▶ Legal Land
 - Land rights
 - Notarial lease registration
 - Proof of land use application
- ▶ Legal Commercial
 - Acceptance of the PPA
 - Project structure
- ▶ Economic Development
 - Contributor status level
 - Compliance with thresholds
- ▶ Financial
 - Full and partial price indexation
 - Financial proposal
- ▶ Technical
 - Eligibility
 - Energy resource
 - Technical feasibility

Should it receive “selected bidder status”, a licence application will be submitted to NERSA, which must contain:

- ▶ preferred bidder's appointment letter from DMRE;

- ▶ connection quotation from Eskom including single-line diagrams;
- ▶ water availability confirmation;
- ▶ waste management license (if required);
- ▶ South African Civil Aviation Authority (SACAA) clearance letter (if required);
- ▶ environmental authorization;
- ▶ financial model;
- ▶ evidence of land ownership or lease option agreement;
- ▶ fuel supply agreement;
- ▶ connection agreement;
- ▶ power purchase agreement (PPA)

These and the project details would then be resolved to allow financing of the project and agreement on the final power purchase agreement, referred to as Financial Close. If the project completes this phase it will then proceed to the next phase, the implementation phase.

5.8.2 Pre-construction phase

Pre-construction activities involve tasks that establish the site, both in terms of the construction activities, as well as the social and environmental management systems. During this time, efforts should be made to ensure that the planning of the project is completed effectively to ensure that there are no delays to the project and that no unnecessary environmental degradation occurs. Detailed design must be consistent with the assessed layout and project description (or altered through an EA amendment process) and must incorporate all design recommendations and mitigations arising from the current assessment.

Before the mobilisation of the main contractor on site, the boundaries of the work areas and nearby no-go areas will be demarcated. No-go areas will be identified and demarcated according to specialist recommendations. Once demarcated, the Contractor may then set up their construction yard, mobilise their staff and equipment on site.

It is also important to ensure that social risk is addressed during the pre-construction period by ensuring that an appropriate grievance mechanism is put in place from the outset. Furthermore, all the Contractors' staff must undergo training to ensure they understand the environmental and social sensitivities of the site. The Applicant or Contractor should also establish a labour desk in town to avoid work seekers arriving on site where they could be at risk or a risk to others.

5.8.3 Construction phase

The contractor is to construct the new foundations, transport parts and start assembly of new pylons and stringing of the powerline for the grid connection. Typical activities for the construction of a powerline are as follows:

- ▶ Establishment of access roads: During the construction period internal roads need to be established; however, these roads will only be temporary. There are a number of permanent roads that need to be established for operation and will be gravel based. Existing roads will be used, where possible.
- ▶ Site preparation: Vegetation would need to be cleared for the footprint of the infrastructure as well as for the access roads to the site/internal roads and the laydown yard, etc. Topsoil stripped from the construction of access roads and infrastructure would need to be stockpiled and used to rehabilitated areas of the construction footprint.
- ▶ Transportation of equipment and components to the site: The main component of the proposed facility would be transported by road to the site. Excavators, graders, trucks and compacting equipment will need to be brought to the site.
- ▶ Establishment of workshops, temporary laydown areas and equipment camps: Once all the equipment has been brought to the site, dedicated laydown and equipment camps will be

established. Fuel will most likely be stored on site during construction; appropriate mitigation measures must be employed to ensure no pollution occurs as a result.

- ▶ Construction of the pylons: The foundations for the pylons will be excavated. Concrete and aggregates would need to be brought to the site.
- ▶ Site rehabilitation: Removal of all construction equipment from the site and rehabilitation of areas where reasonable and practical.

It is possible that all the iLanga Solar Suite projects are selected together with the proposed gridline infrastructure, and construction of all four may take place at once, increasing the cumulative impacts of the construction phase. While this may provide potential opportunities for efficiencies and shared resources (i.e. shared boreholes, powerlines, access roads, equipment, contractors, etc.), this assessment must assess the worst-case scenario and thus these types of efficiencies are not considered in this assessment but are encouraged. This impact is considered in the cumulative impacts section in each component in Section 7.

5.8.4 Operational phase

Power lines are designed to run on low maintenance requirements. During the operational phase Eskom will undertake routine maintenance and inspection of the line.

5.8.5 Decommissioning phase

The PV facility's (and this grid connection infrastructure, by association) life span is expected to be 20 to 25 years after commissioning. The possibility of upgrading the proposed facility to more advanced technologies, to extend its operational lifespan, would be investigated towards the end of this period. Should the facility undergo expansion or significant upgrading, an environmental authorisation may be required at that time, in accordance with the prevailing legislation.

Should decommissioning be considered, it would potentially take 6 to 12 months to complete. The impacts of the decommissioning phase generally correlate closely with impacts identified for the construction phase. After disconnecting the PV infrastructure from the electricity network, the powerline infrastructure would be dismantled, recycled / resold as far as possible.

The rehabilitation of the disturbed areas would form part of the decommissioning phase. The aim would be to establish the appropriate conditions required to restore the land as close as possible to its pre-development vegetation conditions or to another suitable use e.g. low-intensity grazing by game species. The restoration activities would include the following:

- ▶ Removal of foreign materials and debris;
- ▶ Reshaping of the land to conform with the natural topography, if necessary;
- ▶ Breaking up compaction (ripping / scarifying) where required, loosening the soil and the redistribution of topsoil;
- ▶ Replanting with a suitable indigenous grass seed mix. Alternatively, the total footprint can immediately be reintroduced to game farming;
- ▶ Light irrigation to re-establish a biological soil crust and trigger germination and early growth; and
- ▶ Removal of alien vegetation for a period of no less than 1 year, or as otherwise prescribed by a rehabilitation specialist.

5.9 Project Need and Desirability

The main need for the proposed new iLanga Emoyeni project is to contribute to the alleviation of the current shortage of energy crisis in South Africa by generating clean energy for use within the National Grid. This grid connection project is needed to evacuate the generated energy from the SEF to the national grid by connecting to the existing Gamma MTS. As such, the need and desirability of this project

is closely linked to that of the overall iLanga Emoyeni Solar Suite project and the utilisation of renewable resources is therefore considered part of this project. The project falls within the EGI corridor.

The DEA&DP Guideline for Need and Desirability (2013)³ highlights the obligation for all proposed activities that trigger the EIA regulations to be considered against (amongst others) the National Framework for Sustainable Development⁴, the spatial planning context, broader societal needs, and financial viability. This information allows the authorities to contemplate the strategic context of a decision on the proposed project. This section seeks to provide the context within which the need and desirability of the proposed activity should be considered. The need for renewable energy is well documented and reasons for the desirability of solar energy include:

- ▶ Utilising the most abundant renewable resource available to South Africa;
- ▶ Meeting nationally appropriate emission targets in line with global climate change commitments under the Paris Accord;
- ▶ Enhancing energy security by diversifying generation; and
- ▶ Creating a more sustainable economy.

5.9.1 Utilising the most abundant renewable energy resources available to South Africa

As illustrated in Figure 5-8, the region around the iLanga Emoyeni project is situated in an area that has between 1 972 kW/m² and 2 200 kW/m² radiation in the period from 1994 to 2018. Thus, the proposed site has a considerable solar resource potential.

South Africa generates most of its electricity from coal, of which there is currently a ready supply. However, the 2010 Integrated Resource Plan (Department of Energy, 2016) has highlighted the need for expansion of renewable electricity generation and targets an increase in solar PV generation capacity to 6.55% of the energy mix or 11.61% of installed capacity by 2050.

³ This guideline, although written for the Western Cape, has been used in conjunction with the national guideline, since it is the most recent guideline on need and desirability and is more comprehensive than the national guideline.

⁴ Republic of South Africa (2008) People – Planet – Prosperity: A National Framework for Sustainable Development in South Africa. Pretoria: Department of Environmental Affairs (DEA), Republic of South Africa [Internet]. Available from: <http://www.environment.gov.za> [Accessed 29 March 2011].

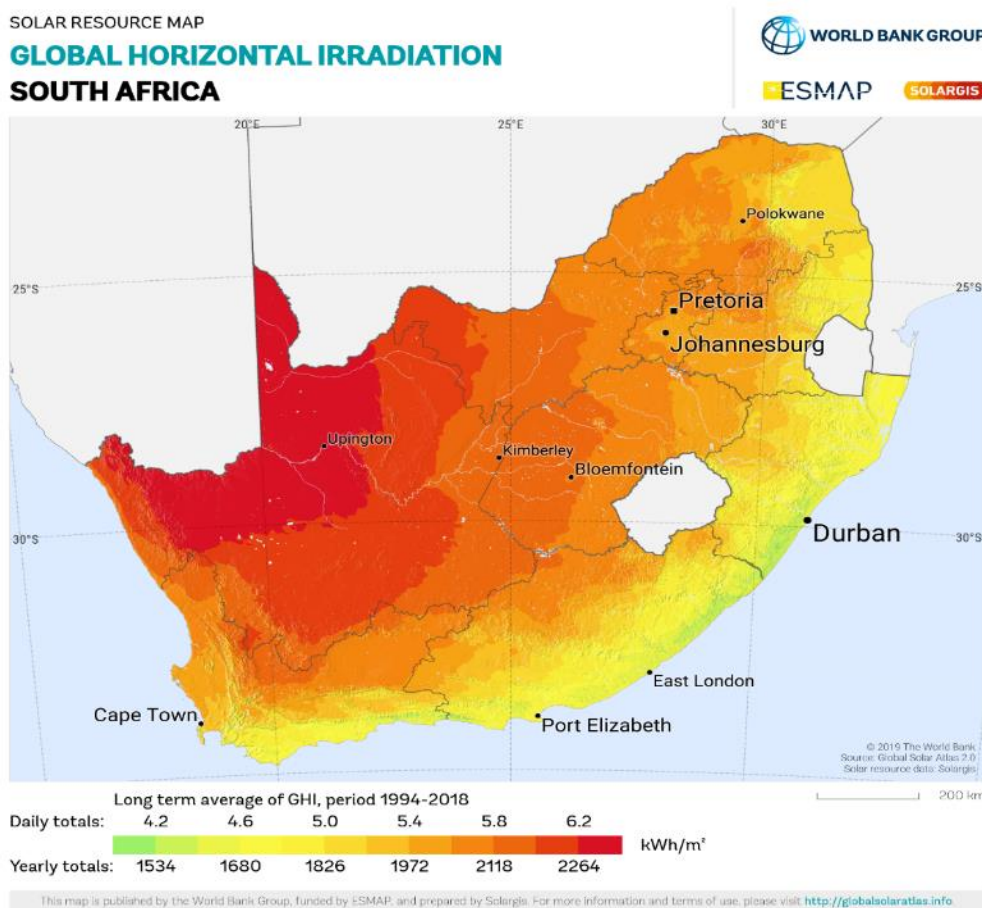


Figure 5-8: Global Horizontal Irradiation for South Africa (source: <http://solargis.info/doc/free-solar-radiation-maps-GHI>, accessed on 20 October 2020)

5.9.2 Why Solar Energy in South Africa

The advent of steam power and the first industrial revolution saw mankind's productivity explode into the 18th and 19th centuries with an uptick in per capita income and rampant population growth. The second industrial revolution followed in the late 19th century and early 20th century, where mass production, electricity and other forms of power ushered in the modern era and saw further growth and expansion in population, productivity and footprint, as mankind spread to every corner of the earth. Since the first industrial revolution, man has been clearing forests and other natural areas and burning renewable and non-renewable fossil fuels in increasing volumes to power our factories, create electricity, power motor vehicles and a variety of other processes. The combustion of fuels (renewable and non-renewable alike) has resulted in a steady release of "extra" Carbon Dioxide (CO₂) gas into the atmosphere, creating a small but continual imbalance in the carbon cycle, and causing atmospheric CO₂ levels to steadily rise above the 'natural' levels. As industry and the human population grew so did the consumption of fuel and the CO₂ emissions. This relationship is shown in the following graph.

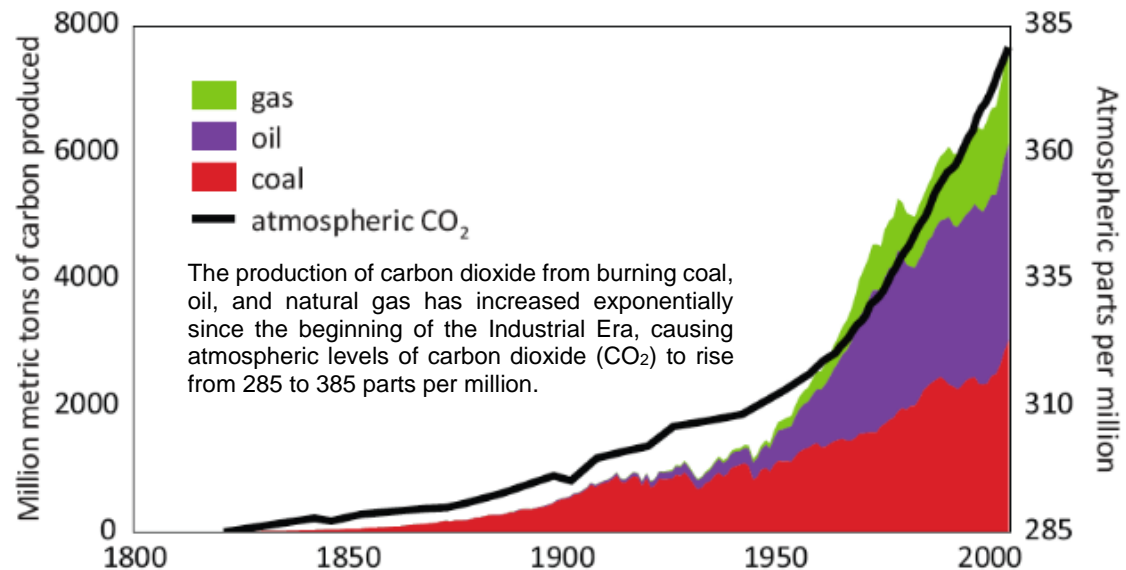


Figure 5-9 | Fossil fuel consumption vs atmospheric CO₂ levels (atmosresearch.com, 2019).

In 1896 a Swedish scientist by the name Svante Arrhenius (Enzler, 2019), was undertaking research in the correlation between CO₂ and the great ice ages. He hypothesised a link between infrared radiation from the sun, water vapor and CO₂ concentrations and global temperatures. A natural process now commonly known as the “greenhouse effect”, which plays an important role in regulating global atmospheric temperatures. Based on this, he (and Thomas Chamberlin) then went on to hypothesise that burning fossil fuels could eventually lead to planetary warming and offered a hypothesis that a doubling of atmospheric CO₂ concentrations would result in a 5°C change in average global temperature. This finding was more of a side note and not of grave concern at the time but did become so later and the hypothesis was finally proved one hundred years later in 1987.

In the 1930s a British engineer by the name Guy Stewart Callendar noted that the United States and North Atlantic region had warmed significantly on the heels of the Industrial Revolution (History.com Editors, 2017) and attributed this directly with CO₂ emissions. He made repeated warnings to the scientific community between the 30s and 60s that a greenhouse-effect warming of the planet was underway and posed a significant risk. While his claims were met with scepticism in mainstream science, they did precipitate the setting up of the first bespoke CO₂ monitoring stations, including a station at the Scripps Institution of Oceanography at the Mona Loa Observatory in Hawaii. Data from this monitoring station led to what is now referred to as the “Keeling Curve”, a dataset that confirmed Stewart’s concerns, namely the upward rise in CO₂ atmospheric levels. This fuelled new research into CO₂ and the potential implications for global climate systems.

Between the 60s and 70s consensus started to grow among scientists that the increasing atmospheric CO₂ levels (and other industrial pollutants) were in fact responsible for observed increases in global temperatures. However, concerns were temporarily moderated by a “global cooling” theory that gained traction in this period, supported by a short-term cooling trend in the data between the 40s and 70s. However, the 80s saw a sharp increase in global temperatures and 1988 was a critical turning point in the USA with the hottest temperatures on record accompanied by widespread drought and wildfires. Scientists sounded the alarm and brought the issue into the mainstream / public domain. They confirmed that data supported the hypothesis that manmade CO₂ emissions were changing average global temperatures, and such could lead to dangerous “climate change”. This led directly to the formation of the International Panel on Climate Change (IPCC) in 1988 under the United Nations, a conglomeration of global climate scientists (along with scientists from other fields) which had the objective to collaboratively study and understand climate change and work to “stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system”. The IPCC published its first report in 1990, confirming that climate change was taking place, was linked with “excess” human greenhouse gas emissions and would likely result in a warming effect of 0.3°C per decade in the 21st century unless interventions were made.

The 1997 Kyoto protocol identified six gasses and sought agreement amongst member states to actively reduce emission of these “greenhouse gasses” (GHG) with a view to reducing dangerous impacts to the global climate systems. Most of the 194 UN member states, including South Africa, signed the agreement and committed to reducing greenhouse gas emissions and most of the onus placed on the 37 most developed countries (Annex 1 countries). Well-intentioned but not compelling or far reaching enough, the Kyoto protocol has not led to the depth of change and reform needed to steer humanity away from dangerous climate change.

The IPCC’s fourth report that was published in 2007 confirmed, unequivocally, that global warming was occurring due to human activities, and this would result in a likely 3°C plus change before 2100 and significant changes to climate, leading to massive ice melt and sea-level rise, extreme weather events, large-scale drought, conflict, famine, heat stress, mass migrations, species die-off, loss of entire ecosystems, loss of habitable and arable land, and driving an estimated 100 Million people into poverty, among other potentially significant impacts at a rate that outpaces the natural, managed and human systems’ ability to adapt to these changes. However, many of these impacts could be reduced, delayed or avoided if greenhouse gas emissions are controlled. The IPCC later went on to determine that mankind could limit global warming to 1.5°C to 2°C above pre-industrial levels we could avoid most of the potentially significant impacts.

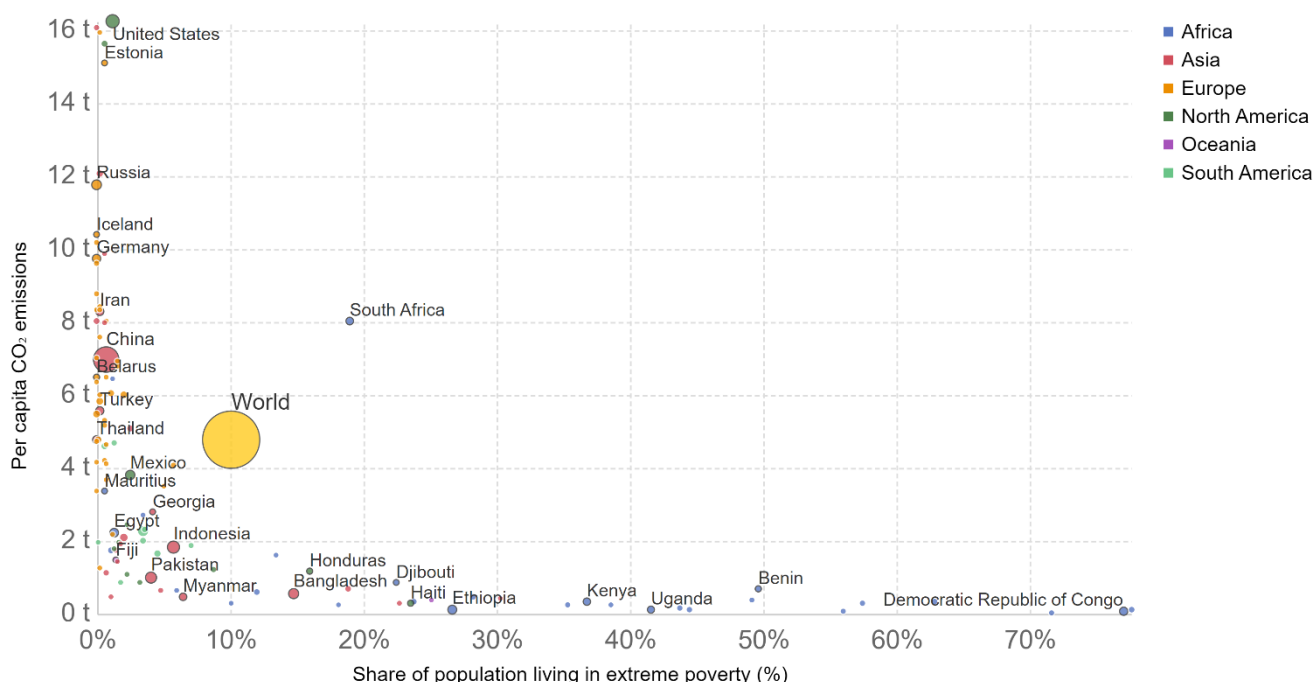
In 2015 the 11th session of the meeting of Parties (COP11) to the Kyoto Protocol resulted in the Paris Agreement in which 196 parties negotiated new targets and 187 nations, including South Africa, signed the agreement. The Paris Agreement aims to manage the increase in global average temperature to 1.5°C ideally (or well below 2°C maximum by 2100) above pre-industrial levels, recognizing that this would substantially reduce the risks and impacts of climate change. While the world recognises the significance of the impacts associated with global warming and climate change, it has been slow to implement the necessary changes. According to the IPCC, keeping the global warming below 1.5°C would require significant and rapid reductions in global emissions and unprecedented changes in all aspects of society (particularly in developed nations). As the developing countries catch up, global CO₂ emission per capita has only increased and is likely to continue with this trend for some time, so the world looks to the developed nations to lead the charge against global warming.

Against this background, South Africa’s electricity sector is based largely on old and dirty⁵ coal-fired power, which makes South Africa the world’s 14th largest emitter of greenhouse gases (GHGs) (Timperley & McSweeney, 2018) and the second highest CO₂ emitter per capita, behind Russia (which is a cold climate country), when compared with the BRICS countries (Our World in Data, 2017). Eskom currently relies on fossil-fuels to produce approximately 86.97% (World Atlas, 2016) of the country’s electricity, using over 90 million tonnes of coal per annum (Eskom, Understanding Electricity, 2019). Many of South Africa’s coal fired power stations are approaching end-of-life and will soon need be decommissioned and the capacity replaced. Despite South Africa’s high per capita CO₂ levels, the country also suffers with a high level of extreme poverty, inequality and underdevelopment and is in desperate need for further economic development and upliftment. South Africa is strikingly revealed as a global outlier in this regard in the following per capita emissions vs poverty graph.

⁵ Associated with the burning of lower grade coals and outmoded technologies.

CO₂ emissions per capita vs. share of people living in extreme poverty, 2017

Average CO₂ emissions per capita are measured in tonnes per year. Extreme poverty is defined as living at a consumption (or income) level below 1.90 "international-\$" per day. International \$ are adjusted for price differences between countries and price changes over time (inflation).



Source: Global Carbon Project; World Bank; Gapminder & UN
OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

Figure 5-10 | Per capita CO₂ emissions vs extreme poverty (Ritchie & Roser, 2017).

South Africa has a major challenge. It has a clear need to continue to develop the country on socioeconomic grounds and lift people out of poverty, which requires more energy, but absolute imperative to curb its high CO₂ per capita emissions rates. Added to this is that South Africa's energy supply is currently highly constrained, it has a growing population that is increasing demand through ongoing electrification programmes leading to an oversubscribed power supply and the sporadic need for load shedding. This harms the country's economy, discourages investment and furthers the country's coal burning addiction. New generation capacity is urgently needed to bridge the current shortfall in the short term. It is hard to motivate for any other form of generation other than renewables that can quickly, and cost effectively fill this gap while meeting our CO₂ emission commitment. This because it only takes two years or less from construction to operation for solar farms and the lowest cost of energy for a solar farm in the last REIPPPP round (round 5) in South Africa came in at under 40c/kWh. Nuclear is another low carbon option of producing electricity but it has very long lead times, and at present would take the form of a large-scale project which would have significant upfront costs and related debt burden for the government (a plethora of economic considerations) and is thus not a quick or short to medium term solution. This is recognised in the government's latest 2019 Integrated Resource Plan (IRP2019), as detailed below, which has more wind energy planned between now and 2030 than any other energy source and no nuclear (except extension of the design life of Koeberg) up to the 2030 horizon. In the longer term (beyond 2030), the coal power stations will need to be replaced with low carbon options, which will likely continue to include renewables, but also nuclear (as baseload), gas and diesel. Eskom recognises that "it is crucial that the private sector plays a role in addressing the future electricity needs of the country. This will reduce the funding burden on Government, relieve the borrowing requirements of Eskom and introduce generation technologies that Eskom may not consider part of its core function" (Eskom, Guide to Independent Power Producer (IPP) processes, 2019).

For these reasons South Africa has turned to renewable energy over conventional fossil fuel-based energy generation. Nuclear and renewable energy, including wind, solar, hydro and biogas, provide a

lower impact alternative to the conventional electricity generation methods, as far as the global warming crisis is concerned, and can also contribute to a range of socioeconomic benefits which contribute to the country's economic development imperatives.

The government began exploring feed-in tariffs (FITs) for renewable energy in 2009 but according to the PPIAF and World Bank Group Report on 'South Africa's Renewable Energy IPP Procurement Program' (PPIAF, 2014), these were later rejected in favour of competitive tenders for commercial scale projects. The resulting program, now known as the REIPPPP, has successfully channelled substantial private sector expertise and investment into grid-connected renewable energy in South Africa at competitive prices. Thus far the REIPPPP, in line with the Integrated Resource Plan (IRP2010) have procured 6,422MW of new renewable power from 112 Independent Power Producers (IPPs) and installed just over 3,776 MW of it (SAWEA, 2019). The REIPPPP's contribution to South Africa's climate change objectives so far is a reduction of 33.2 million tonnes of CO₂ (by 31 December 2018) (SAWEA, 2019) and these reductions will continue to grow as the programme rolls out. The renewable energy sector is estimated to be more employment-intensive than traditional thermal powerplants and has attracted R 209.4 billion in private sector investment (SAWEA, 2019). Additionally, renewable energy facilities (wind and solar) have been getting cheaper as the global market develops and is now cheaper in R/kWh than conventional power supplies (Coal and nuclear), as shown in research undertaken by the CSIR back in 2016 (wind and solar has become even cheaper since then) and presented in the following graph.

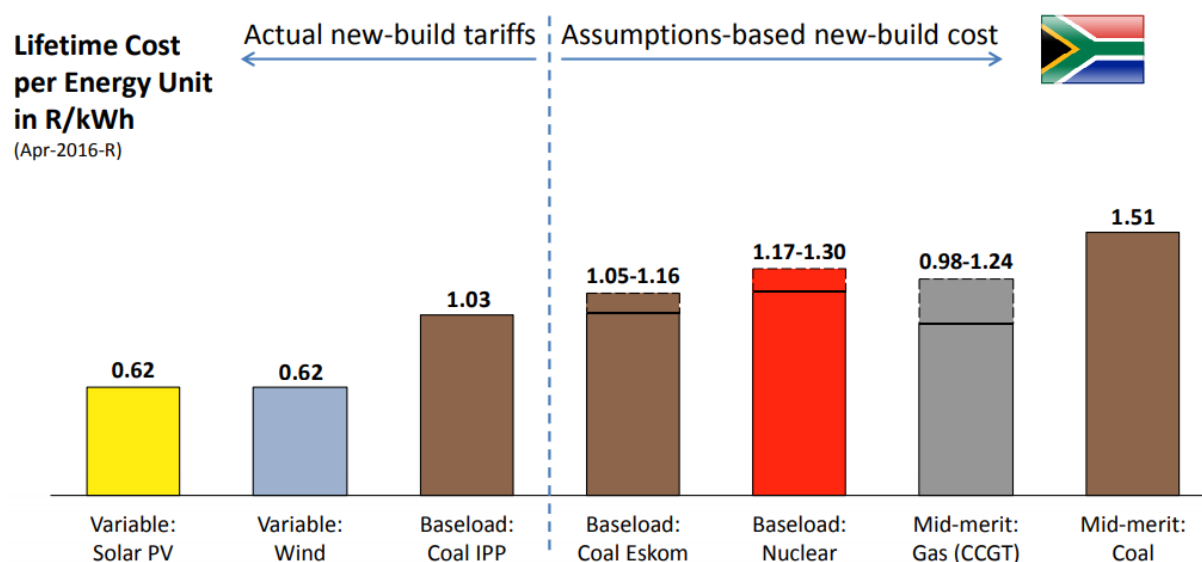


Figure 5-11 | Power cost per kWh for the main generation types under consideration by South Africa (CSIR, 2016).

The drawback however, is that solar and wind energy are not consistent baseload power producers because the sun does not always shine (night times, cloud cover or even seasonal change) and the wind does not always blow consistently or predictably. These facilities therefore produce intermittent and variable power and often not at the times when it's most needed, i.e. the daily electrical demand peaks around sunup and sundown. These problems can be somewhat mitigated, firstly through storage (either in chemical batteries, thermal reservoirs, pump storage schemes, or other mechanisms) to level variations or bridge short periods and secondly by spreading out the renewable facilities across the country to ensure some facilities are always located somewhere where energy can be produced (i.e. the wind is blowing and/ or the sun is shining). Lastly one must make up the difference with peaking facilities (i.e. quick response gas and diesel turbines that can fill the demand/supply gaps). Despite all this, the country may still need additional baseload capacity in the form of new coal or nuclear beyond 2030 and 2040.

The 2010 Integrated Resource Plan (IRP2010) for electricity set a target to source 17.8 Gigawatts (GW) of the country's electricity supply from renewable energy sources, over a 20-year period from 2010 to

2030 (Independent Power Producers Office, n.d.). The 2019 Integrated Resource Plan (2019) (IRP2019) was released on 18 October 2019 and includes the following capacity allocation:

- 1 500MW of new coal power (noting that there will be decommissioning of coal capacity over the period)
- 2 500MW of hydro power
- 6 000MW solar
- 14 400MW wind
- 2 000MW of storage
- 3 000MW from gas

The following chart provides a view for South Africa's energy mix between now and 2030. The Department of Energy (DoE) indicated that new nuclear capacity may come online after 2030 to replace decommissioned coal baseload and shows the central role that solar energy will play in this transformation.

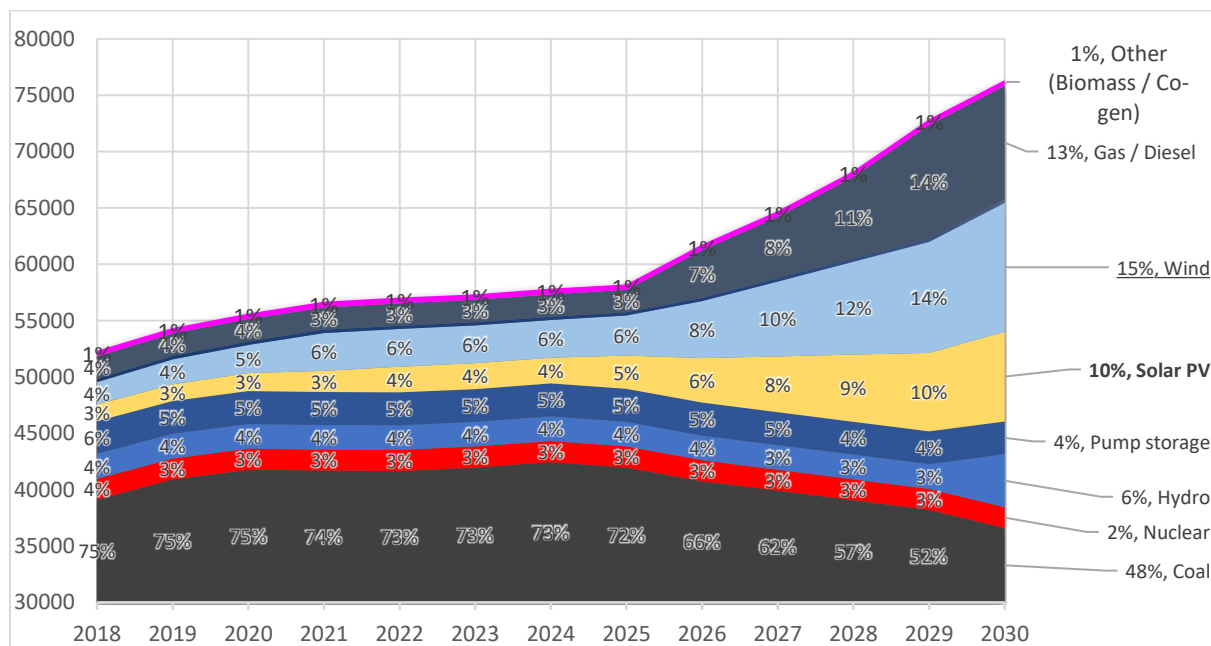


Figure 5-12 | South Africa's energy mix from 2018 to 2030 based on IRP2019 figures (Integrated Resource Plan 2019, 2019).

Solar energy is therefore of critical and strategic importance to South Africa's in terms of its future energy mix (particularly in the short term), economic development objectives, but also in the challenge to manage emissions and global warming related climate change and the variety of potentially catastrophic global impacts associated with this. The proposed project would therefore contribute to South Africa meeting its commitments as it relates to less reliability on non-renewable energy sources.

5.9.3 Meeting emission targets in line with global climate change commitments

As can be seen by the numerous policies and legislation described in Section 2 and detailed in the section above, the need for renewable energy is well-documented. Due to concerns such as climate change, and the on-going exploitation of non-renewable resources, there is increasing international pressure on countries to increase their share of renewable energy generation. This is further required due to the expected decommissioning of approximately 24 100 MW of coal power plants in the period beyond 2030 to 2050 (IRP, 2019).

The proposed iLanga Emoyeni project is expected to contribute positively towards the reduction in the generation of greenhouse gasses and climate change mitigation, and it is therefore imperative that this renewable energy facility be connected to the national grid.

Furthermore, renewable energy is recognised internationally as a major contributor in protecting the climate, nature and the environment, as well as providing a wide range of environmental, economic and social benefits that can contribute towards long-term global sustainability.

Wind energy is a source of “green” electricity as for every unit of “green” electricity used instead of traditional coal powered stations, the following benefits area realised:

- ▶ Saving water;
- ▶ Avoiding Sulphur Dioxide (SO₂) emissions;
- ▶ Avoiding Carbon Dioxide (CO₂) emissions including transmission losses; and
- ▶ Avoiding ash production associated with coal-fired electricity.

5.9.4 Enhancing energy security by diversifying generation

The development of the proposed project would lighten the load on the existing Eskom electricity grid in the area by providing additional electricity supply. Moreover, the project would contribute towards meeting the national energy target for the introduction of renewable energy into South Africa, as set by the Department of Energy (DoE). Should the proposed SEFs be developed, improved grid stability would benefit the Beaufort West community, the Western Cape Province and the National Grid as a whole as capacity is freed up for use elsewhere.

The proposed project would also have international significance as it contributes towards South Africa being able to meet some of its international obligations, by aligning domestic policy with internationally agreed strategies and standards as those set by the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, to both of which South Africa is a signatory.

5.9.5 Community development

The need to improve the quality of life for stakeholders, and especially for the poor, through job creation is critical in South Africa, particularly after the economic impact of COVID-19. Further community involvement would be achieved through direct employment or indirectly through service industries e.g. catering, subcontracting and accommodation.

5.9.6 Need and desirability checklist

Specific need and desirability questions raised by the national and DEA&DP need and desirability guidelines are addressed in Table 3 1 below.

Need and Desirability (Timing)	
Question	Response
1. Is the activity permitted in terms of the property's existing land use rights?	The land is secured through access agreement with an option to enter into a long lease. The property falls within the central EGI corridor.
2. Will the activity be in line with the following? (a) Provincial Spatial Development Framework (PSDF)	Yes. The Western Cape's Provincial Spatial Development Framework (PSDF) has a long term strategy to transition to a low carbon economy. The project aligns with this strategy since the grid connection infrastructure is required to connect the iLanga Emoyeni Solar Suite to the national grid. The Western Cape's green economy strategic framework centres around six strategic objectives: <ul style="list-style-type: none"> I. Become the lowest carbon Province II. Increase usage of low-carbon mobility III. Diversified, climate-resilient agricultural sector and expanded value chain

Need and Desirability (Timing)	
Question	Response
	<p>IV. Emerging market leader in resilient, liveable and smart built environment</p> <p>V. High growth of green industries and services</p> <p>VI. Secure ecosystem infrastructure</p> <p>A key transition for the energy sector as proposed by the Western Cape Infrastructure Framework is to promote the development of renewable energy plants in the Province. One of the provincial spatial policies (policy R4) is to support emergent Independent Power Producers (IPPs) and sustainable energy producers (wind, solar, biomass and waste conversion initiatives) in suitable rural locations. This project is proposed to be constructed within a REDZ and is therefore considered a suitable location.</p>
(b) Urban edge / Edge of Built environment for the area	N/A - The proposed project falls outside of the urban edge.
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	<p>The IDP for Beaufort West Municipality lists solar energy as a solution to address the energy challenges facing the municipality. One of the economic strategies is to promote domestic and large solar energy projects.</p> <p>The Beaufort West Municipality SDF does not refer to renewable energy development but does list the creation and maintenance of a clean healthy natural and built environment as a target for the area.</p>
(d) Approved Structure Plan of the Municipality	The proposed project falls within the designated EGI corridor.
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	The approval of this application will not compromise the integrity of the existing environmental management priorities for the area as the project footprint falls within a designated EGI corridor.
(f) Any other Plans (e.g. Guide Plan)	Phase 2 Strategic Environmental Assessment (SEA) for wind and solar PV energy in South Africa is deemed applicable as the project footprint falls within the EGI corridor.
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	Yes. The municipality IDP and budget process plan for period 2022 – 2027 includes an economic strategy to promote domestic and large solar energy projects.
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific	Yes. The construction of the iLanga Emoyeni project will supply much needed electricity to the national grid. This is important as the current Eskom provided electricity needs to be supplemented to keep up with the growth of the areas.

Need and Desirability (Timing)	
Question	Response
local context it could be inappropriate.)	<p>The need for renewable energy in South Africa is well documented and reasons for the desirability of solar energy include (but are not limited to), the following:</p> <ul style="list-style-type: none"> • utilisation of resources available to South Africa; • meeting nationally and appropriate emission targets in line with global climate change commitments; • enhancing energy security by diversifying generation; and • using renewable energy as a driver for local economic growth. <p>However, not only is the use of renewable energy suitable for South Africa at a strategic level. The project will benefit the local community as well, through the creation of local employment.</p>
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	<p>Yes. No municipal services (water, sewerage, electricity) will be required at the site, as the project contractor or appointed sub-contractor/s will be responsible for providing the necessary services to the site during the construction and decommissioning phases. The owner of the infrastructure during operational phases will be responsible for supplying the necessary services during the operational/maintenance period and may sub-contract these services to appropriate private service providers as needed.</p> <p>Waste produced at the site will be collected and taken to an appropriate facility with sufficient capacity to accept the waste, for recycling, re-use, treatment or disposal (as appropriate). No municipal waste collection will be required at the site. Negligible volumes of waste are expected during the operational phase and will flow into the existing municipal waste stream.</p> <p>Should any need for other services arise the relevant authority will be communicated with, and the necessary approvals/ agreements obtained before proceeding.</p>
6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	<p>Utilisation, application, and investment in renewable energy sources and associated infrastructure in South Africa is considered to be an integral means of reducing the carbon footprint of the country, diversifying the national economy, reducing poverty, and creating much-needed additional sources of energy. From a provincial and municipal policy perspective the facilitation of renewable energy projects and interventions that relate to the broader green economy are seen as a priority. The development of renewable energy would likely lead to improved supply of electricity for the development of the economy. This is likely to improve business confidence in the country as sustainable energy supply is one of the key concerns of business moving forward.</p> <p>Furthermore, as mentioned above, no municipal services (water, sewerage, electricity) will be required at the site, as the project contractor or appointed sub-contractor/s will be responsible for providing the necessary services to the site during the construction and decommissioning phases.</p> <p>The implication on the infrastructure planning of the municipality is therefore considered as a positive contribution.</p>

Need and Desirability (Timing)	
Question	Response
7. Is this project part of a national programme to address an issue of national concern or importance?	<p>Yes. The project will contribute towards meeting the national energy targets as set by the DoE in the 2019 IRP, of a share of all new power generation being derived from IPPs.</p> <p>The Industrial Policy Action Plan (IPAP, 2018/19 – 2020/21) recommends a sector focussed approach identifying key sectors with potential to be developed. The sectors identified in the IPAP document include green energy saving industries especially renewables. The proposed project thus further facilitates the realisation of this development objective.</p> <p>The 2019 Integrated Resource Plan (IRP) developed by the DoE aims to achieve a balance between an affordable electricity price to support a globally competitive economy, a more sustainable and efficient economy, the creation of local jobs, the demand on scarce resources such as water and the need to meet nationally appropriate emission targets in line with global commitments". The final IRP (2019) provides for an additional 14 400MW wind energy in the electricity mix in South Africa by 2030.</p> <p>In addition, please refer to point 4 above.</p>
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	<p>Yes. The proposed project footprint falls within a designated EGI. The close proximity to the existing Eskom Gamma substation, to which the SEF will be connected, is a further benefit as it reduces the need for longer powerlines.</p>
9. Is the development the best practicable environmental option for this land/site?	<p>Yes. The proposed project footprint falls within a designated EGI.</p>
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	<p>Yes. The negative impacts for the proposed development are brief to on-going in duration, very limited to regional in extent and negligible to moderately negative in significance after mitigation measures have been implemented. Therefore, the proposed developments impacts with mitigation measures are reduced and are considered to be acceptable. The proposed development would also enable positive impacts to be realised, especially when considered as part of the larger iLanga Emoyeni Solar Suite project through job creation, clean energy production, and reduction in reliance on fossil fuels.</p>
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	<p>The project footprint falls within a designated EGI, which has been set out by the DFFE specifically for development of powerline projects. As such, similar activities are expected to occur in the area, within the central corridor.</p>
12. Will any person's rights be negatively affected by the proposed activity/ies?	<p>No. No juristic or person's right will be adversely affected as land use agreements with the relevant landowners have been negotiated.</p>
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	<p>No. The proposed development occurs outside the urban edge and within a EGI, therefore the urban edge will not be compromised.</p>
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	<p>Yes, the project forms part of SIP 20: Energy.</p>

Need and Desirability (Timing)	
Question	Response
	<p>The proposed project will align with the following SIPS due to its relation to the renewable energy project:</p> <p>SIP 8: Green Energy in support of the South African economy</p> <p>SIP 9: Electricity generation to support socio-economic development</p> <p>The proposed transmission line will extend the benefits felt by the iLanga Emoyeni Solar Suite by distributing the power to the national grid.</p> <p>Note: The Project has not currently applied for SIP's status.</p>
15. What will the benefits be to society in general and to the local communities?	<p>The need to improve the quality of life for all, and especially for the poor, is critical in the affected municipal areas. It is expected that the proposed project will contribute directly to the upliftment of individuals through direct and indirect employment opportunities and the societies in which they live.</p> <p>The construction of this PV solar energy facility and associated grid connection infrastructure will result in the creation of temporary employment opportunities, with a number of unskilled and semi-skilled opportunities being available to members from the local community. Of greater significance, the development of the iLanga Emoyeni project will be associated with significant socio-economic benefits including direct and indirect job opportunities and skills development.</p>
16. Any other need and desirability considerations related to the proposed activity?	<p>The development of renewable energy facilities not only provides a more environmentally sustainable and responsible source of energy, but also reduces the potential necessity of new coal-fired power stations.</p>
17. How does the project fit into the National Development Plan for 2030?	<p>The National Development Plan for 2030 aims to create jobs, develop and expand infrastructure, transition to a low carbon economy and unify South Africa. This project, along with the larger iLanga Emoyeni project, will fit into the National Development Plan as follows:</p> <p><u>Create jobs:</u></p> <ul style="list-style-type: none"> • The proposed project is expected to result in jobs for the construction phase and the operational phase. • Indirect opportunities for small businesses would be generated such as accommodation, food and service industries through the increased number of people travelling to the proposed area. • Many indirect jobs, such as the hospitality industry, transportation industry and manufacturing industry may also be created. <p><u>Infrastructure development and expansion:</u></p> <ul style="list-style-type: none"> • The iLanga Emoyeni project and grid connection infrastructure will assist in increasing the supply of electricity and thereby facilitate further expansion of the electrical network through additional capacity to help meet South Africa's current and future electricity demands. <p><u>Transition to a low-carbon economy:</u></p>

Need and Desirability (Timing)	
Question	Response
	<ul style="list-style-type: none"> • This project is a renewable energy project and will result in the expansion of South Africa's renewable generation capacity. • These projects will help diversity South Africa's energy portfolio. • Solar energy is a proven source of renewable energy and does not rely on carbon fuels. <p><u>Transformation and unity:</u></p> <ul style="list-style-type: none"> • Employment equity will be met through the Operation and Maintenance Project Company and the contractors responsible for the construction of the transmission lines. • Economic development is one of the most important requirements of the country. Engagement with the community and stakeholders will commence early on in the project implementation.
18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.	The purpose of section 23 of NEMA is to promote the application of appropriate management tools in order to ensure the integrated environmental management of activities. Table 5-1 below lists the general objectives of integrated management and provides a motivation as to how the proposed development has taken the objectives into account.

