FINAL BASIC ASSESSMENT REPORT

Basic Assessment for the proposed development of the 290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV Facility) and Battery Energy Storage System (BESS) and the proposed development of a 132 kV Power Line and associated EGI (i.e., Volta EGI) to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State

Prepared by:
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Prepared for:
VOLTA (Pty) Ltd.

June 2023

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BASIC ASSESSMENT PROCESS

for the

Proposed development of the 290 MW VOLTA Solar Photovoltaic (PV) Facility (i.e., VOLTA PV Facility) and Battery Energy Storage System (BESS) and the proposed development of a 132 kV Power Line and associated EGI (i.e., VOLTA EGI) to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State

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June 2023

Prepared for:
VOLTA PV (Pty) Ltd

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Mapping:
Luanita Snyman-van der Walt (CSIR)

Formatting and Desktop Publishing:
Magdel van der Merwe (DTP Solutions)

REPORT DETAILS

Title:	Basic Assessment for the proposed development of the 290 MW VOLTA Solar Photovoltaic (PV) Facility (i.e., VOLTA PV Facility) and Battery Energy Storage System (BESS) and the proposed development of a 132 kV Power Line and associated EGI (i.e., VOLTA EGI) to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State: FINAL BASIC ASSESSMENT (BA) REPORT
Purpose of this report:	The purpose of this Final BA Report is to: ▪ Present the details of and the need for the proposed project; ▪ Describe the affected environment at a sufficient level of detail to facilitate informed decision-making; ▪ Provide an overview of the BA Process followed, including public consultation; ▪ Assess the potential positive and negative impacts of the proposed project on the environment; ▪ Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; and ▪ Provide an Environmental Management Programme (EMPr) for the proposed project. The Draft BA Report was made available to all Interested and Affected Parties (I&APs), Organs of State and stakeholders for a 30-day review period extending from 31 March 2023 to 3 May 2023. All comments submitted during the 30-day review are incorporated in a detailed Comments and Responses Report (Appendix D Part 2 of this Final BA Report). This Final BA Report has been submitted to the National Department of Forestry, Fisheries and the Environment (DFFE) for decision-making.
Prepared for:	VOLTA PV (Pty) Ltd
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KEY CHANGES MADE FROM THE DRAFT BA REPORT THAT WAS ISSUED FOR I&AP, STAKEHOLDER AND ORGAN OF STATE REVIEW FROM 31 MARCH TO 3 MAY 2023

Section of Report	Key Change
BA Report and Appendices	• The term "BA Report" has been updated to "Final BA Report", where applicable. • Updated all maps in the BA report to include the updated location of BESS (B1) location (in the already assessed area) and in response to comments from DFFE: Biodiversity Conservation to reduce the impact on CBA1. • Updated all maps in the BA report to include clarity on the layout of the proposed infrastructure.
BA Report – Section A	• Updated Section A (4) for maps to include the coordinates in the format as stipulated by DFFE. • Updated Section A (5) to ensure consistency in the naming convention in the project description text and maps and to ensure more clarity on the components and location of the project. • Updated Project description maps to include updated BESS B1 location. • Updated Section A (11) with a description of listed activities included in the Draft BA Report that are no longer applicable and the associated reasoning. An amended application form has been submitted to the DFFE. • Updated Section A (13) to include more information on the process of selecting alternatives
BA Report – Section C	• Updated with additional information regarding the status and progress made on the BA Report, the submission of the Application for Environmental Authorisation to the DFFE, as well as DFFE's acknowledgment of receipt of the BA Report. • Updated with details of the Public Participation Process undertaken thus far. • Updated with new comments received during the review of the Draft BA Report and provided a summary of responses to these comments raised.
BA Report – Section D	• Updated Section D.2.5 with a clarification letter from the terrestrial specialist in response to comments raised by DFFE.
BA Report – Section E	• Updated the maps and included sensitivity maps overlaid with project infrastructure in response to comments from DFFE.
Appendix A	• Updated to include the updated combined sensitivity map. • Updated all maps to include the updated BESS (B1) location.
Appendix C	• All specialists have written a cover letter to indicate that the updated BESS (B1) location does not impact any of the sensitivity ratings contained in their original reports. This cover letter is included as Appendix N. • The Terrestrial specialist has added a clarification letter in response to comments from DFFE. • There have been no changes to the contents of the specialist assessments. The specialists have added a summary of comments received during the 30-day comment period, where relevant.
Appendix D	• Updated with proof of placement of the newspaper advertisements for the release of the Draft BA Reports for comment (Appendix D). • Added Appendix D Copies and Proof of Correspondence Sent to Stakeholders for the Release of the Draft BA Report for Comment); Appendix D (Comments received from Stakeholders during the 30-day review of the Draft BA Report); and Appendix D.15 (Comments and Responses Trail). • Updated the database of I&APs, Stakeholders and Organs of State to reflect stages of consultation, commenting, as well as additions to the database (Appendix D).
Appendix G, H, J and K	• Updated with additional mitigation measures based on the comments/recommendations received from I&APs, Stakeholders and Organs of State during the review of the BA Report. This includes comments from DWS and SAHRA. • Updated all maps to reflect latest project layout.
Appendix N	• Added this Appendix to include the letter from specialists stating that no change in their assessment as a result of the new BESS B1 location in the already assessed area

Note from the CSIR: If sections are not mentioned in the above table, this means that either there have been no changes or no major changes to these sections.

EXECUTIVE SUMMARY

INTRODUCTION

The Project Developer, VOLTA PV (PTY) Ltd (hereinafter referred to as VOLTA PV), is proposing to design, construct and operate a Solar Photovoltaic (PV) power generation facility and associated infrastructure, approximately 4 km west of the town of Dealesville, in the Free State Province. The proposed projects are located within the Tokologo Local Municipality and Lejweleputswa District Municipality. The PV facility will have a capacity of up to 290 MW. The associated infrastructure includes various structures, buildings and electrical grid infrastructure (EGI) such as, but not limited to, two 132 kV power lines, two on-site substations132kV/33kV collector, and one Battery Energy Storage Systems (BESS) associated with each on-site substation, therefore two independent BESS sites. The proposed Solar PV facility will make use of PV solar technology to generate electricity from energy derived from the sun; and will connect to the national grid at the planned Artemis Main Transmission Substation (MTS) also referred to as Dealesville MTS. The locality of the proposed project is depicted in Figure A below. A combined BA Report for the VOLTA PV and BESS and EGI projects is submitted to DFFE for decision making. This BA Report addresses the Solar PV facility, BESS, Substations and the associated 132 kV powerlines, as discussed below.

The proposed projects are located entirely within the Renewable Energy Development Zone 5 (i.e., Kimberley REDZ), one of the eleven REDZs formally gazetted in South Africa for the purpose of developing solar PV and wind energy generation facilities (Government Gazette 41445, Government Notice (GN) 114; 16 February 2018 and (GN) 144; 26 February 2021). Refer to Figure A.1 for the locality of the proposed projects in relation to the REDZs. In line with the gazetted process for projects located within a REDZ, the proposed project is subject to a Basic Assessment (BA) process instead of a full Scoping and Environmental Impact Assessment (EIA) process and a reduced decision making period of 57 days, in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA EIA Regulations (as amended) promulgated in Government Gazette 40772; in GN R326, R327, R325 and R324 on 7 April 2017. A BA Process in terms of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) has therefore been undertaken for the proposed projects. The Competent Authority for the proposed projects is the National Department of Forestry, Fisheries and the Environment (DFFE).

Based on email discussions with the DFFE in February 2023, the option to apply for combining the Applications for EA in terms of Regulation 11 (4) of the 2014 NEMA EIA Regulations (as amended), and the issuing of multiple EAs in terms of Regulation 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended) was discussed. It was confirmed that a letter must be submitted to the DFFE to motivate for the combination and issuing of multiple EAs. The combination request was submitted to the DFFE, and approval was granted.

Therefore, one BA Report has been compiled and this report includes the environmental assessment for the PV facility & Battery Energy Storage System (BESS) and the Powerline & associated Electricity Grid Infrastructure (EGI). As required in the DFFE approval letter, the BA Report is submitted with distinct and clear sections dedicated to the PV facility and EGI. Table A below indicates the two proposed projects and the two separate EAs that are requested (should they be granted).

Table A: BA Reporting Structure and Components

No.	Project	Applicant	No. of Applications for EA	No. of BA Reports	No. of Specialist Reports	No. of EAs
1	PROJECT 1: Development of the proposed development of the 290 MW VOLTA Solar Photovoltaic (PV) Facility (i.e., VOLTA PV Facility) and Battery Energy Storage System (BESS), and associated infrastructure near Dealesville, Free State.	VOLTA PV (Pty) LTD	1 Combined Application for EA	1 Combined BA Report	1 Specialist Report per theme to address all the Solar PV facility and BESS.	**1 EA**
2	PROJECT 2: Development of a 132 kV Power line and associated EGI (i.e., VOLTA EGI) from the VOLTA PV Facility to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State				1 Specialist Report per theme to address the Powerlines.	**1 EA**
Total			**1 Application for EA**	**1 BA**		**2 EAs**

An integrated Public Participation Process was undertaken for the proposed projects.

The Draft BA Report was released to all Interested and Affected Parties (I&APs), Organs of State and stakeholders for a 30-day review period, extending from 31 March 2023 to 3 May 2023.

PROJECT LOCATION

The locality of the proposed VOLTA PV, BESS and EGI, including the associated infrastructure, is shown below in Figure A. The co-ordinates of the proposed project sites are detailed in Section A of this BA Report.