Need and Desirability (Timing)**Question****Response****Table 5-1: Consideration of NEMA objectives**

Section 23(2) of NEMA: The general objective of integrated environmental management is to:	Description as to how the proposed development has taken these general objectives into account.
(a) promote the integration of the principles of environmental management set out in section 2 of NEMA into the making of all decisions which may have a significant effect on the environment;	The underlying principle of this BA process is to ensure that the development is socially, environmentally, and economically sustainable. This has guided the assessment of impacts of the project by Specialists to ensure that the project will be undertaken in an environmentally responsible manner. In recognition that social responsibility is something which needs to be actively developed, a public participation process (PPP) will be undertaken. This process will be undertaken in such a manner to promote active participation and foster a clear understanding of the project and transparent sharing of information.
(b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management set out in section 2;	This BAR includes the list of potential impacts associated with this project. Each aspect was evaluated to determine the significance of the impact and mitigation measures have been proposed to reduce negative impacts and to enhance positive impacts. The generic Environmental Management Programme (EMPr) has been updated to include the recommendations from the respective specialists to guide the construction and operational phases in an environmentally and socially sound manner (Refer to Annexure G).
(c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them.	Specialist studies were commissioned to ensure that specific impacts are adequately assessed, and appropriate mitigation measures are proposed.
(d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment.	The PPP that is undertaken for the proposed grid infrastructure is described in detail in Section 4. The PPP will be done in accordance with Regulation 41 of the 2014 EIA Regulations (GN R982 as amended) and the applicable best practice guidelines.
(e) ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment.	The final location of the site was proposed once the specialists had been to site as part of a site screening assessment. Detailed designs and layouts of infrastructure within the site footprint will take sensitivities and buffer zones into account, as detailed in the specialist assessments in Section 7 and Annexure D.
(f) identify and employ the modes of environmental management best suited to ensuring that a particular	Recommendations and mitigation/ enhancement measures for each of the impacts identified in

Need and Desirability (Timing)	
Question	Response
activity is pursued in accordance with the principles of environmental management set out in section 2.	<p>Section 7 have been included in the EMPr in Annexure G. The purpose of these recommendations is to minimise the disturbance to the environment, and enhance possible opportunities associated with locating the proposed development at this particular site.</p> <p>Where negative impacts are unavoidable, strict management and rehabilitation is recommended to minimise the potential negative impacts.</p>
19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.	<p>Section 2 of NEMA lists a number of principles that underpin the role of Sustainable Development and the consideration of environmental impact within the Act. These principles are critical to achieve Sustainable Development as it is important to find the balance between the competing demands for resources from the Economic system, the social system, and the Ecological system. These principles are applicable to the “actions of all organs of state that may significantly affect the environment” and it is therefore crucial to apply them to the proposed development, for decision-makers to be confident that their decision to allow a development, promotes Sustainable Development.</p> <p>The underlying principle of this BA process is to ensure that the development is socially, environmentally, and economically sustainable. This has guided the assessment of impacts of the project to ensure that the project will be undertaken in an environmentally responsible manner. Recognising that social responsibility is something that needs to be actively developed, PPP will be undertaken (as detailed in Section 4). This process will be undertaken in such a manner to promote active participation and foster a clear understanding of the project and transparent sharing of information. Furthermore, knowledge from I&APs will be included in all forms, including traditional or ordinary knowledge. The PPP and consultation with the directly affected landowners will also aim to improve environmental awareness in the area (Section 2(4)(h) of NEMA).</p> <p>Key organs of state that may have interest in the project have been proactively identified, and an effort has been made to promote intergovernmental coordination as far as possible to reduce the potential for conflicts of interest, caused by lack of information or inappropriate communication channels. Proof of this correspondence is detailed in Section 3.3 and Annexure C.</p> <p>Environmental management has been considered to place people and their needs at the forefront of its concern, aiming to serve their physical, psychological, developmental, cultural and social interests equitably (Section 2(2) of NEMA).</p> <p>However, it is crucial that ecological considerations are also considered through this process and avoidance, minimising or rehabilitating measures are detailed for the disturbance of ecosystems and loss of biodiversity, pollution and degradation of the environment, disturbance of landscapes, and sites that constitute the nation’s cultural heritage, waste, and the use and exploration of non-renewable natural resources (Section 2(4)(a)(i-v) of NEMA). Where a negative impact is unavoidable, measures have</p>

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Question	Response
	<p>been considered to remedy the disturbance and address the effects (Section 2(4)(p) of NEMA).</p> <p>However, fortunately, this proposed development will occur within an area designated specifically for electrical infrastructure projects by the DFFE (EGI corridor) which is expected to lead to fewer negative impacts (Section 2(4)(r)).</p> <p>The nature of this BA process has been to undertaken a risk-averse and cautious approach, and where relevant the worst case scenario has been assessed. Each specialist has detailed their methodology as well as their assumptions and limitations about their assessments, and these reports have been included in full in Annexure D. The specialists undertook their site visits between July and October 2022. The findings of these assessments have been amalgamated into this BAR which have assessed the impact of this proposed development.</p> <p>Should this BAR be granted a positive environmental authorisation, stringent environmental health and safety standards will be required. It will also acknowledge the right of workers to refuse work that is harmful to human health, or the environment, and be informed of any potential dangers (Section 2(4)(e & j)).</p> <p>In addition, this process has been undertaken in a manner that meets the principles and objectives of the South African legislation, and also meets global and international responsibilities relating to the environment by contributing to the renewable energy targets, and reducing the reliance on carbon heavy energy sources using fossil fuels (Section 2(4)(n)).</p>

6 CONSIDERATION OF ALTERNATIVES

The NEMA requires that alternatives are considered during the BA process. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

The DEA&DP Guideline on Alternatives (2013)⁶ states that: “every EIA process must identify and investigate alternatives, with feasible and reasonable alternatives to be comparatively assessed. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives were found, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not proceeding, is required during the assessment phase. What would, however, have to be provided to the Department in this instance is proof that an investigation was undertaken and motivation indicating that no reasonable or feasible alternatives other than the preferred option and the no-go option exist.”

The 2014 EIA Regulations (GN R982) (as amended) provide the following definition: “*Alternatives*”, in relation to a proposed activity, means different ways of meeting the general purpose and requirements of the activity, which may include alternatives to the –

- a) property on which or location where the activity is proposed to be undertaken;
- b) type of activity to be undertaken;
- c) design or layout of the activity;
- d) technology to be used in the activity;
- e) operational aspects of the activity; and
- f) includes the option of not implementing the activity (“No-Go” alternative).

The proposed combined project involves the application for environmental authorisation for three new PV SEFs and the required grid connection infrastructure to connect the SEFs to the Eskom grid.

A consultative approach to the development of the gridline alignment has been followed. Technical, environmental and landowner constraints / preferences and the location of the Solar PV1, PV2 and PV3 substations informed the alignment. The alignment was presented and refined further through interaction with specialists, various stakeholders and I&APs in the preapplication phase to arrive at the preferred, negotiated alignment as required by Government Notice 145 of 26 February 2021. Limited type, location, technology, or operational alternatives exist, and none were identified as reasonable and feasible, as the aim is to find the shortest route that avoids sensitive areas and technology compatible with the Eskom Grid and the alignment presented as the preferred alternative meets these specifications to the exclusion of others.

Since this report specifically refers to the grid connection project, the following alternatives are considered in the Draft BAR are discussed in more detail further in the Chapter:

- 1) **Alternative 1 (preferred):** Development of the grid connection infrastructure for the iLanga Emoyeni project.; and
- 2) **No-Go option:** No development of this specific grid connection and/or no development of the iLanga Emoyeni project.

6.1 Alternatives

The 2014 EIA Regulations require that any feasible and reasonable activity, location and technology alternatives be considered, described and comparatively assessed.

⁶ This guideline has been used as a best practice tool since it is the most recent guideline on alternatives.

No feasible or reasonable alternatives have been identified and in terms of the guidelines on alternatives assessment (See Section 5 for motivations and approach). In accordance with best practice in impact assessment the only alternative being comparatively assessed is the no-go alternative. The no-go alternative deals with the potential impacts that may arise in the event the project does not proceed and heed status quo land use remains in effect. In this case it is assumed that the site would continue to be used for extensive agricultural purposes (i.e. rangeland).

6.1.1 Alternative 1 (preferred)

The iLanga Emoyeni Gridline that will connect the proposed iLanga Emoyeni PV1, PV2 and PV3 SEFs with the National Grid. The application provides a separate connection for each SEF; however, some components may be shared if all three are constructed. Following the construction of the gridline, all components will be ceded to Eskom and become part of the National Grid. The project will have a total disturbance footprint of ≤ 16 ha.

6.1.2 No-Go Alternative

The assessment of alternatives must always include the “no-go” option as a baseline against which all other alternatives must be measured. The no-go option represents the status quo which normally presents the option of not implementing the activity. The assessment of the No-Go is a requirement of NEMA but also considered a global best practice. This assessment can provide a baseline scenario against which the project (or its alternatives) can be compared.

7 BASELINE ENVIRONMENT AND ENVIRONMENTAL IMPACT ASSESSMENT

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the site and surrounding area, specialist studies and discussions with various role players.

The high-level identification of potential impacts which may occur as a result of the proposed activities described in Section 5, is broad and covers the four phases of the project (i.e. pre-construction, construction, operation and decommissioning). Cumulative impacts have been assessed per environmental aspect in the BAR and by specialists.

Impacts of negligible significance have been screened out, to ensure that the BA is focused on the potentially significant impacts only. The following environmental aspects are further discussed in this chapter below:

- Climate
- Terrestrial and Aquatic ecology
- Avifauna
- Heritage and archaeology
- Palaeontology
- Socio-economic aspects
- Agricultural production, potential and soils
- Visual landscape
- Electromagnetic Interference (EMI)
- Defence

The specialist assessments conducted as part of the BA process have been included as Annexure D to this report. Annexure D also includes the required biodiversity compliance statements as compiled by the relevant specialists.

An envelope approach was adopted for the grid connection footprint to assess the entire footprint and determine the sensitivities within. To ensure a risk averse approach was taken, the specialists were tasked with assuming a “worst case scenario” when assessing the potential environmental and social impacts in relation to development within the footprint. This approach will help guide the developer in their detailed layout plans by avoiding construction of infrastructure with a higher negative impact within the more sensitive areas.

As such, the baseline descriptions of the footprint, followed by the predicted impact assessments are detailed below, as assessed by the specialist team. Sensitivity maps are also included in Annexure I.

7.1 Climate, geology and soils

The project site is located within the Nama-Karoo Biome which is situated on the central plateau of the western half of South Africa extending into south-eastern Namibia. This region is characterised by an arid climate with most rainfall occurring over the summer months (December to April). Mean Annual Rainfall (MAR) increases from 70mm in the north west (near the desert biome) to 500mm in the south east with rainfall quantity and reliability increasing eastwards. The project site is located in the north-eastern portion of the biome, near Beaufort West, and receives a MAR of 392mm per annum with mean annual highs reaching 32 °C and mean annual lows of 4.4 °C.

The Nama-Karoo is underlain by a succession of sedimentary rocks that includes the Cape Supergroup followed by Dwyka tillites and then other fossil rich sediments of the Karoo Supergroup. Volcanic activity in the area has resulted in intrusions of igneous rock resulting in the formation of dolerite sills and dykes. Igneous rock is more resistant to weathering than sedimentary rock resulting the formations of mesas,

buttes and plateaus within the biome. These features are often characterised by a higher species diversity than the low lying flat areas.

Soils that have arisen from the sedimentary and igneous rock are typically weakly structured and skeletal. The project area is characterised by moderately deep, calcareous, sandy-clay loams which contain calcrete and calcareous horizons in the flat areas and shallow soils on the slopes and plateaus of the mesas and buttes.

7.2 Terrestrial ecology

Biodiversity Africa was appointed to undertake the ecological impact assessment for the proposed project. The field survey was undertaken by their faunal and botanical specialists during March 2022.

7.2.1 Receiving environment

The climatic variation, geology and soils associated with this region have given rise to a complex of plains and hardeveld dominated by dwarf succulent shrubs interspersed with grasses, geophytes and annual herbs. Variation in the timing of the rainfall and the amount received between years has resulted in variation in the structure, cover and productivity of the vegetation present as well as a diversity of plant forms that range from ephemerals, annuals, geophytes, C3 and C4 grasses, succulents, deciduous and evergreen perennial shrubs and trees.

Other factors that have influenced the structure and composition of the vegetation within the biome include grazing of domestic livestock and wildlife, fires and rainfall. Increased grazing pressure or fire events followed by heavy rainfall makes this biome prone to erosion.

Vegetation types and distributions based on the National Vegetation Map and field survey data are discussed below and illustrated in Figure 7-1.

7.2.1.1 Eastern Upper Karoo

The Eastern Upper Karoo vegetation type is relatively widespread occurring in the Northern Cape, Eastern Cape and Western Cape Provinces between Carnarvon, Loxton, De Aar, Petrusville and Venterstad in the north, Burgersdorp, Hofmeyer and Cradock in the east and the Great Escarpment in the south.

It occurs on gently sloping plains that are typically interspersed with rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane shrubland in the southeast. This vegetation type is characterised by dwarf microphyllous shrubs interspersed with grasses such as *Aristida* and *Eragrostis*.

Although used to graze sheep and game, the vegetation recorded within the project site is near-intact. This vegetation type is present within the flat to gently sloping areas of the site and is broken up by high lying ridges of Upper Karoo Hardeveld. Species assemblages include grasses such as *Aristida congesta*, *Aristida diffusa*, *Stipagrostis cf. ciliata* and are interspersed with dwarf shrubs such as *Eriocephalus sp.*, *Chrysocoma ciliata*, *Pentzia incana*, *Ruschia intricata*, *Aptosimum spinescens* and *Asparagus exuvialis*. *Lycium cinereum* occurs sporadically within this vegetation type. Appendix A of the specialist report provides a full species list.

Eastern Upper Karoo is listed as Least Concern with a conservation target of 21%. Although listed as poorly protected, current data indicates that 97% of this vegetation type remains intact.

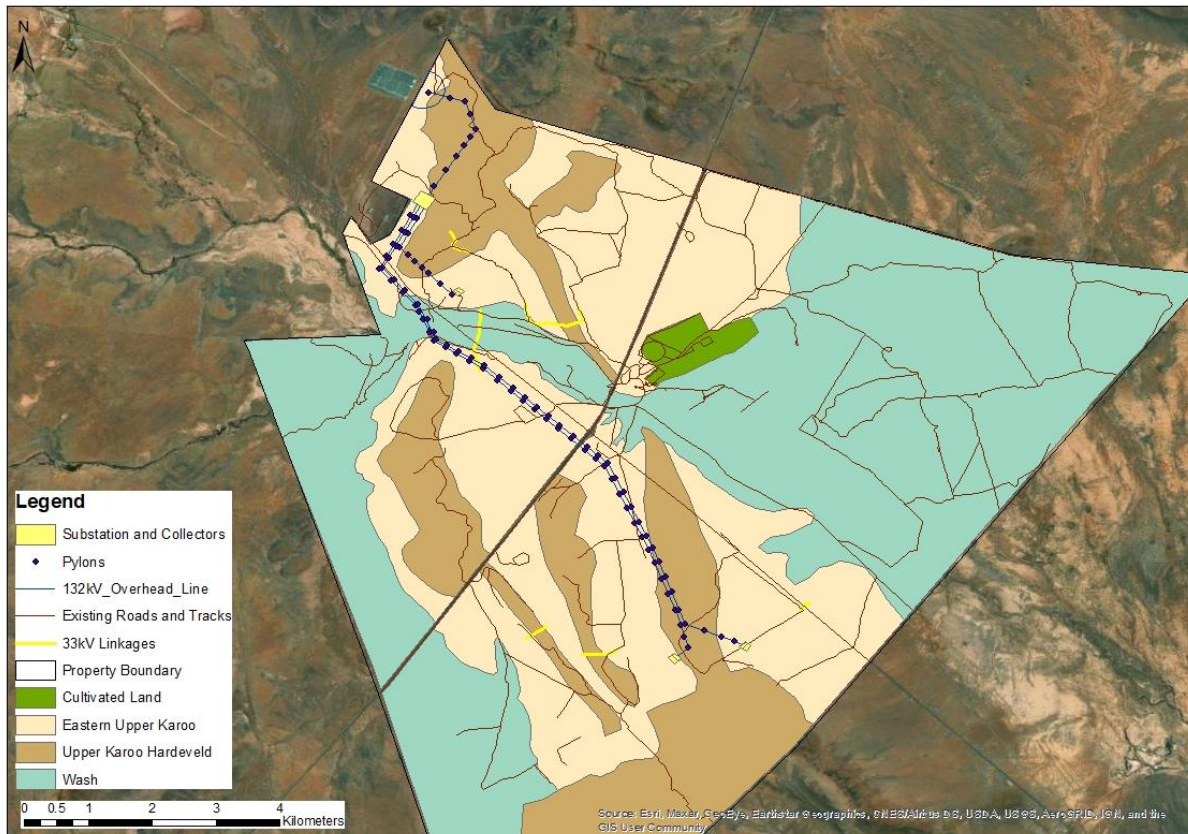


Figure 7-1: Vegetation map for the grid connection site based on the National Vegetation Map and data gathered from the field survey

7.2.1.2 Upper Karoo Hardeveld

This vegetation type is relatively widespread occurring in the Northern Cape, Eastern Cape and Western Cape Provinces between Middelpos, Strydenberg, Richmond and Nieu-Bethesda. It is associated with steep slopes and ridges including dolerite dykes and sills that form mesas, buttes koppies as well as parts of the Great Escarpment. These areas are typically covered by large boulders and rocks and support dwarf karoo scrub and grasses belonging to the genera *Aristida*, *Eragrostis* and *Stipagrostis*.

This vegetation type occurred on the slopes and plateaus of the mesas and dykes present within the site. These areas are typically more diverse than the Eastern Upper Karoo and includes species such as *Searsia burchelli*, *Lycium cinereum*, *Diospyros lycioides*, *Boophone disticha*, *Blepharis capensis*, *Aloe claviflora*, *Hermannia cf. vestita* and *Pelargonium abrotanifolium* as well as succulents such as *Stomatium mustelinum*, *Curio radicans* and *Adromischus trigynus*. Appendix A of the specialist report provides a full species list.

Upper Karoo Hardeveld is listed as Least and has a conservation target of 21%. Although listed as poorly protected, it is estimated that 100% of the natural remaining extent is intact.

7.2.1.3 Wash

There are several washes within the site that are characterised by similar species composition to that recorded within the Eastern Upper Karoo. In these areas, the dwarf shrubs are dominant with fewer grass species.



Figure 7-2: Photograph illustrating the washes that occur in the Eastern Upper Karoo vegetation

7.2.1.4 Flora

A total of 41 species from 23 families were recorded within the project site. The Asteraceae family had the highest number of species (8 species) followed by Scrophulariaceae (six species), Poaceae (four species), Aizoaceae (four species) and Acanthaceae (three species). The remaining families had two or less species.

Of the 41 recorded species, all species are listed as Least Concern. No Species of Conservation Concern (SCC) were recorded on site.

Although no SCC were recorded, seven species are listed as Schedule 4 species on the Western Cape Nature Conservation Laws Amendment Act (2000). These species will require permits for their removal/destruction if impacted by project infrastructure.

The DFFE screening report for the project site lists four SCC that could occur within the site:

- ▶ *Hereroa concava*
- ▶ *Tridentea virescens*
- ▶ *Isolepsis expallescens*
- ▶ Sensitive Species 945

The likelihood of occurrence within the site was assessed for all four species. *Tridentea virescens* was determined to have a high likelihood of occurrence within the Project Area of Influence (PAOI) but a moderate likelihood of occurrence where the majority of project infrastructure is located. If present, it is possible that access roads and powerlines will impact this species, but impacts can be avoided by undertaking an ecological walk through prior to construction and realigning infrastructure where required.

The likelihood of occurrence for *Hereroa concava* was determined to be moderate and for Sensitive Species 945 and *Isolepsis expallescens* it was determined to be low.

Table 7-1: Assessment of the likelihood of occurrence of SCC identified by literature as possibly occurring within the site

Family	Species	Status	Likelihood of Occurrence	Comment
AIZOACEAE	<i>Hereroa concava</i>	VU	Moderate	<p><i>Hereroa concava</i> is a poorly known species thought to occur between Beaufort West, Richmond and De Aar although its distribution range is unknown (Raimondo and von Staden, 2020). It has an estimated extent of occurrence (EOO) of 12 151km² and is known from 3 to 5 locations.</p> <p>This species is typically found to occur on flats and plateaus with shale outcrops.</p> <p>There are some shale outcrops present on site and as such this species may occur at these sites. The likelihood of occurrence is moderate.</p>
APOCYNACEAE	<i>Tridentea virescens</i>	Rare	High	<p><i>Tridentea virescens</i> is widespread occurring from Warmbad in southern Namibia to Kakamas and Prieska in the Northern Cape and Prince Albert and Aberdeen in the Eastern Cape (Victor, 2009).</p> <p>This species is typically associated with stony ground and hard loam in floodplains. The washes present within the site offer suitable habitat although they show evidence of grazing and degradation. The likelihood of occurrence of this species is high within the washes and moderate within the Eastern Upper Karoo, where the majority of project infrastructure will be located.</p>
CYPERACEAE	<i>Isolepis expallescens</i>	VU	Low	<p>This species is only known from three locations within the Nuweveld Mountains and is associated with damp areas along stream channels.</p> <p>Limited, suitable habitat is present on site. Since the site occurs west of Victoria West and is not associated with the Nuweveld Mountains, the likelihood of occurrence is low.</p>

	<i>Sensitive Species 945</i>	Rare	Low	<p>This species is relatively widespread, occurring from the Sneeuwberg and Agter-Sneeuwberg Mountains to the Nuweveld Mountains. It is associated with the summits of rocky dolerite ridges.</p> <p>Although it could be present in the general area, it's likelihood of occurrence within the impacted areas where the solar PV panels and associated infrastructure will be located, is low.</p>
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LC = Least Concern

NT = Near threatened

VU = Vulnerable

EN = Endangered

7.2.1.4.1 Alien species

Four exotic species were recorded within the general project site (Table 7-2) and were typically found within disturbed sites such as along road verges and farm infrastructure. Of these four species, none are listed species.

Table 7-2: List of exotic plant species recorded on site

Family	Species
AGAVACEAE	<i>Agave americana</i>
AMARANTHACEAE	<i>Atriplex semibaccata</i>
AMARANTHACEAE	<i>Salsola gemmifera</i>
ANACARDIACEAE	<i>Schinus molle</i>

7.2.1.5 Fauna

The Nama Karoo Biome hosts approximately 50 frog species, 221 reptile species and 177 mammal species. The project area is within or partly within the distribution range of approximately 10 amphibian species, 58 reptile species and 76 mammal species.

Of these, 7 amphibian species, 20 reptile species and 33 mammal species have been recorded within the same Quarter Degree Square (QDS 3123CB, 3123CD) as the site.

It is important to note that each QDS is approximately 64,233ha each and therefore may include habitat features that are not present within the project area (343ha) or within the PAOI that may support fauna that the habitat in the project area cannot.

7.2.1.5.1 Amphibians

The field survey recorded one amphibian species, namely, the Boettger's Caco (*Cacosternum boettgeri*) recorded from a storage dam in the west of the study area. Microhabitats important to amphibian species include terrestrial and aquatic habitats i.e., not all amphibians require permanent access to water, some species only require access to water for breeding and egg/tadpole development and some species do not require any water and are fully terrestrial.

7.2.1.5.2 Reptiles

The field surveys recorded one snake species, one tortoise and six lizard species. The Leopard Tortoise (*Stigmochelys pardalis*) was recorded from multiple locations across the study area mainly in grassland habitats. The Puff Adder (*Bitis arietans*) was found west of the project area in the hardeveld habitat. Rocky outcrops across the study site hosted lizards associated with the habitat including the Southern Rock Agama (*Agama atra*), Karoo Girdled Lizard (*Karusasaurus polyzonus*) and Western Rock Skink (*Trachylepis sulcata*). The Spotted Desert Lizard (*Meroles suborbitalis*) were recorded in the Dwarf Succulent Karoo Shrubland habitats. The Common Ground Agama (*Agama aculeata*) and Variegated Skink (*Trachylepis variegata*) were common across the site with many *A. aculeata* sunning themselves on the roads.

7.2.1.5.3 Mammals

The field survey recorded three carnivore species the Yellow Mongoose (*Cynictis penicillata*), Meerkat (*Suricata suricatta*) and the Black-backed Jackal (*Canis mesomela*). The farmers in the area report the Black-backed Jackal and the Bush Pig as pests since they will prey on lambs.

Two rodents were recorded from the study area with the most conspicuous being the Ground Squirrel (*Xerus inauris*) and Cape Porcupine (*Hystrix africaeaustralis*). The Ground Squirrel lives in colonies of up to 30 individuals and have extensive burrow systems often within the road and road verges and were recorded across the study area. Evidence of the Cape Porcupine was found across the site e.g., quills, skat, burrows, and foraging sites.

The study area hosts both naturally occurring antelope and introduce game antelope. Introduced species include, *interalia*, the Copper and Black Springbok, Fallow Deer, Zebra, Wildebeest and Blesbok

Naturally occurring species include the Steenbok, Duiker, Kudu, Grey Rhebok, Mountain Reedbuck and Springbok. Although some farms stock Springbok, vast herds of Springbok used to migrate through the region and small herds still occur naturally. One antelope species was confirmed during the field survey, the Steenbok.

Other mammal's species recorded in the study area include the Rock Hyrax (*Procavia capensis*) recorded at multiple rocky outcrops across the study area and two Scrub Hares (*Lepus sp.*) were seen at multiple sites across the study area while driving and walking.

7.2.1.5.4 Faunal Species of Conservation Concern

SCCs that are expected to be impact on by the proposed project are related to reptiles and mammals and are discussed below.

Reptiles

The Tent Tortoise (*Psammobates tentorius*) is listed as Near-Threatened and has a distribution which includes the study area. This species has a high likelihood of occurrence within the study area that contains rocky outcrop habitat. Given the proposed project is 0.005% of this species' Extent of Occupancy (EOO) and that it is considered well protected, the project is unlikely to negatively influence the viability of this species. However, it is still an endangered species and mitigation measures must be implemented to prevent further loss of this species by this project.

Mammals

The study area intersects the distribution of six mammal species of conservation concern, three threatened and three near-threatened species. Threatened species includes the Riverine Rabbit (*Bunolagus monticularis*), Black-footed Cat (*Felis nigripes*) and Leopard (*Panthera pardus*). Near-threatened species includes the Grey Rhebok (*Pelea capreolus*), Brown Hyena (*Parahyaena brunnea*) and Cape Clawless Otter (*Aonyx capensis*). These are presented in detail in the Table 7-3 below.

Two species, the Riverine Rabbit and Cape Clawless Otter, have a moderate likelihood of occurrence within the wash habitat and along seasonal rivers. The Black-footed Cat and Brown Hyaena have a Low likelihood of occurrence in the grassland habitat and the Leopard and Grey Rhebok have a low likelihood of occurrence in the rocky hill habitat.

The Riverine Rabbit inhabits dense, discontinuous vegetation fringing seasonal rivers and constructs burrows in soft and deep alluvial soils along the river courses for breeding (Collins, et al., 2016). It is a browser strongly associated with selected plant species such as *Pteronia erythrochaetha*, *Kochia pubescens*, *Salsola glabrescens* and *Mesembryanthemaceae* (Collins, et al., 2016). These plant species were recorded within the wash vegetation in the project area and suitable habitat for this species is present. This species is therefore considered to have a High likelihood of occurrence.

Table 7-3: Mammal SCC likelihood of occurrence in the study area

Name	Treat Status			Habitat	Known Occurrence	Likelihood of Occurrence
	Global (IUCN)	National (SA red list, 2016)	TOPS			
Riverine Rabbit <i>Bunolagus monticularis</i>	CR	CR	CR	<p>The Riverine Rabbit inhabits dense, discontinuous vegetation fringing seasonal rivers and constructs burrows in soft and deep alluvial soils along the river courses for breeding. It is a browser strongly associated with selected plant species such as <i>Pteronia erythrochaetha</i>, <i>Kochia pubescens</i>, <i>Salsola glabrescens</i> and <i>Mesembryanthemaceae</i>. These plant species were recorded within the wash vegetation in the project area and suitable habitat for this species is present.</p>	<p>There are three known populations with 12 subpopulations (9 in the northern range and 3 southern range) and the proposed project is located within the boundary of the northern population. Flagged by the DFFE Screener as Medium sensitivity due to the location of the project area in relation to an existing population and presence of potential suitable habitat within the study area</p>	<p>Moderate Within the Wash habitat and along seasonal rivers</p>
Black-footed Cat	VU	VU	Protected	<p>The Black-footed cat is typically a solitary, ground dweller that is crepuscular⁷ and</p>	<p>There are no recent records on iNaturalist or</p>	<p>Low Suitable habitat and</p>

⁷ (of an animal) appearing or active in twilight.

<i>Felis nigripes</i>				nocturnal. During the day it makes use of dens, preferring hollowed termite mounds when available but also making use of burrows dug by other animals (e.g., Springhares, Ground Squirrels and Aardvark). It hunts small rodents and ground-dwelling birds found in short, open grasslands and is found in dry, open grasslands, savannah and karoo semi-desert. The estimated EOO is 930,000 km ² and individual home ranges for males have been recorded to be approximately 16-20km ² and for females were 9-10km ² .	MammalMap in the project area or within the broader area.	available prey are present within the site and there are multiple dens and burrows of various species that would provide suitable shelter for this species.
Leopard <i>Panthera pardus</i>	VU	VU		Densely wooded and rocky areas are preferred habitat although across its distribution it has a wide habitat tolerance (grassland savannah, coastal scrub, shrubland and semidesert) (Swanepoel, et al., 2016; Stein, et al., 2020).	There are no records on iNaturalist or MammalMap in the project area or within the broader area.	Low Possible as suitable habitat and available prey is present within the site.
Brown Hyaena <i>Parahyaena brunnea</i>	NT	NT		Inhabits desert areas (<100 mm MAR), semi-desert, open scrub and open woodland	There are no recent records on iNaturalist or MammalMap	Low Suitable habitat is present within the

				savannah (<700 mm). Avoids developed areas but can survive close to them. It is estimated that there are 800–2,200 individuals in SA.	in the project area or within the broader area.	site (i.e., grasslands and karoo scrub)
Grey Rhebok <i>Pelea capreolus</i>	NT	NT		The Grey Rhebok is endemic to South Africa, Lesotho and Swaziland occurring in areas of suitable habitat. This species is associated with the rocky hills of mountain fynbos and the little Karoo and are typically browsers. Of consequence, they are largely water independent as they get most of their water from their food (Taylor, Cowell, & Drouilly, 2017; Taylor et al., 2016).	Recorded 57km NE of the study area near Richmond in August 2016 (iNat, 2022)	Low Suitable habitat (rocky hills) is present within the site.
African Clawless Otter <i>Aonyx capensis</i>	NT	NT		This species is the most widely distributed otter species in Africa, with a range stretching from Senegal and Mali throughout most of West Africa to Sudan and Ethiopia, and then southwards throughout East Africa to the Western Cape of South Africa (Jacques <i>et al.</i> , 2021). Provided freshwater (0.5–1.5 m deep) is available this species can occur in a variety of	No records in close proximity to the study area.	Moderate In habitat available along rivers within the site and washes during the wet season.

				<p>habitats. Permanent habitation is dependent on the availability of prey and shelter and females may exhibit territoriality in these areas (Okes, et al., 2016).</p> <p>Although this species can tolerate high levels of pollution, eutrophication, and disturbance (traffic, dogs, etc) in developed areas this is only in moderation (Okes, et al., 2016).</p>		
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7.2.2 Site sensitivity

7.2.2.1 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP, 2017) maps biodiversity priority areas, including Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and Other Natural Areas (ONAs) which require safeguarding to ensure the persistence of biodiversity and ecosystem functioning, through a systematic conservation planning process.

The majority of the new proposed infrastructure occurs within an ONA and some ESAs. A small portion of Area 4 and Area 2 are located within a CBA1 (Figure 7-3).

The biodiversity features driving the CBA classification for Areas 2 and 4 are:

- ▶ Watercourse Protection – Drought Corridor (Areas 2 and 4)
- ▶ Shale Gas SEA Very High Significance Dry Rivers (Area 2 only)
- ▶ Eastern Upper Karoo (Area 4 only)

The biodiversity features driving the ESA classification include:

- ▶ Eastern Upper Karoo
- ▶ Watercourse Protection – Drought Corridor

Only one terrestrial feature (Eastern Upper Karoo) was identified as contributing to the CBA and ESA status. This vegetation type is widespread and of least concern and the loss of a small portion of these features is unlikely to significantly impact on its ecosystem functioning.

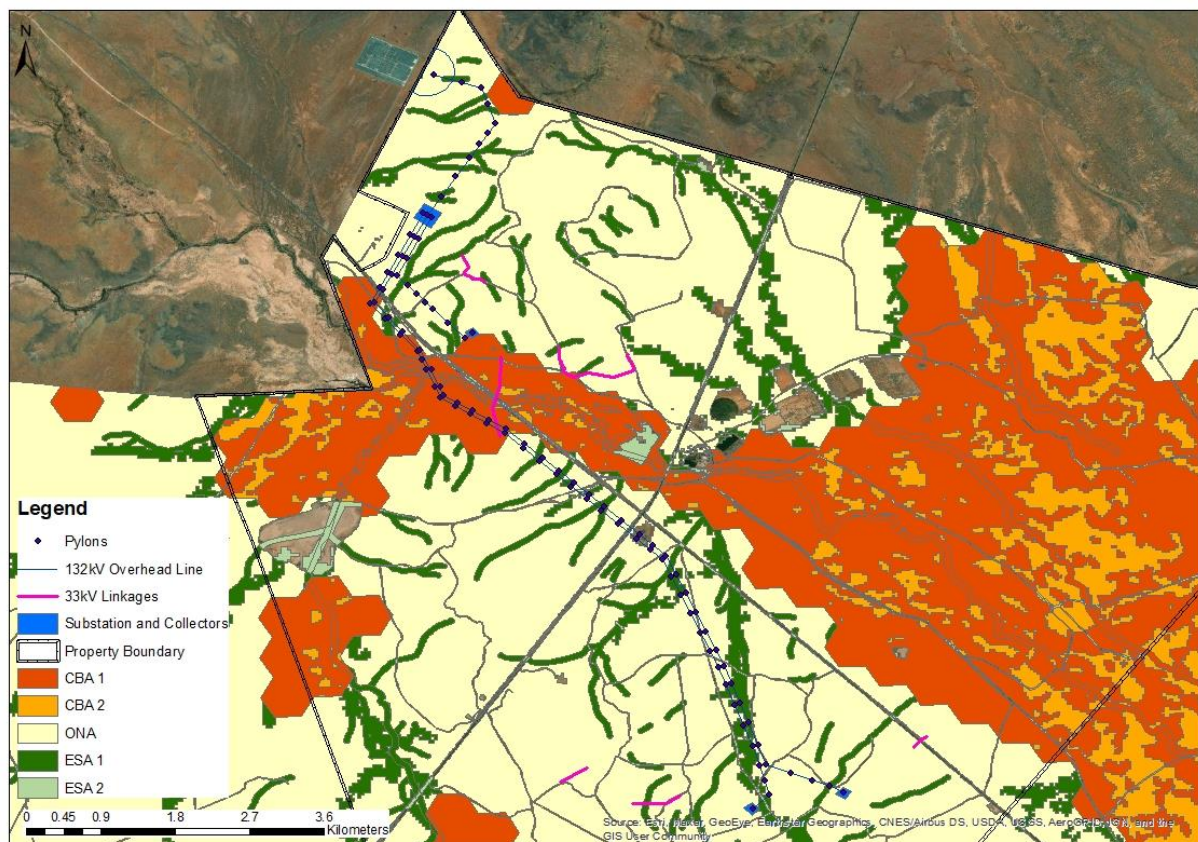


Figure 7-3: Map illustrating the project site in relation to the CBAs and ESAs

7.2.2.2 Site sensitivity

The Species Environmental Assessment guideline was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the SCC in the project area were assessed based on their conservation importance, functional integrity and receptor resilience. The combination of these resulted in a rating of SEI as illustrated in Figure 7-4.

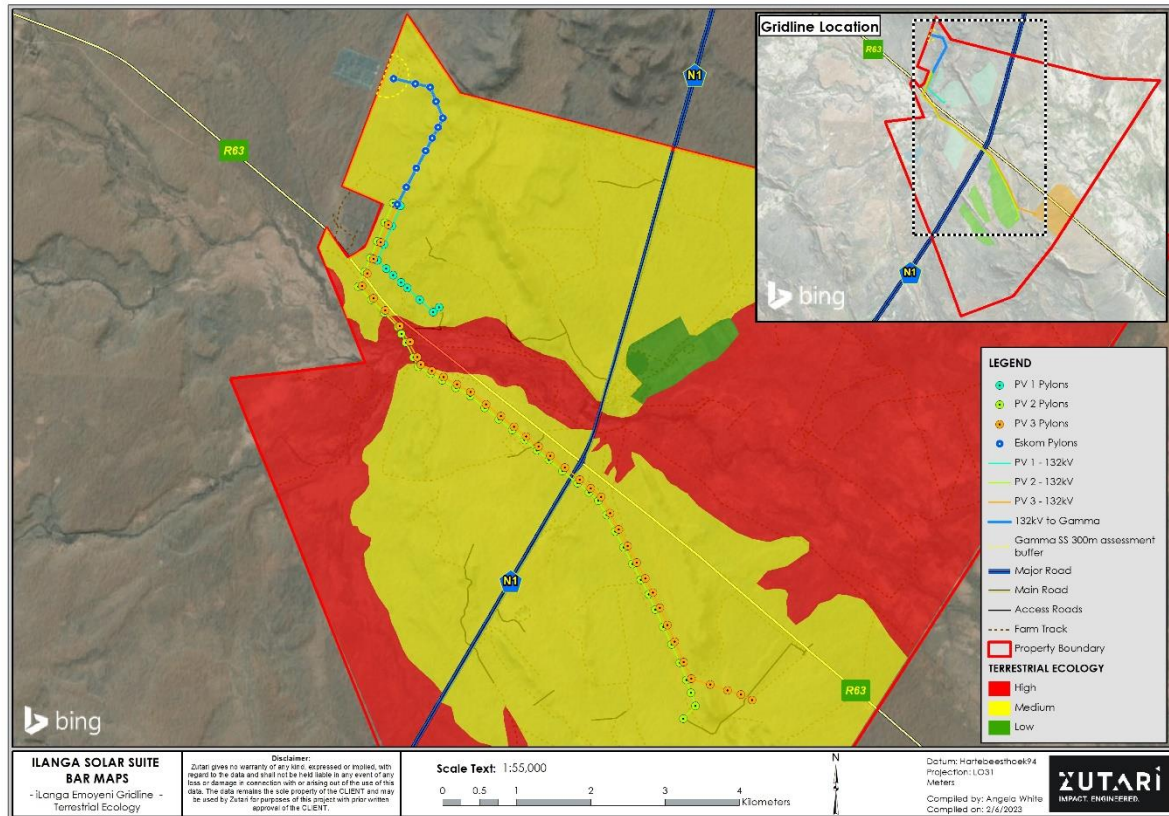


Figure 7-4: Terrestrial ecology site sensitivity map

The Eastern Upper Karoo and Upper Karoo Hardeveld were determined to have a SEI of Medium. This is based on both vegetation types having a low Conservation Importance and a Very High Functional Integrity coupled with a Medium Receptor Resilience. In contrast, the washes have a High SEI as the receptor resilience was found to be low for these areas.

The cultivated areas have a low SEI.

The Tent Tortoise (*Psammobates tentorius*) listed as near-threatened was found to have a high likelihood of occurrence within the project site. The guidelines require that the site ecological importance of the project area be assessed for this species. The project area was found to have a Low ecological importance to the Tent Tortoise.

The Riverine Rabbit (*Bunolagus monticularis*) was found to have a high likelihood of occurrence within the project area based on distribution records and suitable available habitat. Given this species is Critically Endangered, it was included in the sensitivity assessment. The Washes and Rivers in Dwarf Succulent Karoo habitat, within the project area, were found to have a Very High ecological importance if the Riverine Rabbit should be present. Camera trap monitoring for this species is currently underway.

The site layouts have endeavoured to remain outside of the areas delineated as highly sensitive by the specialist and largely impact on areas of medium sensitivity.

7.2.2.3 Limits of Acceptable Change

The limit of acceptable change is defined for the purposes of this report as the maximum degree of change that an area or resource can sustain before deterioration to faunal and floral communities occurs.

The limit of acceptable change was determined for each vegetation type based on a combination of the SEI (calculated above), the habitat's red list status, the percentage of natural remaining extent and its likelihood to support Species of Conservation Concern (Table 7-4).

Table 7-4: Table of limit of acceptable change

Habitat / Species	SEI	Remaining Natural Extent (RLE, 2021)	Conservation Target (Mucina and Rutherford, 2012)	Protection Level (RLE, 2021)	Limit of Acceptable Change (Maximum change)	Comment
Eastern Upper Karoo	Medium	97%	21%	Poorly Protected	< 50%	Given that both these vegetation types are widespread and most of the vegetation remains intact, the limit of acceptable change up to 50% of the vegetation. If multiple solar farms are to be built in the area, ecological corridors that allow for the movement of faunal species and dispersal of seeds must be designed by a specialist and implemented by the proponent.
Upper Karoo Hardeveld	Medium	100%	21%	Poorly Protected		
Wash (Habitat for Riverine Rabbit)	Very High	This vegetation type is a subset of the Eastern Upper Karoo and therefore the remaining natural extent is estimated to be high (upwards of 90%)	Unknown	Poorly Protected	>1%.	Given that the likelihood of occurrence of the CR Riverine Rabbit is High, the limit of acceptable change is >1%. Road and powerline crossings are permissible where there are no alternative routes around the feature. The

Habitat / Species	SEI	Remaining Natural Extent (RLE, 2021)	Conservation Target (Mucina and Rutherford, 2012)	Protection Level (RLE, 2021)	Limit of Acceptable Change (Maximum change)	Comment
						footprint of the infrastructure must be kept to a minimum and the location micro sited by a specialist.
Cultivated Land	Very Low	N/A	N/A	N/A	100% from an ecological perspective	N/A

7.2.3 Impact assessment

The predicted impacts for floral and faunal related aspects have been assessed by the specialists and described in the impact assessment tables below. Mitigation measures have been included in the tables.

7.2.3.1 Floral Impacts

The clearing of vegetation for the construction of the gridline could result in the following impacts:

- ▶ The direct and permanent loss of vegetation types and associated plant species, including species of conservation concern.
- ▶ Clearing of vegetation resulting in breaks in habitat that will lead to habitat fragmentation and edge effects.
- ▶ Clearing of vegetation and subsequent disturbance to the soil, and therefore seed bank, leading to the infestation of alien invasive plant species and other ruderal species.

These predicted impacts have been assessed according to construction, operational and decommissioning phases. The significance of the impact has been rated without mitigation measures, with the implementation of mitigation measures and for the no-go alternative and are detailed in the below tables.

Project phase	Construction	
Impact	Loss of Eastern Upper Karoo	
Description of impact	The clearing of vegetation for the construction of project infrastructure will result in the permanent loss of approximately 329 ha of Eastern Upper Karoo. The extent of vegetation that will be impacted equates to 0.7% of the remaining extent of this vegetation unit. The loss of this vegetation type, which is listed as Least Concern, will have an overall impact of moderate significance. This impact is difficult to mitigate as the loss of vegetation is definite and permanent and as such the impact will remain of moderate significance even after mitigation measures have been implemented.	
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts

Potential mitigation	<ul style="list-style-type: none"> Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. Topsoil (20 cm, where possible) must be collected and stored in an area of low (preferable) and medium sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). Only indigenous species must be used for rehabilitation. Where possible, lay down areas must be located within previously disturbed sites. Employees must be prohibited from making open fires during the construction phase. Employees must be prohibited from collecting plants. It is recommended that spot checks of pockets and bags are done on a regular basis to ensure that no unlawful harvesting of plant species is occurring. An alien invasive management plan for the site must be created. An in-situ search and rescue plan must be developed and implemented for succulents and geophytes that will be impacted by the construction of the project site. Plant translocation to adjacent suitable habitat may only be done for species that are not range restricted and for populations that have not been quantified as regionally significant. In such cases that this is not feasible, any requirement for translocation must be discussed with the relative authorities prior to translocation taking place. 					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/or social functions and/or processes are notably altered	High	Natural and/or social functions and/or processes are notably altered	Very low	Natural and/or social functions and/or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Moderate - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Construction		
Impact	Loss of Upper Karoo Hardeveld		
Description of impact	The clearing of vegetation for the construction of the WEF and associated infrastructure will result in the permanent loss of approximately 14 ha of Upper Karoo Hardeveld. The extent of vegetation that will be impacted equates to 0.1% of the remaining extent of this vegetation unit. The loss of this vegetation type, which is listed as Least Concern, will have an overall impact of moderate significance. This impact is difficult to mitigate as the loss of vegetation is definite and permanent and as such the impact will remain of moderate significance even after mitigation measures have been implemented.		
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts	
Potential mitigation	<ul style="list-style-type: none">Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.Topsoil (20 cm, where possible) must be collected and stored in an area of low (preferable) and medium sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).Only indigenous species must be used for rehabilitation.Where possible, lay down areas must be located within previously disturbed sites.Employees must be prohibited from making open fires during the construction phase.Employees must be prohibited from collecting plants. It is recommended that spot checks of pockets and bags are done on a regular basis to ensure that no unlawful harvesting of plant species is occurring.An alien invasive management plan for the site must be created.An in-situ search and rescue plan must be developed and implemented for succulents and geophytes that will be impacted by the construction of the project site.Plant translocation to adjacent suitable habitat may only be done for species that are not range restricted and for populations that have not been quantified as regionally significant.In such cases that this is not feasible, any requirement for translocation must be discussed with the relative authorities prior to translocation taking place.		
Assessment	Without mitigation	With mitigation	No Go Alternative
Nature	Negative	Negative	Negative

Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Moderate - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Construction
Impact	Loss of wash vegetation type and associated riverine rabbit habitat
Description of impact	The clearing of vegetation will not result in loss of any this vegetation type or habitat and as such the impact is considered negligible.

Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	Where feasible, avoid locating infrastructure within this area. Road and powerline crossings are permissible but footprints must be kept to a minimum.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact

Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
	Moderate - negative		Moderate - negative		Minor - positive	
	The specialist agrees with the significance of the impact.					
	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of low significance.					

Project phase	Construction					
Impact	Loss of Plant Species of Conservation Concern					
Description of impact	No restricted range species or CR, EN or VU species were recorded within the site during the field survey. However, four SCC were identified during the desktop assessment. Of these four, only one species, <i>Tridentia virescens</i> , has a high likelihood of occurrence within the washes. The other species have a moderate and low likelihood of occurrence. If these species are present within the infrastructure footprint, the impact will be of high significance. However, if the recommended mitigation measures are implemented, the impact can be reduced to moderate significance.					
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts				
Potential mitigation	All mitigation measures listed under impact 1 above must be implemented in addition to the following: <ul style="list-style-type: none">• An ecological walk-through must be undertaken prior to construction and where Threatened (i.e. Critically Endangered, Endangered and Vulnerable) species are recorded, project infrastructure must be moved to avoid these populations.• If this is not feasible, then a translocation plan for the population must be designed and implemented with input from an experienced horticulturalist with knowledge on how to move these species to ensure the best chance of survival.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent , or in excess of 20 years	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	International	Impacts felt at an international level	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/ or social	Moderate	Natural and/ or social	Low	Natural and/ or social functions and/ or processes

		functions and/ or processes are majorly altered		functions and/ or processes are moderately altered		are somewhat altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irrereplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Construction
Impact	Disruption of Ecosystem Function and Process

Description of impact	Fragmentation is one of the most important impacts on vegetation as it creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. This impact occurs when more and more areas are cleared, resulting in the isolation of functional ecosystems, which results in reduced biodiversity and reduced movement due to the absence of ecological corridors. The infrastructure associated with the Solar PV facility, particularly the roads, will increase habitat fragmentation by creating breaks in the environment. However, the movement of species (fauna and seeds) will not be entirely prohibited due to the nature of the infrastructure and the ecological functioning of the site can still be maintained.					
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts				
Potential mitigation	In addition to the mitigation measures listed under impact 1, the following should be implemented: <ul style="list-style-type: none">Rehabilitate laydown areas.Use existing access roads and upgrade these where necessary.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Minor - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	The cumulative impact associated with all known Solar PV Facilities in the area will increase habitat fragmentation which could impact on ecosystem functioning at a larger scale.					

Project phase	Operation					
Impact	Infestation of Alien Plant Species					
Description of impact	If laydown areas and roads are not rehabilitated, these disturbed areas can become places for alien invasive species to become established, and if left unmitigated, these species can spread and establish themselves in intact vegetation, resulting in the displacement of indigenous species and possible local extinctions of SCC.					
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts				
Potential mitigation	<ul style="list-style-type: none">The site must be checked regularly for the presence of alien invasive species. When alien invasive species are found, immediate action must be taken to remove them.An alien invasive management plan must be incorporated into the EMPr.The ECO must create a list with accompanying photographs of possible alien invasive species that could occur on site prior to construction. This photo guide must be used to determine if any alien invasive species are present.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Municipal area	Impacts felt at a municipal level	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/or social functions and/ or processes are moderately altered	Very low	Natural and/or social functions and/ or processes are slightly altered	Negligible	Natural and/or social functions and/ or processes are negligibly altered

Probability	Likely	The impact may occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Negligible - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	The cumulative impact associated with all known Solar PV Facilities could increase the infestation of alien invasive plant species at a larger scale.					

Project phase	Decommissioning		
Impact	Loss of Indigenous Vegetation		
Description of impact	The decommissioning of the Solar PV Facility will require laydown areas and will disrupt vegetation that has re-established around the areas that were disturbed during the construction phase. The loss of vegetation will be similar to the construction phase impacts.		
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts	
Potential mitigation	<ul style="list-style-type: none">Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).Only indigenous species must be used for rehabilitation.Lay down areas must not be located within any sensitive features such as watercourses, drainage lines or on rocky outcrops.Employees must be prohibited from making open fires during the construction phase.Employees must be prohibited from collecting any plants.An alien invasive management plan for the site must be created.		
Assessment	Without mitigation		With mitigation
Nature	Negative		Negative
			No Go Alternative
			Negative

Duration	Permanent	Impact may be permanent, or in excess of 20 years	Medium term	Impact will last between 5 and 10 years	Immediate	Impact will self-remedy immediately
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Moderate - negative		Minor - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	The cumulative impact associated with all known Solar PV Facilities will be exacerbated.					

7.2.3.2 Faunal Impacts

The clearing of habitat for the construction of the gridline could result in the following impacts:

- The direct and permanent loss of faunal habitat.

- ▶ Disturbance to faunal species due to construction, operation and decommissioning activities that generate noise, dust, vibrations and lighting. This disturbance may cause faunal species to leave the area or disrupt foraging and/or breeding behaviour of those that remain.
- ▶ Faunal mortality due to roadkill and persecution during construction, operation and decommissioning.
- ▶ Loss of Faunal SCC.

Six faunal impacts were identified, four of which were of moderate significance, one major and one of minor significance without mitigation (refer to impact tables below). However, if the recommended mitigation measures are implemented, these can be reduced to two moderate impacts and two minor impacts. The two impacts that are difficult to mitigate are related to the permanent loss of faunal habitat as these areas are cleared for the placement of infrastructure and the loss of potential faunal SCC given little is known about the occurrence of this species in the area, if at all.

Project phase	Construction					
Impact	Loss of Faunal Habitat					
Description of impact	The clearing of vegetation for the construction of project infrastructure will result in the permanent loss of approximately 329 ha of faunal habitat . This impact is difficult to mitigate as the loss of habitat is definite and permanent and as such the impact will remain of moderate significance even after mitigation measures have been implemented.					
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	<ul style="list-style-type: none">Existing roads must be use as far as possible and road networks consolidated.Construction vehicles and machinery must not encroach into identified ‘no-go’ areas or areas outside the project footprint.Where possible, lay down areas must be located within previously disturbed sites.Employees must be prohibited from making open fires during the construction phase.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur

Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Moderate - negative		Negligible - negative	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Construction					
Impact	Disturbance to faunal species					
Description of impact	Construction activities may generate noise, dust, vibrations and light pollution. This disturbance may cause faunal species to leave the area or disrupt foraging and/or breeding behaviour of those that remain					
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts				
Potential mitigation	<ul style="list-style-type: none">Any fencing required must be wildlife permeable especially at strategic places such as along drainage lines. This allows for small and small-medium sized animals to move between their natural habitat unencumbered. If electrified strands are to be used, there must be no strands within 30 cm of the ground. As an example, if a tortoise touches this strand it automatically retreats into its shell and does not move because it senses danger, and the repeated shocks eventually kill it.Ensure walls allow access for small fauna (openings at the base) within the developed area.External night lighting must be down lights, placed as low to the ground as possible and of low UV emitting lights, such as most LEDs. Lighting in open space areas within development must be minimised. This is to avoid attracting insects and their predators to the lights and minimising unnecessary mortalities.Vehicles and machinery must meet best practice standards in terms of noiseDust suppression techniques such as road watering required during windy periods					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to	Local	Extending across the site and to	Limited	Limited to the site and its

		nearby settlements		nearby settlements		immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Minor - negative		Minor - positive	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Construction	
Impact	Faunal mortality due to roadkill and persecution	
Description of impact	Construction activities may inadvertently kill terrestrial vertebrate fauna during vegetation clearing, earth works and driving across the site. Fauna perceived as dangerous may be persecuted out of fear.	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts
Potential mitigation	<ul style="list-style-type: none"> During construction induction material must iterate safety to fauna and personnel through avoidance of wildlife. Speed restrictions within the residential development for all vehicles (30km/h is recommended) should be in place to reduce the impact of killed fauna on the project roads. A snake handler should be on call to provide removal and relocation service should any snakes be found on site or in neighbouring homes enter their homes, note that October is when snakes are most active as they emerge from hibernation. If possible, any reptile or mammal species that may die as a result of construction and if somewhat intact must should be kept in a plastic bag in the freezer and 	

	ladled with the GPS coordinates until the ECO can preserved and donate it tod to SANBI, museum or relevant tertiary institute.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Local	Extending across the site and to nearby settlements
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Minor - negative		Minor - positive	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Construction					
Impact	Loss of faunal SCC					
Description of impact	The construction related activities may disturb SCC and cause them to move away from the project area.					
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	<ul style="list-style-type: none">• Should any fauna of conservation concern be encountered by the ECO, these must be recorded (photographed, GPS coordinates) and placed on iNaturalist.• Search and rescue for the near-threatened Tent Tortoise must be conducted immediately prior to clearing activities and relocated to the nearest similar habitat out of harm's way.• Conduct pre-construction monitoring for the Riverine Rabbit. Establish additional mitigation measures should these be confirmed including monitor during construction and operation.• Rehab where cables are buried• Keep veg clearing for cables to a minimum as rehab is considered extremely difficult.• Wherever possible existing roads must be used.• Speed limits on these sections must be strictly imposed,• Avoid night driving in the habitat between Sunset-Sunrise, as they are active from 3pm-10am but roadkill is a problem.• Mortality on roads must be monitored and reported (carcasses need to be collected and frozen and circumstances of roadkill investigated).					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Permanent	Impact may be permanent , or in excess of 20 years	Permanent	Impact may be permanent , or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Extremely high	Natural and/ or social functions and/ or processes are severely altered	Extremely high	Natural and/ or social functions and/ or processes are severely altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge

Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified	High	The affected environment will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Major - negative		Moderate - negative		Minor - positive	
Comment on significance	Should SCC occur on site the specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of major significance.					

Project phase	Operation					
Impact	Faunal disturbance and potential mortality due to roadkill					
Description of impact	During operation maintenance of the solar panels will be required and driving around site					
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts				
Potential mitigation	<ul style="list-style-type: none">During construction induction material must iterate safety to fauna and personnel through avoidance of wildlife.Speed restrictions within the residential development for all vehicles (30km/h is recommended) should be in place to reduce the impact of killed fauna on the project roads.A snake handler should be on call to provide removal and relocation service should any snakes be found on site or in neighbouring homes enter their homes, note that October is when snakes are most active as they emerge from hibernation.If possible, any reptile or mammal species that may die as a result of construction and if somewhat intact must should be kept in a plastic bag in the freezer and laded with the GPS coordinates until the ECO can preserved and donate it to SANBI, museum or relevant tertiary institute.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Long term	Impact will last between 10 and 15 years	Long term	Impact will last between 10 and 15 years	On-going	Impact will last between 15 and 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/ or social functions	Moderate	Natural and/ or social functions	Low	Natural and/ or social functions and/ or processes

		and/ or processes are moderately altered		and/ or processes are moderately altered		are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Minor - negative		Minor - negative		Minor - positive	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

Project phase	Decommissioning	
Impact	Faunal disturbance and mortality due to roadkill	
Description of impact	Decommissioning activities may inadvertently kill terrestrial vertebrate fauna when removing infrastructure and driving across the site. Fauna perceived as dangerous may be persecuted out of fear.	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts
Potential mitigation	<ul style="list-style-type: none"> During construction induction material must iterate safety to fauna and personnel through avoidance of wildlife. Speed restrictions within the residential development for all vehicles (30km/h is recommended) should be in place to reduce the impact of killed fauna on the project roads. A snake handler should be on call to provide removal and relocation service should any snakes be found on site or in neighbouring homes enter their homes, note that October is when snakes are most active as they emerge from hibernation. If possible, any reptile or mammal species that may die as a result of construction and if somewhat intact must should be kept in a plastic bag in the freezer and 	

	ladled with the GPS coordinates until the ECO can preserved and donate it tod to SANBI, museum or relevant tertiary institute .					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Permane nt	Impact may be permanent , or in excess of 20 years	Permane nt	Impact may be permanent , or in excess of 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlement s	Local	Extending across the site and to nearby settlement s	Region al	Impacts felt at a regional / provincial level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat alter ed
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur	Probabl e	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantiv e supportive data exists to verify the assessme nt	High	Substantiv e supportive data exists to verify the assessme nt	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environme nt will not be able to recover from the impact - permanentl y modified	Low	The affected environme nt will not be able to recover from the impact - permanentl y modified	High	The affected environment will be able to recover from the impact
Resource irreplaceabili ty	Medium	The resource is damaged irreparably but is represente d elsewhere	Medium	The resource is damaged irreparably but is represente d elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Moderate - negative		Minor - negative		Minor - positive	
Comment on significance	The specialist agrees with the significance of the impact.					
Cumulative impacts	Should all three facilities and the associated gridline be constructed, the cumulative impact will be of moderate significance.					

7.2.4 Conclusions and recommendations

The majority of the project infrastructure is situated within Eastern Upper Karoo with some infrastructure occurring in the Upper Karoo Hardeveld and small sections of roads occurring on the edge of the Washes. The SEI for these vegetation types have been assessed and Upper Karoo Hardeveld and Eastern Upper Karoo is of medium sensitivity meaning that construction within these areas is permissible from a botanical perspective.

The Wash habitat and riverine areas within the Dwarf Succulent Karoo habitat would have a very high site ecological importance to the **critically endangered Riverine Rabbit** (*Bunolagus monticularis*) should it occur in the study area. The study area is located within the distribution of the northern population of the Riverine Rabbit and suitable habitat is present. There is a moderate likelihood of this species occurring within the wash and riverine habitats. The majority of the project infrastructure avoids this habitat and effort should be made to avoid project related infrastructure (roads and cables) transecting this habitat. Monitoring for this species is currently underway.

The Tent Tortoise (*Psammobates tentorius*) is near-threatened and has a high likelihood of occurring in the project area. The project is unlikely to negatively influence the viability of this species. However, mitigation measures must still be implemented to prevent further loss of this species by this project.

The species environmental guideline document states for areas of medium sensitivity, development activities of medium impact are acceptable and for areas with a low SEI, development activities of medium to high impact are acceptable. In both instances these must be followed by appropriate restoration activities.

Some infrastructure is located within a CBA and ESA. The biodiversity features driving the CBA and ESA classification are mostly related to aquatic features and this must therefore be addressed in the aquatic report. Only one terrestrial feature (Eastern Upper Karoo) was identified as contributing to the CBA and ESA status. This vegetation type is widespread and of least concern and the loss of a small portion of these features is unlikely to significantly impact on its ecosystem functioning.

Seven botanical impacts have been identified. Of these, five were of moderate significance, one of minor significance and one of negligible significance prior to mitigation. After mitigation measures have been implemented, these can be reduced to two of moderate significance, two of minor significance and three of negligible.

Six faunal impacts were identified, four of which were of moderate significance, one major and one of minor significance without mitigation. However, if the recommended mitigation measures are implemented, these can be reduced to two moderate impacts and two minor impacts.

The ecological specialist recommends that the following conditions are included in the Final EMP as well as the conditions of the EA, if granted:

- ▶ The remaining vegetation within the property should remain intact so that it can continue to function as an ecological corridor for species movement.
- ▶ All necessary plant permits must be obtained prior to the commencement of any construction activities.
- ▶ Where feasible, laydown areas must be placed in previously disturbed sites.
- ▶ A walkthrough of the final layout must be undertaken by a botanist and if populations of SCC will be impacted, infrastructure should be moved to avoid these areas. Where this is not feasible, a search and rescue plan will be required.
- ▶ If any SCC are to be impacted, these must be relocated to nearest appropriate habitat.
- ▶ Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.
- ▶ Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas).
- ▶ Employees must be prohibited from collecting any plants.

- ▶ Alien invasive plant clearing should be undertaken in line with an Alien Vegetation Management plan, which should be compiled as part of the EMPr and implemented with immediate effect.
- ▶ Only indigenous plant species typical of the local vegetation and approved by a botanist should be used for the rehabilitation of natural habitat.

In addition to all mitigations listed in the impact tables above it is recommended that a clause must be included in contracts for all personnel working on site stating that: “*no wild animals will be hunted, killed, poisoned or captured. No wild animals will be imported into, exported from or transported in or through the province. No wild animals will be sold, bought, donated and no person associated with the development will be in possession of any live wild animal, carcass or anything manufactured from the carcass.*” A clause relating to fines, possible dismissal and legal prosecution must be included should any of the above transgressions occur.

7.3 Aquatic ecology

EnviroSci (Pty) Ltd was appointed to conduct the aquatic ecological impact assessment for the iLanga Emoyeni Solar Suite project. The report for gridline is summarised below and included in Annexure D2.

7.3.1 Receiving environment

The study area is dominated by two major types of natural aquatic features and a small number of artificial barriers associated with catchments and rivers, characterised as follows:

- ▶ Ephemeral watercourses - alluvial systems with or without riparian vegetation. These range from narrow channels to broad flood plain areas. Some of these contained smaller sedge dominated wetlands, that seem to be a result of impoundments or modified channels near the N1 / R63 roads, on the Brak River, but have been included into the No-Go areas associated with the alluvial systems delineated in this report.
- ▶ Minor watercourses; and
- ▶ Dams and weirs / berms with no wetland or aquatic features.

The site is located within the L21A Brak/Skietkuil rivers Quinary Catchments of the Drought Corridor Ecoregion in the Mzimvubu-Tsitikamma Water Management Area (Gqeberha Regional Office) (Figure 7-5).

The results of the DFFE Screening Tool indicated that this was based on the presence of Rivers and wetlands and Aquatic CBAs. The presence of the Very High Sensitivity features was confirmed during this assessment (see Appendix 2 of the aquatic ecological impact assessment for verification statement), but mapped at a finer scale and categorised based on the correct hydrogeomorphic class, i.e. alluvial rivers and not extensive wetland areas.

These riverine features such as alluvial floodplains and riparian thickets were dominated by *Vachellia karroo*, *Searsia lancea*, *Euclea undulata*, *Gymnosporia buxifolia*, *Juncius spp*, *Scirpoides spp*, and *Ficinia littorals*.

The study area is however not located within an International Bird Area (IBA) or a Strategic Water Resource Area and did not contain any Wetland Clusters or listed Threatened Ecosystems.

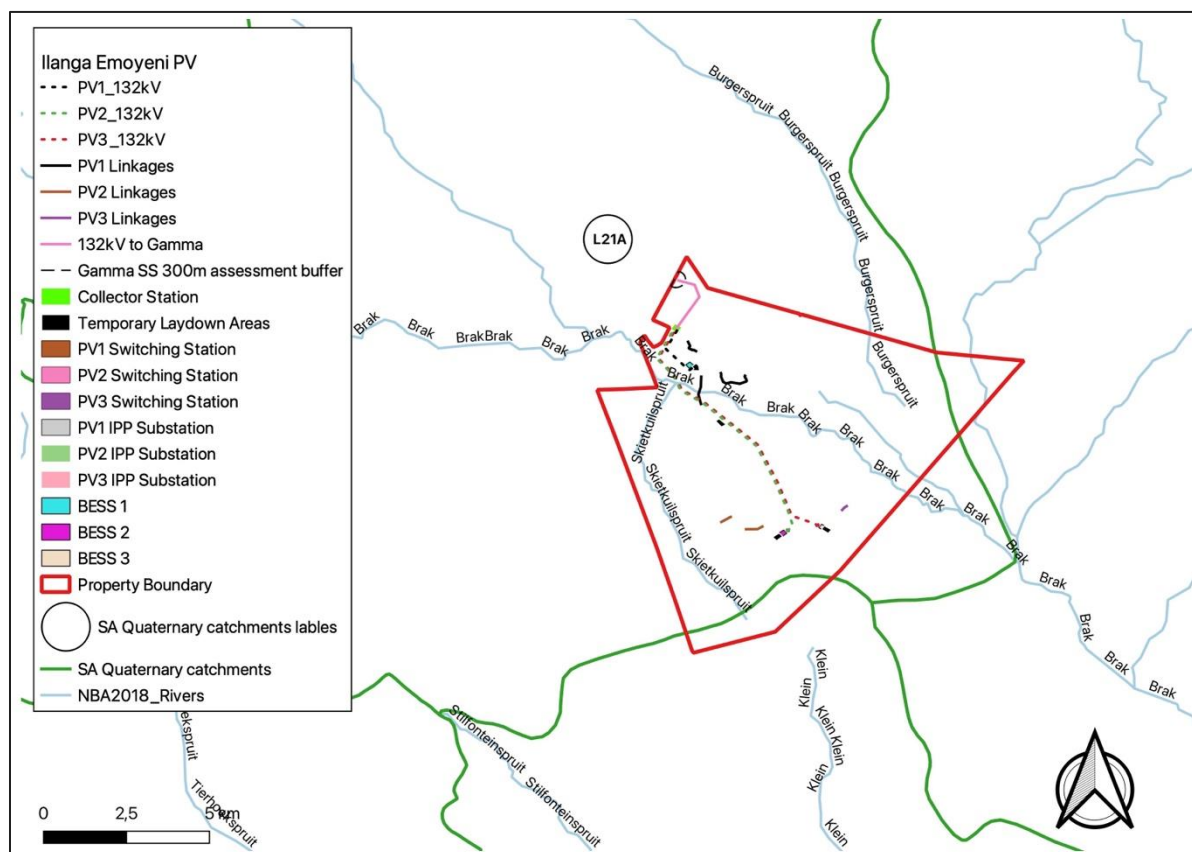


Figure 7-5: Locality map indicating the various quaternary catchments and mainstem rivers within the proposed project's boundaries.

Current waterbody inventories, 1:50 000 topo cadastral surveys mapping indicated the potential for several wetlands within the greater study region (Figure 7-6). These inventories include wetland spatial data based on landcover 2007 data, previous assessments and wetland information retained by the Provincial authorities, combined into one database that formed part of the updated National Spatial Biodiversity Assessment, 2018. It should be noted that the riverine wetlands shown in the National database were misidentified actually are part of various alluvial channels within the site.

A baseline map was then developed and refined using the 2022 survey data, noting that due to the complex nature of the topography and geology, the features were digitised at a scale of 1:5 000 (Figure 7-7).

Coupled to the aquatic delineations, information was collected on potential species that could occur within the watercourses, especially any conservation worthy species (Listed or Protected) along with a detailed account of the potential species and observed species.

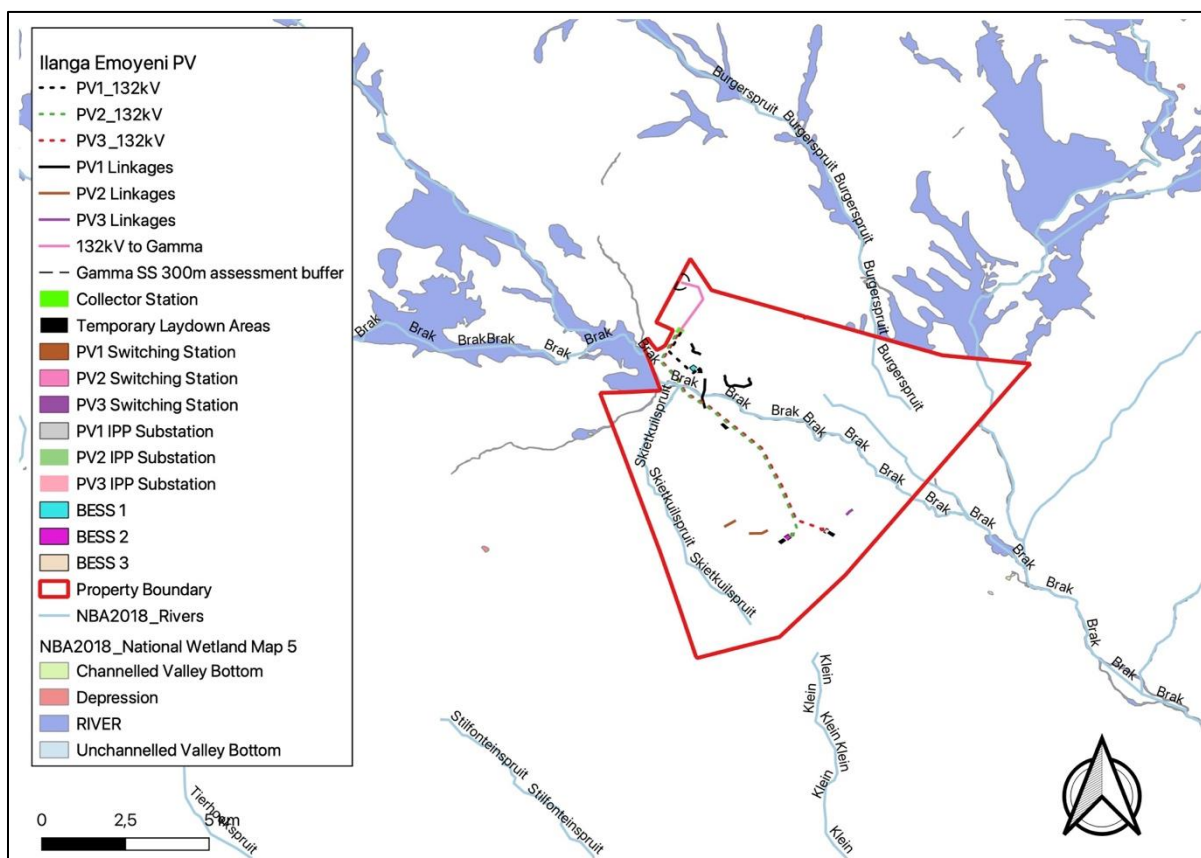


Figure 7-6: National Wetland Inventory wetlands and waterbodies

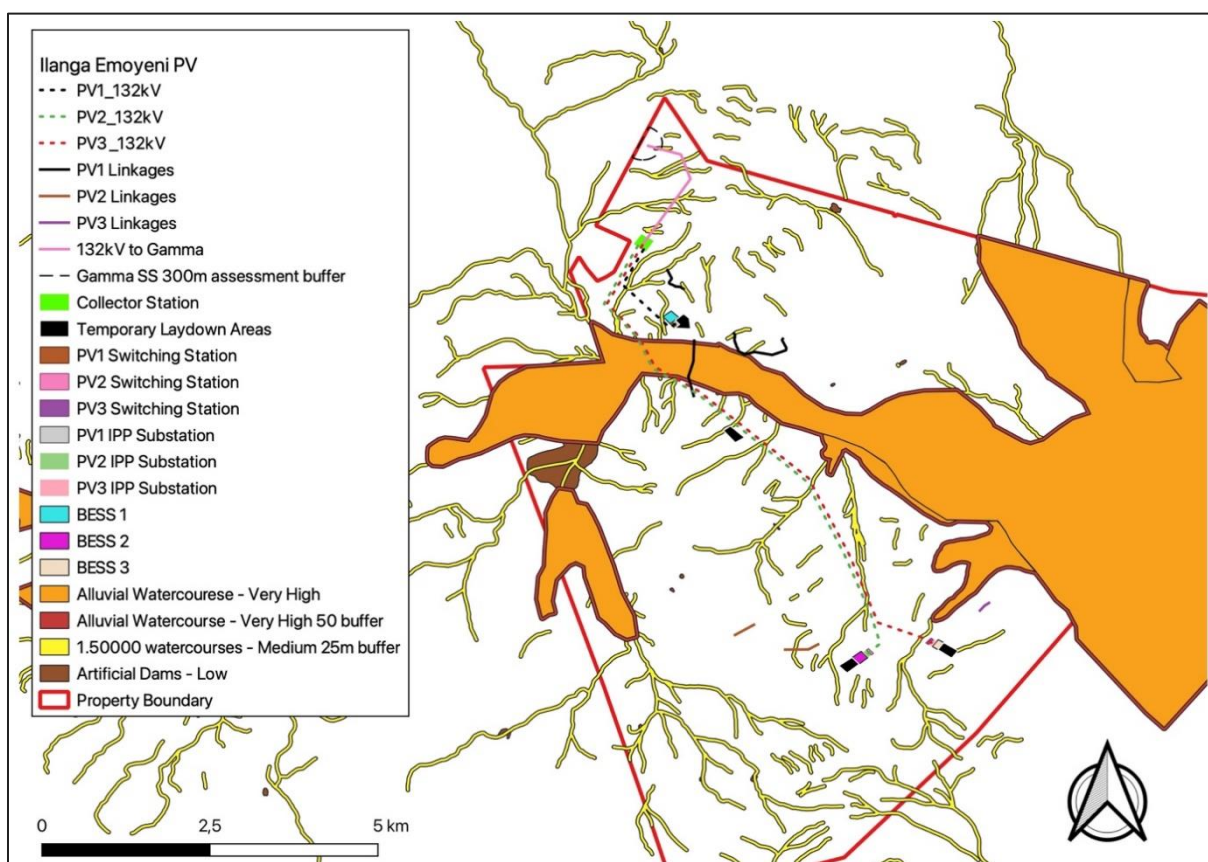


Figure 7-7: Waterbodies delineated in this assessment based on ground-truthing information collected

The Present Ecological State (PES) of a river, watercourse or wetland represents the extent to which it has changed from the reference or near pristine condition (Category A) towards a highly impacted

system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E).

The PES scores have been revised for the country and based on the new models, aspects of functional importance as well as direct and indirect impacts have been included. The new PES system incorporates Ecological Importance (EI) and Ecological Sensitivity (ES) separately as opposed to Ecological Importance and Sensitivity (EIS) in the old model, although the new model is still heavily centred on rating rivers using broad fish, invertebrate, riparian vegetation and water quality indicators. The Recommended Ecological Category (REC) is still contained within the new models, with the default REC being B, when little or no information is available to assess the system or when only one of the above-mentioned parameters are assessed or the overall PES is rated between a C or D.

All of the systems assessed on a Subquaternary level within the study area were rated as PES B = Largely Natural to C = Moderately Modified. While these were also rated as High in terms of Ecological Sensitivity and Low in terms of Ecological Importance respectively.

Based on the information collected during the preliminary field investigations, these ratings are verified and upheld for the riverine systems. The High Ecological Sensitivity rating for the natural water sources, is further substantiated by the fact that some of the affected catchments are included in both the National Freshwater Priority Atlas and the respective provincial Biodiversity Spatial Plan CBA spatial layers (Figure 7-8 and Figure 7-9).

Overall, these catchment areas and subsequent rivers / watercourses are largely in a natural state with localised impacts in some areas, which include the following:

- ▶ Erosion and sedimentation associated with road crossings, and
- ▶ Impeded water flow due to several in channel farm dams and weirs.

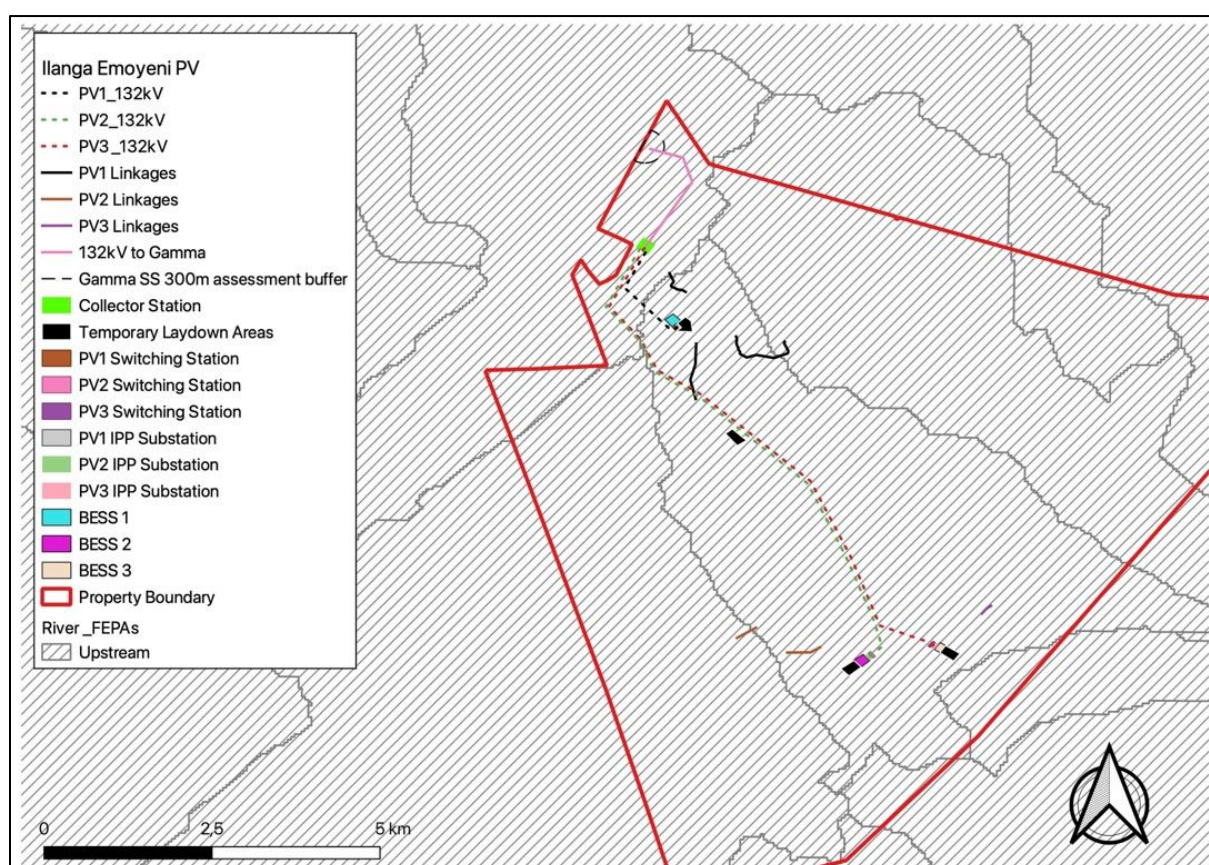


Figure 7-8: The Freshwater Ecosystem Priority Areas for the study sites

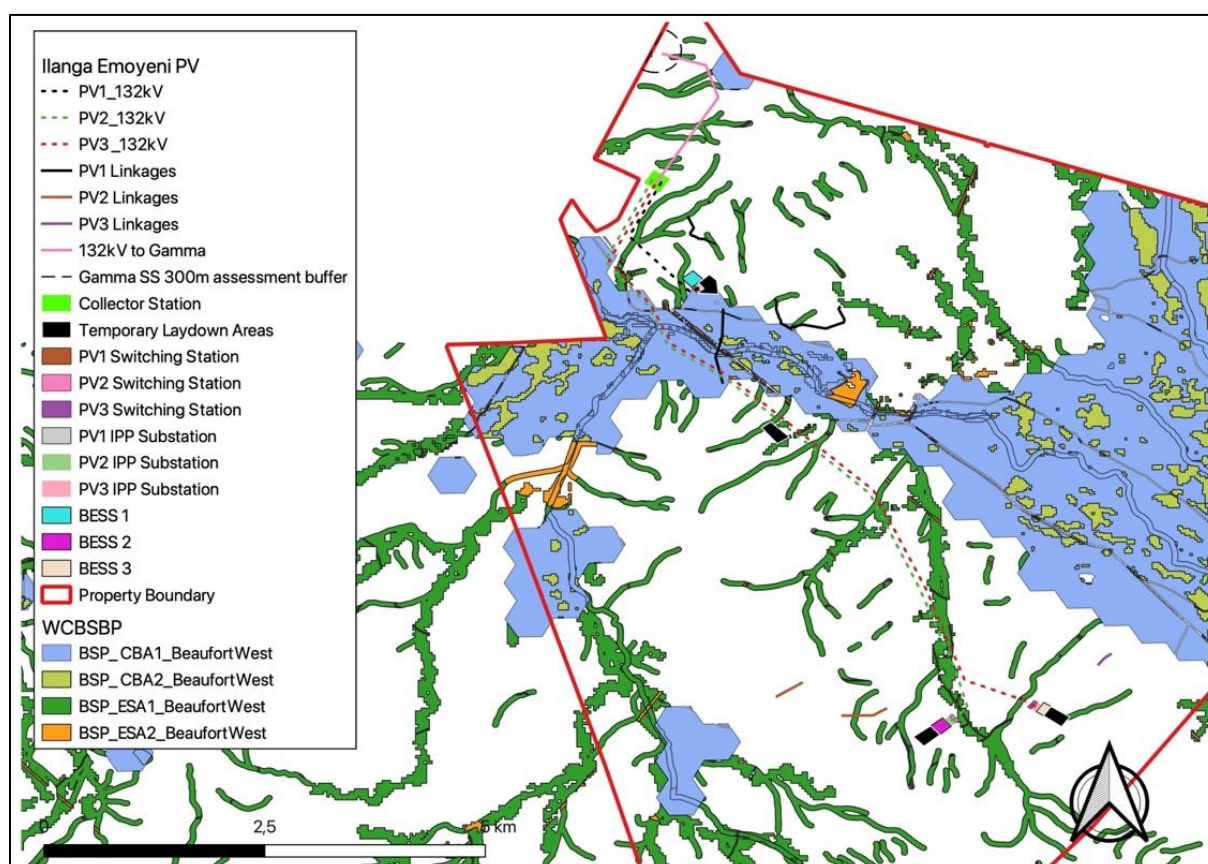


Figure 7-9: The Critical Biodiversity Areas (CBAs) as per the WCBSP

7.3.2 Site sensitivity

Using the baseline description and preliminary field data while considering the current disturbances and site characteristics, the following features were identified, then categorised into one of number pre-determined sensitivity categories to provide protect and/or guide the layout planning and possibly the design processes:

Table 7-5 below provides an overview of the sensitivity of features (with buffers distances included) as it relates to the main project component types for the project. The features are shown spatially in Figure 7-10.

The sensitivity ratings of High No-Go to Low were determined through an assessment of the habitat sensitivity and related constraints. However, these No-Go areas (with buffers) relate in general terms to the project and there are areas where encroachment on these areas would occur (i.e. existing road crossings within systems and considered acceptable since these areas have already been impacted).

These proposed constraints / buffers do not include bird and or bat specialist buffers / constraints as theirs buffers along aquatic features are at times far larger around aquatic features, than those required for the known aquatic species within this region.