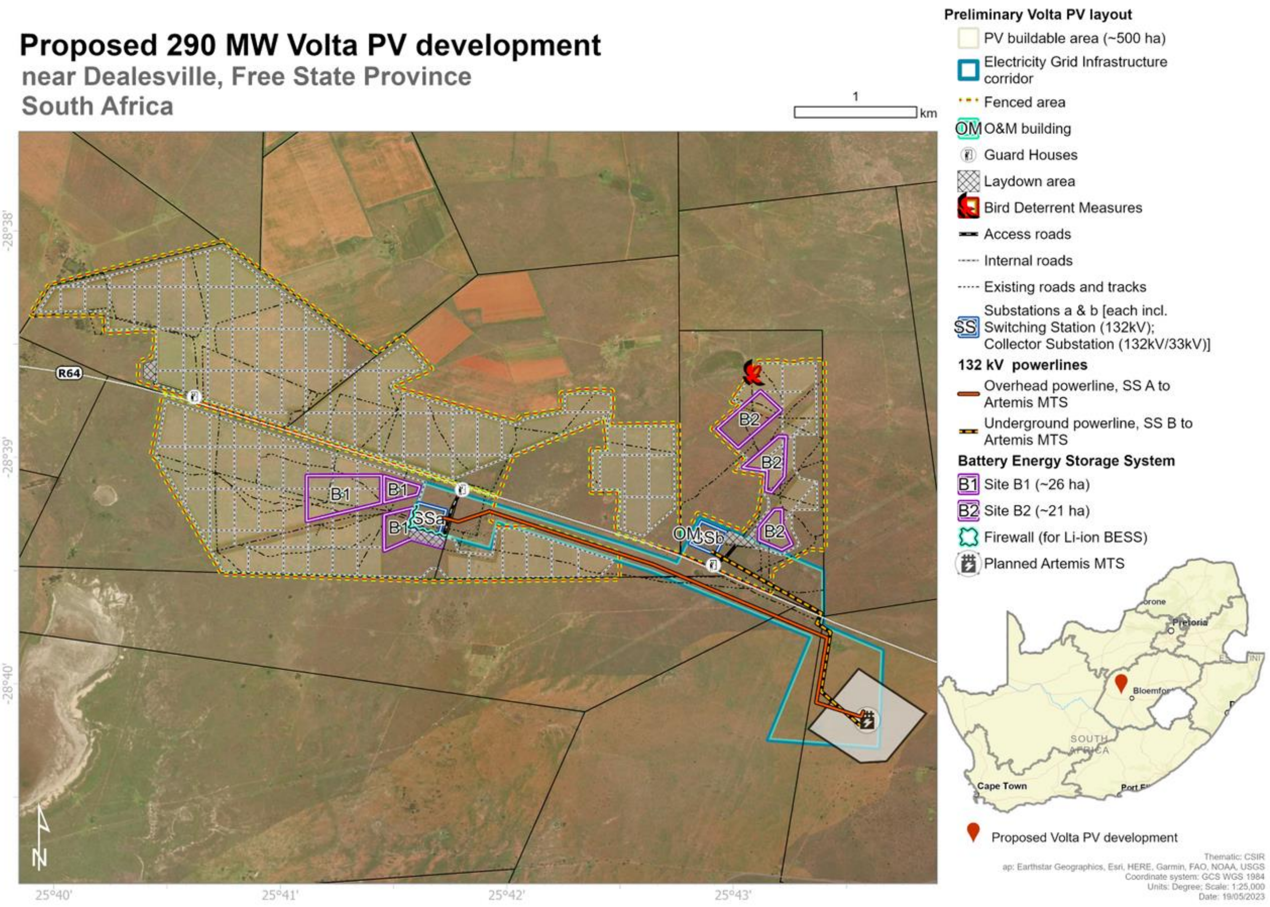


Figure A: Locality of the Proposed PV Project and EGI Corridor

PROJECT BASIC ASSESSMENT TEAM

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), the Project Developer has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the required BA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed development. The project team, including the relevant specialists, is indicated in Table B below.

Table B. Project Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Paul Lochner (*Registered EAP (2019/745)*)	CSIR	EAP and Project Leader
Abulele Adams (*Pr.Sci.Nat.*)	CSIR	Project Manager
Helen Antonopoulos	CSIR	Project Officer
Luanita Snyman-van der Walt	CSIR	Project Mapping

Name	Organisation	Role/ Specialist Study
(*Pr.Sci.Nat.*)		
Sonto Mkize	CSIR	Project Officer
Specialists		
Johann Lanz (*Pr.Sci.Nat.*)	Private	Agricultural Compliance Statement
Lourens du Plessis (*GPr GISc*)	LOGIS	Visual Impact Assessment
Bryony Walmsley (*EAPASA*)		
Jaco van der Walt	Beyond Heritage	Heritage Impact Assessment (Archaeology, Cultural Landscape)
Prof Marion Bamford	Private	Palaeontology
Corné Niemandt (*Pr.Sci.Nat.*)	Enviro-Insight	Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species
Russel Tate (*Pr.Sci.Nat.*)	HCV Africa (Enviro-Insight)	Aquatic Biodiversity and Species Impact Assessment
Luke Verburgt (*Pr.Sci.Nat.*)	Enviro-Insight	Avifauna Impact Assessment
Tony Barbour	Private	Socio-Economic Impact Assessment
Debbie Mitchell	Ishecon	BESS Risk Assessment (PV only)
Merchandt Le Maitre (*Pr Tech Eng*)	Skerp Consulting Engineers	Traffic Impact Assessment
Hardy Luttig, Dale Barrow and Shane Teek	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment
Hardy Luttig and Shane Teek		Desktop Geotechnical Assessment
Sonto Mkize, Abulele Adams (*Pr.Sci.Nat.*), Helen Antonopoulos	CSIR	Civil Aviation Site Sensitivity Verification
Sonto Mkize, Abulele Adams (Pr.Sci.Nat.), Helen Antonopoulos	CSIR	Defence Site Sensitivity Verification

PROJECT DESCRIPTION

It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EAs, should such authorisations be granted for the proposed projects) but that the information provided below is seen as the worst-case scenario for the project. The information presented in Table C applies to VOLTA PV and Table D applies to the VOLTA EGI.

A.1.1 VOLTA PV

The proposed solar PV facility and BESS will consist of the key components listed below in Table C and will be developed with a possible maximum installed capacity of 290 MW of electricity from PV solar energy. The developer has identified the need for two independent BESS storage systems due to the amount of solar PV (at least 1,5GW) connecting to Artemis MTS from multiple developers.

The footprint area of the proposed BESS sites are 48ha in extent. The final footprint of the BESS is however likely to be significantly less, but a larger assessed area allows for micro-siting of the BESS components to avoid possible site sensitivities and implement larger buffers if necessary. Thirty hectares of the BESS sites are within PV footprint areas and 18 ha is allocated as BESS only.

Table C. Description of the Project Components for VOLTA PV and BESS

Project Description for VOLTA PV 290 MW Solar PV and BESS		
Component	**Dimensions / Specifications**	
Solar PV	Height of PV panels:	Max 3,5m
	Capacity of the PV Facility:	290 MW
	Area of PV Array (i.e. proposed area occupied by PV Modules):	500 hectares
	Total developable area (i.e. the area that includes all associated infrastructure within the **fenced** off area of the PV facility):	720 hectares
	Number of inverter-transformer stations:	1050 inverters 30 inverters (per Tx station) x 35 Tx stations 800V/33000V
	Area occupied by inverter-transformer stations and height:	The inverters are distributed evenly and mounted in the array field on a small plinth 2x2m, the 35 Tx stations are distributed evenly throughout the solar arrays each having underground cables (800V) from 30 inverters trenched to them. The Tx stations will have a 33 kV underground cable that carries the power to two 33/132kV collector stations as shown on the plan as Substations a & b (SSa & SSb).
Construction Compound	Construction camp area (ha):	2 – 3 Ha
	Temporary laydown area (ha):	2 to 3 Ha
Main access roads	Width of access roads (m):	5m
	Length of access roads (km):	Less than 500m
Internal access roads to be constructed between different development portions	Width of access roads (m):	4m
	Length of access roads (km):	Approx. 20km of internal roads – in order for security patrols and to access all the equipment (module cleaning and equipment maintenance)
Upgrading of existing access road/s	Yes / No:	Yes – no tar, only aggregate
	Current width (m):	4m turn into farm
	Upgraded width (m):	5m
Warehouse/Workshop	Maximum height (m):	3,6m
	Footprint (m^2):	300m2
Site offices	Number of buildings:	4
	Maximum height (m):	3,6
	Footprint (m^2):	500m2
Operational and	Maximum height (m):	2

Project Description for VOLTA PV 290 MW Solar PV and BESS		
Component	**Dimensions / Specifications**	
Maintenance Control Centre Building	Footprint (m²):	300m2
Guard houses	Maximum height (m):	3,6
	Footprint (m²):	100m2
Ablution facilities	Maximum height (m):	3,6
	Footprint (m²):	50m2
Battery storage	Battery technology type (preferred):	Lithium-Ion, Sodium-Ion, Solid State
	Battery technology type (alternative):	Redox Flow, Liquid Metal (https://ambri.com/) and other technology types will be considered
	Approx. footprint (ha):	BESS Site B1::Mooihoek BESS N Mooihoek BESS S & Cornelia BESS = TOTAL 26.31ha BESS Site B2:Oxford BESS N, Oxford BESS C & Oxford BESS N = TOTAL 20.95ha – see attached BESS kmz/diagram
	Maximum height (m):	Containers approx.. 6x3 x 3 (3m max height)
	Capacity:	BESS Site B1; approx. .550MVA / 2200 Mwh (Store 100% of VOLTA PV average daily yield energy for 4 hours) BESS Site B2: approx. 450MVA / 1800Mwh
	For the storage and handling of a dangerous goods (e.g., electrolytes), where such storage occurs in containers on site, have a combined capacity of 80 m^3 or more but not exceeding 500 m^3 at any one time?	We have engaged a specialist to advise and ensure we can meet the Health and Safety Compliance and mitigate any hazardous substance risk Debra Mitchell from iSHEcon

The proposed VOLTA EGI will consist of the key components listed below in Table D. The proposed project comprises a 132 kV overhead and underground power line from the proposed VOLTA PV collector substations to Artemis MTS near Dealesville in the Free State Province. The line is assessed within a 135 m wide corridor (note this is the narrowest width). There are two project substations, SSa, the westerly one and SSb, the easterly one, each with a footprint of approximately 4 hectares. An overhead power line is planned from substation SSa to Artemis MTS and an underground power line is planned from substation SSb to Artemis MTS.

Table D. Description of the Project Components for VOLTA EGI

Project Description for VOLTA EGI and associated infrastructure		
Component	**Dimensions / Specifications**	
On-site substation hub (including collector and/or switching yard)	Number of substation alternatives:	No alternatives as the Artemis MTS position has been set by ESKOM as well as collector substation SSa as they were set for REIPP Rounds 5 and 6 projects.
	Footprint (ha):	For each substation SSa and SSb a 0,7 ha platform for substation, surrounded by 4ha, fence. The remainder of 4ha is open ground for overhead lines to turn and connect into the substation

Project Description for VOLTA EGI and associated infrastructure		
Component	**Dimensions / Specifications**	
	Capacity:	Each approx. 500MVA on substations SSa and SSb
	Height (m):	Max 30 m (lightening conductors) 132kV OHL pylons need 16m clearance from ground (including earth and structure 20m maximum height) All other plant including transformers, CTs, VTs Breakers, SCADA and control room, fencing etc will be below 10m
Internal transmission and/or distribution lines	Under or aboveground:	Underground
	Capacity (kV):	800V from inverters to containerised mini-subs. 33kV from mini-subs to substations SSa and SSb
	If above: height (m) If below: maximum depth (m)	Max depth 1M
	If above - width of service road below powerline(s) (m):	As per ESKOM spec- see attached ESKOM restrictions document
	Length (m):	Estimate
Overhead transmission powerlines for connection of PV facility to existing national grid	Capacity (kV):	132 kV
	Pylon type:	Monopole Twin circuit – various designs available
	Tower type:	Monopole
	Height (m):	Max 20m
	Foundation:	Concrete with anchors
	Width of registered servitude (m):	See attached ESKOM restrictions document 18 meters
	Width of service road below powerline (m):	5m
	Width of powerline corridor for specialist assessment (m):	30m
	Length of powerline (km):	Less than 4km from VOLTA PV collector substation SSa to Artemis MTS of 132kV overhead line
	Any additional infrastructure – please describe?	
Underground transmission powerlines for connection of PV facility to existing national grid	Capacity (kV)	132 kV
	Trench width (m)	3.6m
	Trench Depth (m)	1.2m
	Width of registered servitude (m):	15m
	Width of service road next to powerline (m):	5m
	Width of powerline corridor for specialist assessment (m):	30m
	Length of powerline (km):	Less than 2.1km from VOLTA PV collector substation SSb to Artemis MTS of 132kV OHL
	Any additional infrastructure – please describe?	Danger tape will be placed 30cm above the cable and 70cm below ground (at least one tape for each circuit) At joins a widening of the trench will be needed (approx. double the width)

NEED FOR THE BA

As noted above, in terms of the 2014 NEMA EIA Regulations (as amended) published in GN R326, R327, R325 and R324, as well as GN 114 for procedures within a REDZs, a full BA Process is required for the proposed projects. The need for the BA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure".*

Section A of this Final BA Report contains the detailed list of activities contained in GN R327, R325 and R324 which are triggered by the various project components and thus form part of this BA Process.