Table 7-5: Table of constraints and sensitivity ratings

Map Key	Sensitivity Rationale	Buffer	Development Constraints and override exceptions
High = No Go	“No go” areas or setbacks and areas or features that are considered of such significance that impacting them may be regarded as fatal flaw or strongly influence the project impact significance profile. Therefore areas or features that are considered to have a high sensitivity or where project infrastructure would be highly constrained and should be avoided as far as possible. Infrastructure located in these areas are likely to drive up impact significance ratings and mitigations	50m as these areas also form part of CBAs	Access roads and grid connection can span these areas, but preferably where existing impacts already occur
Medium	Areas that are deemed to be of medium sensitivity but should still be avoided as this would minimise impacts and or the need for additional Water Use Authorisation in the case of any aquatic features	25m to aid delineation accuracy and prevent bank instability	Access roads and grid connection can span these areas, but preferably where existing impacts already occur
Low	Areas of low sensitivity or constraints such as artificial systems with little to no biological value or would not result in any future licensing requirements e.g. dry earth wall farm dams. While from a terrestrial perspective the vegetation or habitat is ubiquitous within the greater region or has seen some form of disturbance.	N/A	If structure is not prone to any surface water flow risk then structures can be placed in these area
Neutral	Unconstrained areas (left blank in mapping) from aquatic perspective	N/A	N/A

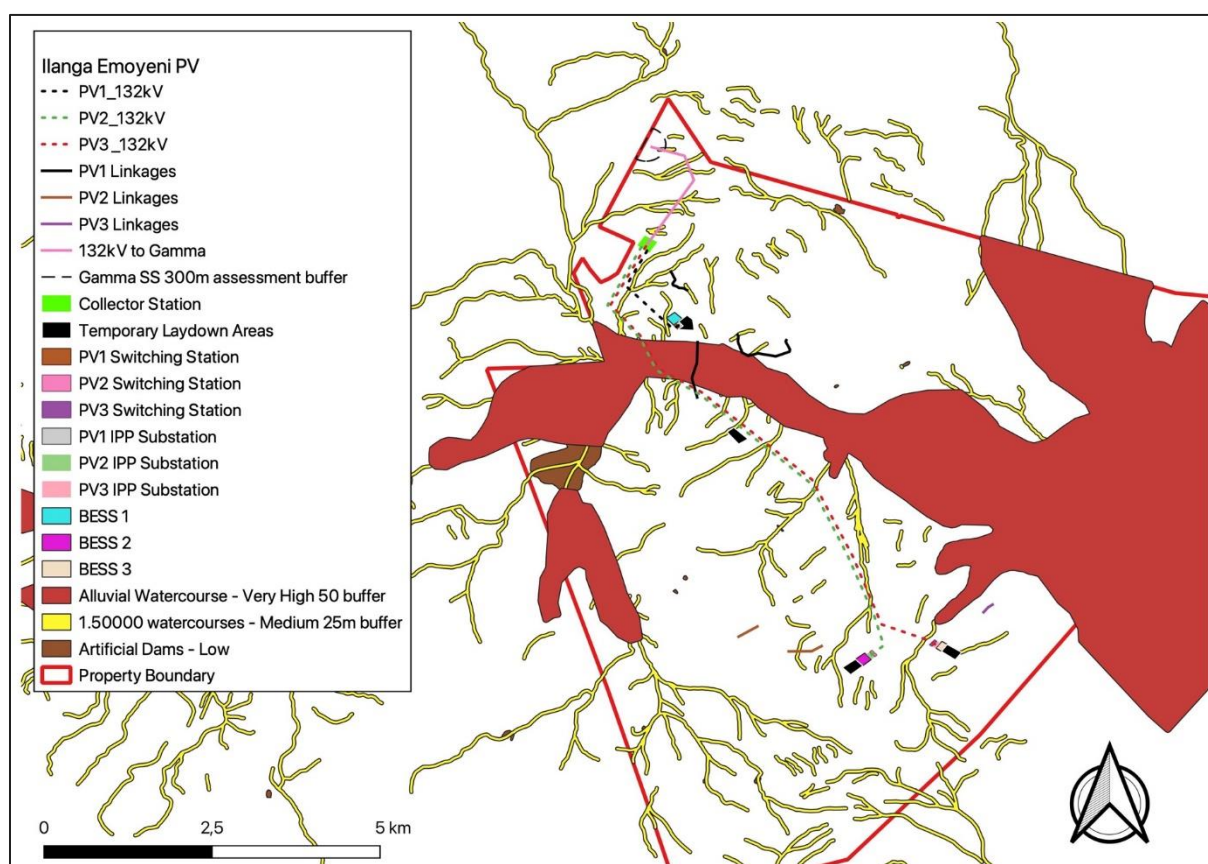


Figure 7-10: Delineated habitats inclusive of the respective buffers and overall sensitivity ratings

In summary, structures such as PV Panel Areas, buildings, substations and Battery Energy Storage System (BESS), should be placed outside of the High Sensitivity habitats, while remaining structures (roads and transmission lines) could cross or span the Moderate / Low Sensitivity areas. Noting that Low Sensitivity can also = Moderate areas but with existing impacts e.g., current roads, farm tracks of previously disturbed areas but these must be confirmed during the remainder of the assessment phases for areas such as roads or grid access routes.

7.3.3 Impact assessment

During the aquatic ecological impact assessment it was found that the greatest number of impacts are expected to occur within the construction phase, but if the High sensitivity / No-Go areas are avoided (as the current layout strives to do), then the impacts would be limited to a low number of road crossings only.

With regard to the decommissioning phase, this will not be assessed as the impacts would remain the same as that shown in the operational phase. This is due to the lack of irreversibility of the impacts due to the nature of the soils, topography and vegetation having a low rehabilitation potential.

Note no important aquatic taxa were observed during this assessment, however it does not preclude terrestrial species that associates with riverine habitat, and thus the terrestrial ecology, and avifaunal assessments can be reference for more detail on such impacts.

Project phase	Construction
Impact	Disturbance or destruction of aquatic species of special concern
Description of impact	During construction activities within watercourses could result in the disturbance or destruction of any listed and or protected plant or animal species. However, any of the aquatic obligate species observed during this assessment can be avoided. The terrestrial impact assessment considers the potential impact of the Critically Endangered Riverine rabbit (<i>Bunolagus monticulan</i>) in greater detail.

Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Develop and implement an Aquatic Rehabilitation and Monitoring plan post Environmental Authorisation. This must be developed following the finalisation of grid connection and access layout and a walk down has been completed as part of the final design.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	
Comment on significance	With the above mitigation in mind the derived impact significance above is agreed with.			
Cumulative impacts	The cumulative impact assessment considers the combined impact of the remaining PV projects, and adjacent wind farms that are also in the development phase and the associated grid lines on the aquatic resources. Although the current state of the surrounding landscape is largely natural the cumulative impact would be Negligible.			

Project phase	Construction	
Impact	Damage or loss of riparian systems, wetlands and water courses through the placement of new crossings or infrastructure.	
Description of impact	Construction could result in the loss of riparian and wetland systems that are still functional and provide an ecosystem services within the site especially where new access roads are required or road upgrades will widen any current tracks to access the PV site. Loss can also include a functional loss, through change in vegetation type via alien encroach for example	
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts
Potential mitigation	A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. This will also assist in confirming that all of the proposed PV areas, buildings and camps are located outside any of the delineated systems.	

	<p>All alien plant re-growth, which is currently low within the greater region must be monitored and should it occur, these plants must be eradicated within the project footprints and especially in areas near the proposed crossings. Prosopis (alien invasive riparian tree) is prevalent in areas to the north of the site, thus care in transporting any material, while ensuring that such materials is free of alien seed, coupled with pre and post alien clearing must be stipulated in the EMPr.</p> <p>Where roads and crossings are upgraded, the following applies:</p> <ol style="list-style-type: none"> 1. All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. 2. River levels, regardless of the current state of the river / water course will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. 3. Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. 4. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). 5. A detailed monitoring plan must be developed in the pre-construction phase by an aquatic specialist, where any delineated wetlands occur within 50 m of existing crossings. 			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact

Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	
Comment on significance	With the above in mind the derived impact significance above is found acceptable.			
Cumulative impacts	The cumulative impact assessment considers the combined impact of the remaining PV projects, and adjacent wind farms that are also in the development phase and the associated grid lines on the aquatic resources. Although the current state of the surrounding landscape is largely natural the cumulative impact would be Negligible.			

Project phase	Construction			
Impact	Potential impacts on localised water quality are limited in degree for the access roads and ancillary infrastructure associated with the grid connections.			
Description of impact	During construction earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc. Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	<ul style="list-style-type: none">• All liquid chemicals including fuels and oil, including the BESS must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely.• Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment).• Mechanical plant and bowsers must not be refuelled or serviced within 100m of a river channel.• All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 50 m from any demarcated water courses.• Littering and contamination associated with construction activity must be avoided through effective construction camp management;• No stockpiling should take place within or near a water course• All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable;			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur

Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	
Comment on significance	Spills do occur, and these should be minimised through immediate clean up using spill kits, however with the above in mind the derived impact significance is found acceptable.			
Cumulative impacts	The cumulative impact assessment considers the combined impact of the remaining PV projects, and adjacent wind farms that are also in the development phase and the associated grid lines on the aquatic resources. Although the current state of the surrounding landscape is largely natural the cumulative impact would be Negligible.			

Project phase	Operation			
Impact	Impact on aquatic systems through possible increase in surface water runoff from the access roads and substations			
Description of impact	Increase in hard surface areas, and roads that require stormwater management will increase through the concentration of surface water flows that could result in localised changes to flows (volume) that would result in form and function changes within the riparian / wetland systems, which are currently ephemeral, i.e. riparian systems become tree rather than shrub dominated, with a loss in instream plant biodiversity through shading, which then results in habitat changes / loss.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. This stormwater control systems must be inspected on an annual basis to ensure these are functional. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil and the re-vegetation of any disturbed riverbanks			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact	High	The affected environmental will be

		with significant intervention		able to recover from the impact
Resource irreplaceability		N/A		N/A
Significance	Minor - negative		Negligible - negative	
Comment on significance	With effective stormwater management all the potential impacts can be minimised			
Cumulative impacts	The cumulative impact assessment considers the combined impact of the remaining PV projects, and adjacent wind farms that are also in the development phase and the associated grid lines on the aquatic resources. Although the current state of the surrounding landscape is largely natural the cumulative impact would be Negligible.			

Project phase	NO GO alternative		
Impact	Combined impact on aquatic resources should the project not go ahead (i.e. the No Go Alternative).		
Description of impact	<p>Should the project not proceed, then current status quo with regard the aquatic environment would remain unchanged. Overall, these catchment and subsequent rivers / watercourses are largely in a natural state. But present-day impacts do occur in localised areas and included the following:</p> <ul style="list-style-type: none">• Erosion as a result of road crossings;• Several farm dams; and• Undersized culverts within present day road crossings. <p>This has resulted in a slow degradation within the aquatic systems but the rate in change is not noticeable within the timeframe of this assessment. These activities are likely to continue intermitted into the future and Provincial Roads Authorities and landowners should undertake the following:</p> <ul style="list-style-type: none">► Improve the current stormwater and energy dissipation features not currently found along the tracks and roads within the region► Install properly sized culverts with erosion protection measures at the present road / track crossings		
Mitigatability	Not applicable	Not applicable	
Potential mitigation	None		
Assessment	Without mitigation		With mitigation
Nature	Negative		NA
Duration	Long term	Impact will last between 10 and 15 years	
Extent	Limited	Limited to the site and its immediate surroundings	
Intensity	Negligible	Natural and/ or social functions and/ or processes are negligibly altered	
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	
Confidence	High	Substantive supportive data exists to verify the assessment	
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	
Significance	Negligible - negative		
Comment on significance	The impact on aquatic resources are likely remain in line with the status quo and the finding of negligible is deemed correct		
Cumulative impacts	The cumulative effect if all projects do not proceed would be negligible.		

Project phase	All phase combined
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Impact	Cumulative Impact of the three PV Facilities associated grid line of local aquatic resources			
Description of impact	The cumulative impact assessment considers the combined impact of the remaining PV projects, and adjacent wind farms that are also in the development phase and the associated grid lines on the aquatic resources			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Refer to all mitigations measures already provided under individual impacts. The only additional mitigation measures may include: <ul style="list-style-type: none">The project should share roads and infrastructure where possible to reduce the overall footprint and reduce stormwater and erosion and sedimentation related impactsThe projects should collaborate with provincial roads authority to upgrade the main access routes (R63) and improve the crossings and stormwater controls			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Medium term	Impact will last between 5 and 10 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Negligible - negative	
Comment on significance	The projects are spread over a larger areas, including three catchments, the potential cumulative impact of the four projects together is there likely to be Minor (-) without the proposed mitigations measures. With all cumulative mitigations (dealt with under foregoing impacts) together with the additional mitigations measures proposed here.			

7.3.4 Conclusions and recommendations

During this assessment, several sensitive habitats were observed and are shown in the maps provided in this report. Noteworthy areas, which should be avoided for infrastructure development, include the main riverine systems.

In summary the study area was dominated by three major types of natural aquatic features and a small number of artificial barriers associated with catchments and rivers, characterised as follows:

- Ephemeral watercourses - alluvial systems with or without riparian vegetation. These range from narrow channels to broad flood plain areas. Some of these also contain wetland areas, but have been avoided by the proposed footprints

- Minor watercourses; and
- Dams and weirs / berms with no wetland or aquatic features.

The type of aquatic systems, observed were typical from a plant species as well as from a form/function perspective for this portion of the Karoo (the area bound by Loxton, Beaufort West (above the escarpment), Victoria West, Nelspoort and Frasersburg). Thus the site would not be considered unique in these terms as the systems are represented within a wide area, with no listed species (aquatic) observed, but is rated as important due to it supporting the downstream systems.

A variety of aquatic features, mostly ephemeral in nature were identified within the study area and, where possible required, will be spanned. Generally, the grid line may span over the identified waterbodies but no pylons may be placed within these areas, except where existing impacts occur.

Existing roads through these features must be utilised as far as possible. In terms of new access roads or service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings, but if these are required, then a specific walkdown should be conducted with the specialist to identify the most suited crossing position. Where these crossings do occur, it needs to be monitored for erosion.

Thus the overall impact on the aquatic environment presently is likely be Negligible (with mitigation). Care must be taken to avoid the No-Go areas and for the most part are excluded from the proposed layout.

A portion of the proposed grid connection areas will be placed within a CBA, however this area was delineated to a finer scale and the affected feature (aquatic zone) will be avoided as the aquatic environment in this section of the lines is approximately 350m wide and could thus be spanned, i.e. no impacts within the associated aquatic zones.

Based on the findings of this study, the specialist finds no reason to withhold to an authorisation of any of the proposed activities, assuming that key mitigations measures are implemented. A key recommendation is also that during the construction mobilisation process, that the temporary construction camps are located outside of the water courses (including the 50m buffer). None are presently located within any aquatic systems, but additional laydown areas may be required during the construction process, hence this recommendation

7.4 Avifauna

Chris van Rooyen Consulting were appointed to conduct the Avifaunal Specialist Assessment for this iLanga Emoyeni Solar Suite project. Their full report is in Annexure D.

7.4.1 Receiving environment

It is estimated that a total of 153 bird species could potentially occur in the Broader Area. Please refer to Appendix 5 of the Avifaunal Specialist Assessment (Annexure D) which provides a comprehensive list of all the species in the Broader Area. Of these, 46 species are classified as powerline sensitive species.

Preconstruction bird monitoring was conducted during two surveys (June and August 2022). The results are presented in Table 7-6.

Table 7-6: Results of the bird monitoring drive transects

Total number of species	
All Species	79
Priority Species	26 (33%)

Non-Priority Species	53
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Total number of records	
Drive transects	3665

Table below lists all the powerline sensitive species and the possible impacts on these species by the proposed gridline.

LC = Least Concern

H = High

NT = Near threatened

M = Medium

VU = Vulnerable

L = Low

EN = Endangered

Table 7-7: Powerline sensitive species recorded in the broader area, preferred habitat and potential impacts

Species name	Scientific name	Full protocol – Reporting Rate %	Ad hoc protocol – Reporting Rate %	Global Conservation Status	Regional Conservation Status	Endemic (SA)	Likelihood of regular occurrence in the PAOI	Recorded during monitoring	Karoo shrub	Surface water (dams, boreholes and drainage lines)	Drainage woodland	Agricultural lands	Alien trees	High voltage powerlines	Powerline - displacement due to disturbance (breeding)	Powerline - displacement due to habitat transformation	Powerline - Collision
Blue Crane	<i>Grus paradisea</i>	62,5	10,9	VU	NT		H	x	x	x		x			x	x	x
Egyptian Goose	<i>Alopochen aegyptiaca</i>	50	9,24	-	-		H	x		x		x	x	x			x
Pale Chanting Goshawk	<i>Melierax canorus</i>	40,6	15,1	-	-		H	x	x	x	x	x	x	x	x		
South African Shelduck	<i>Tadorna cana</i>	37,5	5,88	-	-		H	x		x							x
Karoo Korhaan	<i>Eupodotis vigorsii</i>	31,3	5,88	-	NT		H	x	x						x	x	x
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	25	3,36	-	-		H	x		x		x	x				x
Jackal Buzzard	<i>Buteo rufofuscus</i>	21,9	3,36	-	-	x	H		x	x	x	x	x	x			
Rock Kestrel	<i>Falco rupicolus</i>	21,9	1,68	-	-		H	x	x		x	x	x	x			
Cape Crow	<i>Corvus capensis</i>	40,6	13,4	-	-		H	x	x	x	x	x	x	x			
Verreaux's Eagle	<i>Aquila verreauxii</i>	18,8	5,04	-	VU		M	x	x	x			x	x	x		
Grey Heron	<i>Ardea cinerea</i>	12,5	0,84	-	-		M			x							x
Reed Cormorant	<i>Microcarbo africanus</i>	12,5	0	-	-		M			x			x				x
Spotted Eagle-Owl	<i>Bubo africanus</i>	12,5	0,84	-	-		M		x	x	x	x	x	x			x
Yellow-billed Duck	<i>Anas undulata</i>	12,5	1,68	-	-		M			x							x
Greater Kestrel	<i>Falco rupicoloides</i>	9,38	5,04	-	-		M	x	x		x	x	x	x	x		
Hadada Ibis	<i>Bostrychia hagedash</i>	43,8	4,2	-	-		H			x	x	x	x	x			x
African Spoonbill	<i>Platalea alba</i>	6,25	0	-	-		M	x		x			x				x

Species name	Scientific name	Full protocol – Reporting Rate %	Ad hoc protocol – Reporting Rate %	Global Conservation Status	Regional Conservation Status	Endemic (SA)	Likelihood of regular occurrence in the PAOI	Recorded during monitoring	Karoo shrub	Surface water (dams, boreholes and drainage lines)	Drainage woodland	Agricultural lands	Alien trees	High voltage powerlines	Powerline - displacement due to disturbance (breeding)	Powerline - displacement due to habitat transformation	Powerline - Collision
Helmeted Guineafowl	<i>Numida meleagris</i>	15,6	1,68	-	-		M	x	x	x	x	x	x	x			
Black-headed Heron	<i>Ardea melanocephala</i>	6,25	2,52	-	-		M			x		x	x	x			x
Black-winged Kite	<i>Elanus caeruleus</i>	6,25	0	-	-		M		x		x	x	x				
Black-winged Stilt	<i>Himantopus himantopus</i>	6,25	1,68	-	-		M			x							
Hamerkop	<i>Scopus umbretta</i>	6,25	0,84	-	-		M			x							x
Lanner Falcon	<i>Falco biarmicus</i>	6,25	5,04	-	VU		M		x	x	x	x	x	x	x		
Red-billed Teal	<i>Anas erythrorhyncha</i>	6,25	0	-	-		M			x							x
Red-knobbed Coot	<i>Fulica cristata</i>	6,25	0	-	-		M			x							x
Spur-winged Goose	<i>Plectropterus gambensis</i>	6,25	1,68	-	-		M	x		x		x	x	x			x
African Black Duck	<i>Anas sparsa</i>	3,13	0	-	-		M			x							x
African Darter	<i>Anhinga rufa</i>	3,13	0	-	-		M			x							x
African Harrier-Hawk	<i>Polyboroides typus</i>	3,13	0,84	-	-		L		x	x	x		x				
Northern Black Korhaan	<i>Afrotis afraoides</i>	0	0	-	-		M	x	x		x	x					x
Black Stork	<i>Ciconia nigra</i>	3,13	0,84	-	VU		M			x			x	x			x
Booted Eagle	<i>Hieraaetus pennatus</i>	3,13	0,84	-	-		M		x	x	x	x	x	x			
Pied Crow	<i>Corvus albus</i>	75	32,8	-	-		H		x	x	x	x	x	x			
Common Buzzard	<i>Buteo buteo</i>	3,13	2,52	-	-		L		x	x	x	x	x	x			
Common Moorhen	<i>Gallinula chloropus</i>	3,13	0	-	-		M			x							x

Species name	Scientific name	Full protocol – Reporting Rate %	Ad hoc protocol – Reporting Rate %	Global Conservation Status	Regional Conservation Status	Endemic (SA)	Likelihood of regular occurrence in the PAOI	Recorded during monitoring	Karoo shrub	Surface water (dams, boreholes and drainage lines)	Drainage woodland	Agricultural lands	Alien trees	High voltage powerlines	Powerline - displacement due to disturbance (breeding)	Powerline - displacement due to habitat transformation	Powerline - Collision
Little Grebe	<i>Tachybaptus ruficollis</i>	3,13	0	-	-		M			x							x
Ludwig's Bustard	<i>Neotis ludwigii</i>	3,13	2,52	EN	EN		M	x	x		x	x			x	x	x
Martial Eagle	<i>Polemaetus bellicosus</i>	3,13	1,68	EN	EN		M		x	x	x	x	x	x	x	x	x
Secretarybird	<i>Sagittarius serpentarius</i>	3,13	2,52	EN	VU		M	x	x	x	x		x		x	x	x
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>	3,13	0	-	-		M			x			x				x
Greater Flamingo	<i>Phoenicopterus roseus</i>	0	0	-	NT		M	x		x							x
Kori Bustard	<i>Ardeotis kori</i>	0	0,84	NT	NT		M		x	x	x	x			x	x	x
Little Bittern	<i>Ixobrychus minutus</i>	0	0,84	-	-		L			x							
White-necked Raven	<i>Corvus albicollis</i>	15,6	1,68	-	-		H		x	x	x	x	x	x			
White Stork	<i>Ciconia ciconia</i>	0	0,84	-	-		L		x	x		x	x	x			x
Woolly-necked Stork	<i>Ciconia episcopus</i>	0	0,84	-	-		L			x			x				x

7.4.2 Site sensitivity

There are no Important Bird Areas (IBA) within close proximity of the PAOI. The closest IBA is the Platberg-Karoo Conservancy IBA (SA037) which is more than 90km from the site. There are also no National Protected Areas nearby. The closest significant protected area to the PAOI is the Karoo National Park which is more than 90km west of the PAOI.

According to the DFFE national screening tool, the habitat within the PAOI is classified as High sensitivity for birds according to the Animal Species Theme (Screening Report attached in Annexure E). The High sensitivity is linked to the possible occurrence of several Species of Conservation Concern (SCC), namely: Ludwig's Bustard *Neotis ludwigii* (Globally and Regionally Endangered), Verreaux's Eagle *Aquila verreauxii* (Regionally Vulnerable), and Caspian Tern *Hydroprogne caspia* (Regionally Vulnerable).

The PAOI contains confirmed habitat for SCC as defined in the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial animal species (Government Gazette No 43855, 30 October 2020). The following SCC were recorded in the PAOI during the on-site surveys: Blue Crane, Ludwig's Bustard, Karoo Korhaan, Verreaux's Eagle, Secretarybird and Greater Flamingo.

Based on these criteria, a classification of High sensitivity for avifauna is suggested for the whole PAOI.

The following sections discuss the sensitivity of species in relation to the expected impact that the construction activities will have on them.

7.4.2.1 Displacement due to habitat transformation

During the construction of power lines, service roads (jeep tracks) and substations, habitat destruction/transformation inevitably takes place. The construction activities will constitute the following:

- ▶ Site clearance and preparation;
- ▶ Construction of the infrastructure (i.e. the substations, OHL and service road);
- ▶ Transportation of personnel, construction material and equipment to the site, and personnel away from the site;
- ▶ Removal of vegetation for the proposed substation and stockpiling of topsoil and cleared vegetation;
- ▶ Excavations for infrastructure;

These activities could impact on birds breeding, foraging and roosting in or in close proximity of the proposed switching stations and collector substation, through transformation of habitat, which could result in temporary or permanent displacement of a range of species. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the substation yards is unavoidable. Fortunately, due to the nature of the vegetation, and judged by the existing power lines, very little if any vegetation clearing will be required in the power line servitudes. The habitat in the study area is extensive, very uniform, and largely untransformed from a bird impact perspective; therefore, the loss of a few hectares of habitat due to direct habitat transformation associated with the construction of the proposed switching stations and collector substation, is likely to have a low impact on avifauna. The species most likely to be directly impacted would be small, common, non-Red Data species which happen to be resident in those few hectares of Karoo habitat.

The following are powerline sensitive species that could be negatively affected by displacement due to habitat loss:

Table 7-8: Powerline-sensitive avifauna species - habitat loss

Species name	Scientific name	Full protocol	Ad hoc protocol	Global status	Regional status	Likelihood of regular occurrence at the PAOI	Recorded during monitoring
Blue Crane	<i>Grus paradisea</i>	62,5	10,9	VU	NT	H	x
Karoo Korhaan	<i>Eupodotis vigorsii</i>	31,3	5,88	-	NT	H	x
Ludwig's Bustard	<i>Neotis ludwigii</i>	3,13	2,52	EN	EN	M	x
Martial Eagle	<i>Polemaetus bellicosus</i>	3,13	1,68	EN	EN	M	
Secretarybird	<i>Sagittarius serpentarius</i>	3,13	2,52	EN	VU	M	x
Kori Bustard	<i>Ardeotis kori</i>	0	0,84	NT	NT	M	

7.4.2.2 Displacement due to disturbance associated with construction

Apart from direct habitat destruction, the above-mentioned activities also impact on birds through disturbance; this could lead to breeding failure if the disturbance happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. A potential mitigation measure is the timeous identification of nests and the timing of the construction activities to avoid disturbance during a critical phase of the breeding cycle, although in practice that can admittedly be very challenging to implement. As far as SCC are concerned, large terrestrial species are most likely to be affected by displacement due to disturbance associated with the construction of the proposed powerline, as well as the Verreaux's Eagles breeding on the Droërivier Hydra 1 400kV in the PAOI near the Gamma MTS. The normal practice is to place a 1km all infrastructure exclusion zone around a nest of a Verreaux's Eagle. The exception to this would be in certain circumstances where a nest is located on an existing transmission line. In such an event, it is preferable to place any new powerlines next to the existing powerline, even if this means temporary disturbance of a pair of breeding eagles. By placing the new line next to an existing line, the creation of a new collision risk in a pristine area is avoided, and the collision risk that the new line poses is also mitigated to some extent through making all the lines more visible. The temporary, short-term disturbance of the eagles is less detrimental compared to the long-term collision risk that the new powerline will pose in a pristine area and the additional habitat fragmentation which it will cause.

Powerline sensitive species that could be negatively affected by disturbance associated with the construction of the OHPL are the following:

Table 7-9: Powerline sensitive species that could be negatively affected by disturbance associated with the construction

Species name	Scientific name	Full protocol	Ad hoc protocol	Global status	Regional status	Likelihood of regular occurrence at the PAOI	Recorded during monitoring
Blue Crane	<i>Grus paradisea</i>	62,5	10,9	VU	NT	H	x

Pale Chanting Goshawk	<i>Melierax canorus</i>	40,6	15,1	-	-	H	x
Karoo Korhaan	<i>Eupodotis vigorsii</i>	31,3	5,88	-	NT	H	x
Verreaux's Eagle	<i>Aquila verreauxii</i>	18,8	5,04	-	VU	M	x
Greater Kestrel	<i>Falco rupicoloides</i>	9,38	5,04	-	-	M	x
Lanner Falcon	<i>Falco biarmicus</i>	6,25	5,04	-	VU	M	
Ludwig's Bustard	<i>Neotis ludwigii</i>	3,13	2,52	EN	EN	M	x
Martial Eagle	<i>Polemaetus bellicosus</i>	3,13	1,68	EN	EN	M	
Secretarybird	<i>Sagittarius serpentarius</i>	3,13	2,52	EN	VU	M	x
Kori Bustard	<i>Ardeotis kori</i>	0	0,84	NT	NT	M	

7.4.2.3 Electrocutions

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (Van Rooyen 2004). The electrocution risk is largely determined by the pole/tower design and the size of the bird. In the case of the proposed power lines, no electrocution risk is envisaged because the proposed design of the 132kV line, namely the steel monopole and self-supporting lattice structures, should not pose an electrocution threat to any of the powerline sensitive species which are likely to occur in the study area.

7.4.2.4 Collisions

Collisions are arguably the biggest threat posed by transmission lines to birds in southern Africa. Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines.

From incidental record keeping by the Endangered Wildlife Trust, it is possible to give a measure of what species are generally susceptible to power line collisions in South Africa (Figure 7-11).

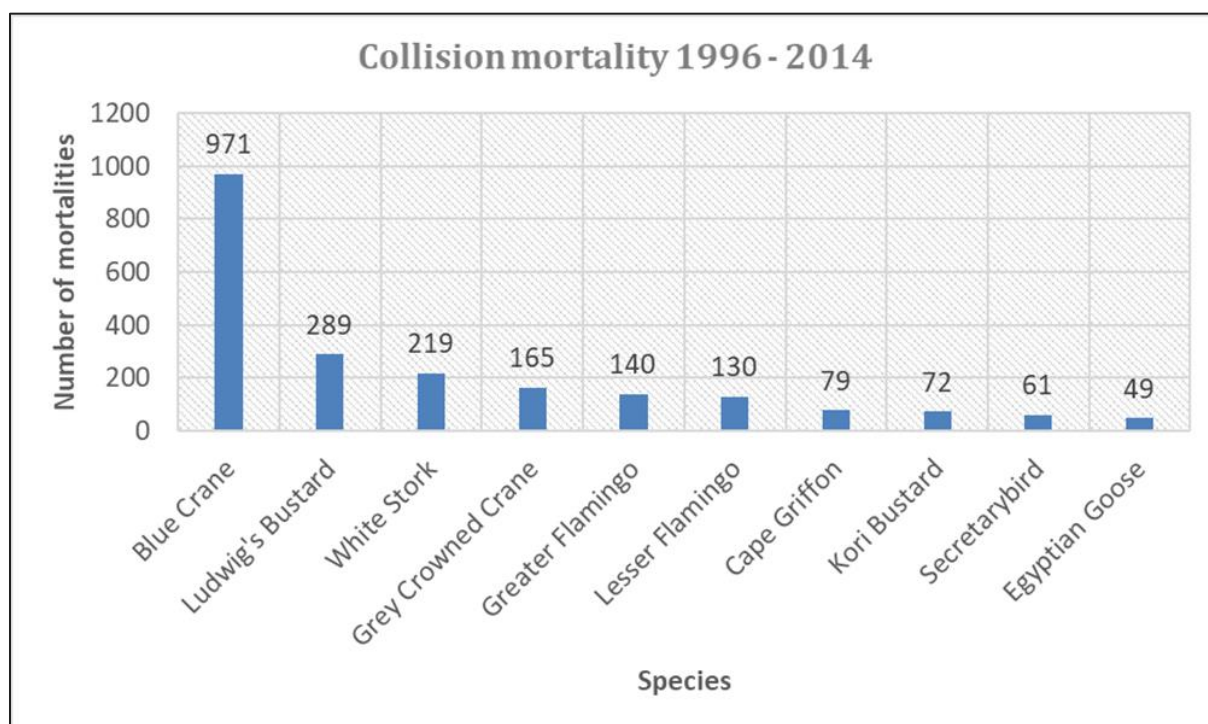


Figure 7-11: The top 10 collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom/Endangered Wildlife Trust Strategic Partnership central incident register 1996 - 2014 (EWT unpublished data)

Several factors are thought to influence avian collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. An important additional factor that previously has received little attention is the visual capacity of birds; i.e. whether they are able to see obstacles such as power lines, and whether they are looking ahead to see obstacles with enough time to avoid a collision. In addition to helping explain the susceptibility of some species to collision, this factor is key to planning effective mitigation measures.

Despite doubts about the efficacy of line marking to reduce the collision risk for bustards, there are numerous studies which prove that marking a line with PVC spiral type Bird Flight Diversers (BFDs) generally reduce mortality rates, including to some extent for bustards.

Using a controlled experiment spanning a period of nearly eight years (2008 to 2016), the Endangered Wildlife Trust (EWT) and Eskom tested the effectiveness of two types of line markers in reducing power line collision mortalities of large birds on three 400kV transmission lines near Hydra substation in the Karoo. Marking was highly effective for Blue Cranes, with a 92% reduction in mortality, and large birds in general with a 56% reduction in mortality, but not for bustards, including the endangered Ludwig's Bustard. The two different marking devices were approximately equally effective, namely spirals and bird flappers, they found no evidence supporting the preferential use of one type of marker over the other.

The powerline sensitive species which are potentially vulnerable to this impact are the following:

Table 7-10: Species vulnerable to powerline collisions

Species name	Scientific name	Full protocol	Ad hoc protocol	Global status	Regional status	Likelihood of regular occurrence at the PAOI	Recorded during monitoring
Blue Crane	<i>Grus paradisea</i>	62,5	10,9	VU	NT	H	x
Egyptian Goose	<i>Alopochen aegyptiaca</i>	50	9,24	-	-	H	x
South African Shelduck	<i>Tadorna cana</i>	37,5	5,88	-	-	H	x
Karoo Korhaan	<i>Eupodotis vigorsii</i>	31,3	5,88	-	NT	H	x
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	25	3,36	-	-	H	x
Grey Heron	<i>Ardea cinerea</i>	12,5	0,84	-	-	M	
Reed Cormorant	<i>Microcarbo africanus</i>	12,5	0	-	-	M	
Spotted Eagle-Owl	<i>Bubo africanus</i>	12,5	0,84	-	-	M	
Yellow-billed Duck	<i>Anas undulata</i>	12,5	1,68	-	-	M	
Hadada Ibis	<i>Bostrychia hagedash</i>	43,8	4,2	-	-	H	
African Spoonbill	<i>Platalea alba</i>	6,25	0	-	-	M	x
Black-headed Heron	<i>Ardea melanocephala</i>	6,25	2,52	-	-	M	
Hamerkop	<i>Scopus umbretta</i>	6,25	0,84	-	-	M	
Red-billed Teal	<i>Anas erythrorhyncha</i>	6,25	0	-	-	M	
Red-knobbed Coot	<i>Fulica cristata</i>	6,25	0	-	-	M	
Spur-winged Goose	<i>Plectropterus gambensis</i>	6,25	1,68	-	-	M	x
African Black Duck	<i>Anas sparsa</i>	3,13	0	-	-	M	
African Darter	<i>Anhinga rufa</i>	3,13	0	-	-	M	
Northern Black Korhaan	<i>Afrotis afraoides</i>	0	0	-	-	M	x
Black Stork	<i>Ciconia nigra</i>	3,13	0,84	-	VU	M	
Common Moorhen	<i>Gallinula chloropus</i>	3,13	0	-	-	M	
Little Grebe	<i>Tachybaptus ruficollis</i>	3,13	0	-	-	M	
Ludwig's Bustard	<i>Neotis ludwigii</i>	3,13	2,52	EN	EN	M	x
Martial Eagle	<i>Polemaetus bellicosus</i>	3,13	1,68	EN	EN	M	
Secretarybird	<i>Sagittarius serpentarius</i>	3,13	2,52	EN	VU	M	x

White-breasted Cormorant	<i>Phalacrocorax lucidus</i>	3,13	0	-	-	M	
Greater Flamingo	<i>Phoenicopterus roseus</i>	0	0	-	NT	M	x
Kori Bustard	<i>Ardeotis kori</i>	0	0,84	NT	NT	M	
White Stork	<i>Ciconia ciconia</i>	0	0,84	-	-	L	
Woolly-necked Stork	<i>Ciconia episcopus</i>	0	0,84	-	-	L	

7.4.2.5 Sensitivity Map

The avifaunal sensitivity is indicated in the map below and must be read in context of the text provided in this chapter.

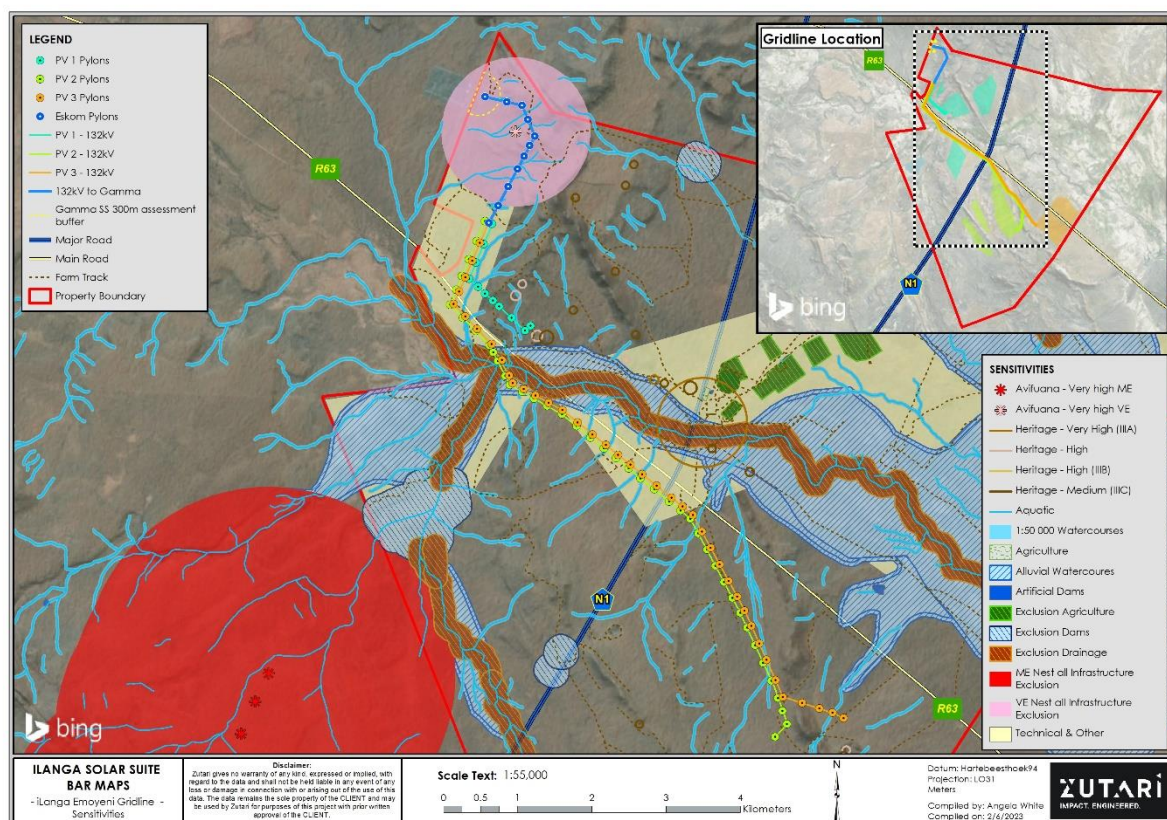


Figure 7-12: Avifaunal sensitivity as depicted on the combined site sensitivity map for the gridline.

7.4.3 Impact assessment

Project phase	Construction	
Impact	Displacement of priority species due to disturbance	
Description of impact	Displacement of powerline sensitive species due to disturbance linked to construction activities	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts

Potential mitigation	1. Conduct a pre-construction inspection (avifaunal walk-through) of the final substation layout and power line alignment to identify powerline sensitive species that may be breeding within the substation area and to record the status of the eagle nests on the existing transmission power lines. If a nest is occupied, the avifaunal specialist must consult with the contractor to find ways of minimising the potential disturbance to the breeding pair of eagles during the construction period. This could include measures such as delaying some of the activities until after the breeding season. 2. Construction activity should be restricted to the immediate footprint of the infrastructure. 3. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of powerline sensitive species. 4. Measures to control noise and dust should be applied according to current best practice in the industry. 5. Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum.6					
Assessment	Without mitigation		With mitigation		NO Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very high	Natural and/or social functions and/or processes are majorly altered	High	Natural and/or social functions and/or processes are notably altered	Negligible	Natural and/or social functions and/or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Minor - negative		Minor - positive	
Comment on significance	The residual risk of displacement will be reduced to a low level after mitigation, if the proposed mitigation measures are implemented.					

Project phase	Construction					
Impact	Displacement due to habitat transformation					
Description of impact	Displacement due to habitat transformation associated with the construction of the switching stations and collector substation, associated infrastructure and to a lesser extent the 132kV powerlines					
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	1. Vegetation clearance should be limited to what is absolutely necessary. 2. The mitigation measures proposed by the botanical specialist must be strictly enforced.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent , or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Minor - negative		Minor - positive	

Comment on significance	Ground nesting species, shrubland specialists and some raptors are likely to be impacted most by the habitat transformation.
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Project phase	Operation					
Impact	Mortality of powerline sensitive species due to collisions with the 132kV OHL					
Description of impact	Mortality of powerline sensitive species due to collisions with the 132kV OHL					
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts				
Potential mitigation	The entire line must be marked with Bird Flight Diversers according to the relevant Eskom Engineering Instruction. These devices must be installed as soon as the conductors are strung.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/or social functions and/or processes are notably altered	High	Natural and/or social functions and/or processes are notably altered	Negligible	Natural and/or social functions and/or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	There are sound scientific reasons to expect that the impact will definitely occur	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Moderate - negative		Negligible - positive	
Comment on significance	There will be an ongoing residual risk of collisions with the grid connection power lines, but mitigation should make a marked difference for all species except bustards. The marking of powerlines does not help to reduce the collision risk for Ludwig's Bustard; therefore collisions will still take place, albeit less frequently.					

Project phase	Decommissioning
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Impact	Displacement due to disturbance associated with the dismantling of the grid connection					
Description of impact	Displacement of avifaunal species due to disturbance associated with the dismantling of the grid connection					
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts				
Potential mitigation	1. The existing transmission lines must be inspected for active raptor nests prior to the commencement of the decommissioning activities. Should any active nests be present, decommissioning activities during the breeding season should be avoided, if possible. 2. Decommissioning activity should be restricted to the immediate footprint of the infrastructure as far as possible. 3. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of powerline sensitive species. 4. Measures to control noise and dust should be applied according to current best practice in the industry. 5. Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Positive	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very high	Natural and/or social functions and/or processes are notably altered	High	Natural and/or social functions and/or processes are notably altered	Negligible	Natural and/or social functions and/or processes are negligibly altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Minor - negative		Minor - positive	

Comment on significance	The residual risk of displacement will be reduced to a low level after mitigation, if the proposed mitigation measures are implemented.
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In terms of cumulative impacts, five proposed renewable energy projects were considered within a 30km radius of the proposed development. The projects were identified using the latest (2022) Renewable Energy EIA Application Database for SA from the Department of Fisheries, Forestry and Environment (DFFE), in conjunction with information available on the internet. All of these projects require overhead grid connections, but information on the length of these grid connections could not be attained in all instances, therefore assumptions were made on the expected length of some of the connections, based on the distance from the Droërivier Substation. The existing HV lines in the 30km radius around the proposed iLanga Emoyeni Solar Suite amounts to ~125km (counting parallel lines as one).