The purpose of the BA is to identify, assess and report on any potential impacts the proposed project, if implemented, may have on the receiving environment. The BA therefore needs to show the Competent Authority, the DFFE; and the project proponent, VOLTA PV (PTY) Ltd, what the consequences of their choices will be in terms of impacts on the biophysical and socio-economic environment and how such impacts can be, as far as possible, enhanced or mitigated and managed as the case may be.

IMPACT ASSESSMENT

Full specialist studies are provided in Appendix C of this BA Report. Section B of this report provides a summary of the affected environment associated with these studies; and Section D provides a summary of the impact assessments conducted by the specialists.

A summary of the specialist studies is outlined below.

Agriculture

The Agriculture Compliance Statement was undertaken by Johann Lanz to inform the outcome of this BA from an agricultural and soils perspective. The complete Agriculture Compliance Statements are included in Appendix C.1 and C.2 of the BA report.

Two main potential negative agricultural impacts have been identified. These impacts are described below:

- **Occupation of land** - Agricultural land directly occupied by the development infrastructure will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime.
- **Soil erosion and degradation –** Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Soil erosion and loss of topsoil are completely preventable. The stormwater management that will be an inherent part of the engineering on site and standard, best-practice erosion control and topsoil management measures recommended and included

in the Environmental Management Programme (EMPr), are likely to be effective in preventing soil erosion and loss of topsoil.

In quantifying the cumulative impact, the area of land taken out of grazing as a result of all the projects (total generation capacity of 4990 MW) will amount to a total of approximately 12,475 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30 km radius (approximately 282,700 ha), this amounts to 4.41% of the surface area. That is within an acceptable limit in terms of loss of land which is only suitable for grazing, and of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the following points:

Therefore, from an agricultural impact point of view, it is recommended that the proposed development be approved for both the VOLTA PV and BESS and EGI projects.

Visual Impact Assessment

The Visual Impact Assessments (refer to Appendix C.4 and C.4) were undertaken by Lourens du Plessis and Bryony van Niekerk to inform the outcome of this BA from a visual perspective.

VOLTA PV and BESS

The findings of the Visual Impact Assessment undertaken for the proposed VOLTA PV Facility and BESS is that the visual environment surrounding the site, especially within a 1 km radius (and potentially up to a radius of 3 km) of the proposed facility, may be visually impacted during the anticipated operational lifespan of the facility (i.e. a minimum of 20 years).

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from moderate to low significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed facility.

Considering all factors, it is recommended that the development of the facility as proposed be supported; subject to the implementation of the recommended mitigation measures.

VOLTA EGI

The findings of the Visual Impact Assessment undertaken for the proposed grid connection infrastructure is that the visual environment surrounding the site, especially within a 0.5 km radius (and potentially up to a radius of 1.5 km) of the proposed infrastructure, may be visually impacted during the anticipated operational lifespan of the grid connection infrastructure.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from moderate to low significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed infrastructure are not considered to be fatal flaws.

Heritage Impact Assessment (Archaeology and Cultural Landscape)

The Heritage Impact Assessments (refer to Appendix C.5 and C.6) were undertaken by Jaco van der Walt to inform the outcome of this BA from an archaeology and cultural landscape perspective.

The Heritage Impact Assessment concluded that there are no significant impacts to archaeological or culturally significant heritage resources for both the VOLTA PV and BESS and EGI projects.

Palaeontology Impact Assessment

The Palaeontology Impact Assessments (refer to Appendix C.7 and C.8) were undertaken by Prof Marion Bamford to inform the outcome of this BA from a palaeontological perspective.

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer or other responsible person, once excavations for poles, foundations and amenities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

The impact on the palaeontological heritage would be low pre-mitigation and very low post-mitigation (removal of fossils if they are found in the footprint), so as far as the palaeontology is concerned, the project should be authorised for VOLTA PV and BESS and EGI projects.

Terrestrial Biodiversity and Species Impact Assessment

The Terrestrial Biodiversity and Species Assessments (refer to Appendix C.9 and C.10) were undertaken by Corné Niemandt to inform the outcome of this BA from a terrestrial biodiversity and species perspective.

VOLTA PV and BESS

The proposed VOLTA PV facility is located in a CBA Irreplaceable and threatened ecosystem and vegetation type classified as endangered, namely the Vaal-Vet Sandy Grassland. The Grassland habitat will not be transformed completely, accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact is considered medium for Grassland.

The loss of topsoil and fragmentation of natural habitats that is virtually unavoidable with any type of development, has a negative impact on the regional ecosystem as it disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. The impact of clearing of the vegetation is High Negative. No meaningful mitigation measures are possible, and rehabilitation post-construction and post-operational are required. The proposed development will not completely transform the grassland during the construction period when installing the PV panels, only the internal roads and battery energy storage systems (BESS) of approximately 40 ha will transform the entire study area. This accounts for <1% loss of the original vegetation type extent, which is not considered significant. Accordingly, the grass and herbaceous layer underneath the PV panels will persist during the operational phase, but certain important ecological processes, such as fire, will be excluded which will change the species composition over time (owing to the exclusion of fire as an ecosystem driver) and accordingly the functioning of the system will change over time. For this reason, the seedbank located in the topsoil will need to be protected during the construction period, strips of natural grassland will have to persist between the PV panels in order to create islands for grassland succession, and active rehabilitation post-construction and decommissioning will have to take place to ensure the viability of the ecosystem during the lifetime of the project and after the decommissioning process. Where possible, landowners should convert disturbed areas and transformed agricultural land back to natural grassland through restoration efforts.

The alternative option of not developing this PV project and leaving it up to the landowners to make the decision to transform the land to agricultural land and/or intense grazing, which will not assist in protecting the CBA1 or the threatened ecosystem. Accordingly, the type of activity needs to be considered for this site, **unless conservation in terms of declaring these sites as a nature reserve or similar, it is not feasible to consider no development**. **Considering that the topsoil will not be disturbed and that heavy machinery will be utilised to only drill holes for the erection of the PV panels, approximately 3.5 m above ground, the grassland will not be transformed**. An effective rehabilitation and management plan needs to be drafted to ensure the continuous functionality of the grassland system taking the construction phase impacts into account, as well as the possible risk of fires. As the main grass species is *Themeda triandra*, the species is resistant to fire, and grows to about 1.5 m. Accordingly, over time, the species will become less dominant due to the absence of fire, but other species including *Eragrostis spp* and *Aristida spp*, along with shade-tolerant forbs will dominate the vegetation layer. As little is known about the impacts of solar panels on vegetation in South Africa, it is unclear whether there would be a significant change to the system, and whether additional rehabilitation efforts and the extent of success will be required post-operational phase of the facility.

Note from CSIR: the project developer has moved the location of BESS (B1) which was in a CBA1, in order to reduce the impacts on the grassland, which further reduces the impact on sensitive areas. With the new positioning of BESS -B1, the impact of the total BESS is less than 3% of the undisturbed and uncultivated CBA1/ESAs/VVSG/pans areas within the project farms area. The total BESS coverage with the new positioning is 1.7% of the total CBA1/ESAs/VVSG/pans within the project farm areas. In addition, there are corridors remaining due to the strings of pans that have been avoided with buffer zones.

The worst case estimated permanent clearance of vegetation in CBA1 for BESS was estimated at 40 ha prior to the relocation of the BESS Cornelia B1 area. It is now estimated at 18ha with the new location to an area that has no sensitivities identified from all specialist studies undertaken during the BA process, including the Terrestrial Biodiversity Impact Assessment. The new BESS –B1 site on the farm Mooihoek has the same size as the previous BESS –B1 site on the farm Cornelia. The BESS B2 location remains unchanged.

VOLTA EGI

The proposed VOLTA EGI facility is located in a CBA Irreplicable and threatened ecosystem and vegetation type classified as endangered, namely the Vaal-Vet Sandy Grassland.

The loss of vegetation and fragmentation of natural habitats that is virtually unavoidable with any type of development, has a negative impact on the regional ecosystem as it disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. The impact of clearing of the vegetation is Medium Negative. Limited meaningful mitigation measures are possible, and rehabilitation post-construction and post-operational are required.

Considering that less than 30% of the Vaal-Vet Sandy Grassland remains and with hardly any protection of this endangered grassland, development must be carefully scrutinised and appropriate measures must be taken to conserve and protect the remaining extent of this grassland. Since the Vaal-Vet Sandy Grassland is an extensive system and not confined to VOLTA, the cumulative impact would be Medium-Low Negative and the loss of resources similar.

The alternative option of not developing this PV project and leaving it up to the landowners to make the decision to transform the land to agricultural land and/or intense grazing, which will not assist in protecting the CBA1 or the threatened ecosystem. Accordingly, the type of activity needs to be considered for this site, unless conservation in terms of declaring these sites as a nature reserve or similar is considered, it is not feasible to consider no development. Considering that the topsoil will not be disturbed, the grassland will not be transformed completely. An effective rehabilitation and management plan needs to be drafted to ensure the continuous functionality of the grassland system taking the construction phase impacts into account, as well as the possible risk of fires. As the main grass species is *Themeda triandra,* the species is resistant to fire, and grows to about 1.5m. Accordingly, over time, the species will become less dominant due to the absence of fire, but other species including *Eragrostis spp* and *Aristida spp*, along with shade-tolerant forbs will dominate the vegetation layer.

Aquatic Biodiversity and Species Impact Assessment

The Wetland Ecology Studies (refer to Appendix C.11 and C.12) were undertaken by Russel Tate to inform the outcome of this BA from an aquatic biodiversity and species perspective.

The outcomes of the risk assessment indicate minor impacts from the proposed activities. The minor impacts can be attributed to gentle topography and the nature of the project. Should avoidance and basic mitigation actions be implemented, limited impacts to aquatic biodiversity can be expected.

In the view of the proposed new activities, should the proposed mitigation actions be implemented, no fatal flaw was identified. In line with the recommendations, avoidance must be implemented for both the VOLTA PV and BESS and EGI projects.

Avifauna Assessment

The Avifauna Impact Assessments (refer to Appendix C.13 and C.14) were undertaken by Luke Verbugt to inform the outcome of this BA from an avifaunal perspective.

VOLTA PV and BESS

The Avifauna study has appropriately demonstrated that there are no major negative impacts to avifauna Species of Conservation Concern (SCC) expected from the proposed VOLTA PV facility and BESS development, provided that the proposed mitigation measures are applied appropriately and that continued adaptive management take place throughout the lifespan of the facility.

If the Applicant agrees to implement the described mitigation measures and post-construction monitoring, the specialists recommends that the Competent Authority should grant environmental authorisation for this proposed development (exclusive of any transmission lines which are to be evaluated separately).

VOLTA EGI

The Avifauna study has appropriately demonstrated that there are no major negative impacts to avifauna SCC expected from the proposed VOLTA EGI development, provided that the proposed mitigation measures are applied appropriately and that continued adaptive management take place throughout the lifespan of the facility.

Without long-term data to present the flight paths of large-bodied SCC prone to collision, it is not possible to develop strict No-go areas for OHPLs based on likely collisions (other than significantly buffering major attractions like large freshwater pans). Furthermore, such desirable avoidance mitigation is typically not practically possible due to many other constraints, such as rules and regulations governing the placement of new OHPLs in close proximity to existing Eskom OHPLs.

Therefore, none of the EGI areas for proposed infrastructure can be considered as No-go but strong emphasis must therefore be placed on minimisation mitigation and in this case, ensuring that no electrocutions or collisions of SCC take place. It is for this reason that the entire proposed OHPL will require extensive application (every ~ 15 m) of bird flight diverters that are visible in the dark. Furthermore, if possible, underground cabling or re-alignment of the proposed OHPL route should be implemented in the 50 m buffers surrounding the western-most depression wetland, to further minimise avoid the likelihood risk of collisions around this habitat.

Post-construction avifauna monitoring as stipulated in Jenkins et al. (2017) must take place for the VOLTA PV facility following construction and at the onset of operation. It is strongly recommended that this monitoring must include bird carcass monitoring activities along the proposed OHPL, with the goal of adaptively managing unforeseen impacts.

If the Applicant agrees to implement the described mitigation measures and post-construction monitoring, the specialists recommends that the Competent Authority should grant environmental authorisation for this proposed EGI development.

Note from CSIR: The applicant has agreed to install bird deterrents as recommended by the Avifauna specialist. The current routing is the best option for feasibility and land restriction issues.

Socio-Economic Assessment

The Socio-Economic Assessment (refer to Appendix C.15) was undertaken by Tony Barbour to inform the outcome of this BA from a socio-economic perspective.

The findings of the SIA indicate that the development of the proposed VOLTA PV facility and associated infrastructure will create employment and business opportunities for the Tokologo Local Municipality during both the construction and operational phase of the project. However, due the small size of the towns of Dealesville and Boshof the employment opportunities for local community members are likely to be limited. The availability of accommodation for construction workers in Dealesville and Boshof is also limited. This will be exacerbated by the proposed construction of several PV facilities in the area over the next 2 to 5 years. All of the potential negative impacts, with the exception of the visual impact on sense of place, can also be effectively mitigated.

The establishment of the proposed VOLTA PV facility and associated infrastructure, including a battery energy storage system (BESS), is therefore supported by the findings of the SIA.

Geohydrology Assessment

The Geohydrology Assessment (refer to Appendix C.16) was undertaken by Hardy Luttig and Shane Teek of GEOSS South Africa (PTY) Ltd to inform the outcome of this BA from a geohydrological perspective.

As the project will only use municipal water for develop the development, a Water Use License will not be required; however, if the project requires the use of groundwater resources, a WULA will need to be submitted to the Department of Water and Sanitation under Section 40 of the National Water Act, 1998 (Act No. 36 of 1998).

From the impact assessment it is evident that the development will have a very low to low impact on the local geohydrology. **Therefore, it is supported that the project can progress as is, as long as the recommended mitigation measures are implemented.**

Desktop Geotechnical Assessment

The Geotechnical Assessment (refer to Appendix C.17) was undertaken by Hardy Luttig and Shane Teek of GEOSS South Africa (PTY) Ltd to inform the outcome of this BA from a geohydrological perspective

Based on the findings of this study, development should proceed provided the mitigation measures are implemented. The following conclusions can be drawn from the investigation:

1. **The impact of the proposed development is expected to be very low and is anticipated to have little effect on the site from a geotechnical point of view**. Cumulatively the intensities of the impacts may increase as the project progress, however, with effective mitigation the significance of impacts is regarded as low.
2. Increased soil erosion may transpire as an impact of development, this may persist for the life of the project. However, the impact of this is expected to be very low and is anticipated to have little effect on the site from a geotechnical point of view.
3. Variable soil and rock conditions will exist across the site, broadly these have been divided as follows:
   a. Zone A – Karoo sandstones, siltstones and mudstones
   b. Zone B – Karoo dolerite
   c. Zone C – Quaternary sediments
4. The presence of potential foundation related movement resulting from potentially collapsible soils and/or expansive clays must be confirmed during intrusive investigations. Each proposed structural footprint would have to be investigated prior to compilation of final design.
5. Owing to the variable geologic and soil conditions across the proposed development area, the subgrade conditions will vary across the site. Dolerite has been proven to perform well as an aggregate for wearing courses. Dolerite has also been incorporated as an aggregate in

concrete mixes. Karoo mudrock and sandstone should be avoided when selecting aggregates for concrete mixes.

6. The excavatability of the stratum on site are anticipated to variable, based on material composition and texture, the degree of weathering, and the nature of discontinuities within the rock and/or soil mass.
7. The seismicity in the region is considered to have a NPGA that exceeds a 0.1 g once every 475 years. The design phase should therefore make allowances for potential regional seismicity.
8. Intrusive investigations will be required to confirm the anticipated conditions at each of the PV cluster positions and all other associated structures.
9. Any road cuttings should be designed by an appropriately qualified professional.
10. GEOSS has endeavoured to highlight and characterise all potential geotechnical risks that are presented by the site that has been proposed for development. However, due to the anisotropic (variable) nature of earth materials, each point on the site will present results that differ. For this reason, it is considered of the utmost importance that the foundation excavations be inspected prior to casting to ensure that soil with an adequate bearing capacity is obtained beneath each footing. These works should be carried out by an appropriately qualified individual.

Traffic Impact Statement

A technical Traffic Impact Statement is informed by the technical Transportation Assessment Statement included in Appendix C.18 of the BA Report. The assessment was carried out by Merchandt Le Maitre.

With reference to this report, associated assessment, and the findings made within SKERP Consulting Engineers' opinion, the VOLTA PV Facility will have a negligible impact on the surrounding environment. Therefore, the project is deemed acceptable from a Transportations perspective, provided this report's recommendations, and mitigation measures are implemented and maintained.

Impacts relating to BESS

The VOLTA Solar PV facility will have Battery Energy Storage Systems (BESS) of up to 2200 MWh located adjacent the VOLTA substation SSa named BESS Site 1. A further 1800 MWh BESS named BESS Site 2 is planned on the farm Oxford 1/1030, and this will feed to substation SSb then into the Artemis MTS. The preferred battery technology at draft stage was solid state Lithium-ion such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or sodium-ion systems. Alternative technologies being considered include Redox flow (typically vanadium) as well as Liquid Metal (Ambri technology). Since the Draft Basic Assessment was submitted the Redox Flow battery using Vanadium electrolyte has emerged as a new preferred battery technology The specific technology will only be determined following Engineering, Procurement and Construction (EPC) procurement.

- There are numerous different battery technologies, but using one consistent battery technology system for the BESS installations associated with all the PV developments in the complex would allow for ease of training, maintenance, emergency response and could significantly reduce risks.

- Where reasonably practicable, state-of-the-art battery technology should be used with all the necessary protective features e.g., draining of cells during shutdown and standby-mode, full BMS with deviation monitoring and trips, leak detection systems.

- **There are no fatal flaws associated with the proposed VOLTA battery installation for either of the three technology types**.

- The overall design should be subject to a full Hazop prior to finalization of the design.

- For the VRFB systems there should be an environmentally friendly method of filling the systems with electrolyte upon startup and an end of life (and for possible periodic purging requirements) solution for the large quantities of hazardous electrolyte should be investigated, e.g., can it be returned to the supplier for re-conditioning.

- Prior to bringing any solid-state battery containers into the country, the contractor should ensure that:

    - An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating.

    - An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers.

- The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another.

- Under certain weather conditions, the noxious smoke from a fire in a lithium battery container could travel some distance from the unit. The smoke will most likely be acrid and could cause irritation, coughing, distress etc. Close to the source of the smoke, the concentration of toxic gases may be high enough to cause irreversible harmful effects. Location of the facilities needs to ensure a suitable separation distance from public facilities/residences etc. The current proposed BESS location is over 500m from isolated farmhouses / other occupied facilities and 100m from the R64 is therefore suitable. The risks of significant impacts is very low.

- Where there is a choice of alternative locations for the BESS, those that are further from water courses would be preferred. VRFB hazards are mostly related to possible loss of containment of electrolyte and solid-state systems may experience fires that may result in loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want these run-offs to enter water courses directly. The buffer distance between water bodies and the facilities containing chemicals should be set in consultation with a water specialist and is therefore not specified in this SHE RA. It should be noted that the locations are well over 100m from the closest water source and will likely be suitable.

- For molten metal batteries the most significant hazards are to persons working with the facilities, e.g. operation and maintenance personnel. Suitable procedures will need to be in place and PPE to be specified.

- Finally, it is suggested once the technology has been chosen and more details of the actual design are available, the necessary updated Risk Assessments should be in place.

Civil Aviation

The proposed project study area was determined and verified to be of low sensitivity (as it relates to civil aviation). This was determined through a site visit and based on existing databases, and confirms the sensitivity allocated on the Screening Tool. Based on the above, in terms of GN R320, no further requirements are applicable i.e. a Compliance Statement is not required.

Defence

The proposed project study area was determined and verified to be of low sensitivity (as it relates to defence installations). This was determined through a site visit and based on existing databases, and confirms the sensitivity allocated on the Screening Tool. Based on the above, in terms of GN R320, no further requirements are applicable i.e. a Compliance Statement is not required.

EAP'S RECOMMENDATION

No negative impacts have been identified within this BA that, in the opinion of the EAPs who have conducted this BA Process, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project. This echoes the findings of the specialists as summarised above.

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development." Based on this imperative, this BA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures, and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans (refer to the Environmental Management Programmes (EMPrs) included in Appendix G - K of this BA Report).

It is understood that the information contained in this BA Report and appendices is sufficient to make a decision in respect of the activity applied for.