The sum total of all the existing HV lines in the 30km radius, plus that of the proposed iLanga Emoyeni Solar Suite, amounts to an estimated 147.4km. The sum total of all the existing and planned HV lines in the 30km radius amounts to ~ 222km (assuming that the aforementioned renewable energy developments will each contribute a maximum of ~15km i.e., ~75km in total). Of this, the proposed iLanga Emoyeni Solar Suite will contribute ~22.4km, or about 10%. The contribution of the iLanga Emoyeni Solar Suite grid connection to the significance of the cumulative impact of all the grid connections and existing HV lines is thus fairly minor. However, the estimated length of the proposed grid connections as a group constitute almost 34% of the planned and existing HV network in the 30km radius around the project. The contribution of all the grid connections to the significance of the cumulative impact of the HV lines in the 30km radius, which is mainly collision mortality of powerline sensitive species with the powerlines, is therefore high, and the total amount of existing and planned HV lines in the 30km radius, namely around 267km, is substantial as well.

The significance of the cumulative collision impact of all the grid connections and existing HV lines in the 30km radius is assessed to be **high negative** pre-mitigation but can be reduced to **moderate negative** through mitigation.

7.4.4 Conclusions and recommendations

The proposed Emoyeni Grid will have several potential impacts on priority avifauna. These impacts are the following:

- ▶ Displacement due to disturbance linked to construction activities in the construction phase.
- ▶ Displacement due to habitat transformation in the construction phase.
- ▶ Mortality due to collisions with the overhead powerline in the operational phase.
- ▶ Displacement due to disturbance linked to dismantling activities in the decommissioning phase.

Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. A potential mitigation measure is the timeous identification of nests and the timing of the construction activities to avoid disturbance during a critical phase of the breeding cycle, although in practice that can admittedly be challenging to implement. Large terrestrial species and some raptors, particularly Red List species breeding on the existing HV line, are most likely to be affected by displacement due to disturbance. The impact is rated as moderate negative pre-mitigation and minor negative post-mitigation.

During the construction of power lines, service roads (jeep tracks) and substations, habitat destruction/transformation inevitably takes place. Construction activities could impact on birds breeding, foraging and roosting in or in close proximity of the proposed onsite awitching stations and collector substation through transformation of habitat, which could result in temporary or permanent displacement. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the substation yard is unavoidable. Fortunately, due to the nature of the vegetation, and judged by the existing powerlines, very little if any vegetation clearing will be required in the power line servitudes. The

habitat in the study area is extensive, very uniform and largely untransformed from a bird impact perspective; therefore, the loss of a few hectares of habitat due to direct habitat transformation associated with the construction of the proposed switching stations and collector substation is likely to have a low impact on avifauna. The species most likely to be more heavily impacted would be small, non-Red Data species which happen to be resident in those few hectares of Karoo habitat. The impact is rated as minor negative pre-mitigation and post-mitigation.

The grid connection could potentially pose a collision risk to various powerline sensitive species, particularly large terrestrial species, including Red Data species such as Ludwig's Bustard, Blue Crane, Karoo Korhaan and Secretarybird, and various waterbirds when the dams are full, and the drainage lines contain water. The impact is rated as moderate negative pre-mitigation and remains moderate negative post-mitigation.

Decommissioning impacts are likely to be similar to the construction phase, but less severe. This impact is rated as minor negative pre- and post-mitigation.

The significance of the cumulative collision impact of all the grid connections and existing HV lines in the 30km radius is assessed to be high negative pre-mitigation but can be reduced to moderate negative through mitigation.

7.5 Social and Socio-economic

Urban-Econ Development Economists was appointed to conduct the socio-economic impact assessment (SEIA) for the iLanga Emoyeni Solar Suite project. The SEIA is in Annexure D6.

7.5.1 Receiving environment

The purpose of compiling an economic profile and a socio-demographic profile is to develop an understanding of the trends, issues, and dynamics of the local economy in terms of its micro and macro context. This is essential as it provides both qualitative and quantitative data related to the economies under observation, creating a baseline against which the impacts can be assessed.

7.5.1.1 Social and Economic Profile

The social and economic profile of the Central Karoo District Municipality and the Beaufort West Local Municipality are summarised below.

7.5.1.1.1 Population and households

Beaufort West Local Municipality has a population of 53,348 people comprising of approximately 13,969 households which accounts for 70.6 percent of the Central Karoo District Municipality. The largest town within the Beaufort West Local Municipality is Beaufort West which is 21.6km from the proposed development. Beaufort West which is the known as the Capital of the Karoo and the centre of the agricultural district has a population is 20,059. The estimated population growth within Beaufort West Local Municipality is 0.5 percent with the household growth rate sitting at 0.7 percent.

7.5.1.1.2 Age

The age profile assists in establishing the Potentially Economically Active population. The Potentially Economically Active population is the population that falls within the working-age group, namely people between the age of 15 and 64 years. However, it does not imply that the entire population is economically active as some people falling within this age group choose not to work, i.e., are students or homemakers, etc. Figure 7-13 depicts the age profile of the Central Karoo District Municipality and the Beaufort West Local Municipality.

The Potentially Economically Active population within the Beaufort West Local Municipality is approximately 61.2 percent which is slightly higher but is in line with that of the Central Karoo District Municipality (60.9 percent).

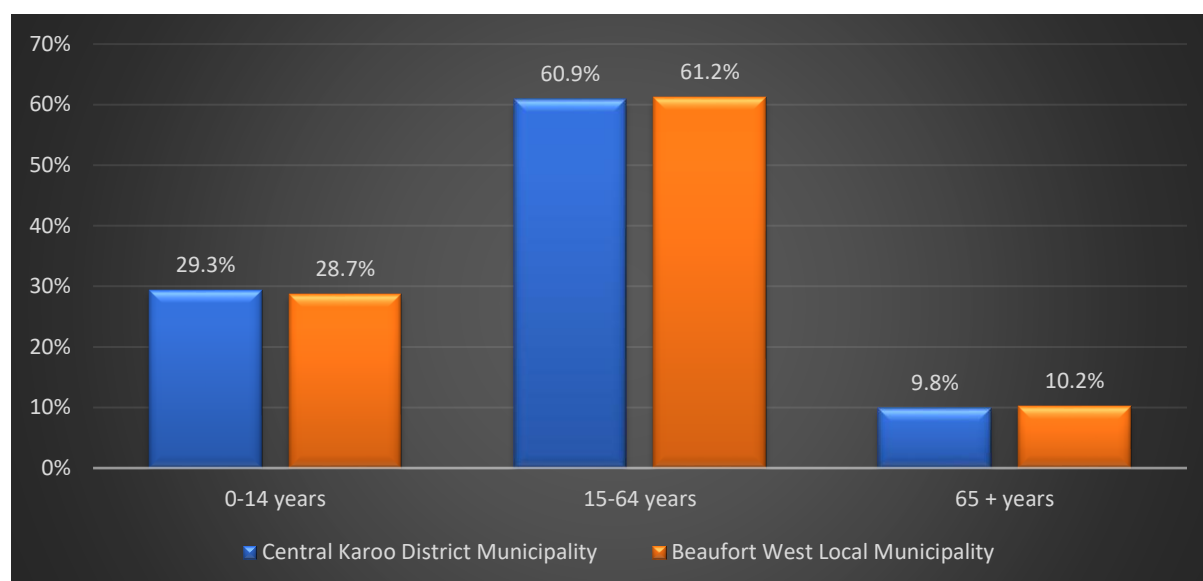


Figure 7-13: Age profile of the district and local municipalities

7.5.1.1.3 Energy used for lighting

The level of access to energy supply and social infrastructure indicates the standard of living in households. The availability of the different energy sources creates a baseline against which the potential impacts of the proposed projects can be assessed.

Table 7-11 indicates the energy supply used for lighting in the Central Karoo District Municipality and the Beaufort West Local Municipality.

Table 7-11: Energy used for lighting (2021)

	Central Karoo District Municipality	Beaufort West Local Municipality
Electricity	88.1%	91.9%
Gas	0.4%	0.5%
Paraffin	0.0%	0.0%
Candles	4.1%	3.2%
Solar	7.2%	4.1%
Other	0.0%	0.0%
None	0.2%	0.2%

The majority of households within the Central Karoo District Municipality and the Beaufort West Local Municipality have access to electricity (88.1 percent and 91.9 percent, respectively).

7.5.1.1.4 Education levels

In any society, education levels have a significant influence on economic and human development. Low levels of education translate into a low skills base in an area, thereby resulting in a less competitive workforce. However, an area with high levels of education is characterised by a workforce capable of operating industries at a competitive level, producing a skilled and highly skilled population. People increase their earning potential by developing and enhancing their capabilities, reaffirming that household and personal income levels are either positively or adversely affected by education levels. Also, a skilled population does not necessarily aspire to employment but to entrepreneurship, which adds businesses and increases economic activity in an area, consequently increasing the number of

jobs available. Table 7-12 depicts the level of education in Central Karoo District Municipality, Beaufort West Local Municipality, and Beaufort West.

Table 7-12: Level of education (2021)

	Central Karoo District Municipality	Beaufort West Local Municipality
No Schooling	20.7%	20.8%
Some Primary Education	18.9%	18.1%
Completed Primary	5.4%	5.1%
Some High School	24.1%	24.0%
Grade 12	15.9%	17.2%
Higher	4.8%	4.5%
Other	10.1%	10.3%

Around 20.7 percent of the Central Karoo District population, and in the Beaufort West Local Municipality 20.8 percent of the population, over the age of 20, has had no schooling. The majority of the population over the age of 20 in Central Karoo District Municipality (24.1 percent) and the Beaufort West Local Municipality (24.0 percent) has some high school education. A significant percent of the population across the Central Karoo District Municipality and the Beaufort West Local Municipality have not obtained Grade 12 – 15.9 percent and 17.2 percent, respectively. This implies that a low level of education exists. Low education and skills level hinder developments aimed at diversifying and broadening the local and district economy. The number of schools within the Beaufort West Local Municipality is currently 18 which is down from the 20 schools operating in 2017. With the learner enrolment increasing by 1.8 percent between 2017 and 2019, the closure of schools would negative impact on education outcomes.

7.5.1.1.5 Employment status

Table 7-13 highlights the unemployment profile in the Central Karoo District Municipality and the Beaufort West Local Municipality.

Table 7-13: Employment status (2021)

	Central Karoo District Municipality	Beaufort west Local Municipality
Employed (Formal)	14,276	9,099
Employed (Informal)	2,983	2,003
Unemployment Rate	26.4%	29.0%
Not Economically Active	22,808	16,944
Labour Force Participation Rate	50.7%	47.9%

In terms of employment contribution per sector within the Beaufort West Local Municipality, the highest contributing sectors are community, social and personal services (29.3 percent), agriculture (19.8 percent), and wholesale and retail trade, catering and accommodation (16.6 percent).

7.5.1.1.6 Skills level

Table 7-14 shows the skills level of within Central Karoo District Municipality and the Beaufort West Local Municipality.

Table 7-14: Skills level (2021)

	Central Karoo District Municipality	Beaufort West Local Municipality
Skilled	22.8%	24.5%
Semi-Skilled	40.3%	40.0%
Low-Skilled	36.9%	35.6%

The majority of the population in Beaufort West Local Municipality (40.0 percent) are semi-skilled, while 35.6 percent are low-skilled and 24.5 percent are skilled. The low-skilled population of the Beaufort West Local Municipality is slightly lower than that of the Central Karoo District Municipality. A population with low skills will not be able to improve their income and therefore it would be important to implement skills development programmes and job creation in higher-skilled occupations to uplift people to qualify for better jobs.

7.5.1.1.7 Household income

Household Income levels are a basis for determining poverty levels in a community. The level of household income in a study area is indicative of social welfare, the capacity to purchase goods and services and provide insight into the economic behaviour of a community. Table 7-15 indicates the annual household income of the Central Karoo District Municipality and the Beaufort West Local Municipality.

Table 7-15: Annual household income (2021)

	Income Brackets	Central Karoo District Municipality	Beaufort West Local Municipality
Low Income	No income	8.5%	9.6%
	R1 - R8 997	3.1%	3.2%
	R8 998 - R17 994	5.4%	5.8%
	R17 995 - R35 989	21.5%	21.8%
	R35 990 - R71 977	24.4%	23.5%
Medium income	R71 978 - R143 955	16.3%	15.3%
	R143 956 - R287 909	9.9%	9.6%
	R287 910 - R575 819	6.3%	6.6%
High income	R575 820 - R1 151 638	3.3%	3.2%
	R1 151 639 - R2 303 275	0.8%	0.8%
	R2 303 276 - R4 606 550	0.3%	0.3%
	R4 606 551 or more	0.2%	0.2%

Table 7-16 shows a summary of the household income of the above-mentioned areas.

Table 7-16: Summary of annual household income (2021)

Income Category	Central Karoo District Municipality	Beaufort West Local Municipality
Low Income (R0- R71 977)	62.8%	63.9%
Medium Income (R71 978 – R575 819)	32.5%	31.6%
High Income (R575 820 – R4 606 551 plus)	4.7%	4.5%

Most households in Beaufort West Local Municipality (63.9 percent) are low-income earners which is slightly higher than the Central Karoo District Municipality of 62.8 percent. However, both areas have a high level of middle-income earners which indicates a higher spending power within the local population. The level and type of employment adopted by the population of an area directly affects the income levels of its people. A high poverty level has social consequences, for example not being able to pay school fees, not having enough food in the house, not affording proper medical care, etc. Income categories

will not improve unless skills and knowledge of the population improve through training programmes, better education attainment opportunities and job creation in higher-skilled economic sectors.

7.5.1.1.8 Gross domestic product

The Gross Value Added is the measure of the value of goods and services that are produced in an area, industry, or sector of an economy. Gross Value Added is linked as a measurement of the Gross Domestic Product. Gross Value Added is the difference between output and intermediate consumption for any area/sector/industry and it thus is used as a measure of a local or regional economy.

Figure 7-14 illustrates the Gross Value-Added growth within the Central Karoo District Municipality and the Beaufort West Local Municipality for the period 2011 to 2021.

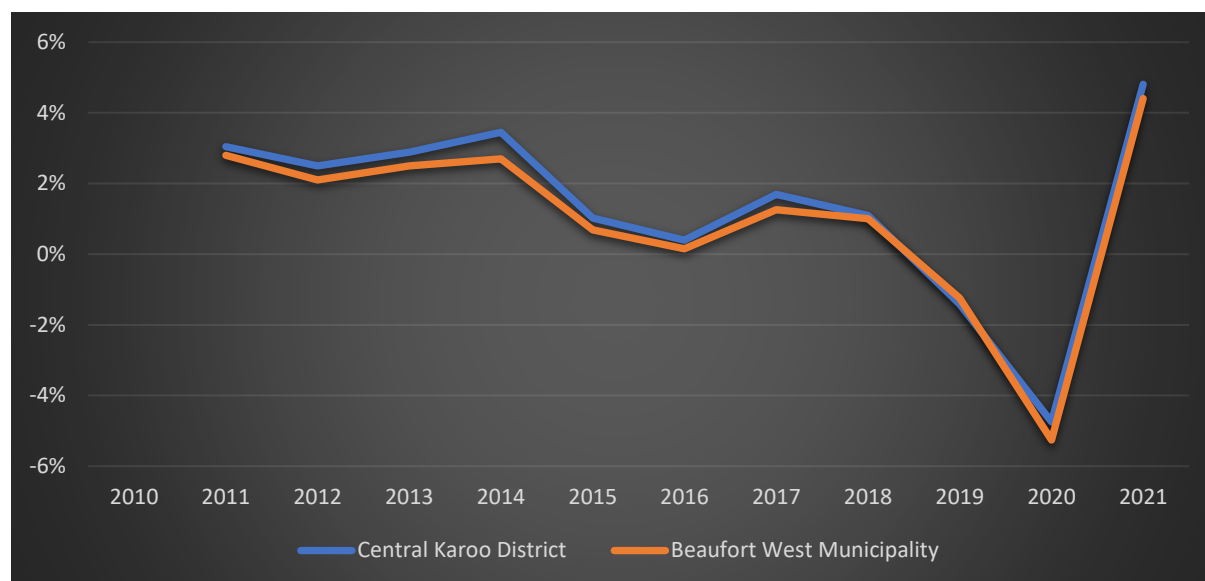


Figure 7-14: Real gross value added (2011-2021)

The economies of the Central Karoo District Municipality and the Beaufort West Local Municipality grew from 2009 to 2011. Thereafter, the economic growth of both the Central Karoo District Municipality and the Beaufort Local Municipality fluctuated between 2011 and 2019. Both the Central Karoo District Municipality and the Beaufort West Local Municipality saw a steep decline in the growth rate, -4.0 percent and -4.8 percent, respectively. The COVID-19 pandemic is having a devastating effect on the global economy and the South African economy, in that economists are predicting negative growth rates and significant declines in Gross Domestic Product in South Africa. According to StatsSA, South Africa's gross domestic product for 2021 increased by 4.9% in 2021, compared with a contraction of 6.4% in 2020.

In terms of Gross Domestic Product contribution per sector within the Beaufort West Local Municipality, the highest contributing sectors are general government (22.9 percent); finance, insurance, real estate and business services (17.1 percent), and agriculture (14.6 percent). Electricity, gas, and water was one of the lowest contributors, with the Gross Domestic Contribution being 3.3 percent.

7.5.1.2 Health

Within the Central Karoo District Municipality there are 4 district hospitals of which 2 are located in Beaufort West Local Municipality. In addition to the above the following health care facilities exist as indicated in Table 7-17.

Table 7-17: Healthcare facilities

	Central Karoo District Municipality	Beaufort West Local Municipality
PHC Facilities (fixed clinics, CHCs and CDCs)	9	6

Community Day Centres	1	1
PHC Clinics (satellite and mobile)	10	5
PHC Clinics (fixed)	8	5

In addition to the above, it has been identified that the Beaufort West Local Municipality has 1 ambulance per 10,000 inhabitants in 2019. Within the Beaufort West Local Municipality, a total of 1,524 registered patients received antiretroviral treatment in 2019/2020. The number of new patients receiving antiretroviral treatment declined to 142 patients in 2019/2020. Additionally, in terms of TB there has been an average annual decline of 3.0 percent between 2017/2018 and 2019/2020 in the number of registered patients receiving TB treatment.

7.5.1.3 Safety and Security

Five aspect of crime are highlighted within the Socio-Economic Profile compiled on the Beaufort west Local Municipality, namely, murder, sexual offences, drug related offences, driving under the influence and residential burglaries. An overview of each of the above aspects are indicated below:

- ▶ Murders within the Beaufort West Local Municipality increased from 14 in 2018/2019 to 19 in 2019/2020. The municipal murder rate (35.8 percent) in 2019/2020 was slightly higher than the districts average of 33.0 percent;
- ▶ Sexual offences in the Beaufort West Local Municipality decreased by 21.9 percent from 141 in 2018/19 to 110 in 2019/20;
- ▶ Drug-related crime rate in the Beaufort West Local Municipality increased by 8.6 percent to 715 occurrences per 100 000 people across the same period;
- ▶ Driving under the influence cases within the Beaufort West Local Municipality increased from 68 in 2017/18 to 108 in 2019/20.

Residential burglaries within the Beaufort West Local Municipality decreased from 578 in 2017/18 to 474 in 2019/20.

7.5.1.4 Social and economic profile conclusion

The continual household growth with within Beaufort West Local Municipality and broader will translate into increase electricity demand which in turn will result in additional stress on local and national electricity grids. The proposed Ilanga Emoyeni Gridline has the capability to strengthen this grid. Additionally, employment opportunities will be created which would assist in alleviating local unemployment which in turn will improve income levels, skills levels, and a general improved standard of living. The provision of electricity, job opportunities, improved income levels, education, and skills development, aligns the proposed Ilanga Emoyeni Gridline with several policies outlined in Section 3 of the SEIA.

7.5.2 Site sensitivity

The area proposed for the development is rural by nature with a wide agricultural plain. Surrounding land uses according to Cape Farm Mapper is limited to livestock, particularly, ovine (sheep). A visual illustration of the surrounding land use is illustrated in Figure 7-15.

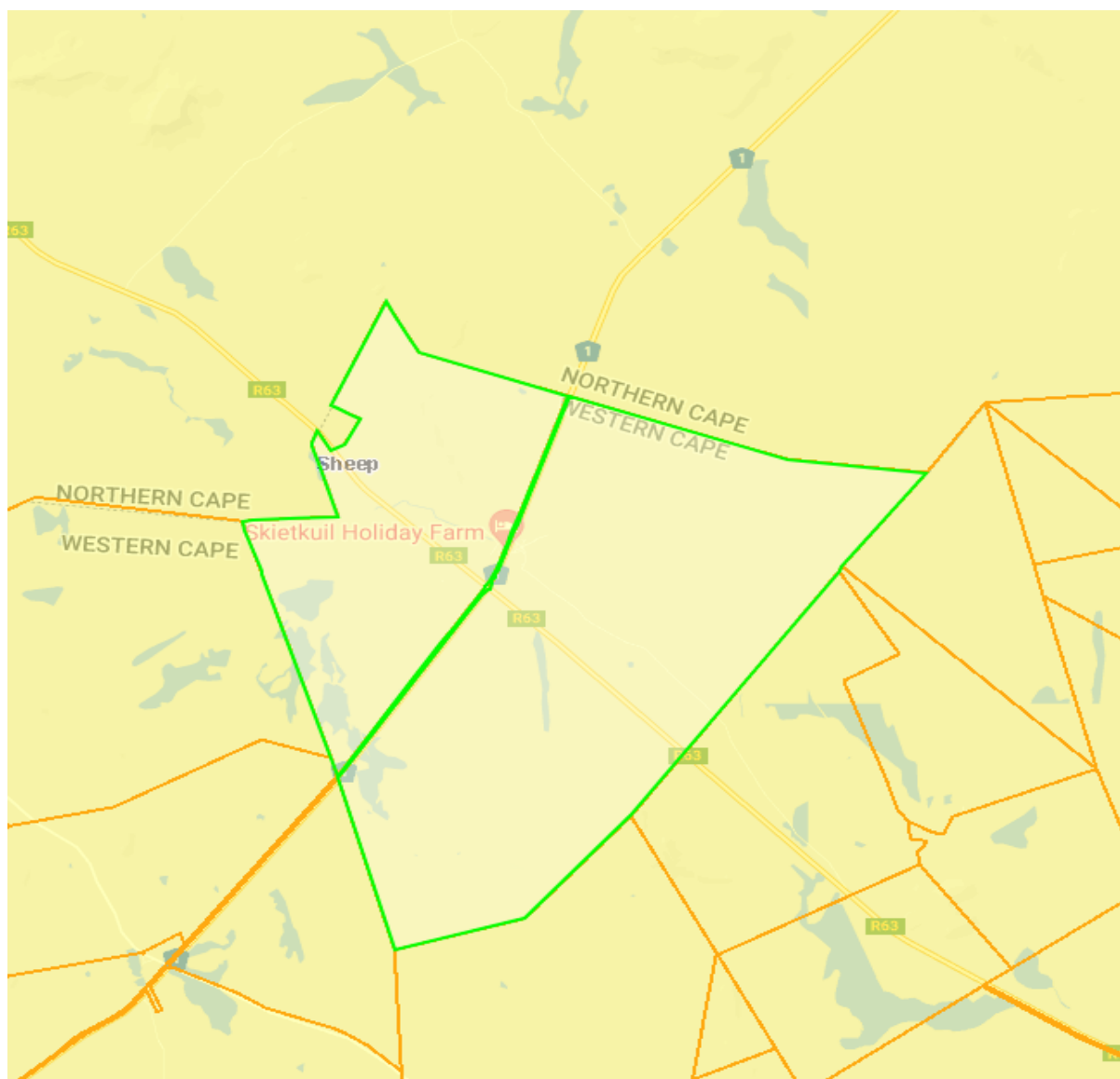


Figure 7-15: Surrounding land use map

In addition to the surrounding agricultural activity, tourism plays a functional role. Beaufort West in which the proposed development is located is known for its scenic beauty, isolated nature and open landscapes. Within a 10km radius of the proposed development, only one accommodation facility was identified which is visually illustrated in Figure 7-16.

The tourism facility identified is located on the development site and is operated by the landowner; Skietkuil Holiday Farm provides 5 cottages inclusive of a restaurant and a swimming pool. Additional tourism facilities that exist within the area that could fall within the zone of visual influence are Desert Dew Guest Farm, Nguni Lodge, Jolani Guest Farm and Taaibosfontein. The closest nature conservation area is the Karoo National Park (80km south west) and the Mountain Zebra National Park (90km south east).

Importantly, the N1 National Highway, as well as the R63 District Road, have high levels of scenic quality and as both road networks carry tourist traffic, thus they were included under key observation points. This aspect is discussed in more detail in Section 7.9.

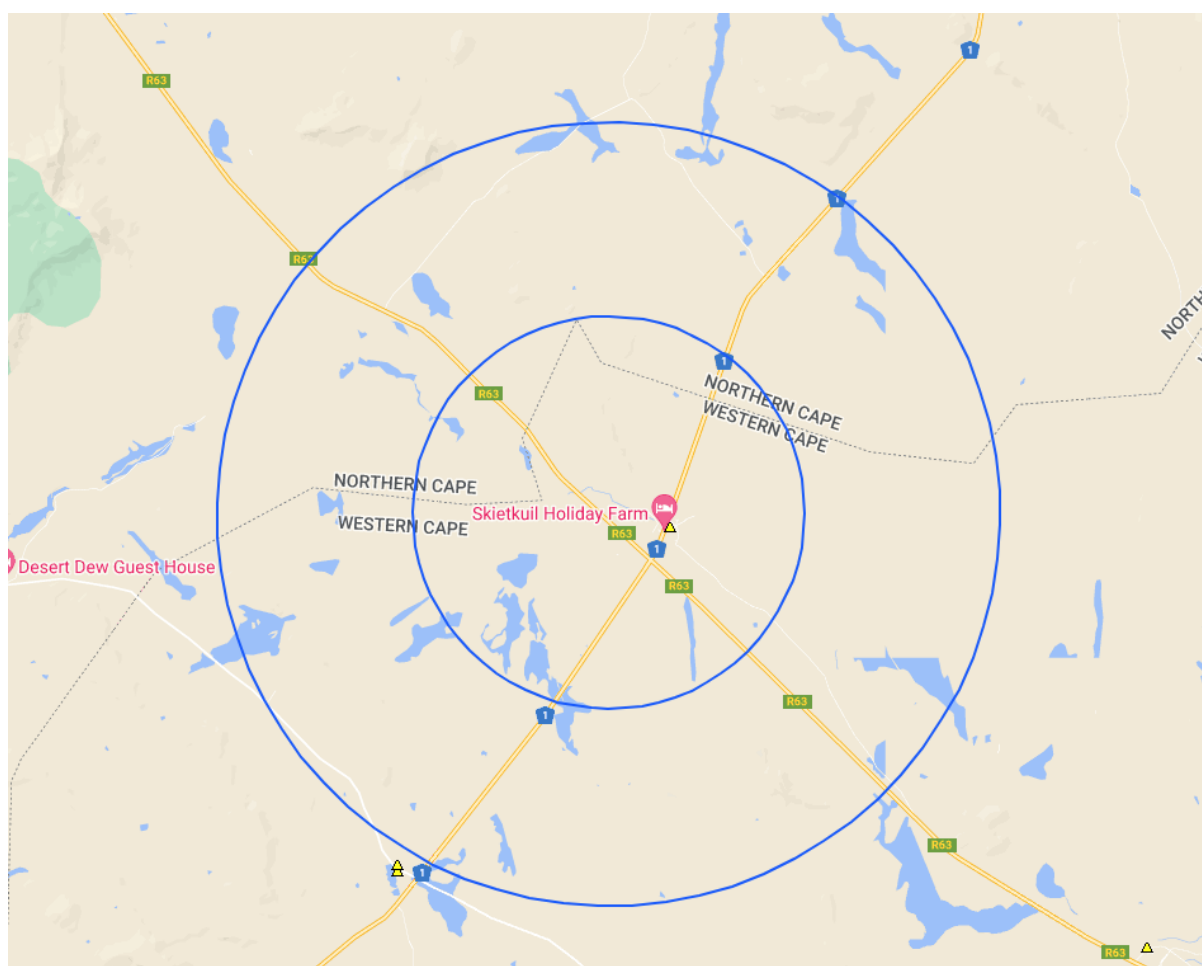


Figure 7-16: Visual of tourism facility locality

In summary, development site for the proposed iLanga Emoyeni Gridline is located within an agricultural area within the Beaufort West Local Municipality. Land usage on the development site is limited to livestock farming (sheep) and a tourism facility; the land usage surrounding the development site is livestock, particularly, sheep. Visually, the proposed gridline is unlikely to impact surrounding landowners, especially, regarding tourism as no tourism facility with exception of the facility located on the development site, falls within the visual viewshed as provided by the visual specialist. Importantly, visual mitigations have been proposed that would assist in negating or reducing any negative visual exposure to an acceptable level. Furthermore, from an agricultural perspective, the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site.

7.5.3 Impact Assessment

The impact tables below describe the predicted impacts that may occur due to the development of the proposed project. The tables also contain mitigation measures recommended by the specialist.

Issue	Temporary Increase in Production and Gross Domestic Product
Description of Impact	
The proposed iLanga Emoyeni Gridline will require capital expenditure to establish which in turn would equate to a direct, indirect, and induced impact on production/ new business sales within the country. The localised expenditure on the project will stimulate albeit for a temporary period during construction. The biggest effects on economic activity will be through production and Gross Domestic Product stimulated during construction activities due to the proposed development that will be created through the multiplier effects, specifically through production and consumption induced effects. The former refers to the impacts generated along backward linkages when the project creates the demand for goods and services required for construction, which in turn stimulates the business sales of the	

suppliers of inputs that are required to produce these goods and services. The latter refers to the effects of household spending, which is derived from an increase in salaries and wages directly and indirectly stimulated by the project's expenditure. It is envisioned that the majority, if not all of the direct spend will be spent within local economies. It should be noted that actual final figures will depend on the choice of suppliers and contracts as well as their procurement strategies.				
Nature of Impact	Positive			
Phases	Construction			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)	Not Applicable	Not Applicable
Duration	Short-Term to Medium-Term (2)	Short-Term to Medium-Term (2)	Not Applicable	Not Applicable
Intensity	Low (2)	Low (2)	Not Applicable	Not Applicable
Probability	Highly Likely (4)	Highly Likely (4)	Not Applicable	Not Applicable
Confidence	High	High	Not Applicable	Not Applicable
Reversibility	Benefit terminated with end of construction	Benefit terminated with end of construction	Not Applicable	Not Applicable
Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Not Applicable	Not Applicable
Significance	Low	Low	Not Applicable	Not Applicable
Degree to which impact can be mitigated	There is a potential chance to improve upon the impact by implementing the mitigation measures below.			
Mitigation actions				
The following measures are recommended:	<ul style="list-style-type: none">- The developer should encourage the EPC contractor to increase the local procurement practices and promote the employment of people from local communities, as far as feasible, to maximise the benefits to the local economies; and- The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers were feasible.			
Monitoring				
The following monitoring is recommended:	The Environmental Compliance Officer will create a Monitoring and Evaluation Programme which will be monitored by the holder of the EA. This will ensure that mitigation measures proposed will be adhered to/ monitored.			
Residual Impact				
An improved local and regional economy				
Cumulative impacts				
Nature of cumulative impacts	As stated in section 2, there are a range of developments are proposed to be built within the province. It is highly likely that if the projects are approved by government the demand for goods and services required for the construction of similar facilities would grow especially if they were constructed simultaneously.			

	This could provide sufficient economies of scale and thus open opportunities for the establishment of new industries in the country and new businesses in the local area, specifically in the sectors that are not well represented in the economy. This would have a significant positive impact on the regional economies and a notable impact on the national economy.			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	High (Positive)	High (Positive)	Not Applicable	Not Applicable

Issue	Sustainable Increase in Employment			
Description of Impact				
The ongoing maintenance and monitoring of the proposed ILanga Emoyeni Gridline will create full time employment positions all of which would be retained for the lifespan of the proposed projects. Aside from the direct employment opportunities created the gridlines through production and consumption induced effects will create both indirect and induced employment opportunities.				
Nature of Impact	Positive			
Phases	Operation			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)	Not Applicable	Not Applicable
Duration	Long Term (4)	Long Term (4)	Not Applicable	Not Applicable
Intensity	Low (2)	Low (2)	Not Applicable	Not Applicable
Probability	Highly Likely (4)	Highly Likely (4)	Not Applicable	Not Applicable
Confidence	High	High	Not Applicable	Not Applicable
Reversibility	Benefits are sustained only over project's lifespan	Benefits are sustained only over project's lifespan	Not Applicable	Not Applicable
Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Not Applicable	Not Applicable
Significance	Medium	Medium	Not Applicable	Not Applicable
Degree to which impact can be mitigated	There is a potential chance to improve upon the impact by implementing the mitigation measures below.			
Mitigation actions				
The following measures are recommended:	<ul style="list-style-type: none">- Where possible, local labour should be considered for employment so as to increase the positive impact on the local economy- As far as possible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the facility			
Monitoring				

The following monitoring is recommended:	The Environmental Compliance Officer will create a Monitoring and Evaluation Programme which will be monitored by the holder of the EA. This will ensure that mitigation measures proposed will be adhered to/ monitored.			
Residual Impact				
Experience in operating and maintaining a solar energy facility				
Cumulative impacts				
Nature of cumulative impacts	As stated in section 2, there are a range of developments are proposed to be built within the province. The development of the proposed projects will create a notable number of sustainable employment positions for the region. The operation of the proposed development will create direct employment positions alone. The development of other renewable projects will be notable in the region as they will likely create a similar number or a larger number of sustainable positions for the duration of the operation of the facilities, dependent on type of renewable energy project. indicates the impact on the sustainable increase in employment in national and local economy during operation.			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	High (Positive)	High (Positive)	Not Applicable	Not Applicable

Issue	Temporary Increase in Household Income			
Description of Impact				
The proposed Ilanga Emoyeni Gridline will create employment positions during construction generating revenue for the affected households in the country through direct, indirect, and induced effects. Depending on the employment position created, salaries, and wages within low to high-income levels would be paid out. Although temporary, this increase in household earnings would have a positive effect on nutrition, living conditions, access to better health care, access to more options regarding education, and improved ability to make economic choices.				
Nature of Impact	Positive			
Phases	Construction			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)	Not Applicable	Not Applicable
Duration	Short-Term to Medium-Term (2)	Short-Term to Medium-Term (2)	Not Applicable	Not Applicable
Intensity	Low (2)	Low (2)	Not Applicable	Not Applicable
Probability	Highly Likely (4)	Highly Likely (4)	Not Applicable	Not Applicable
Confidence	High	High	Not Applicable	Not Applicable
Reversibility	Benefit terminated with end of construction	Benefit terminated with end of construction	Not Applicable	Not Applicable
Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not	Not Applicable	Not Applicable

	irreplaceable (not scarce).	irreplaceable (not scarce).		
Significance	Low (28)	Low (28)	Not Applicable	Not Applicable
Degree to which impact can be mitigated	There is a potential chance to improve upon the impact by implementing the mitigation measures below.			
Mitigation actions				
The following measures are recommended:	<ul style="list-style-type: none"> - Employ labour-intensive methods in construction where feasible - Sub-contract to local construction companies particularly SMMEs and BBBEE compliant enterprises where possible - Use local suppliers where feasible and arrange with the local SMMEs to provide transport, catering and other services to the construction crews. 			
Monitoring				
The following monitoring is recommended:	The Environmental Compliance Officer will create a Monitoring and Evaluation Programme which will be monitored by the holder of the EA. This will ensure that mitigation measures proposed will be adhered to/ monitored.			
Residual Impact				
Improved living standards of the directly and indirectly affected households				
Cumulative impacts				
Nature of cumulative impacts	As stated in section 2, there are a range of developments are proposed to be built within the province. The living standards in the Beaufort West Local Municipality and the Central Karoo District will likely increase for the affected households as earnings increase. If construction of all proposed projects occurs simultaneously then it is likely that the cumulative impact will be notable for the Beaufort West Local Municipality and the Central Karoo District . The injection of earnings at a household level will have induced and indirect impacts on the local and regional economy as spending increases.			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	High (Positive)	High (Positive)	Not Applicable	Not Applicable

Issue	Sustainable Increase in Household Income			
Description of Impact				
The proposed Ilanga Emoyeni Gridline will create employment positions throughout the country which will generate personal income and will be sustained for the entire duration of the projects' lifespans. It is important to note that these employment opportunities will be sustainable, compared to the employment opportunities created during construction that will fade away once construction is completed. The employment opportunities created during the operation phase will likely be for unskilled, semi-skilled and skilled positions. The sustainable income generated because of the proposed developments' operation will positively affect the nutrition, living conditions, access to better health care, access to more options regarding education and improved ability to make economic choices.				
Nature of Impact	Positive			
Phases	Operation			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)	Regional (3)	Regional (3)
Duration	Long Term (4)	Long Term (4)	Long Term (4)	Long Term (4)
Intensity	Low (2)	Low to Medium (4)	Low (2)	Low to Medium (4)
Probability	Highly Likely (4)	Highly Likely (4)	Highly Likely (4)	Highly Likely (4)

Confidence	High	High	High	High
Reversibility	Benefit sustained over projects lifespan	Benefit sustained over projects lifespan	Benefit sustained over projects lifespan	Benefit sustained over projects lifespan
Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).
Significance	Medium (36)	Medium (44)	Medium (36)	Medium (44)
Degree to which impact can be mitigated	There is a potential chance to improve upon the impact by implementing the mitigation measures below.			
Mitigation actions				
The following measures are recommended:	<ul style="list-style-type: none">- Where possible, the local labour supply should be considered for employment opportunities to increase the positive impact on the area's economy- As far as feasible, local small and medium enterprises should be approached to investigate the opportunities for supply inputs required for the maintenance and operation of the facility			
Monitoring				
The following monitoring is recommended:	The Environmental Compliance Officer will create a Monitoring and Evaluation Programme which will be monitored by the holder of the EA. This will ensure that mitigation measures proposed will be adhered to/ monitored.			
Residual Impact				
Improved living standards of the directly and indirectly affected households				
Cumulative impacts				
Nature of cumulative impacts	As stated in section 2, there are a range of developments are proposed to be built within the province. Those workers who are employed by the renewable energy facilities are likely to experience improved standards of living.			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	Medium (Positive)	High (Positive)	Not Applicable	Not Applicable

Issue	Temporary Impact on Sense of Place
Description of Impact	
<p>A community's sense of place is developed over time as it embraces the surrounding environment, becomes familiar with its physical properties, and creates its own history. The sense of place is created through the interaction of a number of different factors such as the areas visual resources, its aesthetics, climate, culture, and heritage as well as the lifestyle of individuals that live in and visit the area. Most importantly, it is a highly subjective matter and dependent on the demographics of the population that resides in the area and their perceptions regarding trade-offs. For example, a community living in poverty is generally more likely to be accepting of industrial-type development that promises employment opportunities while a more affluent residential area is more likely to oppose such a development on the grounds that the development is not likely to generate gains for the community (Sinding, 2009). The area for the proposed Photo Voltaic 1 Solar Power Facility Grid Lines</p>	

regardless of alternatives as well as its surrounds has limited to no large-scale industries or high-rise buildings.

During the construction of proposed Ilanga Emoyeni Gridline there are likely to be noise impacts caused by the movement of vehicles as well as construction activities on site. These impacts are anticipated to occur primarily during the day with illumination from the site being experienced during the night. The presence of this noise is likely to alter the way the surrounding environment is experienced by households/ facilities in the area. As construction activities progress and the footprint of the gridline grows. Additionally, visual impacts will result; as per the visual impact assessment a loss of site landscape character due to the removal of vegetation and the construction of project infrastructure.

It is anticipated that households residing on the development site will experience the greatest negative impact on sense of place, due to associated visual and noise intrusion, etc. The sense of place at the farms/ tourism facilities located within proximity will potentially be affected to some extent.