Summary of Key Impact Assessment Findings

Based on the findings of the specialist studies, the proposed projects are considered to have an overall moderate to low negative environmental impact and an overall low to moderate positive socio-economic impact (with the implementation of respective mitigation and enhancement measures). Tables E.1 and E.2 below provide a summary of the impact assessment for each phase of the proposed projects **post mitigation for direct impacts**. Tables E.3 and E.4 provide the same information for the **cumulative impacts**.

As indicated in Table E.1 (VOLTA PV and BESS) it is clear that the majority of the **direct negative impacts** were rated with a **low to very low post mitigation impact significance** for the **construction phase**, with only the Terrestrial Biodiversity and Species and Visual impacts being rated as **moderate**. In terms of the operational and decommissioning phases, the majority of the **direct negative impacts** were rated with a **low post mitigation impact significance**, with only the Terrestrial and Species and Visual impacts being rated as **moderate**. In terms of **positive impacts**, the Socio-Economic impacts are rated as **low to moderate significance** for the construction phase; **very low to high** for the operational phase; and **low** for the decommissioning phase.

As indicated in Table E.2 (VOLTA EGI) it is clear that the majority of the **direct negative impacts** were rated with a **low post mitigation impact significance** for the **construction phase**, **operation** and **decommissioning phase** with only the Terrestrial Biodiversity and Species and Visual impacts being rated as **moderate**. In terms of the operational and decommissioning phases, the majority of the **direct negative impacts** were rated with a **low post mitigation impact significance**, with only the Terrestrial and Species and Visual impacts being rated as **moderate**. In terms of **positive impacts**, the Socio-Economic impacts are rated as **low to moderate significance** for the construction phase; **very low to high** for the operational phase; and **low** for the decommissioning phase.

Based on Table E.3 and E4, the majority of the **cumulative negative impacts** were rated with a **low post mitigation impact significance** for both the VOLTA PV and BESS and EGI projects.

Table E.1. Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for the VOLTA PV and BESS

<table>
<tr><th>Specialist Assessment</th><th>Construction Phase</th><th colspan="2">Operational Phase</th><th>Decommissioning Phase</th></tr>
<tr><td colspan="5">DIRECT NEGATIVE IMPACTS</td></tr>
<tr><td>Visual</td><td>Moderate</td><td>Low</td><td>Moderate</td><td>Moderate</td></tr>
<tr><td>Heritage (Archaeology and Cultural Landscape)</td><td>Low</td><td colspan="2">Low</td><td>Low</td></tr>
<tr><td>Palaeontology</td><td>Very Low</td><td colspan="2">Insignificant and/or not identified and/or not applicable</td><td>Insignificant and/or not identified and/or not applicable</td></tr>
<tr><td>Terrestrial Biodiversity and Species</td><td>Moderate</td><td colspan="2">Moderate</td><td>Low</td></tr>
<tr><td>Aquatic Biodiversity and</td><td>Low</td><td colspan="2">Low</td><td>Low</td></tr>
</table>

<table>
<tr><th>Specialist Assessment</th><th colspan="2">Construction Phase</th><th>Operational Phase</th><th colspan="2">Decommissioning Phase</th></tr>
<tr><td colspan="6">DIRECT NEGATIVE IMPACTS</td></tr>
<tr><td>Species</td><td colspan="2"></td><td></td><td colspan="2"></td></tr>
<tr><td>Avifauna</td><td colspan="2">Low</td><td>Low</td><td colspan="2">Low</td></tr>
<tr><td>Socio-Economic</td><td colspan="2">Low</td><td>Low</td><td colspan="2">Low</td></tr>
<tr><td>Geohydrology</td><td colspan="2">Very Low</td><td>Very Low</td><td colspan="2">Very Low</td></tr>
<tr><td>Geotechnical</td><td colspan="2">Very Low</td><td>Very Low</td><td colspan="2">Very Low</td></tr>
<tr><td>Transport</td><td>Low</td><td>Very Low</td><td>Insignificant and/or not identified and/or not applicable</td><td>Low</td><td>Very Low</td></tr>
<tr><td colspan="6">DIRECT POSITIVE IMPACTS</td></tr>
<tr><td>Socio-Economic</td><td colspan="2">Moderate</td><td>Moderate</td><td colspan="2">Low</td></tr>
</table>

Table E.2: Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for the VOLTA EGI

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
DIRECT NEGATIVE IMPACTS			
Visual	Moderate	Low to moderate	Moderate
Heritage (Archaeology and Cultural Landscape)	Low	Low	Low
Palaeontology	Very Low	Insignificant and/or not identified and/or not applicable	Insignificant and/or not identified and/or not applicable
Terrestrial Biodiversity and Species	Moderate	Moderate	Low
Aquatic Biodiversity and Species	Low	Low	Low
Avifauna	Low	Low	Low

Table E.2. Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts for the VOLTA PV and BESS project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Visual	Insignificant and/or	Moderate	Insignificant and/or

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
	not identified and/or not applicable		**not identified and/or not applicable**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Insignificant and/or not identified and/or not applicable**	**Insignificant and/or not identified and/or not applicable**
Palaeontology	**Very Low**	**Insignificant and/or not identified and/or not applicable**	**Insignificant and/or not identified and/or not applicable**
Terrestrial Biodiversity and Species	**Moderate**	**Low**	**Low**
Aquatic Biodiversity and Species	**Low**	**Low**	**Low**
Avifauna	**Low**	**Low**	**Low**
Socio-Economic	**Low**	**Low**	**Low**
Geohydrology	**Very Low**	**Very Low**	**Very Low**
Geotechnical	**Low**	**Low**	**Low**
Transport	**Low** **Very Low**	**Insignificant and/or not identified and/or not applicable**	**Low** **Very Low**
CUMULATIVE POSITIVE IMPACTS			
Socio-Economic	**Moderate**	**Moderate**	**Moderate**

Table E.2. Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts for the VOLTA EGI project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Visual	**Insignificant and/or not identified and/or not applicable**	**Moderate**	**Insignificant and/or not identified and/or not applicable**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Insignificant and/or not identified and/or not applicable**	**Insignificant and/or not identified and/or not applicable**
Palaeontology	**Very Low**	**Insignificant and/or not identified and/or**	**Insignificant and/or not identified**

Specialist Assessment	Construction Phase		Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS				
			not applicable	**and/or not applicable**
Terrestrial Biodiversity and Species	**Moderate**	**Low**	**Low**	**Low**
Aquatic Biodiversity and Species	**Low**		**Low**	**Low**
Avifauna	**Low**		**Low**	**Low**

All of the specialists have recommended that the proposed projects receive EAs if the recommended mitigation measures are implemented.

Overall Impact Assessment

Taking into consideration the findings of the BA Process, as well as the fact that the proposed **VOLTA PV and BESS and VOLTA EGI projects** will be located within Kimberley REDZ (REDZ 5), it is the opinion of the EAP, that the project benefits outweigh the costs and that the projects will make a positive contribution to sustainable infrastructure development in the Dealesville town and surrounding regions, as well as make a net positive contribution to electricity generation for South Africa. Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed projects receive EAs in terms of the EIA Regulations promulgated under the NEMA.

Cumulative Environmental Impact Statement

The cumulative impacts have been assessed by all the specialists on the project team. The cumulative assessment included approved renewable energy projects within a 30 km radius of the project sites, as well as existing and planned transmission lines, as well as the proposed VOLTA PV and BESS projects and proposed VOLTA power line project. No cumulative impacts have been identified that were considered to be fatal flaws. The specialists recommended that the projects receive EA in terms of the EIA Regulations promulgated under the NEMA, including consideration of cumulative impacts. It is also important to note that the proposed project sites are located within REDZ 5 (Kimberley REDZ), which supports the development of large-scale wind and solar energy developments. The proposed projects are therefore in line with the national planning vision for wind and solar development in South Africa.

Summary of where requirements of Appendix 1 of the 2014 NEMA EIA Regulations (as amended, GN R326) are provided in this BA Report

Appendix 1	YES / NO	SECTION IN BA REPORT
Objective of the basic assessment process 2) The objective of the basic assessment process is 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 alternatives considered, including the activity, location, and technology alternatives; c) describe the need and desirability of the proposed 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 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; and 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; (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and (iii) identify residual risks that need to be managed and monitored.	**Yes**	**Section A of the report includes the Introduction, legislative review, alternatives assessment and needs and desirability** **Section D includes a summary of the specialist studies and associated impact assessments undertaken**
Scope of assessment and content of basic assessment reports 3) (1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include: (a) details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	**Yes**	**Section A.2**
(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;	**Yes**	**Section A.4**
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**Yes**	**Section A.3 and Section A.4**
(d) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the activities to be undertaken including associated structures and infrastructure;	**Yes**	**Section A.5 and Section A.11**

Appendix 1	YES / NO	SECTION IN BA REPORT
(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 have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	**Yes**	**Section A.10**
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;	**Yes**	**Section A.14**
(g) a motivation for the preferred site, activity and technology alternative;	**Yes**	**Section A.13**
(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;	**Yes**	**Section A.13**
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	**Yes**	**Section C**
(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;	**Yes**	**Section C**
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**Yes**	**Section A.13 and Section B**
(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;	**Yes**	**Section A.13**
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	**Yes**	
(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;	**Yes**	
(viii) the possible mitigation measures that could be applied and level of residual risk;	**Yes**	
(ix) the outcome of the site selection matrix;	**Yes**	
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	**Yes**	
(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity.	**Yes**	**Section A.13**
(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;	**Yes**	**Section A.13**
(j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts;	**Yes**	**Section D and Appendix C**

Appendix 1	YES / NO	SECTION IN BA REPORT
(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;		
(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;	**Yes**	**Section D and Section E**
(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;	**Yes**	**Section E**
(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;	**Yes**	**Section D and E**
(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;	**Yes**	**Section E**
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**Yes**	**Please refer to each specialist study included in Appendix C**
(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;	**Yes**	**Section E**
(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;	**X**	**Not Applicable.**
(r) an undertaking under oath or affirmation by the EAP in relation to - (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (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 and affected parties; and	**Yes**	**Appendix E**
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	**X**	**N/A**
(t) any specific information that may be required by the competent authority; and	**Yes**	**Comments raised during the 30-day review of the Draft BA Report have been addressed at relevant points throughout the Final BA Report.**
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	**X**	**N/A**

Appendix 1		YES / NO	SECTION IN BA REPORT
2)	Where a government notice *gazetted* by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply.	**Yes**	**Refer to Section A.10 for a breakdown of the relevant gazettes that are applicable.**

SECTION A: INTRODUCTION, PROJECT DESCRIPTION; ALTERNATIVES; LEGISLATION; SCREENING TOOL

A.1 Introduction

The Project Developer, VOLTA PV (PTY) Ltd (hereinafter referred to as VOLTA PV), is proposing to design, construct and operate a Solar Photovoltaic (PV) power generation facility and associated infrastructure, approximately 4 km west of the town of Dealesville, in the Free State Province. The proposed projects are located within the Tokologo Local Municipality and Lejweleputswa District Municipality. The PV facility will have a capacity of up to 290 MW. The associated infrastructure includes various structures, buildings and electrical grid infrastructure (EGI) such as, but not limited to, two 132 kV power lines, two on-site substations132kV/33kV collector, and one Battery Energy Storage Systems (BESS) associated with each on-site substation, therefor two independent BESS sites or options. The proposed Solar PV facility will make use of PV solar technology to generate electricity from energy derived from the sun; and will connect to the national grid at the planned Artemis Main Transmission Substation also referred to as Dealesville MTS. The locality of the proposed project is depicted in Figure A.1 below. This BA Report addresses the Solar PV facility, BESS, Substations and the associated 132 kV powerlines, as discussed below.

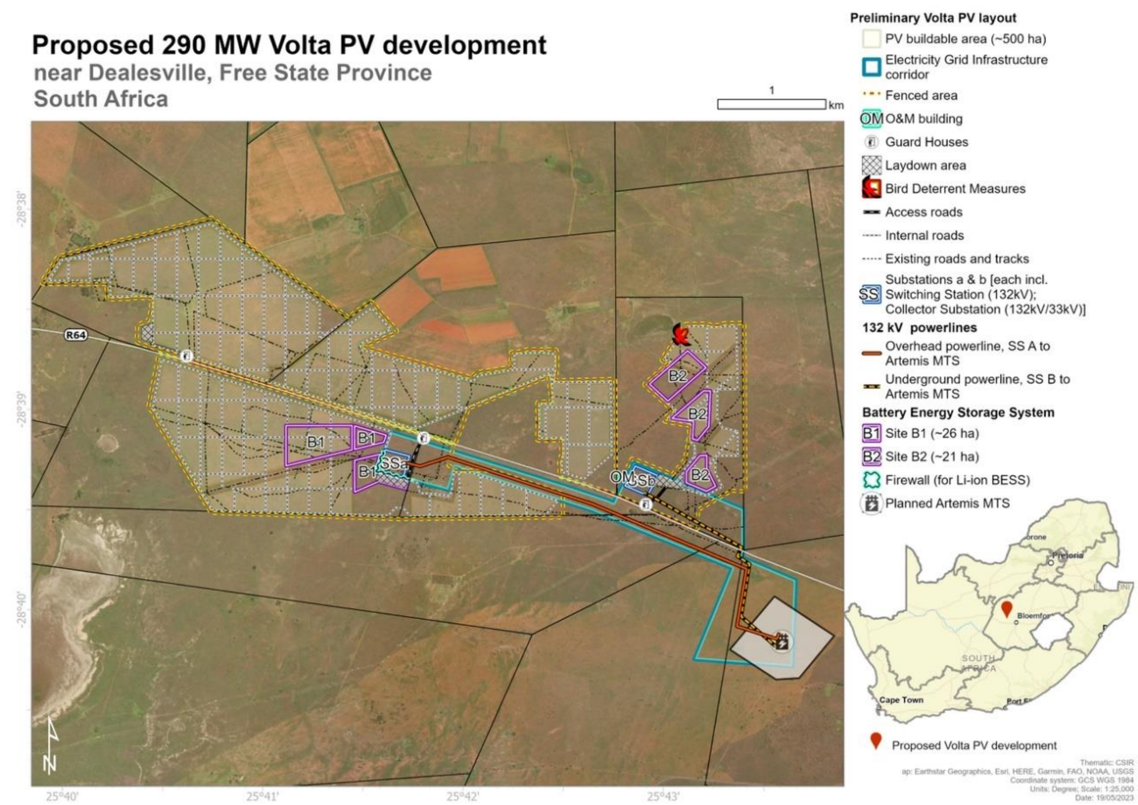


Figure A.1. Locality of the Proposed PV Project and EGI Corridor

The respective farm portions affected by the proposed PV facility, EGI and associated infrastructure are shown in Table A.1 below.

Table A.1. Project Names, Applicants, and the main Affected Farm Portions

Affected Farm Portion	Mooihoek (RE/1551)	Cornelia (RE/1550)	Carlton (RE/74)	Vadersrust (RE/822)	Modderpan (RE/750)	Oxford (1/1030)	Klipfontein (RE/305)	Leliehoek (RE/748)
VOLTA Solar PV Facility	✓	✓	✓	✓		✓		
VOLTA EGI	✓	✓			✓	✓	✓	✓

It is important to note that the farms Mooihoek, Cornelia and Carlton were part of the 29 Solar Environmental Approvals. These projects were sold to ibVogt and continue as Ngonyama (Case Ref. No. 14/12/16/3/3/2/852), Indlovu (Case Ref. No. 14/12/16/3/3/2/851) and Amagama (Case Ref. No.14/12/16/3/3/2/853) also called the Marula Cluster Projects. ibVogt did not utilise Mooihoek, Cornelia, or Carlton in their project areas and these landowners have now signed options/lease agreements with VOLTA PV (Pty) Ltd. These farm portions were assessed in an EIA conducted by the CSIR and authorised in 2016.

VOLTA PV will consider developing the project as a REIPPP or an IPP and see the project being developed in phases over a period of one to five years.

The proposed projects are located entirely within the Renewable Energy Development Zone 5 (i.e., Kimberley REDZ), one of the eleven REDZs formally gazetted in South Africa for the purpose of developing solar PV and wind energy generation facilities (Government Gazette 41445, Government Notice (GN) 114; 16 February 2018 and (GN) 144; 26 February 2021). Refer to Figure A.1 for the locality of the proposed projects in relation to the REDZs. In line with the gazetted process for projects located within a REDZ, the proposed project is subject to a Basic Assessment (BA) process instead of a full Scoping and Environmental Impact Assessment (EIA) process and a reduced decision making period of 57 days, in terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) and the 2014 NEMA EIA Regulations (as amended) promulgated in Government Gazette 40772; in GN R326, R327, R325 and R324 on 7 April 2017. A BA Process in terms of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) has therefore been undertaken for the proposed projects. The Competent Authority for the proposed projects is the National Department of Forestry, Fisheries, and the Environment (DFFE).

Based on email discussions with the DFFE in February 2023, the option to apply for combining the Applications for EA in terms of Regulation 11 (4) of the 2014 NEMA EIA Regulations (as amended), and the issuing of multiple EAs in terms of Regulation 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended) was discussed. It was confirmed that a letter must be submitted to the DFFE to motivate for the combination and issuing of multiple EAs. The combination request was submitted to the DFFE via email on 28 February 2023 and it was made specifically in terms of the following regulations of the 2014 NEMA EIA Regulations (as amended):

- Regulation 11 (4): *"If one or more proponents intend undertaking interrelated activities at the same or different locations within the area of jurisdiction of a competent authority, the competent authority may, in writing, agree that the proponent or proponents submit a single application in* *respect of all of those activities and to conduct a consolidated assessment process but the potential environmental impacts of each activity, including its cumulative impacts, must be considered in terms of the location where the activity is to be undertaken".*

- Regulation 25 (1) and (2): "*(1) If the competent authority decides to grant authorisation, the competent authority must issue an environmental authorisation or environmental authorisations complying with regulation 26 to, and in the name of, the applicant or applicants. (2) If the competent authority decides to grant authorisation in respect of an application, the competent authority may issue a single environmental authorisation or multiple environmental authorisations in the name of the same or different applicants covering all aspects for which authorisation is granted*".

It was motivated to the DFFE to submit a combined Application for Environmental Authorisation (EA) in terms of Regulation 11 (4) of the 2014 NEMA EIA Regulations (as amended), and for the issuing of multiple EAs (should they be granted) in terms of Regulation 25 (1) and (2) of the 2014 NEMA EIA Regulations (as amended). The combined reporting process reduces the administrative aspects on the case officer and reduces the number of reports that need to be reviewed by Interested and Affected Parties (I&APs), while still maintaining high levels of environmental rigour and clear reporting. The combination and multiple EA request was approved by the DFFE on 10 March 2023 2020. A copy of this approval is included in Appendix L of this BA Report.

Therefore, one BA Report has been compiled and this report includes the PV facility and the powerline environmental assessment. As requested in the approval letter, the BA Report is submitted with distinct and clear sections dedicated to the PV facility and EGI. Table A.2 below indicates the two proposed projects, the two separate EAs that are requested (should they be granted).

Table A.2: BA Reporting Structure and Components

No.	Project	Applicant	No. of Applications for EA	No. of BA Reports	No. of Specialist Reports	No. of EAs
1	PROJECT 1: Basic Assessment for the proposed development of the 290 MW VOLTA Solar Photovoltaic (PV) Facility (i.e., VOLTA PV Facility) and Battery Energy Storage System (BESS), and associated infrastructure near Dealesville, Free State.	VOLTA PV (Pty) LTD	1 Combined Application for EA	1 Combined BA Report	1 Specialist Report per theme to address all the Solar PV facility and BESS.	**1 EA**
2	PROJECT 2: Basic Assessment for the proposed development of a 132 kV Power line and associated EGI (i.e., VOLTA EGI) from the VOLTA PV Facility to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State				1 Specialist Report per theme to address the Powerline.	**1 EA**
Total			**1 Application for EA**	**1 BA**		**2 EAs**

The specialists have each compiled **separate reports per specialist theme**, which includes a clear assessment of the following:

- **Report 1**: 290 MW VOLTA Solar Photovoltaic (PV), 2x Battery Energy Storage Systems (BESS), and associated infrastructure; and
- **Report 2**: Electricity Grid Infrastructure (EGI) for the proposed development of a 132 kV overhead and underground Power line, associated EGI (i.e., VOLTA EGI) from the VOLTA PV Facility, and 2x onsite substations.

An integrated Public Participation Process (PPP) has been undertaken for this BA process. The Draft BA Report was released to all I&APs, Organs of State and stakeholders for a 30-day review period, extending from 31 March 2023 to 3 May 2023. All comments submitted during the 30-day review period were captured in a detailed Comments and Responses Report (CRR). The CRR is included in Appendix D Part 2 of this BA Report.

A.2 Project Team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), the Project Developer has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the separate BA Processes in order to determine the biophysical, social and economic impacts associated with undertaking the proposed development.

The BA is being led by the Environmental Assessment Practitioner (EAP) and Project Leader, Paul Lochner. Paul Lochner has more than 27 years of experience in Environmental Assessment and management studies, primarily in the leadership and integration functions. This includes Strategic Environmental Assessments (SEAs), EIAs and Environmental Management Plans (EMPs). Paul has extensive experience in conducting Environmental Assessment and management processes across South Africa and internationally. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). He has been Project Leader on numerous renewable energy, ports and oil and gas related environmental studies and assessments. He has also authored several Guidelines, such as the Guideline for EMPs published in 2005 by the Western Cape government and was lead author on the introductory "Overview of IEM" document for the DEAT IEM Series. He was also Project Leader for the Wind and Solar REDZs SEAs Phase 1 and 2, within which the proposed projects will take place.