As stated, the sense of place of local residents is likely to begin to be altered once the construction of the proposed Ilanga Emoyeni Gridline begins. Visual impacts will, however, remain for the entire operation of the development. This means that although the effect on the sense of place could be relatively small considering the population to be affected, the duration of the impact increases it significantly. It is advisable that efforts be made to address the factors that will affect individual's sense of place such as visual effects and noise pollution to make them less intrusive.

concern or place such as visual effects and noise pollution to make them less intrusive.				
Nature of Impact	Negative			
Phases	Construction			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)	Not Applicable	Not Applicable
Duration	Short-Term to Medium-Term (2)	Short-Term to Medium-Term (2)	Not Applicable	Not Applicable
Intensity	Medium to High (8)	Low to Medium (2)	Not Applicable	Not Applicable
Probability	Likely (3)	Possible (2)	Not Applicable	Not Applicable
Confidence	High	High	Not Applicable	Not Applicable
Reversibility	Issue terminated with end of construction	Issue terminated with end of construction	Not Applicable	Not Applicable
Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Not Applicable	Not Applicable
Significance	Medium (39)	Low (14)	Not Applicable	Not Applicable
Degree to which impact can be mitigated	There is a potential chance to reduce the negative impact by implementing the mitigation measures below.			
Mitigation actions				
The following measures are recommended:	<ul style="list-style-type: none">- Mitigation measures to reduce visual, noise and dust impacts should be implemented.- Appointed contractor should notify landowners prior to commencement of construction. The contractor should keep an updated complaints register that indicates type of complaint and how it was resolved. A sign			

	board should be clearly placed to ensure contact details are visible to interested and affected parties.			
Monitoring				
The following monitoring is recommended:	The Environmental Compliance Officer will create a Monitoring and Evaluation Programme which will be monitored by the holder of the EA. This will ensure that mitigation measures proposed will be adhered to/ monitored.			
Residual Impact				
The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.				
Cumulative impacts				
Nature of cumulative impacts	None Envisioned			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Issue	Sustainable Impact on Sense of Place			
Description of Impact				
<p>The effects on the community's sense of place will initially be felt during the construction period and will continue into the operational phase. A community's sense of place is developed over time as it embraces the surrounding environment, becomes familiar with its physical properties, and creates its own history. The sense of place is created through the interaction of a number of different factors such as the areas visual resources, its aesthetics, climate, culture, and heritage as well as the lifestyle of individuals that live in and visit the area. Most importantly, it is a highly subjective matter and dependent on the demographics of the population that resides in the area and their perceptions regarding trade-offs. For example, a community living in poverty is generally more likely to be accepting of industrial-type development that promises employment opportunities while a more affluent residential area is more likely to oppose such a development on the grounds that the development is not likely to generate gains for the community (Sinding, 2009).</p> <p>Based on the visual impact assessment it was ascertained that the viewshed of the proposed Ilanga Emoyeni Gridline is localised in extend to some degree, with the topographic screening of the local ridgelines providing some screening and fragmentation of the viewshed. However, due to the 32m (approximate) height of the monopoles, and the relatively flat terrain for the karoo landscape (excluding the ridgelines), the visible extent of the powerline landscape change will extend into much of the viewshed areas within the 3km distance zone. The higher view frequency areas mainly track the routing area within a 1km distance, with some lower visual intensity located to the east. The main receptors are the N1 National Highway and the R63 District Road. Other than the Skietkuil Holiday Farm (property owner), no other tourist or farmstead receptors are located in the Foreground/ Mid Ground areas. The operation of the proposed Ilanga Emoyeni Gridline will result in a long term landscape change from a current rural agricultural sense of place to a semi-industrial landscape. This will occur through the removal of vegetation and the construction of gridlines and associated infrastructure.</p> <p>In terms of traffic, during operation, it is envisioned that staff and security will periodically visit the site with a small number of full time employees being station on site. Thus, the traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.</p> <p>The surrounding landscape can be defined as rural and any rapid changes that alter the characteristics that define the areas sense of place could potentially have a negative impact on the local populations view of the area.</p>				
Nature of Impact	Negative			
Phases	Operation			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Regional (3)	Regional (3)	Not Applicable	Not Applicable

Duration	Long Term (4)	Long Term (4)	Not Applicable	Not Applicable
Intensity	Medium to High (8)	Low to Medium (4)	Not Applicable	Not Applicable
Probability	Likely (3)	Possible (2)	Not Applicable	Not Applicable
Confidence	High	High	Not Applicable	Not Applicable
Reversibility	Issue sustained over projects lifespan	Issue sustained over projects lifespan	Not Applicable	Not Applicable
Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Not Applicable	Not Applicable
Significance	Medium (45)	Low (22)	Not Applicable	Not Applicable
Degree to which impact can be mitigated	There is a potential chance to reduce the negative impact by implementing the mitigation measures below.			
Mitigation actions				
The following measures are recommended:	- The mitigation measures proposed by relevant specialists (visual) should be adhered to.			
Monitoring				
The following monitoring is recommended:	The Environmental Compliance Officer will create a Monitoring and Evaluation Programme which will be monitored by the holder of the EA. This will ensure that mitigation measures proposed will be adhered to/ monitored.			
Residual Impact				
The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.				
Cumulative impacts				
Nature of cumulative impacts	None envisioned			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Issue	Sustainable Impact on Site Specific Agricultural Activity	
Description of Impact		
Remainder of Farm 3 (Schietkuil) the site for the development has low agricultural potential and no dryland cropping potential predominantly because of aridity constraints but also because of soil constraints. As a result of the constraints, agricultural production is limited to low density grazing. The land across the site is verified in this assessment as being of low to medium agricultural sensitivity. Importantly, as per the agricultural specialist the gridline itself has insignificant agricultural impact because all agricultural activities that are viable in this environment, can continue completely unhindered underneath the power line and there will therefore be no loss of agricultural production potential underneath it.		
Nature of Impact	Insignificant	
Phases	Operation	
	Alternative 1 (Preferred)	No Go Alternative

Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Duration	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Intensity	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Probability	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Confidence	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Reversibility	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Replicability	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Significance	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Degree to which impact can be mitigated	Not Applicable			
Mitigation actions				
The following measures are recommended:	- Not Applicable			
Monitoring				
The following monitoring is recommended:	Not Applicable			
Residual Impact				
Not Applicable				
Cumulative impacts				
Nature of cumulative impacts	Not Applicable			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Issue	Impact on the Sustainable Revenue where the Solar Farm is Located			
Description of Impact				
It is anticipated that the farm where the proposed Ilanga Emoyeni Gridline is to be located on will enter into a rental agreement with the developer. The owner will likely thus receive rental revenue as a result of hosting the solar photovoltaic development on their property. The revenue that the owner of the property receives will have a positive impact on the local economies especially if spent in the local area. While these impacts are notably only for those farms who have solar panels located on their properties, the impact of additional revenue is likely to be significant to those impacted.				
Nature of Impact	Positive			
Phases	Operation			
	Alternative 1 (Preferred)		No Go Alternative	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	Site (2)	Site (2)	Not Applicable	Not Applicable
Duration	Long Term (4)	Long Term (4)	Not Applicable	Not Applicable
Intensity	Low (2)	Low (2)	Not Applicable	Not Applicable
Probability	Definite (5)	Definite (5)	Not Applicable	Not Applicable
Confidence	High	High	Not Applicable	Not Applicable
Reversibility	Benefits are sustained only over project's lifespan	Benefits are sustained only over project's lifespan	Not Applicable	Not Applicable

Replicability	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Yes: Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).	Not Applicable	Not Applicable
Significance	Medium (40)	Medium (40)	Not Applicable	Not Applicable
Degree to which impact can be mitigated	No mitigation measures envisioned.			
Mitigation actions				
The following measures are recommended:	Not Applicable			
Monitoring				
The following monitoring is recommended:	Not Applicable			
Residual Impact				
None foreseen at this stage				
Cumulative impacts				
Nature of cumulative impacts	None envisioned			
Rating of cumulative impacts	Alternative 1 (Preferred)		No Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Upon the expiry of the proposed Ilanga Emoyeni Gridline lifespan, the proposed Ilanga Emoyeni Gridline would need to be decommissioned, although the project could be upgraded to maintain and prolong the lifespan of the respective project. If the proposed Ilanga Emoyeni Gridline is decommissioned, the land for proposed project would be rehabilitated in order to return it to pre-project conditions. This also means that all impacts, whether positive or negative, which take place during the operation phase will cease to exist. At the same time, spending on the disassembly of the components and rehabilitation of land will increase the demand for construction services and other industries, thus stimulating economic activity in the local area, albeit over a temporary period. Socio-economic impacts stimulated during the decommissioning phase are expected to be similar to those that took place during the construction phase.

The impact tables would be similar in nature to the construction phase; they will also be temporary in nature, but most likely will take a much shorter time than the construction phase. They will also be associated with some expenditure, although it will be less than the investment required during the construction phase. Besides the positive impacts on production, employment, household income and government revenue that could ensue from the projects, some negative impacts could also occur. These would largely be related to a slight increase in noise in the area surrounding the site, an increase in traffic congestion and concerns over local safety and security due to a greater number of people accessing the area. All of the positive impacts can be enhanced to increase the benefits to the local communities, while the negative impacts could be mitigated to acceptably low levels. Mitigations and enhancement measures suggested for the construction phase would apply. Overall, the impact that would ensue during the decommissioning phase will mostly be of low significance and should not affect the decision regarding proposed development.

7.5.4 Conclusions and recommendations

Based on the information presented in this report, the following can be recommended from the socio-economic perspective. The net positive impacts associated with the construction and operation of the proposed Ilanga Emoyeni Gridline is expected to outweigh the net negative effects. The proposed Ilanga Emoyeni Gridline is envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. In terms of the site area assessed, there are no fatal flaws from a socio-economic perspective and thus the location is deemed acceptable and should be authorised. In addition, even though the 'no-go' alternative will result in the avoidance of negative impacts from a socio-economic perspective, this would also result in the positive effects / impacts not being realised. Since positive effects and impacts would outweigh the negative effects, the construction and operation of the proposed development is preferred over the 'no-go' alternative.

The proposed Ilanga Emoyeni Gridline should therefore be considered for development, subject to the implementation of the recommended mitigation and enhancement measures.

7.6 Agriculture

Johann Lanz was appointed as an independent agricultural specialist to conduct the agricultural assessment. The objective and focus of an agricultural assessment is to assess whether or not the proposed development will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether or not it should be approved.

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. However, the specialist did consider agricultural impacts and these are discussed in more detail below.

7.6.1 Receiving environment

The arid climate (low rainfall of approximately 234 mm per annum and high evaporation of approximately 1,475 mm per annum) (Schulze, 2009) is the limiting factor for land capability, regardless of the soil capability and terrain. Moisture availability is very limiting to any kind of agricultural production. Moisture availability is insufficient for crop production without irrigation and the potential agricultural land use of the site is therefore limited to grazing. The land has a low long term grazing capacity of 24 ha per large stock unit. Because climate is the limiting factor that controls production potential, it is the only aspect of the agro-ecosystem description that is required for assessing the agricultural impact of this development. All other agricultural potential parameters become irrelevant under the dominant limitation of aridity.

7.6.2 Site sensitivity

Agricultural sensitivity is a direct function of the capability of the land for agricultural production. All arable land that can support viable crop production, is classified as high (or very high) sensitivity. This is because there is a scarcity of arable production land in South Africa and its conservation for agricultural use is therefore a priority. Land which cannot support viable crop production is much less of a priority to conserve for agricultural use, and is rated as medium or low agricultural sensitivity.

However, the verification of agricultural sensitivity of the power line route has very little relevance to this assessment. It is important to recognise that the agricultural sensitivity of land, in terms of a particular development, is not only a function of the screening tool sensitivity, which equates to agricultural potential, but is also a function of the severity of the impact which that development poses to agriculture. This is not recognised in the screening tool classification of sensitivity and is therefore a limitation to that sensitivity. This is relevant for transmission lines, because their agricultural impact is usually negligible

(see impact assessment section), regardless of the agricultural sensitivity of the land which they traverse. Therefore, in the context of overhead power lines, almost no land can be considered to have high agricultural sensitivity. In this assessment, only the footprint of the substation is of relevance.

The screening tool classifies agricultural sensitivity according to only two independent criteria – the land capability rating and whether the land is used for cropland or not. All cropland is classified as at least high sensitivity, based on the logic that if it is under crop production, it is indeed suitable for it, irrespective of its land capability rating.

The low to medium agricultural sensitivity of the site, as identified by the screening tool, is confirmed by this assessment. The motivation for confirming the sensitivity is predominantly that the climate data (low rainfall of approximately 234 mm per annum and high evaporation of approximately 1,475 mm per annum) proves the area to be arid and therefore of limited land capability. Moisture availability is completely insufficient for viable rainfed crop production. In addition, the land type data shows the dominant soils to be shallow on underlying rock and hardpan carbonate. A low to medium agricultural sensitivity is entirely appropriate for the site, which is unsuitable for crop production.

7.6.3 Impact assessment

7.6.3.1 Impact on loss of agricultural resources

An agricultural impact is a temporary or permanent change to the future production potential of land. The significance of the agricultural impact is directly proportional to the extent of the change in production potential. If a development will not change the future production potential of the land, then there is no agricultural impact.

The proposed overhead power lines have negligible agricultural impact, regardless of their route and design and the agricultural potential of the land they traverse. All agricultural activities can continue completely unhindered underneath the power lines. This is because their direct, permanent, physical footprint that has any potential to interfere with agriculture (pylon bases and servitude track, where it is needed), is insignificantly small. There will therefore be no reduction in future agricultural production potential underneath the power lines. The only potential source of impact is minimal disturbance to the land (erosion and topsoil loss) during construction (and decommissioning). This impact can be completely mitigated with standard, generic mitigation measures that are included in the EMP.

The only impact of this development is therefore the loss of up to 5.33 ha of agricultural land on the site of the substations. The significance of the loss of agricultural land is a direct function of two things, firstly the amount of land that will be lost and secondly, the production potential of the land that will be lost. In this case the amount of land loss is small, and the production potential of the land is very limited. Therefore, the agricultural impact of the proposed development is assessed as being of very low significance.

7.6.3.2 Cumulative impact

The potential cumulative agricultural impact of importance is a regional loss of future agricultural production potential.

Because this grid connection itself leads to insignificant loss of production potential, its cumulative impact must also logically be insignificant. It therefore does not make sense to conduct a more formal assessment of the development's cumulative impacts as per DFFE requirements for cumulative impacts.

Due to the considerations discussed above, the cumulative impact of loss of future agricultural production potential can confidently be assessed as being of very low significance and therefore not having an unacceptable negative impact on the area.

7.6.3.3 No-go alternative impact

The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There is no agricultural impact of the no-go option. Therefore, the extent to which the development (insignificant impact) and the no-go alternative will impact agricultural production are more or less equal, which results in there being, from an agricultural impact perspective only, no preferred alternative between the development and the no-go. However, the no-go option would prevent the proposed development from contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa because the associated renewable energy facilities cannot operate without the power line.

7.6.4 Mitigation measures

There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.

7.6.5 Conclusions and recommendations

The proposed development will have very low agricultural impact and will therefore be acceptable in terms of its impact on the agricultural production capability of the site. The only impact of this development is the loss of up to 5.33 hectares of agricultural land on the site of the substations. This is assessed as being of very low significance because the amount of land loss is small, and the production potential of the land is very limited.

The power line itself has insignificant agricultural impact because all agricultural activities that are viable in this environment, can continue completely unhindered underneath the power line and there will therefore be no loss of agricultural production potential underneath it.

In terms of cumulative impact, the proposed development is therefore acceptable, and it is recommended that it be approved.

The only potential source of impact from the power line is minimal disturbance to the land (erosion and topsoil loss) during construction (and decommissioning). This impact can be completely mitigated with standard, generic mitigation measures that are included in the EMPr.

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

The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.

7.7 Heritage and Archaeology

Asha Consulting (Pty) Ltd was appointed to conduct the Heritage Impact Assessment (HIA) for the iLanga Solar Suite project. The heritage impact related to the gridline project is summarised in this section. The report can be found in Annexure D5.

7.7.1 Receiving environment

The wider area is quite flat but there are a number of dolerite dykes cutting through the landscape as well as several isolated dolerite koppies. A large dyke runs from southeast to northwest and is crossed in the far south by the PV2 and PV3 powerlines. The ground tends to be sandy away from the dolerite and is covered in sparse grass and shrubs. Figure 7-17 and Figure 7-18 show the nature of the landscape.



Figure 7-17: View towards the northwest across the land to the south of the N1/R63 intersection. The approximate position of the PV2 and PV3 powerlines is indicated by the dashed line:



Figure 7-18: View towards the northwest approximately along the line of the section of powerline that would link the Collector and Gamma Substations. Gamma is indicated by the black circle

The broader Karoo region generally contains sparse archaeological traces from the Early (ESA), Middle (MSA) and Later Stone Ages (LSA). The vast majority of material tends to be what is referred to as background scatter. This can be defined as “widespread isolated artefacts whose distribution results from either primary or secondary causes”. In this dry landscape, LSA archaeological sites are well-known to be focused most strongly on water sources, but dolerite outcrops, which offer opportunities for shelter and a vantage point to watch for potential prey, are also commonly occupied landscape features. This pattern is well demonstrated by surveys in the wider area. Most sites are scatters of stone artefacts, often accompanied by ostrich eggshell fragments and sometimes pottery, but some include fragments

of bone and, rarely, archaeological deposits. The latter would normally be found in rock shelters but, due to the nature of the local geology, overhangs are rare. Rock shelters form in sandstone bands, but the rock outcrops in the vicinity of the present study area are exclusively dolerite.

To the west of the current study area, MSA and LSA artefacts have been found in various places during previous assessments of the area. Pottery was seen at one LSA site, but ostrich eggshell fragments were more commonly associated with these sites, including some painted rock shelters. Some 70 to 150 km northeast of the study area, the Seacow River Valley is one of the best studied parts of South Africa. There, vast numbers of Stone Age sites have been recorded with many of them being Kheokhoe sites, including kraals. ESA and MSA sites were also found to occur. Previous studies in the hills to the east of Schietkuil located many LSA sites but found ESA and MSA occurrences to be very rare. The LSA sites were mostly stone artefact scatters, but some included pottery and a few circular stone-walled features were also recorded. Also in that general area, background scatters of LSA materials were recorded during previous studies, while further southwest background scatter of mixed age materials including an ESA handaxe have been recorded. Along the N1 to the southwest of the study area, previous studies found background scatter artefacts pertaining to the MSA and LSA and also scratched engravings that are supposed to be from the 20th century. They included a horse and rider and an ostrich. Such engravings are relatively common in the central Karoo having been recorded between Three Sisters and Beaufort West and also – in very large numbers – some 130 km west of the study area. These recent engravings have been attributed to Europeans and Griquas and to ‘Hottentots’. It has also been suggested that some were almost certainly made by early Baster and Trekboer immigrants and that the tradition continued into the 20th century.

LSA rock art sites occur in low density through the wider area, and include painted and engraved ‘geometric tradition’ sites as well as painted and engraved ‘fine line’ tradition sites. One of these sites was considered as being of provincial significance due to the layering of imagery on the shelter wall and the very unusual inclusion of engravings. It is considered likely that hundreds, if not thousands, of rock art sites occurred in his large study area. Most of those sites recorded were engravings on dolerite outcrops with many of them being heavily patinated. However, younger images extending into the recent historical past were also documented.

An interesting aspect of Karoo archaeology is rock gongs. These are (usually) dolerite rocks that are naturally perched in such a way that when struck they release a ringing musical note. The gongs are identified by heavily worn patches where they have been repeatedly struck. A number of gongs from Nelspoort and Vosburg, to the 50 km southeast and 130 km north of the present study area have previously been recorded, respectively, while two further examples in the Nuweveld about 90 km to the west of Schietkuil have also been found. Both of the latter were surrounded by extensive stone artefact scatters indicating occupation of the area.

Historical stone-walled kraals and features are known to occur in the general area. These are likely mostly from the 19th century and represent the material remains of the early European farmers in the area. Such features are usually associated with variable density scatters of historical materials such as glass, ceramics and metal items.

7.7.2 Site sensitivity

Only one find was made within the proposed powerline servitude. This was a dolerite boulder with some indeterminate scratching on it at waypoint 2020. It is quite likely modern, but with the variety of scratched marks found on dolerite boulders this cannot be assumed with certainty.



Figure 7-19: Scratches on a dolerite rock at waypoint 2020

Finds on the rest of the farm included background scatter artefacts displaying variable patination and which are thus of variable age, scatters of MSA and LSA artefacts, pre-colonial stone-walled features/kraals, pre-colonial and/or historical engravings, historical stone-walled features/kraals (including a possible animal trap [wolwehok]) and an ash and rubbish midden. All these finds are illustrated in the HIA. None will be affected by the proposed project but they show the variety of heritage resources in the environment.

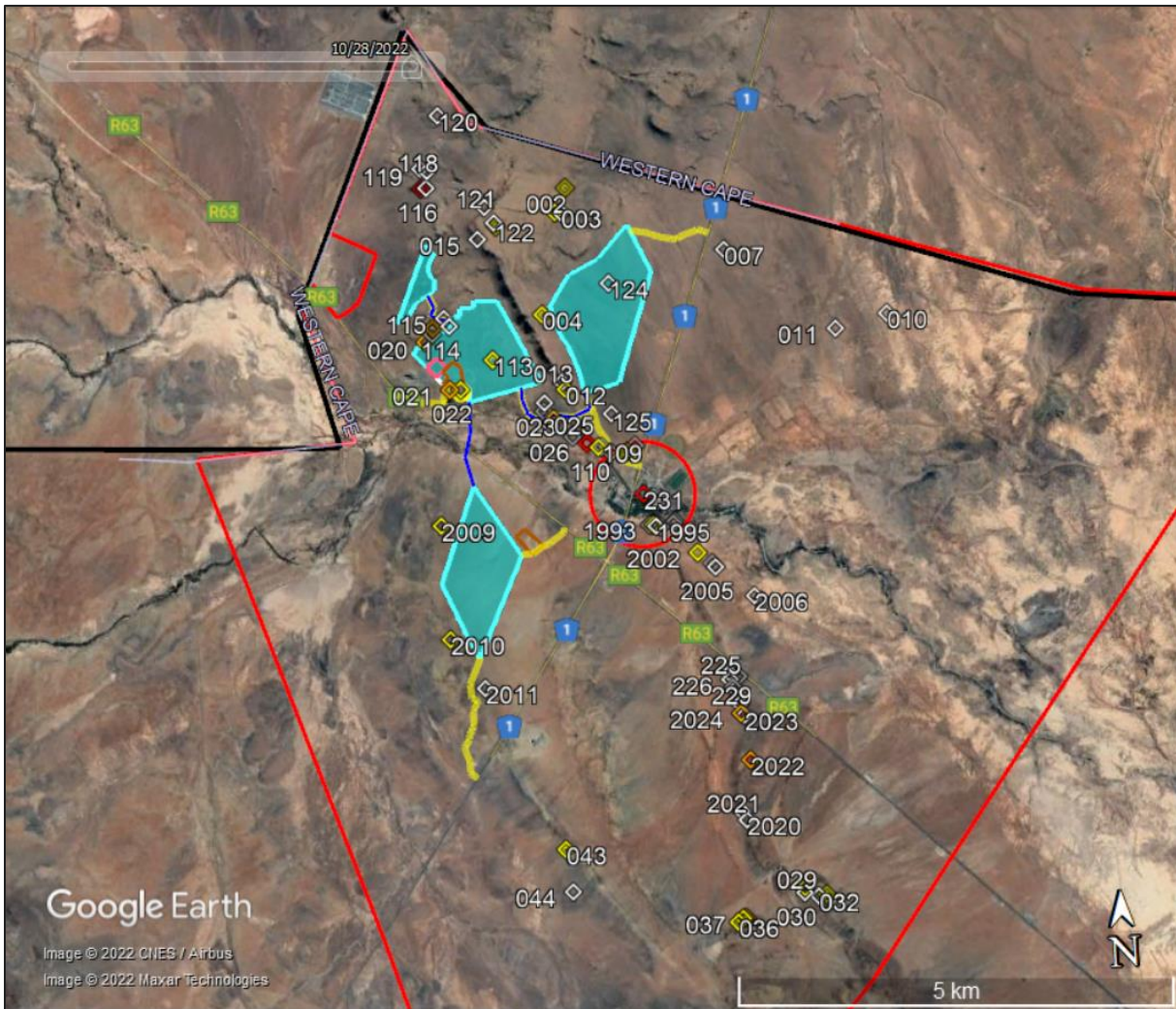


Figure 7-20: Heritage findings mapped showing identification of heritage features in the greater project area (note grid alignment not shown – refer to maps below). Key to map: Red symbol and buffer = Grade IIIA, Orange symbol and buffer = Grade IIIB, Yellow symbol and buffer = Grade IIIC, White symbol (no buffer) = Grade NCW.

7.7.2.1 Graves

Graves are occasionally encountered in the area and may be from the LSA or the historical period. The field surveys for this project revealed the presence of a farm workers' graveyard at waypoint 026 to the northwest of the farmhouse and at least 1 km from the nearest proposed powerline (see Figure 7-20). Given this distance, it is of no further concern. Another possible grave was found at waypoint 117 some 90 m northwest of the proposed Collector to Gamma powerline. This consisted of a small cluster of about ten rock slabs on a sandy floodplain and could be a pre-colonial grave (Figure 7-21).



Figure 7-21: Cluster of rocks that may represent a pre-colonial grave

7.7.2.2 Historical aspects and built environment

No historical or built environment sites were found to occur within the servitude area and the only site on the farm is the farmstead which lies along the south-eastern side of the N1, in the centre of the farm. Figure 7-22 to Figure 7-24 illustrate the structures in the complex. They tend to be well-maintained and representative of various ages. The main house is probably a mid-19th century building that has been Victorianised, while the grey building alongside it seems like a 19th Karoostyle house that has grown over time with sections added in later years. Another house dates to the mid-20th century.



Figure 7-22: Stone werf wall and many trees around the homestead.



Figure 7-23: The main house on Schietkuil.



Figure 7-24: Mid-20th century house at the farmstead and now used as guest accommodation. It has been altered.

7.7.2.3 Cultural landscape and scenic routes

The Karoo landscape is well-known for the wide open spaces and extensive plains punctuated by dolerite dykes and koppies. It is largely a natural landscape. The Three Sisters (three adjacent conical dolerite koppies) are a well-known Karoo landmark but lie about 32 km southwest of the study area and are listed as a scenic resource of local significance. Anthropogenic input to the landscape is widespread including all the features listed above as well as fences, tracks, dams and windpumps. Farmsteads tend to be widely spaced and marked by clusters of trees, while arable lands are limited to the riparian areas where fertile silty floodplains occur. The night sky in the Karoo reveals spectacular displays of stars.

In addition to the Stone Age and historical layers, the most recent layer to the landscape is an electrical one. The Gamma Substation lies at the north-western edge of the farm and many powerlines connect to this substation. These large substations also form foci for the development of renewable energy facilities and a number of other applications have been made in this area over the years.

Because of the generally scenic nature of the Karoo, the N1 is regarded as a scenic route. The N1 is listed as an important regional linking route. Its cultural significance will vary along the route depending on the surrounding landscape. In this area it is considered as of at least local significance. It is noted that the project has been set back from the N1 by 500 m and from the R63 by 300 m.

7.7.2.4 Statement of significance

Although sites of at least medium cultural significance occur on the farm (Grade IIIB), the archaeological resources within the study area are deemed to have no more than low cultural significance at the local level for their scientific value and can be graded no higher than IIIC.

Graves are deemed to have high cultural significance at the local level for their social value. They are allocated a grade of IIIA. Note that no graves that will be directly impacted on by the development have been identified.

The farmstead with its several historic structures is of high local significance for its architectural, historical and social significance. It is graded IIIA.

The cultural landscape is largely a natural landscape with aesthetic value and, in this area, is rated as having medium cultural significance at the local level. It can be graded IIIB.

Figure 7-25 and Figure 7-26 show all heritage resources graded IIIC and above mapped with 50 m buffers in relation to the proposed project.

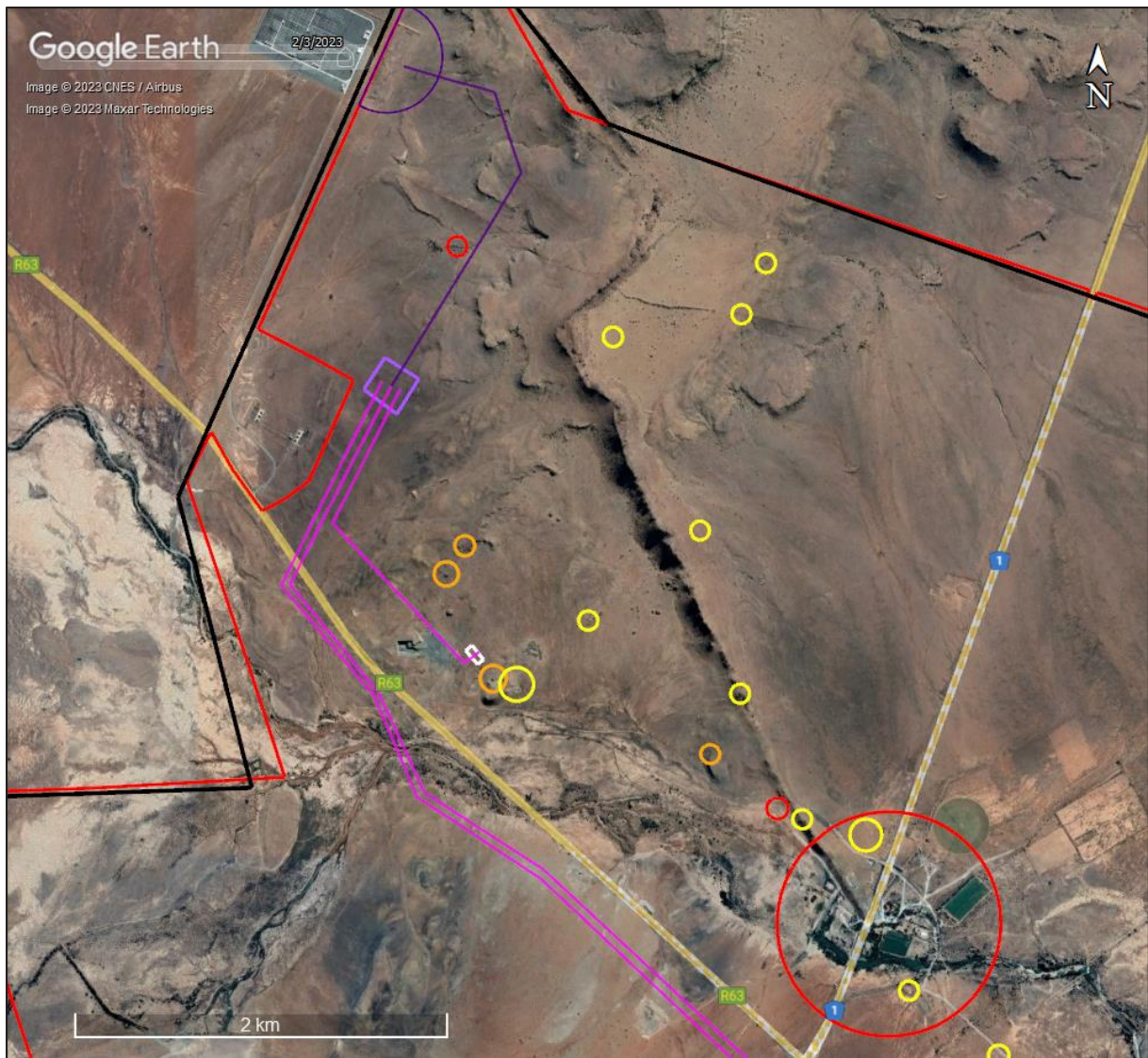


Figure 7-25: Grading map of heritage resources on Schietkuil with the northern part of the proposed powerlines indicated. Red circles = Grade IIIA, orange = Grade IIIB, yellow = Grade IIIC. All buffers are mapped at 50 m.

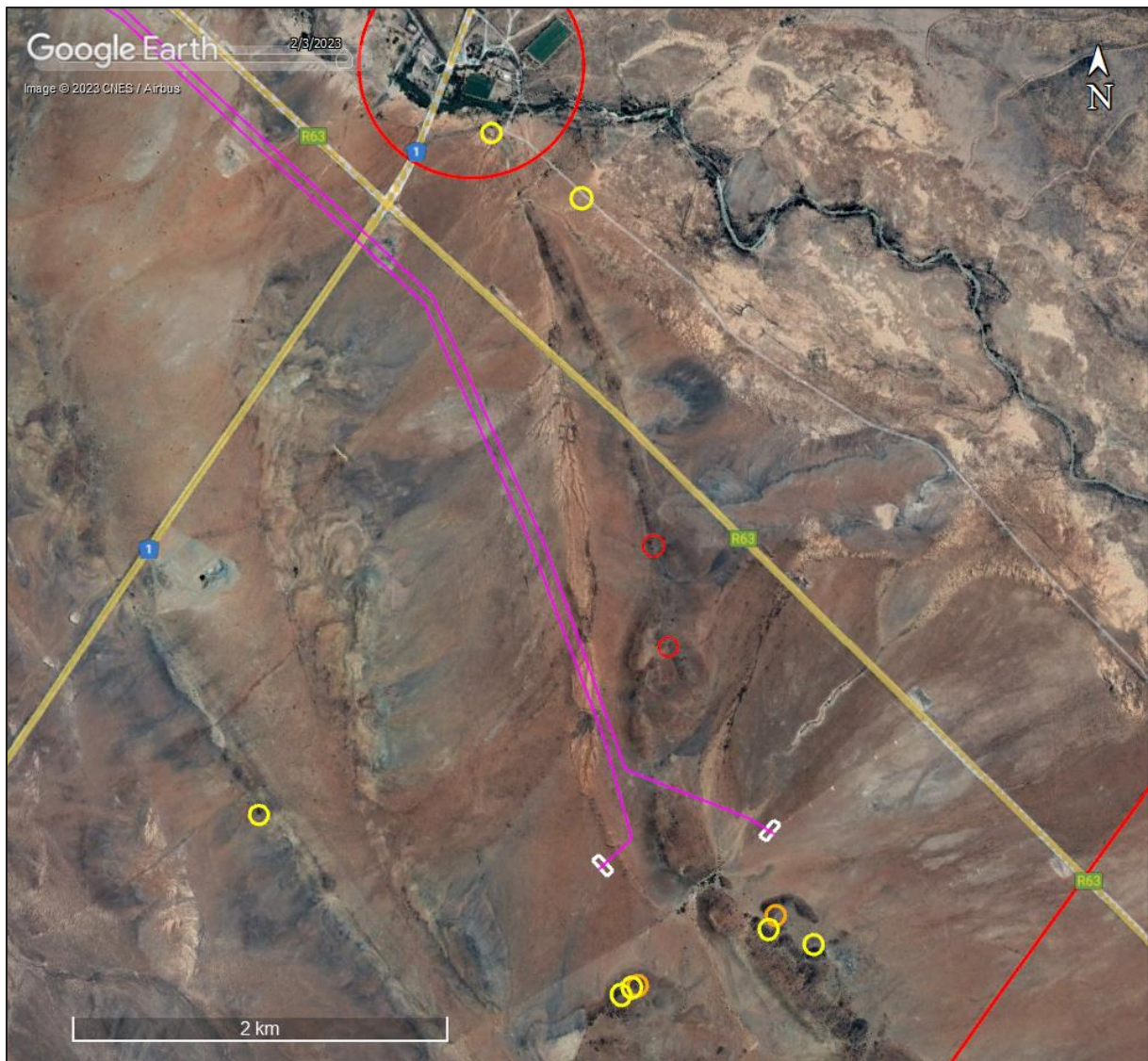


Figure 7-26: Grading map of heritage resources on Schietkuil with the southern part of the proposed powerlines indicated. Red circles = Grade IIIA, orange = Grade IIIB, yellow = Grade IIIC. All buffers are mapped at 50 m.

7.7.3 Impact assessment

Impacts related to archaeological disturbances are assessed for the construction and operational phases of the project as detailed in the below tables.

The impact assessment tables below contain the significance ratings of each predicted impact, as well as the proposed mitigation measures.

Project phase	Construction					
Impact	Damage to or destruction of archaeological sites					
Description of impact	Archaeological sites may be damaged or destroyed during earthworks for foundations, road works, etc.					
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts				
Potential mitigation	• Any chance finds of archaeological materials must be protected <i>in situ</i> and reported to an archaeologist or HWC.					
Assessment	Without mitigation		With mitigation		NO Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Likely	The impact may occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Minor - negative		Negligible - negative		Negligible - negative	
Comment on significance	The calculated ratings are appropriate.					
Cumulative impacts	Should all three solar farms and the gridlines be constructed, the cumulative impact is assessed as being Minor negative .					

Project phase	Construction					
Impact	Damage to or destruction of graves					
Description of impact	Graves may be damaged or destroyed during earthworks for foundations, road works, etc.					
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts				
Potential mitigation	Report any chance finds of human remains that might occur during construction.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Permanent	Impact may be permanent , or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent , or in excess of 20 years
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Extremely high	Natural and/ or social functions and/ or processes are severely altered	Low	Natural and/ or social functions and/ or processes are somewhat altered	Extremely high	Natural and/ or social functions and/ or processes are severely altered
Probability	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen	Highly unlikely / none	Expected never to happen
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Negligible - negative		Negligible - negative		Negligible - negative	

Comment on significance	The rating is deemed appropriate because the chances of finding graves are extremely low.
Cumulative impacts	Should all three solar farms and the gridlines be constructed, the cumulative impact is assessed as being negligible negative.

Project phase	Construction					
Impact	Alteration of the cultural landscape					
Description of impact	The cultural landscape may be altered through visual intrusion when construction equipment and project components are brought to the site and work commences.					
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	<ul style="list-style-type: none">Minimise the construction period.Minimise the amount of land cleared.Ensure that all areas not needed during operation are rehabilitated.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years	Immediate	Impact will self-remedy immediately
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact

Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Minor - negative		Negligible - negative	
Comment on significance	The significance rating is appropriate.					
Cumulative impacts	Should all three solar farms and the gridlines be constructed, the cumulative impact is assessed as being minor negative.					

Note that the possibility of rerouting the PV2 and PV3 powerlines to run adjacent to the PV1 line was considered but constraints around the river crossing and the existing hard rock quarry made this unfeasible. The proposed lines do also follow an existing powerline.

Project phase	Operation					
Impact	Alteration of the cultural landscape					
Description of impact	The cultural landscape may be altered through visual intrusion due to the presence of the powerline in the landscape.					
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	<ul style="list-style-type: none">• Ensure that all maintenance activities remain in approved areas.• Ensure that security lighting is directed downwards or use motion-detectors to minimise night time light pollution.• Buildings to be painted a grey-brown colour.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years	Long term	Impact will last between 10 and 15 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/or social functions and/or processes are moderately altered	Very low	Natural and/ or social functions and/ or processes are moderately altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Moderate - negative		Minor - negative		Negligible - negative	
Comment on significance	The significance rating is appropriate.					
Cumulative impacts	Should all three solar farms and the gridlines be constructed, the cumulative impact is assessed as being moderate negative					

Project phase	Decommissioning					
Impact	Alteration of the cultural landscape					
Description of impact	The cultural landscape may be altered through visual intrusion when construction equipment arrives and dismantling of the project takes place.					
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts				
Potential mitigation	<ul style="list-style-type: none">Minimise the decommissioning period.Ensure that all areas are rehabilitated according to a rehabilitation plan.					
Assessment	Without mitigation		With mitigation		No Go Alternative	
Nature	Negative		Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years	Immediate	Impact will self-remedy immediately
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment

Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Minor - negative		Negligible - negative	
Comment on significance	The significance rating is appropriate.					
Cumulative impacts	Should all three solar farms and the gridlines be constructed, the cumulative impact is assessed as being minor negative					

When one considers other renewable energy and powerline applications in the area then the impacts relate to a far larger area. The significance of archaeological impacts would still be expected to be **minor negative** because layouts tend to avoid sensitive sites and pre-construction surveys – where these are merited – would ensure that mitigation measures are implemented prior to construction if necessary. Impacts to graves would be rated **negligible negative** because the chances of intersecting graves remain very low even over wider areas. Impacts to the landscape are different though. These would increase with multiple facilities being built because a far larger area would be visually affected. This would tend to increase the impacts to **major negative**, especially because some wind energy facilities are also included. However, the location of the site within a REDZ and EGI Corridor means that electrical infrastructure is to be expected – and already does occur – in the area. Also, highly significant Karoo landscape features are not present locally and the overall cumulative impact may thus be considered **moderate negative** after mitigation.

7.7.4 Conclusions and recommendations

The layout for this project has been designed to avoid environmental sensitivities and only one very low significance (Grade NCW) heritage resource falls within the corridor. This site is a dolerite boulder with some scratches on it at waypoint 2020 and whose archaeological nature may be considered doubtful. The layout is thus acceptable from an archaeological point of view but it is noted that some potentially sensitive parts of the servitude (i.e. ridges and riparian areas) have not been examined in the field as the routings were not known at the time of the survey. Impacts to the landscape are unavoidable but the presence of an existing substation and high voltage powerlines – and the three iLanga Emoyeni PV facilities without which the powerlines would not be built – means that the landscape use is consistent with existing uses and thus can be deemed appropriate. There are therefore no significant heritage concerns for this project. Furthermore, there are no known areas within the proposed servitude that require avoidance, although it is possible that some could be found during the recommended pre-construction survey. The heritage indicators and project responses have been listed in Table 7-18.

Table 7-18: Heritage indicators and project responses

Indicator	Project Response
Uncontrolled damage to fossils should be minimised as far as possible.	No fossils were found within the project footprint so this indicator has been met.
Buffers of at least 30 m should be maintained around archaeological sites as far as possible.	This has largely been done for known sites but one Grade NCW site (waypoint 2020) lies within the alignment. It does not merit mitigation. A pre-construction survey is recommended to check for any further sites.
Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.	This has largely been done but one Grade NCW site (waypoint 2020) lies within the alignment. This impact is acceptable considering the socio-economic benefits. A pre-construction survey is recommended to check for any further sites.
Direct impacts to graves must be avoided completely with a 30 m buffer.	This has been done, but a pre-construction survey is recommended to check for any further graves.
The Schietkuil farm complex should be avoided by at least 200 m.	This has been done.

Due to the generally low significance of heritage impacts, it is the opinion of the heritage consultant that the proposed iLanga Emoyeni gridline should be authorised in full.

7.8 Palaeontology

Natura Viva cc were appointed to conduct the palaeontological compliance statement and site sensitivity verification report for the project. A two and a half-day palaeontological site visit, supported by desktop studies drawing on previous field-based palaeontological studies in the wider region was undertaken. The report is included in Annexure D6.

7.8.1 Receiving environment

The project area is situated in the west-central sector of the Main Karoo Basin and is largely underlain at depth by continental (fluvial / lacustrine) sediments of the Lower Beaufort Group / Adelaide Subgroup (Karoo Supergroup) of latest Middle to earliest Late Permian age (c. 260 to 256 Ma = million years ago). According to the current 1: 250 000 geological map, the Beaufort Group sedimentary succession represented within the project area is assigned to the lower part of the Teekloof Formation - viz. the sandstone-dominated, prominent-weathering Poortjie Member and the overlying mudrock-dominated, more recessive weathering Hoedemaker Member (Figure 7-27). The Poortjie Member is only mapped within the westernmost corner of Farm 3 Schietkuil, outside the solar project footprint, and so was not considered further in the assessment.