Abulele Adams, serves as the Project Manager, in the EMS group of the CSIR. She has 9 years of experience in the Environmental Management field and has been involved in various transport SEAs. She is a registered Professional Natural Scientist (400168/17) with the South African Council for Natural Scientific Professions (SACNASP).

Helen Antonopoulos and Sonto Mkize are the Project Officers on the BA and are Environmental Consultants in training in the EMS group of the CSIR.

Various specialists and additional members from the CSIR have contributed to these BAs. The team which is involved in this BA Process is listed in Table A.3 below.

Table A.3. Details of the BA Team

Name	Organisation	Role/ Specialist Study
CSIR Project Team		
Paul Lochner (*Registered EAP (2019/745)*)	CSIR	EAP and Project Leader
Abulele Adams (*Pr.Sci.Nat.*)	CSIR	Project Manager
Helen Antonopoulos	CSIR	Project Officer
Luanita Snyman-van der Walt (*Pr.Sci.Nat.*)	CSIR	Project Mapping
Sonto Mkize	CSIR	Project Officer

Name	Organisation	Role/ Specialist Study
Specialists		
Johann Lanz (*Pr.Sci.Nat.*)	Private	Agricultural Compliance Statement
Lourens du Plessis (*GPr GISc*)	LOGIS	Visual Impact Assessment
Bryony Walmsley (*EAPASA*)		
Jaco van der Walt	Beyond Heritage	Heritage Impact Assessment (Archaeology, Cultural Landscape)
Prof Marion Bamford	Private	Palaeontology
Corné Niemandt (*Pr.Sci.Nat.*)	Enviro-Insight	Terrestrial Biodiversity, Terrestrial Plant Species, and Terrestrial Animal Species
Russel Tate (*Pr.Sci.Nat.*)	HCV Africa (Enviro-Insight)	Aquatic Biodiversity and Species Impact Assessment
Luke Verburgt (*Pr.Sci.Nat.*)	Enviro-Insight	Avifauna Impact Assessment
Tony Barbour	Private	Socio-Economic Impact Assessment
Debbie Mitchell	Ishecon	BESS Risk Assessment (PV only)
Merchandt Le Maitre (*Pr Tech Eng*)	Skerp Consulting Engineers	Traffic Impact Assessment
Hardy Luttig, Dale Barrow and Shane Teek	GEOSS South Africa (PTY) Ltd	Geohydrology Assessment
Hardy Luttig and Shane Teek		Desktop Geotechnical Assessment
Sonto Mkize, Abulele Adams (*Pr.Sci.Nat.*), Helen Antonopoulos	CSIR	Civil Aviation Site Sensitivity Verification
Sonto Mkize, Abulele Adams (Pr.Sci.Nat.), Helen Antonopoulos	CSIR	Defence Site Sensitivity Verification

A.3 Project Overview in terms of Energy Planning

As noted above, the proposed projects fall within the REDZ 5 (i.e., Kimberley REDZ) which was promulgated in GN 114 in February 2018. The REDZs represent areas where wind and solar PV development is being incentivised from resource, socio-economic and environmental perspectives. To date, the DFFE has gazetted 11 REDZs as well as procedures for submitting environmental impact assessment applications and reduced environmental authorisation timeframes within these REDZs, which have reduced the review timeframes by half and significantly simplified the authorisation process. The REDZs were identified in two phases, with the first 8 being identified through an SEA process which concluded in March 2015 and gazetted in February 2018 and the 3 additional REDZs concluded in March 2019 and gazetted in February 2021. A BA Process is undertaken instead of a full Scoping and EIA Process and is subjected to a reduced decision-making timeframe.

In addition, five EGI Power Corridors were gazetted for implementation on 16 February 2018 in Government Gazette 41445, GN 113 and an additional two expanded corridors were gazetted 29 April 2021. The Gazette documented notice, given by the Minister of Environmental Affairs, of alternative procedures to be followed when applying for EA for large scale electricity transmission and distribution development activities, identified in terms of section 24(2)(a) of the NEMA in the identified Strategic Transmission Corridors (i.e., areas declared as geographical areas of strategic importance). Developers proposing to submit applications for EA for large scale electricity transmission infrastructure within any of the five gazetted Strategic Transmission Corridors, that trigger Listed Activity 9 of Listing Notice 2 of the 2014 NEMA EIA Regulations (as amended), or any other listed and specified activities that are necessary for the realisation of such infrastructure and facilities, would need to follow a BA Process, as opposed to a full Scoping and EIA Process. The proposed project also falls within the Central EGI Corridor. The fact that the proposed project falls within the Central EGI Corridor is important as it indicates that the proposed project aligns with the strategic objectives of the country in terms of infrastructure placement.

Refer to Figure A.3 below which shows the location of the proposed projects in relation to the REDZ 5 and Central EGI Corridor.

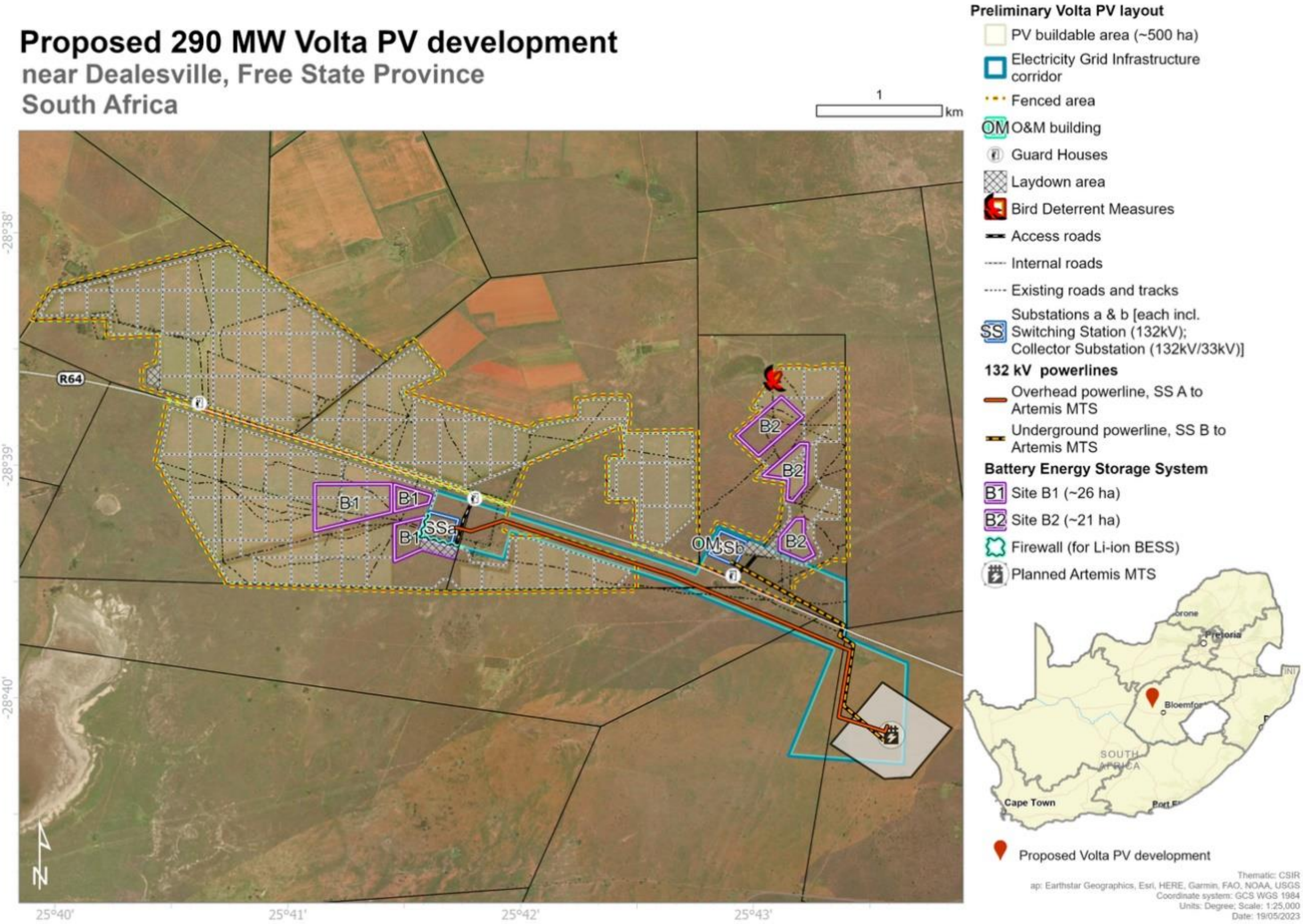


Figure A.2. Project Location in relation to the REDZ 5: Kimberley and Central EGI Corridor

A.4 Project Co-ordinates

The proposed VOLTA PV and Powerline projects will take place on the farm portions indicated in Table A.4.

Table A.4. Affected Farm Portion Details

Affected Farm Portion	Mooihoek (RE/1551)	Cornelia (RE/1550)	Carlton (RE/74)	Vadersrust (RE/822)	Modderpan (RE/750)	Oxford (1/1030)	Klipfontein (RE/305)	Leliehoek (RE/748)
VOLTA PV	✓	✓	✓	✓		✓		
VOLTA EGI	✓	✓			✓	✓	✓	✓
SS A	✓							
SS B						✓		
SG Code	F00400000000 155100000	F00400000000 155000000	F00400000000 007400000	F00400000000 082200000	F00400000000 075000000	F00400000000 103000001	F00400000000 030500000	F00400000000 074800000

The co-ordinates of the boundary points of the project PV sites and the BESS midpoints are detailed in Table A.5 and A.6. The boundary points for the EGI, the midpoints for the proposed on-site substations and the powerline cable routes in the VOLTA EGI are detailed in Table A.7 and Table A.8 respectively:

Table A.5. Co-ordinate Points along the boundary of VOLTA PV facility

PV AREA VERTICES	No	Lat_y_dms	Long_x_dms
Oxford PV2	1	28° 38' 45.41165977" S	25° 43' 21.60187681" E
Oxford PV2	2	28° 38' 53.90710527" S	25° 43' 21.74595436" E
Oxford PV2	3	28° 38' 53.88374845" S	25° 43' 16.16242035" E
Oxford PV2	4	28° 39' 02.58530826" S	25° 43' 16.06829054" E
Oxford PV2	5	28° 39' 09.39124910" S	25° 43' 10.70850330" E
Oxford PV2	6	28° 39' 08.86345952" S	25° 43' 08.72444791" E
Oxford PV2	7	28° 39' 03.57915379" S	25° 43' 09.02642479" E
Oxford PV2	8	28° 39' 02.60749630" S	25° 43' 02.12401013" E
Oxford PV3	9	28° 39' 22.23941257" S	25° 43' 06.85284164" E
Oxford PV3	10	28° 39' 18.42333919" S	25° 43' 06.87703228" E
Oxford PV3	11	28° 39' 05.48198843" S	25° 43' 17.33385169" E
Oxford PV3	12	28° 39' 06.41673096" S	25° 43' 21.82382912" E
Oxford PV3	13	28° 39' 13.78979897" S	25° 43' 21.87752283" E
Oxford PV3	14	28° 39' 13.81553168" S	25° 43' 15.48734146" E
Oxford PV3	15	28° 39' 23.59238764" S	25° 43' 15.43555509" E
Oxford PV3	16	28° 39' 24.89827249" S	25° 43' 13.07307289" E
Oxford PV1	17	28° 38' 44.89060610" S	25° 43' 00.5363257" E
Oxford PV1	18	28° 38' 35.36660536" S	25° 43' 06.94578737" E