The legend for Figure 7-27 reads:

- ▶ **Ptp** (middle green with stipple) = Middle to Late Permian Poortjie Member, Teekloof Formation (Adelaide Subgroup).
- ▶ **Pth** (middle green without stipple) = Late Permian Hoedemaker Member, Teekloof Formation (Adelaide Subgroup).
- ▶ **Jd** (red) = sills and dykes of the Early Jurassic Karoo Dolerite Suite.
- ▶ **Pale yellow with flying bird symbol** = Late Caenozoic (Neogene / Pleistocene to Recent) alluvium. *N.B.* The mapping of the various stratigraphic subunits of the Lower Beaufort Group shown here is currently contested and may require considerable revision in future, based on detailed field mapping and collection of additional biostratigraphic data. In particular, the contact between the Poortjie and Hoedemaker Members is equivocal.
- ▶ **Orange triangle** = hydrothermal pipe penetrating Hoedemaker Member country rocks adjacent to a major dolerite intrusion

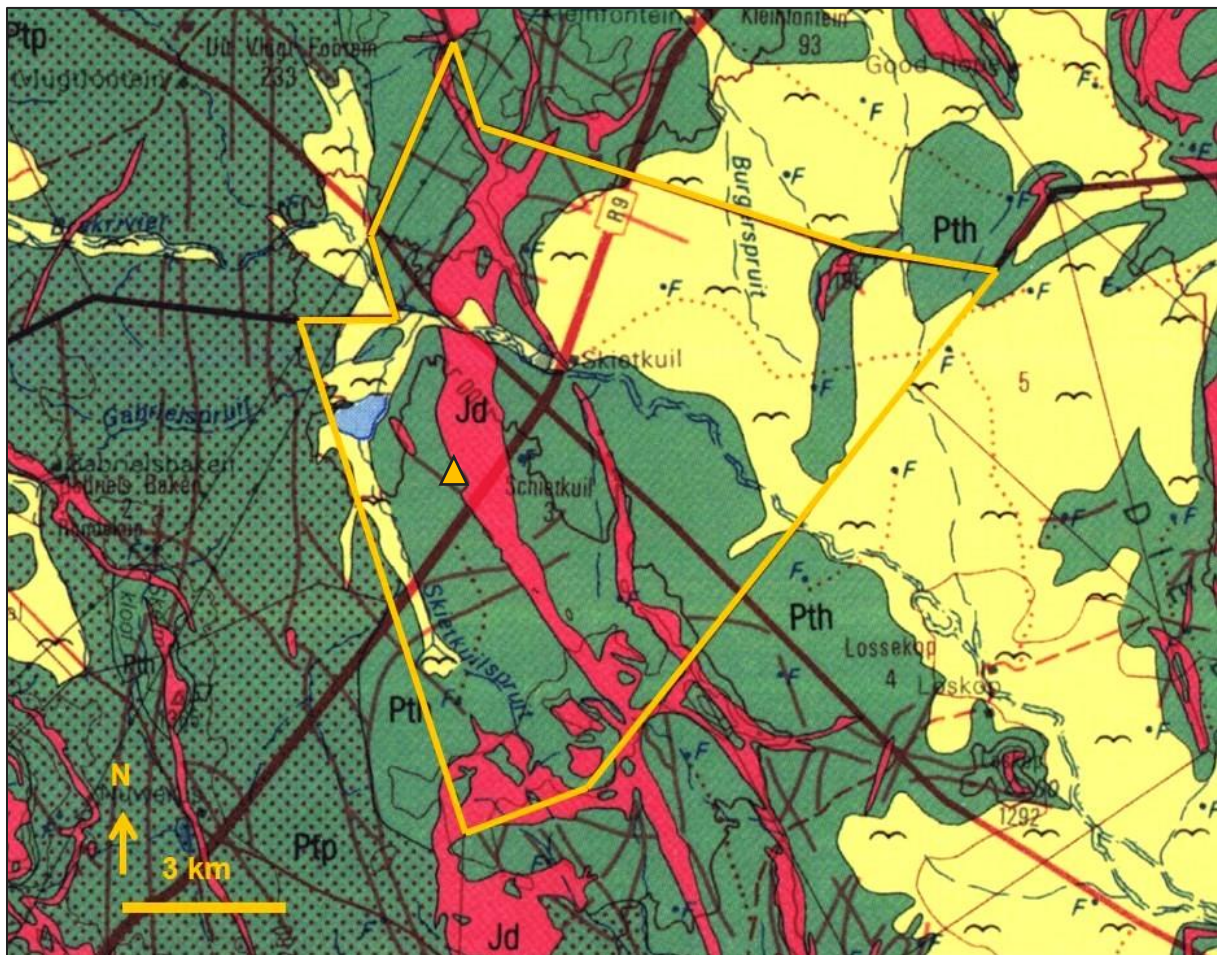


Figure 7-27: Extract from 1: 250 000 geology sheet 3122 Victoria West showing the combined project area for the Ilanga Emoyeni Solar Suite on Farm 3 Schietkuil between Murraysburg and Victoria West, Central Karoo District, Western Cape (Base map published by the Council for Geoscience, Pretoria).

The Hoedemaker succession is dominated by greenish-grey to purple-brown overbank mudrocks, with occasional single-storey sheet sandstones that are generally thinner, finer-grained and less friable (biscuit-like) than seen within the Poortjie Member. Palaeosol (ancient soil) horizons characterized by small calcrete nodules and rhizocretions (root casts) are common, as are also lacustrine (transient to long-lived playa lake) sediments deposited in depressions on the Late Permian floodplain. These last are associated with limestone crusts, gypsum crystals (“desert roses”) as well as a range of fine-scale sedimentary features such as wave rippled sandstones, falling water marks, mudcracks, and trace fossils. The overbank mudrocks of the Hoedemaker Member often display vibrant or luminous purple-brown to grey-green or blue-grey hues. The best exposures of the Hoedemaker Member on Farm 3 Schietkuil are found on the slopes of dolerite-capped *koppies* in the farm south while there are also several good mudrock sections in the banks of the Brakrivier. In areas dominated by dolerite intrusion only the baked sandstone facies tend to be exposed as low, highly-jointed ridges and *kranzes*.

The Poortjie – Hoedemaker transition zone is characterised by a succession of thin, single-storey channel sandstones and intervening thick packages of predominantly reddish-brown mudrocks with subordinate crevasse splay sandstones. This stratigraphic interval records the transition from thick, multi-storey channel sandstones dominated by downstream accretion process typical of the Poortjie Member to laterally accreting, meandering river systems of the Hoedemaker Member. The transition is accompanied by more frequent development of crevasse splay deposits and calcareous palaeosols on the floodplain driven by increased aridification in the Karoo Basin and aggradation of the Reiersvlei Meanderbelt sedimentary prism.

Large portions of the Lower Beaufort Group outcrop on Farm 3 Schietkuil, especially in its western half, have been extensively baked and mineralised by voluminous intrusions of the Early Jurassic **Karoo**

Dolerite Suite in the vicinity. These intrusions comprise a series of roughly NNW-SSE trending bodies which weather out as prominent, rubble-strewn ridges. Thermal metamorphism of the country rocks has altered them to tough, pale, vuggy (vesicle-rich) quartzites and dark grey hornfels. These resistant-weathering lithologies erode to generate copious blocky gravels that mantle adjoining hillslopes.

A **hydrothermal breccia pipe** associated with Early Jurassic dolerite intrusion located on Farm 3 Schietkuil, c. 570 m to the northwest of the N1 trunk road (S31.740749, E23.418369, indicated by an arrow on Figure 7-28) is potentially of geoscientific research interest. The pipe is exposed as a low, massive, rounded feature penetrating baked country rocks on the western margins of a major N-S dolerite intrusion. It is composed of well-consolidated, polymict breccio-conglomerate containing rounded to angular inclusions, up to boulder-sized, of quartzite, sandstone, dolerite and other rock types within a massive to foliated, well-consolidated matrix with lots of small-scale soft sediment deformation (recumbent folds etc) (Figure 7-29 and Figure 7-33). Previously mapped phreatic hydrothermal vent complexes related to the Karoo Dolerite Suite are mainly limited to the Stormberg Group outcrop area in the eastern sector of the Main Karoo Basin while breccia pipes are confined to the Eccia and lowermost Beaufort Groups (Svensen *et al.* 2007). The Schietkuil pipe (*N.B.* there may be more than one pipe in the area) is of interest in that it penetrates lower Teekloof Formation beds that lie well above the base of the Lower Beaufort Group succession in a sector of the Main Karoo basin where such features have not been previously recorded.

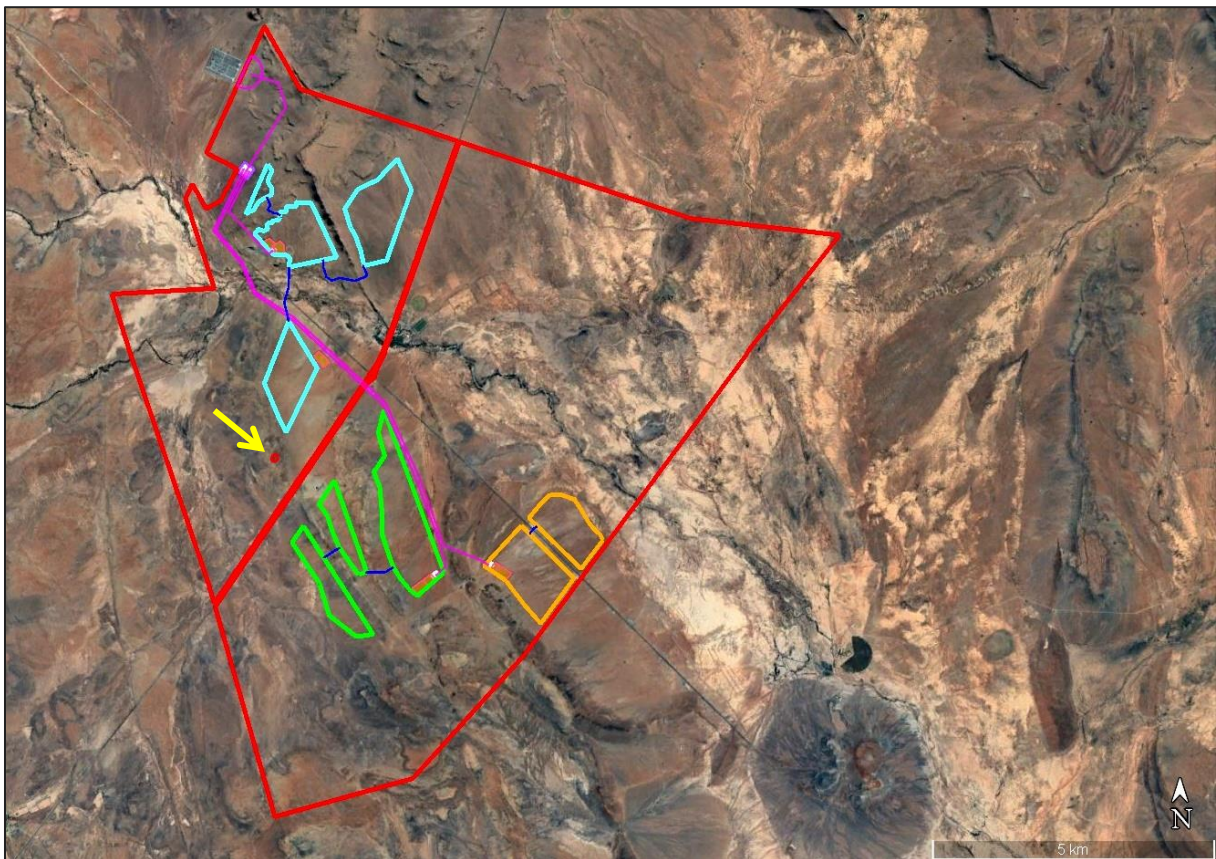


Figure 7-28: Google Earth© satellite image of the Ilanga Emoyeni Solar Suite on the Remainder of Farm 3 (Schietkuil) spanning the N1 and R63 tar roads in the Beaufort West Municipality, Western Cape Province. Development areas for the gridline is shown in purple. The small orange rectangles indicate on-site substations, BESS and temporary laydown areas. The small red circle (arrowed) indicates a volcanic hydrothermal breccia pipe or vent associated with dolerite intrusion that is of potentially high geoscientific interest.

The Permian sediments and Jurassic intrusions within the project area are extensively mantled by a range of Late Caenozoic superficial deposits, severely constraining exposure levels of fresh (unweathered), potentially fossiliferous Permian sediments, especially in low-relief lowlands where the PV solar development areas will be located. Bedrock exposure levels within these lower-lying areas

accordingly extremely limited or non-existent. In addition to thick, consolidated (calcretised) to unconsolidated, gravelly to silty alluvial sediments along major active or defunct drainage lines (e.g. Brakrivier, Skietkuilspruit, Burgerspruit and their various tributaries), these younger cover sediments include pan deposits (e.g. shallow *brak-kolle*), colluvial (slope) and eluvial (downwasted) surface gravels, pedocretes (e.g. calcrete), and a spectrum of mainly sandy to gravelly soils.



Figure 7-29: View north-westwards towards the extensive dolerite ridge on Farm 3 Scheitkuil, NW of the N1 trunk road, showing the flat-lying terrain with sparse karroid bossieveld vegetation in lower lying areas and trees along the Brakrivier.



Figure 7-30: Flat-lying terrain mantled with alluvial soils and grassy bossieveld vegetation with no significance bedrock exposure – part of the PV 1 SEF development area – situated to the east of the dolerite ridge seen in the previous illustration.



Figure 7-31: Doleritic terrain on Farm 3 Schietkuil to the south of Gamma Substation forming part of the PV1 SEF development area with benches of baked Hoedemaker Member sediments bordering the dolerite ridge in the background.



Figure 7-32: Channel sandstone package of the Hoedemaker Member capping a low scarp to the NW of the N1 trunk road on Farm 3 Schietkuil. Mudrocks underlying the cap sandstone are largely mantled by rubbly colluvial deposits of downwasted sandstone blocks.



Figure 7-33: Good sections through baked Hoedemaker Member quartzites and hornfels exposed in road cuttings along the R63 to the SW of the PV1 SEF development area.

7.8.2 Site sensitivity

Provisional site sensitivity mapping for palaeontological heritage using the DFFE National Web-Based Environmental Screening Tool (as well as the SAHRIS Palaeosensitivity Map) suggests that large portions of the Ilanga Emoyeni Solar Suite project area on Farm 3 Schietkuil are of Very High Palaeosensitivity due to the presence here of potentially fossil-rich sedimentary bedrocks of the Lower Beaufort Group (Figure 7-34). Substantial areas underlain by thick alluvial deposits are assigned a Medium Palaeosensitivity while areas underlain by dolerite intrusions are palaeontologically Insensitive.

An overall **Low Palaeosensitivity** for Farm 3 Schietkuil is inferred in this report on the basis of:

- ▶ Desktop analysis of relevant geological maps and palaeontological databases, including previous PIA studies in the region by the author (e.g. Modderfontein WEF, Gamma Grid Connection);
- ▶ A two and a half-day palaeontological heritage site visit which yielded only a sparse scatter of fossil sites (mostly of low scientific / conservation value) within the Lower Beaufort Group bedrocks – none of which occurs within the Solar Suite development areas - and no Late Caenozoic sites;
- ▶ Generally low to very low levels of bedrock exposure, especially within the low-relief PV solar project development areas;
- ▶ Substantial, closely-spaced dolerite intrusions which have compromised fossil preservation over large sectors of the combined project area through baking of the surrounding country rocks.

The DFFE-based palaeosensitivity mapping is accordingly *contested* in the palaeontological site verification .

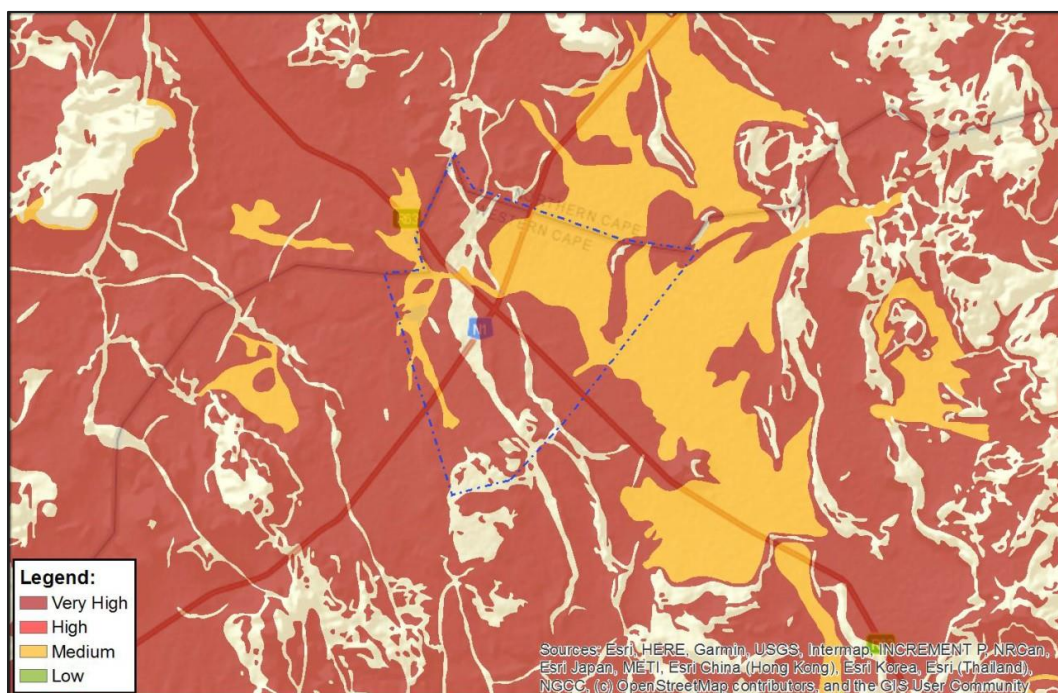


Figure 7-34: Palaeontological sensitivity map for the Ilanga Emoyeni Solar Suite project area on Farm 3 Schietkuil (blue dotted polygon), abstracted from the DFFE Screening Report (Zutari, February 2022).

7.8.3 Impact assessment

Impacts on local palaeontological heritage resources due to the proposed PV solar and associated infrastructure developments (including EGI) are anticipated to be of **Low to Very Low Significance** and in the context of other renewable energy developments proposed for the region (e.g. Modderfontein WEF, Great Karoo Renewable Energy Cluster, Gamma Grid Line) they fall within acceptable limits. The projects are not fatally flawed and there are no objections on palaeontological heritage grounds to the authorisation of the proposed Ilanga Emoyeni Solar Suite developments or the associated EGI.

No recorded fossil sites of unique scientific or conservation value are likely to be directly impacted by the proposed renewable energy and electrical infrastructure developments and no further palaeontological studies or mitigation is proposed here with regard to these sites.

7.8.4 Conclusions and recommendations

Pending the discovery of significant new fossil finds before or during construction, no further specialist palaeontological studies, monitoring or mitigation are recommended for the project. Any new fossil sites revealed during the Construction Phase of the developments are best handled by the Chance Fossil Finds Protocol appended to the Palaeontological report (Annexure D6) and the project EMPr (Annexure G).

Where Pre-construction or Construction Phase mitigation, comprising palaeontological recording and collection of fossil material and associated geological data, is triggered by chance fossil finds, this must be carried out by a suitably qualified palaeontological specialist under a Fossil Collection Permit issued by the relevant Heritage Resources Management Agency (In the case of mitigation within the Western Cape, a Work Plan must be submitted for approval by Heritage Western Cape, Cape Town). The fossil material collected must be curated in an approved repository (e.g. museum / university collection).

7.9 Visual Landscape

Visual Resource Management Africa cc was appointed to conduct the Visual Impact Assessment (VIA) for the project. The VIA is included in Annexure D7.

7.9.1 Receiving environment

This section identifies the main landscape features that define the landscape character, as well as the key receptors that make use of the visual resources created by the landscape.

7.9.1.1 Landscape context

The region where the project is proposed is within an arid environment landscape within the Nama-karoo biome. The following features are core elements within the greater landscapes.

- ▶ Skietkuil Guest Farm and dryland agriculture farming.
- ▶ Nama-karoo landscape.
- ▶ Eskom Gamma Substation and power line corridor.
- ▶ N1 National Highway and R63 tourist view corridors.
- ▶ Renewable Energy projects.

Within the regional context, the property is located in the Great Karoo stretching 600 km from Calvinia in the west to Cradock in the east, and approximately 600 km from Marydale to the north to Calitzdorp in the south. The Karoo is a vast and diverse arid area which straddles four provinces. The vegetation falls within the Nama Karoo Biome. This consists of Montane Karoo grassy shrublands, Karoo grassy dwarf shrublands, Karoo succulent dwarf shrublands, and riparian thicket.

The economy in the Karoo has been largely based on extensive sheep and goat farming. Irrigation-based agriculture is concentrated along the rivers. The arid areas are sparsely populated, and in some areas, the population density is less than 1 or 2 people per km². During the last fifty years, extensive stock farms have grown even larger. The recent advent of game farming has contributed to this trend, although opportunities in agri-tourism and eco-tourism have created scope for new and more sophisticated types of employment. As farms are large, farmsteads are scattered, with a few of them, such as the Skietkuil Guest Farm, offering accommodation for the N1 National Highway users. Others guest farms also catering to N1 Highway tourists include Desert Dew, Jolani Guest Farm as well as Camp Nguni on the R63 District Road. As can be seen from the photograph below, the guest farm is well-established and likely a heritage structure.

With open views of the undulating, wide open plains juxtaposed with steep sided hills and mountains, the landscape character is unique and often reflects iconic karoo-type sense of place. This is depicted in the photograph overleaf taken from the N1 Highway southbound in Figure 7-35 and Figure 7-36. Aesthetic value within the landscape is created by the long views down the wide Gabrielspruit River, with the shade tree 'oasis' of the Skietkuil Farmstead with low hills in the background. Also creating aesthetic value are the dark colours of the rocky outcrops, contrasting with the lighter colours of the veld grasses. As a result of the higher levels of scenic quality along the route, the N1 Highway has been recognised in regional planning as a tourist view corridor. While the R63, located in the region, is likely to carry less tourist traffic than the N1 Highway, the route also reflects a similar landscape, also with high levels of scenic quality.



Figure 7-35: Photograph from the N1 Highway southbound with Skietkuil on the left and Gys Roosberg Mountain in the background right.



Figure 7-36: Photograph taken from the R63 eastbound.

Also located within the property landscape context is the Eskom Gamma Substation. Located to the northwest of the property, the large substation is topographically well screened as seen from the N1 Highway. Also, well setback from the highway are the multiple power line corridors located to the west of the property. Within the immediate locality, the landscape is degraded by the visual intensity of these structure as seen in Figure 7-37.



Figure 7-37: Photograph of the Eskom power line corridor located to the west of the property.

As the region falls within the Beaufort West REDZ11 area, numerous RE projects are proposed, and the Nobelsfontein Wind Farms have been established. While not within the property viewshed, there is the likelihood that RE landscape change will be introduced into the landscape. While this clearly creates value at a National Level in terms of energy security and employment, care needs to be taken to ensure that significant landscapes along the N1 Highway view corridor are not compromised.

7.9.1.2 Vegetation

Of relevance to the project, given the nature of the low-growing, very sparse vegetation on the site, there is little to no opportunity for visual screening by indigenous vegetation on the site, nor would it be possible to cultivate an effective vegetation screen, given the constraints of climate, soils and slopes.

7.9.1.3 Other renewable energy project

Located on the northern boundary of the Beaufort West REDZ, there are other RE projects proposed around the area, and a single developed wind farm. The developed wind farm is the Nobelsfontein Wind Farm that is located to the west of the project. Other proposed, projects within the vicinity are the Emoyeni Wind Farm Project, South Africa Mainstream Renewable Power Developments and Coria (PFK) Investments as well as the Ishwati Wind Farm located to the east of the property. As indicated in Figure 7-38, the Skietkuil Property was the site proposed for the Aurora Power Solutions project, with the EIA undertaken by the CSIR. The project was not developed, and the authorisation has subsequently lapsed. Given the number of RE projects in the area, inter-visibility as a cumulative effect needs to be taken into account, with views of multiple projects having the potential to detract from the existing higher levels of scenic quality of the N1 Highway view corridor. However, with suitable setback, as depicted in the Nobelsfontein WEF, these necessary RE projects can be accommodated within the landscape, if careful planning and design is implemented to reduce visual intrusion.

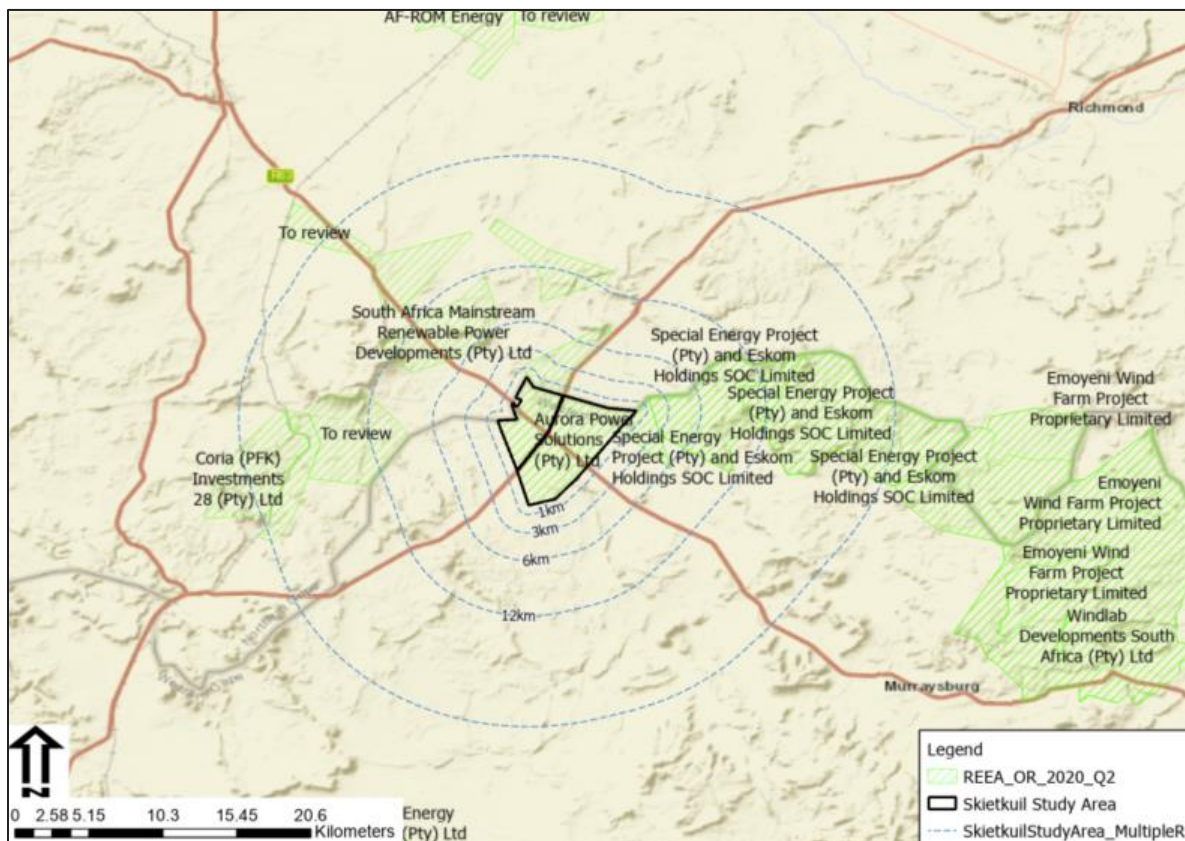


Figure 7-38: Map depicting DEA Renewable Energy project status

7.9.1.4 Nature and tourism activities

The nearest significant nature conservation area is the Karoo National Park (80km southwest) and the Mountain Zebra National Park (90km southeast). Both nature reserves are located outside of the project Zone of Visual Influence (ZVI).

As tourism is emphasised in the local and regional planning, from a cumulative landscape impact perspective, care would need to be taken to ensure that the proposed landscape change does not degrade scenic resources due to cluttering effects. Also important are the scenic routes that are used by tourists. Key tourist related locations that could fall within the project ZVI are Desert Dew Guest Farm, Nguni Lodge, Skietkuil, Jolani Guest Farm and Taaibosfontein. The N1 National Highway, as well as the R63 District Road, have high levels of scenic quality and as they are likely to carry tourist traffic, these should be considered as view corridors.

As these tourist destinations and view corridors would be located within the viewshed and would be exposed to the landscape change, the locations would need to be incorporated as a Key Observation Point (KOP) for impact assessment.

7.9.1.5 Project zone of visual influence

In order to define the extent of the possible influence of the proposed project, a viewshed analysis was undertaken from the proposed site at a specified height above ground level as indicated in the Table 7-19.

The extent of the viewshed analysis was restricted to a defined distance that represents the approximate ZVI of the proposed activities, which takes the scale, and size of the proposed projects into consideration in relation to the natural visual absorption capacity of the receiving environment. The maps are informative only as visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature. The viewshed is strongly associated with the regional topography and as such this topic is addressed before the viewshed analysis.

7.9.1.5.1 Regional landscape topography

The regional topography is dominated by the Gys Roosberg Mountain located to the west of the property. The Geographic Names website, with source the National Geospatial-Intelligence Agency, identified Gys Roosberg as a Mountain classified as Hypsographic type feature. According to the PeakVisor website for the Pixley ka Seme District Municipality, the mountain is number 28 out of 1297 hills and mountain for elevation, and number 3 out of 1297 for prominence. The height of the mountain is 1815mamsl and the nearest Higher Neighbour is the Aasvoelberg located 50km WSW with elevation 1833mamsl. While the Gys Roosberg Mountain creates a landform focal point, the wide, open plain of the Gabrielspruit River located on the north-western portion of the property, allows for open views to the east, with steep sided ridgelines and low hills forming background features in the vista.

The South to North Profile depicts the low ground to the south, rising to a high point of 1318mamsl on the southern boundary of the property. The gradient then drops across the wide Gabrielspruit River Valley located at approximately 1150mamsl before rising to a northern high point of 1383mamsl. East to West Profile depicts the wide and open plain of the Gabrielspruit River, with a low point within the range of 1139mamsl. The property contains a high point hill feature rising to 1301mamsl, with the highest terrain located to the west at 1398mamsl. Also visible on both profiles are steep slopes that are related to the hill/ mountain features, as well as a locally prominent ridgeline that would need to be excluded from the development footprint.

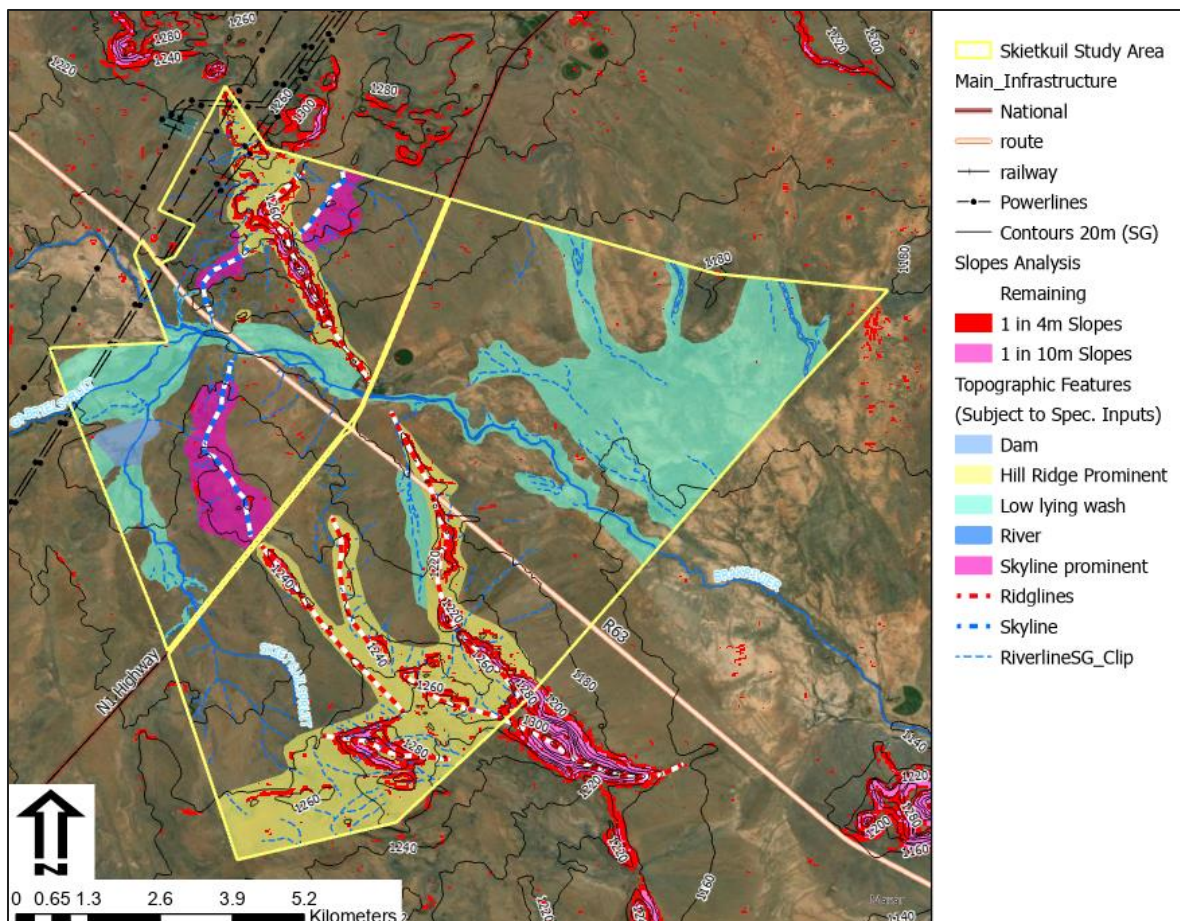


Figure 7-39: Key topographic features map

In order to unpack the topographic features within the property, a slopes analysis was undertaken based on the ASTER 30m DEM from which steep slopes were derived. Two categories of slope were categorised, namely, 1 in 4m and 1 in 10m. Also, clearly visible on the property, and highlighted in the DFFE Screening Tool mapping, are the topographically prominent hills to the south and north. Numerous prominent and often steep-sided ridgelines characterise these areas. Located to the east and west of the property are low lying areas related to the three rivers that drain the site to the east. These include the Skietkuil River draining north into the Gabrielspruit, which flows east into the Brak

River. These rivers are located on wide flood plains and are likely to be associated with washes that would flood during the rainfall season.

7.9.1.5.2 Viewshed analysis

A viewshed analysis was undertaken for the site making use of NASA SRTM 30m Digital Elevation Model data. An Offset value representing the height of the PV panels was used to represent the approximate height of the proposed development as reflected in the table below. The viewshed was also capped at a defined extent to take atmospheric influences into consideration where the landscape change would not be clearly visible from. As tabled below, the Offset Height above ground levels was set a 32m and the outer extent of the viewshed was capped at 14km. This is to take into account the undulation of the terrain, as well as the atmospheric conditions of this semi-arid environment where visual clarity can sometimes be reduced by dust in the air. This places the extent of the viewshed analysis well into the background distance zones, where after 6km, the influence of the landscape change is significantly reduced

Table 7-19: Proposed project heights table

Proposed Activity	Approx. Height (m)	Terrain Model Extent
Monopole structures	32m	14km

As can be viewed in mapping on the following page, a detailed viewshed analysis was undertaken for the individual project clusters (Figure 7-40). The Powerline Viewshed combined with the PV area is also mapped (Figure 7-41) in order to better understand the cumulative effects of the total PV project visibility.

The Gridline viewshed is localised in extend to some degree, with the topographic screening of the local ridgelines providing some screening and fragmentation of the viewshed. However, due to the 32m (approximate) height of the monopoles, and the relatively flat terrain for the karoo landscape (excluding the ridgelines), the visible extent of the powerline landscape change will extend into much of the viewshed areas within the 3km distance zone. The higher view frequency areas mainly track the routing area within a 1km distance, with some lower visual intensity located to the east. The Zone of Visual Influence is likely to be localised to the 6km area and is rated Medium in extent. The main receptors are the N1 National Highway and the R63 District Road, both located in High Visual Exposure areas. Other than the Skietkuil Holiday Farm (property owner), no other tourist or farmstead receptors are located in the Foreground/ Mid Ground areas.

From a cumulative effect, the combined viewshed of the Powerline and the PV developments, does not extend further than the combined PV viewshed, but increases the visual intensity in the central section along the R63 road, as well as the intersection of the R63 and the N1 Highway. From this location, the effect of the intervisibility of the PV areas and the double powerline routings, is likely to be clearly noticeable to the casual observer and will dominate the landscape character in this locality.

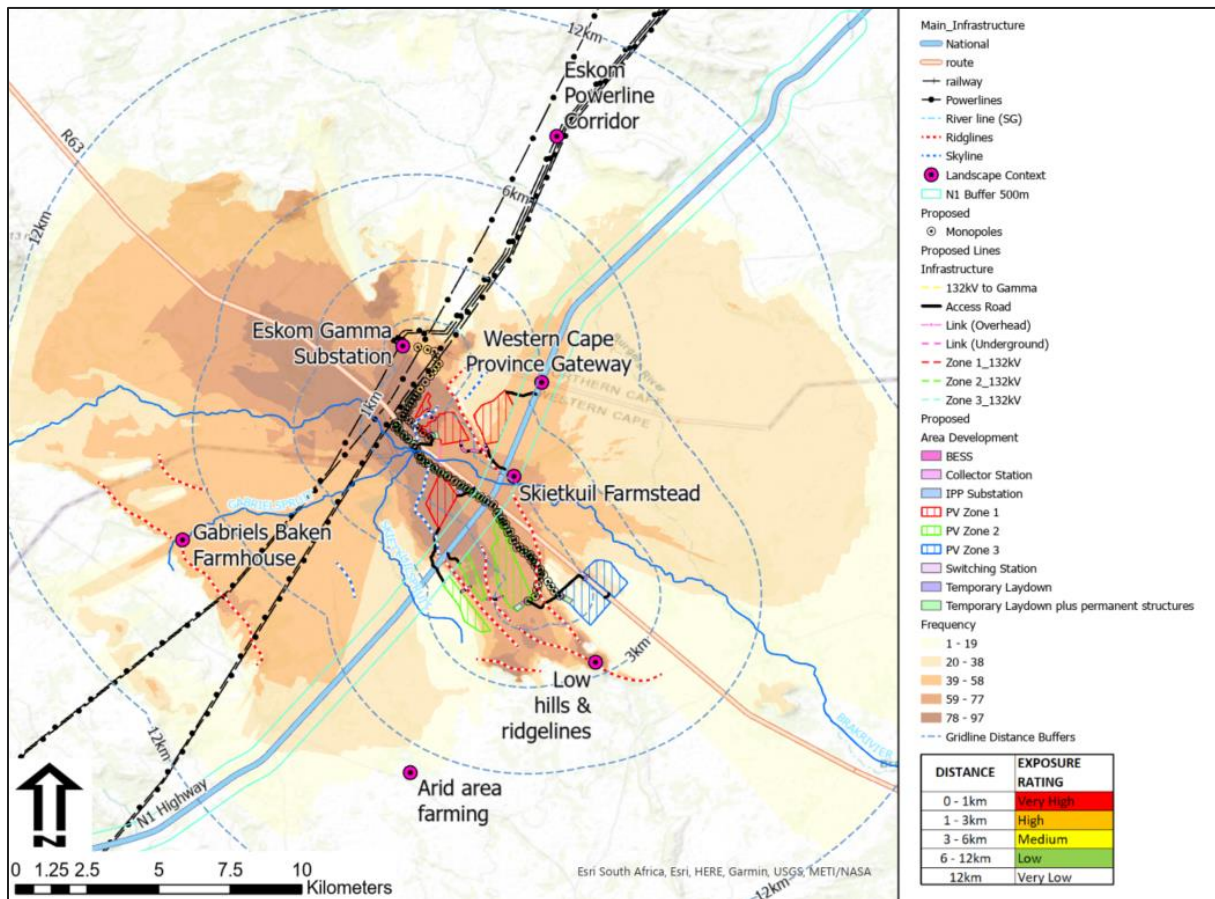


Figure 7-40: Viewshed frequency analysis map with 32m offset.

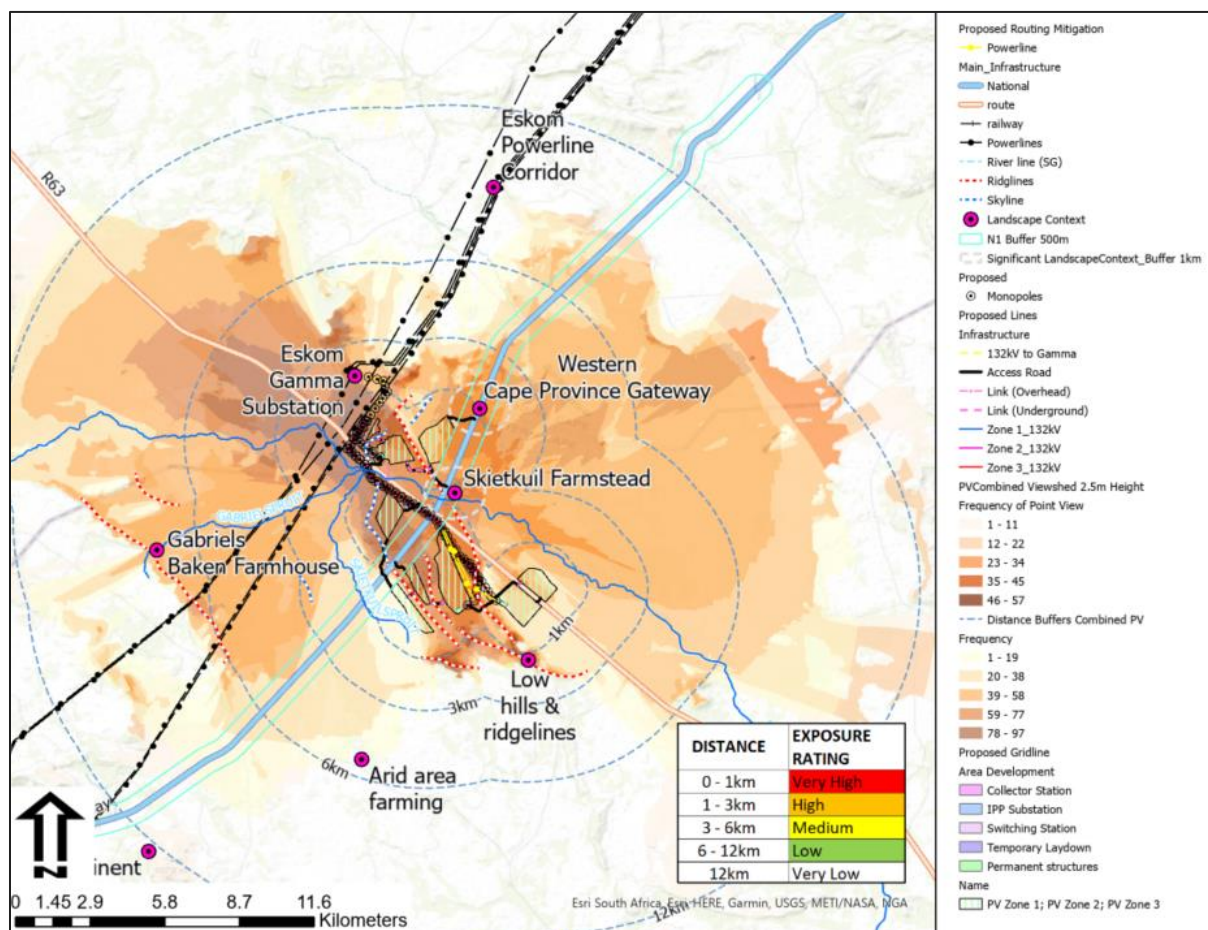


Figure 7-41: Viewshed frequency of Powerline Routing *combined* with the PV Projects.

7.9.1.5.3 Receptors and KOPs

The following table identifies the receptors identified within the ZVI, as well as motivates if they have significance and should be defined as KOP.

Table 7-20: KOP motivation table

Attribute	Receptor name	Exposure	KOP	Motivation
Tourism	Jolani Guest Farm	Low	No	Tourist related but Low Exposure
Tourism	Taaibosfontein	Low	No	Tourist related but Low Exposure
Tourism	Desert Dew	Low	No	Tourist related but Low Exposure
Tourism	Skietkuil Holiday Farm	Very High	No	Tourist related but project related
Tourism	Camp Nguni	Low	No	Tourist related but Low Exposure
Tourism	R63 District Road	Very High	Yes	Tourist view corridor with High Visual Exposure
Tourism	N1 National Highway	Very High	Yes	Tourist view corridor with High Visual Exposure

7.9.1.6 Visual resource management

Figure 7-427-: indicates the Visual Resource Management (VRM) classes that were identified and assessed. four Classes that represent the relative value of the visual resources of an area and are defined in terms of the VRM Matrix as follows:

- ▶ **Classes I and II** are the most valued. These areas are likely to result in strong levels of visual intrusion, or conflict with existing environmental legislation and as such are not recommended for development (subject to confirmation of specialist findings).
- ▶ **Class III** represent a moderate value. Located outside of the prominent N1 Highway receptor views and High Exposure areas, these areas would be suitable for development of Solar PV with some height restraint, depending on the locality.
- ▶ **Class IV** is of least value. As these areas already reflect landscape degradation from adjacent land uses and are not visually prominent to the N1 Highway receptors, development would be suitable.

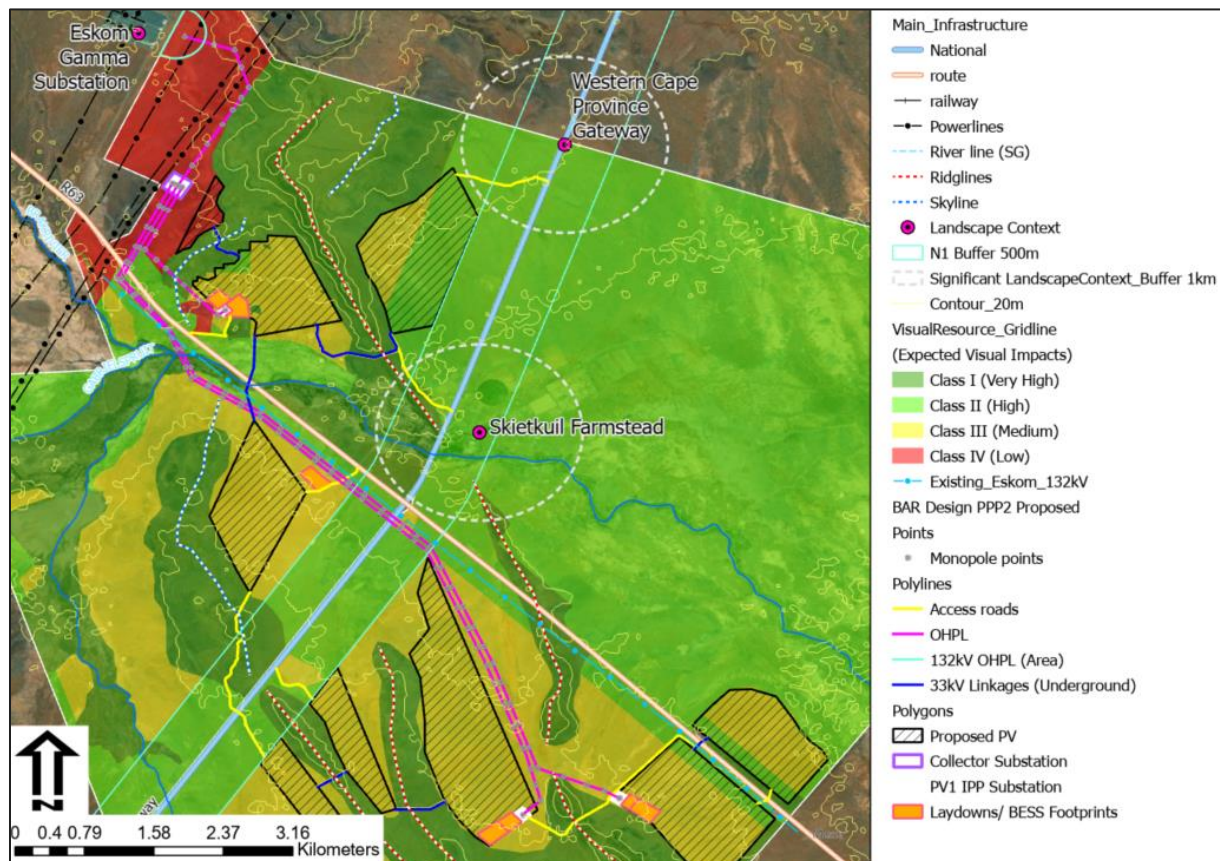


Figure 7-427:- Visual Resource Management Classes map with *focus on Gridline visual carrying capacity* Impact assessment

3D modelling and photomontages are used to provide the further information on the nature of the landscape change. For this project purposes, only 3D modelling was used due to the Basic Assessment nature of the EIA, and the location of the project within the Beaufort West REDZ. However, detailed 3D modelling was undertaken that informed the landscape and visual No-go mapping, excluding prominent area that would increase intervisibility, or keeping open significant visas that would otherwise be 'boxed in' with a PV corridor. The following preferred layouts were informed by a detailed 3D modelling exercise to take the views as seen from the N1 National Highway into consideration. Based on 3D modelling, a significant reduction in the development area was implemented, such that the significance of the Skietkuil Holiday Farm landscape could be retained. The development preferred as well as the visual/ landscape preferred modelling is included in the impact assessment section, with the modelling depicting the difference between the two development options. The modelling images can be found in Section 8 of the VIA (Annexure D7).

7.9.2 Sensitivity Map

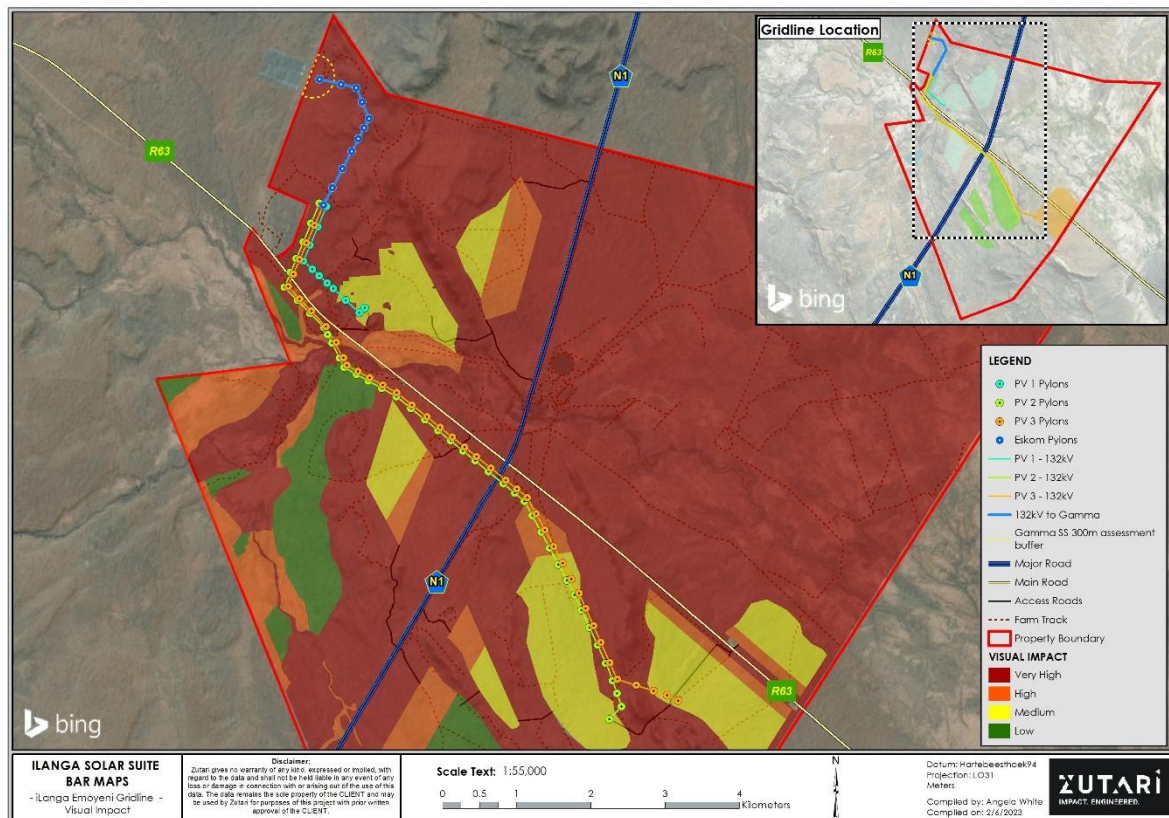


Figure 7-43: Visual sensitivity/impact map for the gridline.

7.9.3 Impact Assessment

The PV impacts were assessed separately and are discussed in the iLanga Emoyeni PV1, PV2 and PV2 BARs.

Project phase	Construction			
Impact	Short-term landscape change from the construction of the double powerline to the current rural agricultural sense of place			
Description of impact	Loss of site landscape character due to the removal of vegetation and the construction of the double powerlines and associated substation infrastructure. Wind-blown litter from the laydown and construction sites.			
Mitigability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Dust suppression measures Litter management measures Rehabilitation of impacted areas.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Local	Extending across the site and to nearby settlements

Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Minor - negative		Minor - negative	
Comment on significance	Without mitigation, the visual intrusion would be very high and set a negative precedent for development of powerlines in close proximity to the N1 Highway that could influence this scenic corridor at the Provincial level. With mitigation, and the re-alignment with the 132kV powerline, placement of monopoles 75m away from the N1 Highway and the re-routing around the high point ridgeline, the Class II and III Visual Objectives would be met due to the higher VAC levels created by the existing 132kV powerline.			
Cumulative impacts	With mitigation, the Cumulative effects could be reduced to Medium - Low as there precedent is already created for powerline routing, and the area does fall within the REDZ area			

Project phase	Operation			
Impact	Long-term landscape change from the construction of the double powerline to the current rural agricultural sense of place			
Description of impact	Loss of long-term landscape character due to the operation of the double powerlines.			
Mitigability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Continued monitoring for soil erosion			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Long term	Impact will last between 10 and 15 years
Extent	Regional	Impacts felt at a regional / provincial level	Municipal area	Impacts felt at a municipal level
Intensity	Very high	Natural and/ or social functions and/ or processes are majorly altered	High	Natural and/ or social functions and/ or processes are notably altered

Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Moderate - negative		Minor - negative	
Comment on significance	As for Construction phase, but with a Long-term time period.			
Cumulative impacts	As for construction phase			

7.9.4 Conclusion and recommendation

A Level 3 Landscape and Visual Impact Assessment was undertaken for the proposed Gridline development. The finding of the assessment is that the impacts to Visual and Landscape Resources would be Medium with mitigation. This is due to the existing precedent for the 132kV powerline routing, as well as the REDZ and Powerline Corridor planning alignment. The majority of design recommendations made in the pre-application phase have been included in the current revised layout. Where these recommendations have not been implemented, explanation has been given to specialists as to why, and specialists have agreed that the reasons given are valid and reasonable.

7.10 Electromagnetic Interference

Interference Testing And Consultancy Services (Pty) Ltd were appointed to conduct the Radiofrequency Interference (RFI) assessment for the iLanga Emoyeni Solar Suite project.

7.10.1 Receiving environment

RFI from a PV facility is generally emitted from the inverters, as solar panels do not emit any radiofrequency (RF). The switching station equipment and associated cabling and grid connections can also cause unwanted levels of RFI. Thus, the effects of the PV facility inverters and switching station equipment will be the focus of this report.

RFI and electromagnetic interference (EMI) can influence sensitive facilities such as airports, RF high sites, railway line control equipment, cell phone towers, EMI sensitive equipment in the area, etc. If a PV facility or switching station influences existing infrastructure, EMI mitigation will have to be implemented.

According to the DFFE screening report, there are two medium sensitivity areas close to the proposed PV facility site, namely a telecommunication facility and a SKA receptor. There is a possibility that the

proposed PV facilities and switching station will interfere with existing electrical/electronic equipment or electrical/electronic infrastructure.

Only the telecommunication facility was found to be relevant to this assessment, as the nearest SKA receptor is 180 km away from the proposed site (indicated by the maps supplied by the AMA) and not between 14 and 32 km as stated in the DFFE screening tool. ITC Services will conduct the RFI statement study according to maps supplied by the Astronomy Management Authority (AMA).

7.10.2 Site sensitivity

The DFFE screening tool ranks the proposed project site as Medium and Low sensitivity as shown in Figure 7-44.

MAP OF RELATIVE RFI THEME SENSITIVITY

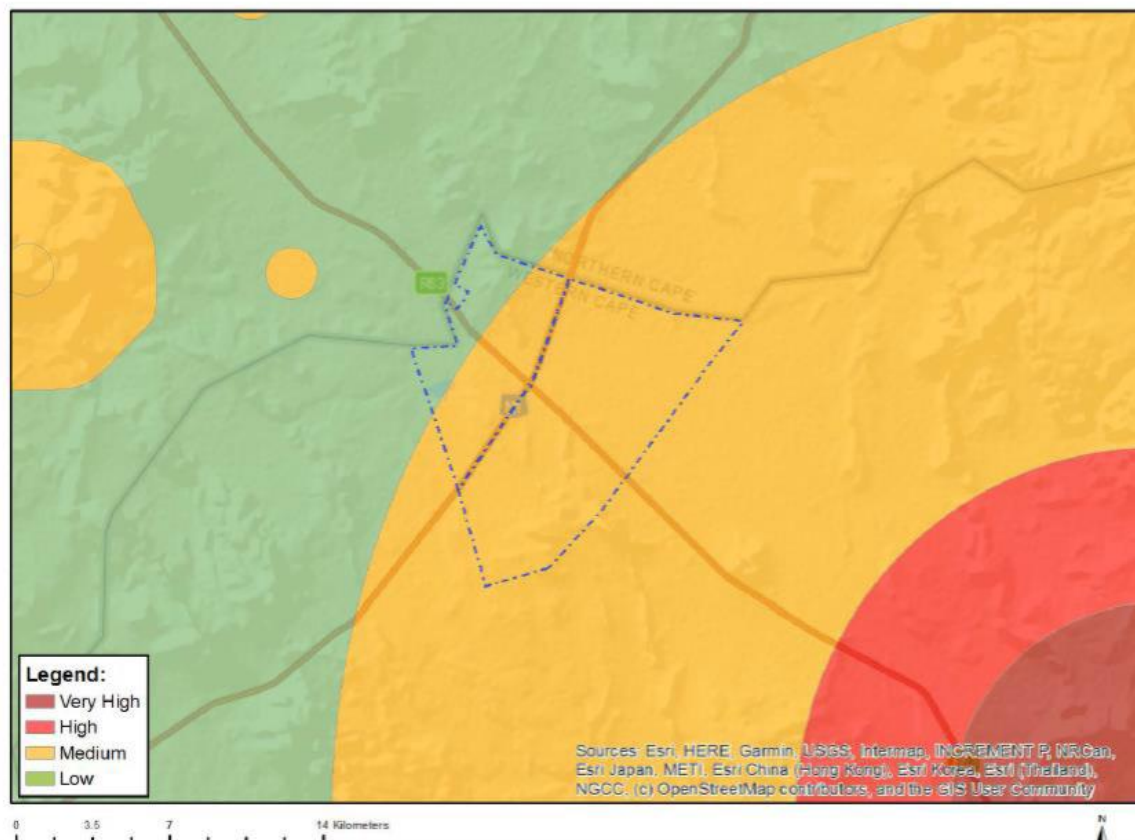


Figure 7-44: DFFE Screening Report RFI results

7.10.2.1 Noise sources

In a high voltage environment, the RFI sources are generally arcing and sparking related. Corona from the lines are generally not associated with high frequency (above 30MHz) interference. Gap-type corona interference can extend to beyond 1GHz. Typical causes of RFI from switching stations and grid connections are listed below.

- ▶ Corona discharge at the surface of the conductors, insulators, and fittings.
- ▶ Sparking at the insulators.
- ▶ Sparking at mounting hardware and contacts.
- ▶ Control equipment in the substation.
- ▶ Micro arcing.

Weather conditions has a 10 to 20 dB impact on the noise source amplitude with corona being worst during wet weather conditions and sparking/ arcing being worst during dry weather conditions.

7.10.2.2 Corona discharge

Corona discharge occurs when the electrical field close to a conductor is higher than the electrical withstand capability of the air, resulting in an electrical break down. The breakdown occurs at a local level, hence no flash over will occur. The discharge energy will be fairly low and the frequency band of concern is also low.

Any equipment, fittings and insulators energised to high voltage may generate corona. Corona is a normal effect and is worst during wet weather conditions.

7.10.2.3 Sparking

Sparking occurs when there is sufficient voltage ($>$ withstand capability of air) to cause electrical breakdown of the air between two metallic objects (avalanche ionisation) and the development of an arc. At least one of the metallic components is electrically floating. This is not necessarily a single event as the components can be charged again after the discharge. The discharge energy is much higher than for corona and the frequency range extends into the GHz domain.

Sparking (gap discharge) is mostly associated with bad contacts and inferior installation practises. Sparking is worst during dry weather conditions.

7.10.2.4 Arcing

Arcing is when ionised air forms a conductive current path between an earthed component and component at line potential. Arcing is associated with a fault condition, of short duration and the arc will normally be interrupted by the protection circuits.

7.10.2.5 Switching events

Switching events such as capacitor bank switching will cause voltage and current transients with frequency components into the GHz band due to steep dV/dt and dI/dt gradients.

7.10.3 Impact assessment and proposed mitigation measures

According to map data supplied by the AMA, there is no SKA receptor between 14km and 32km away from the proposed PV facility location, thus this RFI risk was not evaluated. The exact location of the telecommunications facility within 1km from the proposed facilities was not identified, thus a 1km radius point around each proposed PV facility location was used to determine the received power at that distance.

According to the Radio Mobile data, PV1, PV2, PV3 and the switching station will have no RFI influence on the telecommunications facility located 1 km away, assuming that the sites emit less RFI than the CISPR 11 class A levels. If the exclusion zones, listed in Table 7-21, are adhered to when the PV facilities and switching station are constructed, the proposed facilities will have no RFI influence on existing electrical/electronic equipment.

Table 7-21: Clearance zone distances

EMI sensitive location	Distance Between the Edge of a PV plant and an EMI sensitive location in meter
Existing Radar equipment ex. Weather radar	152.4 m
Navigational and communication equipment	45.72 m
Equipment sensitive to EMI	45.72 m
Airfield/Airport Radar system	76.20 m

Table 7-22 contains possible EMI sensitive receivers with their respective sensitivities that can be used in the area. According to the worst-case cumulative coverage data generated in Radio Mobile, the receivers at the telecommunications facility and the surrounding area will not be affected by the

proposed PV facilities. There might be slight interference to LoRa applications within 1km from the PV facilities, thus avoid using LoRa within this area.

Table 7-22: List of typical sensitivities from EMI sensitive equipment

Receiver	Sensitivity
LoRa	-130 dBm
Wifi (common 802.11g)	-85 dBm
GSM/LTE/GPRS	-102 dBm
UHF	-100 dBm
Bluetooth	-82 dBm

There are some steps that can be considered when designing a new PV facility and switching station to minimise the amount of RFI or EMI that can be emitted:

- ▶ Properly ground the PV modules to reduce common mode impedance.
- ▶ Properly ground the switching modules and grid connection points to reduce common mode impedance.
- ▶ Avoid pigtail connections when installing the grid connections.
- ▶ Shield the DC cabling to ensure a good connection to ground.
- ▶ Only use inverters with CE approval.
- ▶ Ensure that there is proper electrical bonding on the PV modules, switching modules and grid connection cables as well as the cable trays, should they be installed.
- ▶ Ensure all grid related connections are according to specification. (no gaps between connections)
- ▶ Use approved grid cable connectors to avoid unwanted corona and/or sparking.
- ▶ Avoid sharp edges at the end of cable connections.

The purpose of electrical bonding is to provide structural homogeneity with respect to the flow of electrical currents, including high frequency currents for proper operation of filters and fault current paths. Bonding prevents or safely discharges static charges. Sufficient bonding ensures a good ground connection. A good ground connection of equipment will prevent unintentional emissions to occur.

The clearance zone around a PV facility is the separation distance needed, between the edge of the PV facility (source) to a specific EMI sensitive location or infrastructure (victim), for the PV facility to have no RFI on existing electrical infrastructure. The exact inverters and switching station equipment that will be used is currently unknown, thus it is assumed that the inverters and equipment comply to CISPR11 Class A specification.

7.10.4 Conclusions and recommendations

It is stated in the Electronic Communications Act that no product used or manufactured in South Africa may cause unwanted RFI or EMI, intentional or unintentional transmissions, on existing electrical equipment. Thus, to prevent the PV facility's unintentional RFI to cause unwanted interference on existing electrical equipment a clearance zone must be used.

A further detailed assessment will not be required based on the findings from the Radio Mobile data as no RFI risk was identified.

7.11 Defence

The Site Sensitivity Verification and compliance statement for the Defence Theme Sensitivity was undertaken by Patrick Killick, the project EAP, with more than 16 years of experience in Environmental Management. The compliance statement can be found in Annexure D.

7.11.1 Site sensitivity

The map of Relative Defence Theme Sensitivity generated by the DFFE Screening Tool using the “Utilities Infrastructure|Electricity|Distribution and Transmission|Powerline” application category indicated that the site of the proposed iLanga Emoyeni Solar Suite is located in a low sensitivity area in terms of defence and no further studies are therefore recommended. Figure 7-45 illustrates the sensitivity according to the DFFE Screening Tool. The full screening report is included as Annexure E of this BA report.



Figure 7-45: Map of relative defence theme sensitivity, taken from the DFFE Screening Tool. Shows previous alignment – no bearing on statement or sensitivity.

7.11.2 Impact assessment

According to the protocol for the Defence Theme in GN 320, a low sensitivity rating means that no negative impacts on the defence installation are expected. Further assessment and mitigation measures are therefore not required.

A desktop review of the defence locations and airfields confirms the low sensitivity of the area from a defence perspective. The nearest minor airfields are at Victoria West and Richmond and are more than 45km from the centre of the site. The larger airfield, karoo gateway airport situated at Beaufort West, is more than 85km from the site. The proposed gridline infrastructure will cross the N1 highway. The gridline will also interact with the Central Transmission Corridor, which includes the 765kV transmission lines and Main Transmission Substations (MTS), which form the backbone of the country's gridline. The gridline will connect to the Gamma MTS. The function of these important infrastructures will not be impacted. The EAP noted no other features in the proximity of the site that would warrant any further investigation, the sensitivity is therefore confirmed as **low**.

7.11.3 Conclusions and recommendations

Using the DFFE Screening tool and desktop assessment the proposed project was found to occur in a low-sensitivity area as far as defence installations are concerned.

Based on the Defence protocol in GN 320, a Compliance Statement is required. This screening verification report includes the requisite information and therefore doubles as a compliance statement.

The EAP confirms the sensitivity to be low and agrees with the screening tool in that no further assessment is required.

8 ENVIRONMENTAL IMPACT STATEMENT

The potential impacts associated with the proposed PV SEF have been assessed and considered in this report. With mitigation measures in place as set out in Chapter 6 and detailed in the EMPr (Annexure G), post mitigation impacts are anticipated to be negligible to moderate negative significance. The proposed project therefore does not result in unacceptable impacts to the environment.

8.1 Specialist statements

The following specialist statements have been captured in the specialist reports as contained in Annexure D. These statements serve as a summary of their findings and their professional opinion on whether the proposed project should be approved or not. A summary of the impacts assessed by the various specialists is included in their respective summaries in Section 6.

8.1.1 Terrestrial biodiversity statement

Project infrastructure should be designed to avoid sensitive features such as the washes particularly if the Riverine Rabbit monitoring program determines that this species is found to occur on site. Further to the above, impacts on the terrestrial plant, faunal species and associated habitats can be reduced to acceptable levels through the implementation of mitigation measures. The botanical and faunal specialists are therefore of the opinion that the development can proceed, provided the recommendations contained in this report are implemented.

Table 8-1 provides a summary of the impacts for floral and faunal environments.

Table 8-1: Summary table of ecological impacts and their significance pre- and post-mitigation

Impact	Pre-Mitigation	Post Mitigation
Construction		
Loss of Eastern Upper Karoo	Moderate – negative	Moderate – negative
Loss of Upper Karoo Hardeveld	Moderate – negative	Moderate – negative
Loss of wash vegetation type and associated riverine rabbit habitat	Negligible Negative	Negligible Negative
Loss of Plant Species of Conservation Concern	Minor-negative	Negligible - negative
Disruption of Ecosystem Function and Process	Moderate – negative	Minor - negative
Loss of Faunal Habitat	Moderate – negative	Moderate – negative
Disturbance to faunal species	Moderate – negative	Minor - negative
Faunal mortality due to roadkill and persecution	Moderate – negative	Minor - negative
Disturbance to faunal species of conservation concern	Major – negative	Moderate – negative
Operation		
Infestation of Alien Plant Species	Moderate – negative	Negligible Negative
Faunal disturbance and potential mortality due to roadkill	Minor-negative	Minor-negative
Decommissioning Phase		
Loss of Indigenous Vegetation	Moderate – negative	Minor - negative
Faunal disturbance and mortality due to roadkill	Moderate – negative	Minor - negative

8.1.2 Aquatic ecology statement

During the aquatic ecological assessment, several sensitive habitats were observed and are shown in the maps provided in Section 7.3. Noteworthy areas, which should be avoided for infrastructure development, include the main riverine systems.

In summary the study area was dominated by three major types of natural aquatic features and a small number of artificial barriers associated with catchments and rivers, characterised as follows:

- Ephemeral watercourses - alluvial systems with or without riparian vegetation. These range from narrow channels to broad flood plain areas. Some of these also contain wetland areas, but have been avoided by the proposed footprints
- Minor watercourses; and
- Dams and weirs / berms with no wetland or aquatic features.

The type of aquatic systems observed were typical from a plant species as well as from a form/function perspective for this portion of the Karoo (the area bound by Loxton, Beaufort West (above the escarpment), Victoria West, Nelspoort and Frasersburg). Thus the site would not be considered unique in these terms as the systems are represented within a wide area, with no listed species (aquatic) observed, but is rated as important due to it supporting the downstream systems.

A variety of aquatic features, mostly ephemeral in nature were identified within the study area and, where possible required, will be spanned. Generally, the grid line may span over the identified waterbodies but no pylons may be placed within these areas, except where existing impacts occur.

Existing roads through these features must be utilised as far as possible. In terms of new access roads or service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings, but if these are required, then a specific walkdown should be conducted with the specialist to identify the most suited crossing position. Where these crossings do occur, it needs to be monitored for erosion.

Thus, the overall impact on the aquatic environment presently is likely be Negligible (with mitigation). Care must be taken to avoid the No-Go areas and for the most part are excluded from the proposed layout.

A portion of the proposed grid connection areas will be placed within a CBA, however this area was delineated to a finer scale and the affected feature (aquatic zone) will be avoided as the aquatic environment in this section of the lines is approximately 350m wide and could thus be spanned, i.e. no impacts within the associated aquatic zones.

Based on the findings of this study, the specialist finds no reason to withhold to an authorisation of any of the proposed activities, assuming that key mitigations measures are implemented. A key recommendation is also that during the construction mobilisation process, that the temporary construction camps are located outside of the water courses (including the 50m buffer). None are presently located within any aquatic systems, but additional laydown areas may be required during the construction process, hence this recommendation

Table 8-2: Summary table of aquatic impacts and their significance pre- and post-mitigation

Project phase	Impact	Without mitigation	With mitigation
		Significance	Significance
Construction / Decommissioning	Loss of aquatic species of special concern	Minor - negative	Negligible - negative
Construction / Decommissioning	Loss of riparian systems. wetlands and water courses through the placement of new crossings or towers	Minor - negative	Negligible - negative
Construction / Decommissioning	Potential impacts on localised water quality particularly near the tower construction areas or substations	Minor - negative	Negligible - negative
Operation	Impact on riparian and wetland systems through possible increase in surface water runoff on form and	Minor - negative	Negligible - negative

	function during the operational phase		
Construction & Operational	Impact 6: No-go Option	Negligible - negative	N/A
Construction & Operational	Impact 7: Cumulative impacts for the overall project due to the high number of projects surrounding this application	Minor - negative	Negligible - negative

8.1.3 Avifauna statement

The proposed Emoyeni Grid will have several potential impacts on priority avifauna. These impacts are the following:

- Displacement due to disturbance linked to construction activities in the construction phase.
- Displacement due to habitat transformation in the construction phase.
- Mortality due to collisions with the overhead powerline in the operational phase.
- Displacement due to disturbance linked to dismantling activities in the decommissioning phase.

Table 8-3: Summary table of avifaunal impacts and their significance pre- and post-mitigation

Project phase	Impact	Without mitigation	With mitigation
		Significance	Significance
Construction	Displacement of priority species due to disturbance	Moderate - negative	Minor - negative
Construction	Displacement due to habitat transformation	Minor - negative	Minor - negative
Operation	Mortality of powerline sensitive species due to collisions with the 132kV OHL	Moderate - negative	Moderate - negative
Decommissioning	Displacement due to disturbance associated with the dismantling of the grid connection	Minor - negative	Minor - negative

The proposed iLanga Emoyeni Gridline will have a moderate negative impact on avifauna which, in most instances, could be reduced to a low negative impact through appropriate mitigation. The development is therefore supported, provided the mitigation measures listed in this report are strictly implemented.

8.1.4 Agriculture statement

The proposed development will have very low agricultural impact and will therefore be acceptable in terms of its impact on the agricultural production capability of the site. The only impact of this development is the loss of up to 5.33 hectares of agricultural land on the site of the substations. This is assessed as being of very low significance because the amount of land loss is small and the production potential of the land is very limited.

The power line itself has insignificant agricultural impact because all agricultural activities that are viable in this environment, can continue completely unhindered underneath the power line and there will therefore be no loss of agricultural production potential underneath it.

The only potential source of impact from the power line is minimal disturbance to the land (erosion and topsoil loss) during construction (and decommissioning). This impact can be completely mitigated with standard, generic mitigation measures that are included in the EMPr.

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

The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions, other than recommended mitigation.

8.1.5 Heritage and Archaeology statement

The layout for this project has been designed to avoid environmental sensitivities and only one very low significance (Grade NCW) heritage resource falls within the footprint. This site is a dolerite boulder with some scratches on it at waypoint 2020 and whose archaeological nature may be considered doubtful. The layout is thus acceptable from an archaeological point of view but it is noted that potentially sensitive parts of the servitude (i.e. ridges and riparian areas) have not been examined in the field as the routings were not known at the time of the survey. Impacts to the landscape are unavoidable but the presence of an existing substation and high voltage powerlines – and the three iLanga Emoyeni PV facilities without which the powerlines would not be built – means that the landscape use is consistent with existing uses and thus can be deemed appropriate. There are therefore no significant heritage concerns for this project, the rerouting suggested in **Error! Reference source not found.** has been carried though into the final alignment to reduce visual clutter and maximise opportunities for sharing of infrastructure. Furthermore, there are no known areas within the proposed servitude that require avoidance, although it is possible that some could be found during the recommended pre-construction survey. The heritage indicators and project responses have been listed in Table 7-18.

Table 8-4: Heritage indicators and project responses

Indicator	Project Response
Uncontrolled damage to fossils should be minimised as far as possible.	No fossils were found within the project footprint so this indicator has been met.
Buffers of at least 30 m should be maintained around archaeological sites as far as possible.	This has largely been done for known sites but one Grade NCW site (waypoint 2020) lies within the footprint. It does not merit mitigation. A pre-construction survey is recommended to check for any further sites.
Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.	This has largely been done but one Grade NCW site (waypoint 2020) lies within the servitude. This impact is acceptable considering the socio-economic benefits. A pre-construction survey is recommended to check for any further sites.
Direct impacts to graves must be avoided completely with a 30 m buffer.	This has been done, but a pre-construction survey is recommended to check for any further graves.
The Schietkuil farm complex should be avoided by at least 200 m.	This has been done.

Due to the generally low significance of heritage impacts, it is the opinion of the heritage consultant that the proposed iLanga Emoyeni gridline should be authorised in full.

8.1.6 Palaeontological statement

The palaeontological compliance statement and site sensitivity verification report concludes that the combined iLanga Emoyeni Solar Suite and EGI project area, including the footprints of all associated infrastructure is, in practice, of LOW to VERY LOW Palaeosensitivity, although the potential for unrecorded fossil sites of high scientific value here cannot be entirely discounted. The provisional

Medium to Very High Palaeosensitivity mapped by the DFFE Screening Tool is accordingly contested in the report.

8.1.7 Visual Landscape statement

A Level 3 Landscape and Visual Impact Assessment was undertaken for the proposed Gridline development. The finding of the assessment is that the impacts to Visual and Landscape Resources would be Medium with mitigation. This is due to the existing precedent for the 132kV powerline routing, as well as the REDZ and Powerline Corridor planning alignment. Mitigation would require the re-routing of the proposed powerlines to align with the existing 132kV powerline from the crossing of the N1 Highway to the west, the re-routing off the ridgeline highpoint in the east, as well as maintaining a 100m (or nearest possible) buffer from the N1 Highway for monopole placement (this recommendation has been incorporated into the final alignment). Without these mitigations, the proposed routing would result in High Visual Significance as the double crossing of the existing 132kV powerline in close proximity to the N1 Highway would result in a Long-term visual and landscape impact due to landscape cluttering.

This is not recommended and, as such, the finding of this assessment is that the proposed routing should only be authorised with the implementation of the recommended mitigation measures.

Table 8-5: Table 8 3: Summary table of visual impacts and their significance pre- and post-mitigation

Project phase	Impact	Without mitigation	With mitigation
		Significance	Significance
Construction	Short-term landscape change from the construction of the double powerline to the current rural agricultural sense of place	Minor - negative	Minor - negative
Operation	Long-term landscape change from the construction of the double powerline to the current rural agricultural sense of place	Moderate - negative	Minor - negative

During the VIA Scoping Phase, a significant risk to the landscape from the location of monopoles on prominent ridgelines and crossing of existing power lines in close proximity to the N1 Highway was identified. Mitigations were recommended and implemented. The High Visual Significance impacts were subsequently amended, given the suitable alignment to the existing 132kV powerline. The reduced impacts also take into account the positive planning for the PV project.

With some residual impacts remaining in the visually sensitive N1 Highway corridor, development of the power lines is likely to result in some loss of local visual resources relating to this scenic corridor. As this is Moderated in intensity, the finding of this report is that the proposed landscape should be authorised, with the minor mitigations proposed.

All design recommendations made in the pre-application phase have been included in the current revised layout.

8.1.8 Socio-economic statement

Based on the information presented in this report, the following can be recommended from the socio-economic perspective. The net positive impacts associated with the construction and operation of the proposed Ilanga Emoyeni Gridline is expected to outweigh the net negative effects. The proposed Ilanga Emoyeni Gridline is envisaged to have a positive stimulus on the local economy and employment

creation, leading to the economy's diversification and a small reduction in the unemployment rate. In terms of the site area assessed, there are no fatal flaws from a socio-economic perspective and thus the location is deemed acceptable and should be authorised. In addition, even though the 'no-go' alternative will result in the avoidance of negative impacts from a socio-economic perspective, this would also result in the positive effects / impacts not being realised. Since positive effects and impacts would outweigh the negative effects, the construction and operation of the proposed development is preferred over the 'no-go' alternative.

The proposed Ilanga Emoyeni Gridline should therefore be considered for development, subject to the implementation of the recommended mitigation and enhancement measures.

Table 8-6: Summary table of socio-economical impacts and their significance pre- and post-mitigation

Project phase	Impact	Without mitigation	With mitigation
		Significance	Significance
Construction	Temporary Increase in Production and Gross Domestic Product	Minor - positive	Minor - positive
Operation	Sustainable Increase in Production and Gross Domestic Product	Moderate - positive	Moderate - positive
Construction	Temporary Increase in Household Income	Minor - positive	Minor - positive
Operation	Sustainable Increase in Household Income	Moderate - positive	Moderate - positive
Construction	Temporary increase in sense of place	Moderate - positive	Minor - positive
Operation	Sustainable Impact on sense of place	Moderate - positive	Minor - positive
Construction	Impact on the sustainable revenue where the development is located	Moderate - negative	Moderate - negative

8.1.9 Electromagnetic interference statement

It is stated in the Electronic Communications Act that no product used or manufactured in South Africa may cause unwanted RFI or EMI, intentional or unintentional transmissions, on existing electrical equipment. Thus, to prevent the PV facility's unintentional RFI to cause unwanted interference on existing electrical equipment a clearance zone must be used.

A further detailed assessment will not be required based on the findings from the Radio Mobile data as no RFI risk was identified.

8.1.10 Defence statement

Using the DFFE Screening tool and desktop assessment the proposed project was found to occur in a low-sensitivity area as far as defence installations are concerned.

Based on the Defence protocol in GN 320, a Compliance Statement is required. This screening verification report includes the requisite information and therefore doubles as a compliance statement.

The EAP confirms the sensitivity to be low and agrees with the screening tool in that no further assessment is required.

8.2 Site Sensitivity Map

The various specialist reports and sensitivity spatial data provided by the specialists were used to generate sensitivity maps for the site, these are presented below.

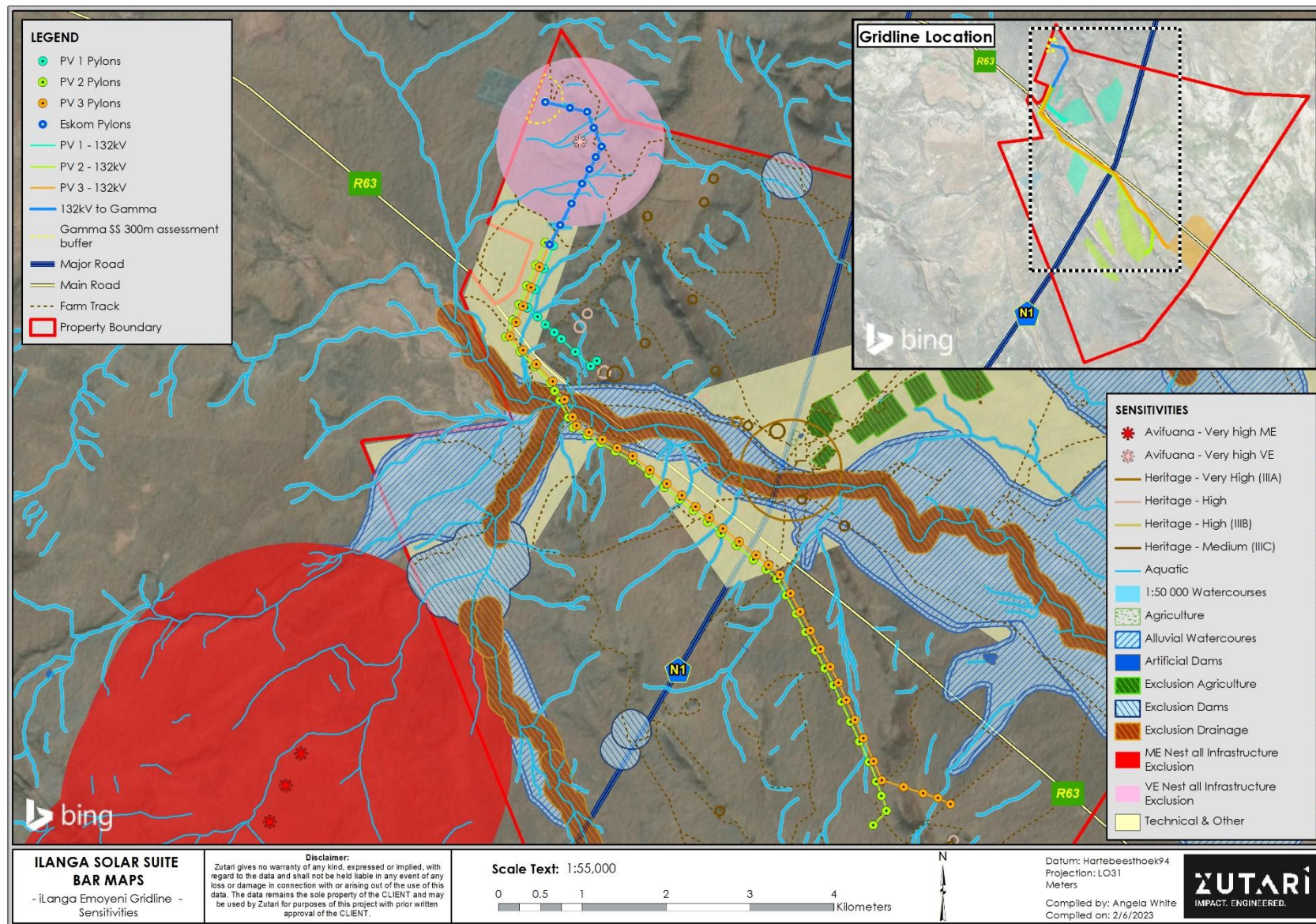


Figure 8-1: Environmental sensitivity map

8.3 Proposed Specific Conditions of Authorisation

- ▶ A walkthrough of the final layout must be undertaken by a botanist and if populations of SCC will be impacted, infrastructure should be moved to avoid these areas. Where this is not feasible, a search and rescue plan will be required.
- ▶ If any SCC are to be impacted, these must be relocated to nearest appropriate habitat.
- ▶ Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint.
- ▶ The temporary construction camps must be located outside of the water courses (including the 50m buffer) during the construction mobilisation process. None are presently located within any aquatic systems, but additional laydown areas may be required during the construction process, hence this recommendation.
- ▶ Rehabilitation must be planned as a staged approach to ensure an area is immediately rehabilitated once construction is completed.
- ▶ The Chance Finds Protocol which is appended to the EMPr must be implemented. Any information, artefacts or burials must be rescued before extensive damage occurs by implementing this protocol.
- ▶ The Schietkuil farm complex should be avoided by at least 200m.

8.4 EAP Statement

It is the EAPs opinion that the recommended mitigation measures proposed by the specialists and contained in the EMPr, together with the Applicant's consideration of the sensitivities and no-go areas in the current design, will sufficiently manage the negative impacts to an acceptable level.

In addition, the Applicant has shown willingness to incorporate design recommendations by specialists in to the layout, further avoiding potentially negative impacts.

Provided the mitigation measures included in the EMPr are implemented, the EAP recommends that the proposed envelope footprint of the iLanga Emoyei Gridline, as part of the larger iLanga Emoyeni Solar Suite project, be authorised. The final layout within the gridline corridor must take the identified sensitivities into account during the detailed design phase.

9 CONCLUSIONS AND WAY FORWARD

Seriti is applying for EA for **three** SEFs and an OHPL or “gridline” to connect with the National Grid. These projects are situated within a REDZ and the strategic transmission corridor or EGI corridor and must therefore undergo an expedited BA process provided for in GN145/2021.

Since a thorough screening exercise of the Schietkuil Farm (Remainder of Farm 3) was conducted prior to the commencement of the BA process, the Applicant and EAP are confident that the proposed alternative is the preferred site for the iLanga Emoyeni Solar Suite, of which this gridline project is part (Section 5). Further consideration of alternatives for the BA process only included the no-go alternative.

The project description (Section 5) informed the legal and planning context of the project (Section 2) as well as the methodology required for this BA process (Section 3). This in turn informed the requisite PPP (Section 4) which will ensure that the relevant and required stakeholders are invited to participate in the BA process.

Finally, the wide range of specialist assessments determined the baseline environment and the potential impacts that the project is expected to have on the affected environment (Section 7). These assessment reports also include recommended mitigation measures which have been included in the EMPr (Annexure G).

Based on the above information, the specialists and the EAP were able to conclude statements on whether to recommend the project for authorisation or not (Section 8). All specialists and the EAP have recommended that the project be granted EA, with the proposed inclusion of specific conditions (Section 8.3).

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11. ANNEXURES

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In diversity there is beauty and there is strength.

MAYA ANGELOU

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