PV AREA VERTICES	No	Lat_y_dms	Long_x_dms
Oxford PV1	19	28° 38' 35.40213499" S	25° 43' 21.60017773" E
Oxford PV1	20	28° 38' 40.08305855" S	25° 43' 21.57378223" E
Oxford PV1	21	28° 38' 49.17288874" S	25° 43' 11.17073101" E
Carlton PV2	22	28° 38' 58.28820224" S	25° 42' 26.81823873" E
Carlton PV2	23	28° 38' 51.97091449" S	25° 42' 26.70581412" E
Carlton PV2	24	28° 38' 52.14178107" S	25° 42' 43.90411159" E
Carlton PV2	25	28° 39' 13.28436715" S	25° 42' 44.06532282" E
Carlton PV2	26	28° 39' 20.39760921" S	25° 42' 36.06625489" E
Carlton PV2	27	28° 39' 18.48577810" S	25° 42' 30.01408675" E
Carlton PV2	28	28° 39' 08.50558008" S	25° 42' 30.04961823" E
Carlton PV2	29	28° 39' 08.54975184" S	25° 42' 22.90234571" E
Carlton PV2	30	28° 38' 58.31739391" S	25° 42' 22.85199530" E
Carlton PV1	31	28° 38' 52.55552370" S	25° 41' 06.81087108" E
Carlton PV1	32	28° 38' 48.51400964" S	25° 41' 06.76663739" E
Carlton PV1	33	28° 38' 34.79408195" S	25° 41' 23.97957002" E
Carlton PV1	34	28° 38' 34.81094736" S	25° 41' 26.00936648" E
Carlton PV1	35	28° 38' 29.99712924" S	25° 41' 32.54755946" E
Carlton PV1	36	28° 38' 35.87558683" S	25° 41' 37.79476157" E
Carlton PV1	37	28° 38' 40.04648712" S	25° 41' 28.90508156" E
Carlton PV1	38	28° 38' 42.25584964" S	25° 41' 28.92767132" E
Carlton PV1	39	28° 38' 51.87913859" S	25° 42' 02.89513230" E
Carlton PV1	40	28° 38' 51.12300732" S	25° 42' 04.32246439" E
Carlton PV1	41	28° 38' 50.19844287" S	25° 42' 04.67731062" E
Carlton PV1	42	28° 38' 48.41738788" S	25° 42' 15.77786968" E
Carlton PV1	43	28° 38' 43.31491331" S	25° 42' 15.70472673" E
Carlton PV1	44	28° 38' 43.40610711" S	25° 42' 27.61556876" E
Carlton PV1	45	28° 38' 48.14994420" S	25° 42' 27.60518591" E
Carlton PV1	46	28° 39' 04.71869965" S	25° 41' 45.77186074" E
Mooihoek PV1	47	28° 39' 23.70813646" S	25° 40' 41.50928324" E
Mooihoek PV1	48	28° 38' 59.28199099" S	25° 40' 27.36028941" E

PV AREA VERTICES	No	Lat_y_dms	Long_x_dms
Mooihoek PV1	49	28° 38' 45.44629029" S	25° 40' 29.99583768" E
Mooihoek PV1	50	28° 39' 03.04104657" S	25° 41' 26.74065074" E
Mooihoek PV1	51	28° 39' 12.50338026" S	25° 41' 26.74113826" E
Vadersrust PV	52	28° 38' 26.02121292" S	25° 40' 27.12255936" E
Vadersrust PV	53	28° 38' 26.01321209" S	25° 40' 14.76737771" E
Vadersrust PV	54	28° 38' 20.93610206" S	25° 40' 14.71433936" E
Vadersrust PV	55	28° 38' 20.93469573" S	25° 39' 57.30043533" E
Vadersrust PV	56	28° 38' 16.22587539" S	25° 40' 00.29247432" E
Vadersrust PV	57	28° 38' 05.00705352" S	25° 40' 44.47554199" E
Vadersrust PV	58	28° 38' 28.83110433" S	25° 41' 16.84737699" E
Vadersrust PV	59	28° 38' 39.38197659" S	25° 41' 16.81662016" E
Vadersrust PV	60	28° 38' 47.30611899" S	25° 41' 06.95551748" E
Vadersrust PV	61	28° 38' 47.29035405" S	25° 41' 02.08049776" E
Vadersrust PV	62	28° 38' 51.18709086" S	25° 41' 02.12701149" E
Vadersrust PV	63	28° 38' 40.38459399" S	25° 40' 27.20643041" E
Mooihoek PV2	64	28° 39' 30.03555494" S	25° 40' 45.17120569" E
Mooihoek PV2	65	28° 39' 26.07705480" S	25° 40' 42.89176076" E
Mooihoek PV2	66	28° 39' 15.23963564" S	25° 41' 26.73105689" E
Mooihoek PV2	67	28° 39' 31.34202543" S	25° 41' 26.85304335" E
Cornelia PV	68	28° 39' 31.75892281" S	25° 41' 44.46728959" E
Cornelia PV	69	28° 39' 25.82922128" S	25° 41' 44.40502722" E
Cornelia PV	70	28° 39' 27.99558955" S	25° 41' 56.95624093" E
Cornelia PV	71	28° 39' 18.85868685" S	25° 41' 59.60976367" E
Cornelia PV	72	28° 39' 18.87830911" S	25° 42' 01.74954771" E
Cornelia PV	73	28° 39' 27.39379823" S	25° 42' 28.20414058" E
Cornelia PV	74	28° 39' 31.31658256" S	25° 42' 23.51754997" E

Table A.6. Co-ordinate Centroids of BESS sites

BESS CENTROIDS	No	Lat_y_dms	Long_x_dms
B 1 (Mooihoek BESS new)	1	28° 39' 09.94841576" S	25° 41' 16.41003445" E
B 1 (Mooihoek BESS S)	2	28° 39' 18.63989069" S	25° 41' 31.51724838" E

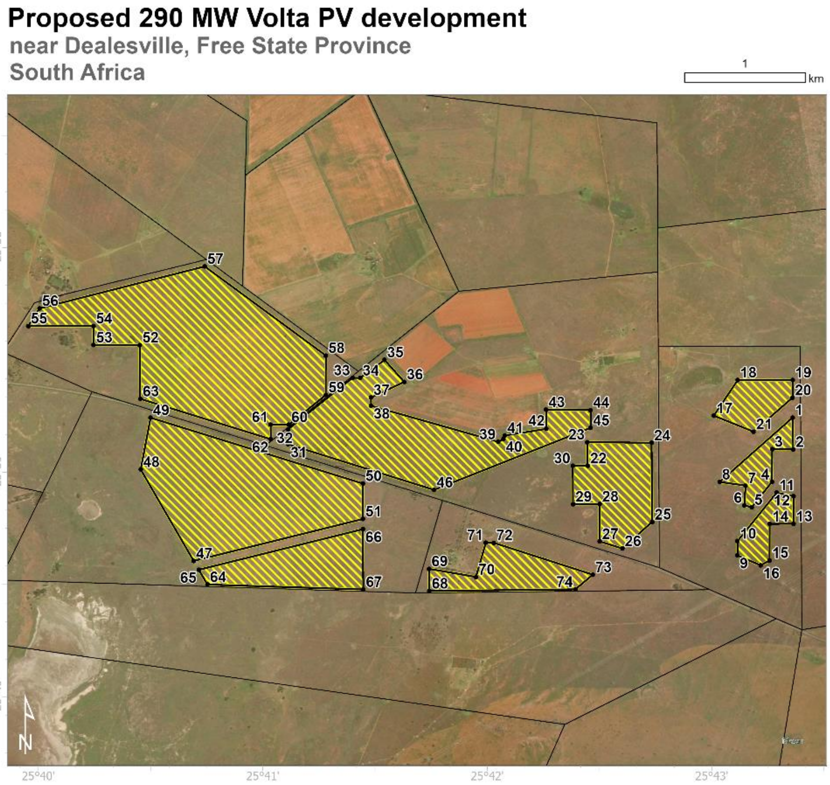
B 1 (Mooihoek BESS N)	3	28° 39' 08.53173547" S	25° 41' 31.25270995" E
B 2 (Oxford BESS S)	1	28° 39' 19.59699201" S	25° 43' 10.97748570" E
B2 (Oxford BESS N)	2	28° 38' 49.94305240" S	25° 43' 04.29853259" E
B 2 (Oxford BESS C)	3	28° 39' 01.36773539" S	25° 43' 10.16283625" E

Table A.7. Co-ordinate Points along the proposed powerline routes of VOLTA EGI

POWERLINE VERTICES	No	Lat_y_dms	Long_x_dms
Overhead 132 kV, SS A to ARTEMIS	1	28° 40' 07.31983323" S	25° 43' 34.48868038" E
Overhead 132 kV, SS A to ARTEMIS	2	28° 40' 08.77596538" S	25° 43' 33.95516950" E
Overhead 132 kV, SS A to ARTEMIS	3	28° 40' 04.95752081" S	25° 43' 22.00312209" E
Overhead 132 kV, SS A to ARTEMIS	4	28° 39' 47.79678058" S	25° 43' 24.88347485" E
Overhead 132 kV, SS A to ARTEMIS	5	28° 39' 28.37898798" S	25° 42' 38.82256148" E
Overhead 132 kV, SS A to ARTEMIS	6	28° 39' 14.30786212" S	25° 41' 55.47125157" E
Overhead 132 kV, SS A to ARTEMIS	7	28° 39' 17.02896773" S	25° 41' 47.15048204" E
Overhead 132 kV, SS A to ARTEMIS	8	28° 39' 16.05058411" S	25° 41' 43.37341950" E
Overhead 132 kV, SS B to ARTEMIS	1	28° 40' 10.96526028" S	25° 43' 33.63256749" E
Overhead 132 kV, SS B to ARTEMIS	2	28° 40' 02.01736216" S	25° 43' 23.27324536" E
Overhead 132 kV, SS B to ARTEMIS	3	28° 39' 46.29094963" S	25° 43' 25.78651447" E
Overhead 132 kV, SS B to ARTEMIS	4	28° 39' 44.00992834" S	25° 43' 22.14713219" E
Overhead 132 kV, SS B to ARTEMIS	5	28° 39' 41.26757690" S	25° 43' 23.34530910" E
Overhead 132 kV, SS B to ARTEMIS	6	28° 39' 24.87439682" S	25° 42' 54.20919388" E

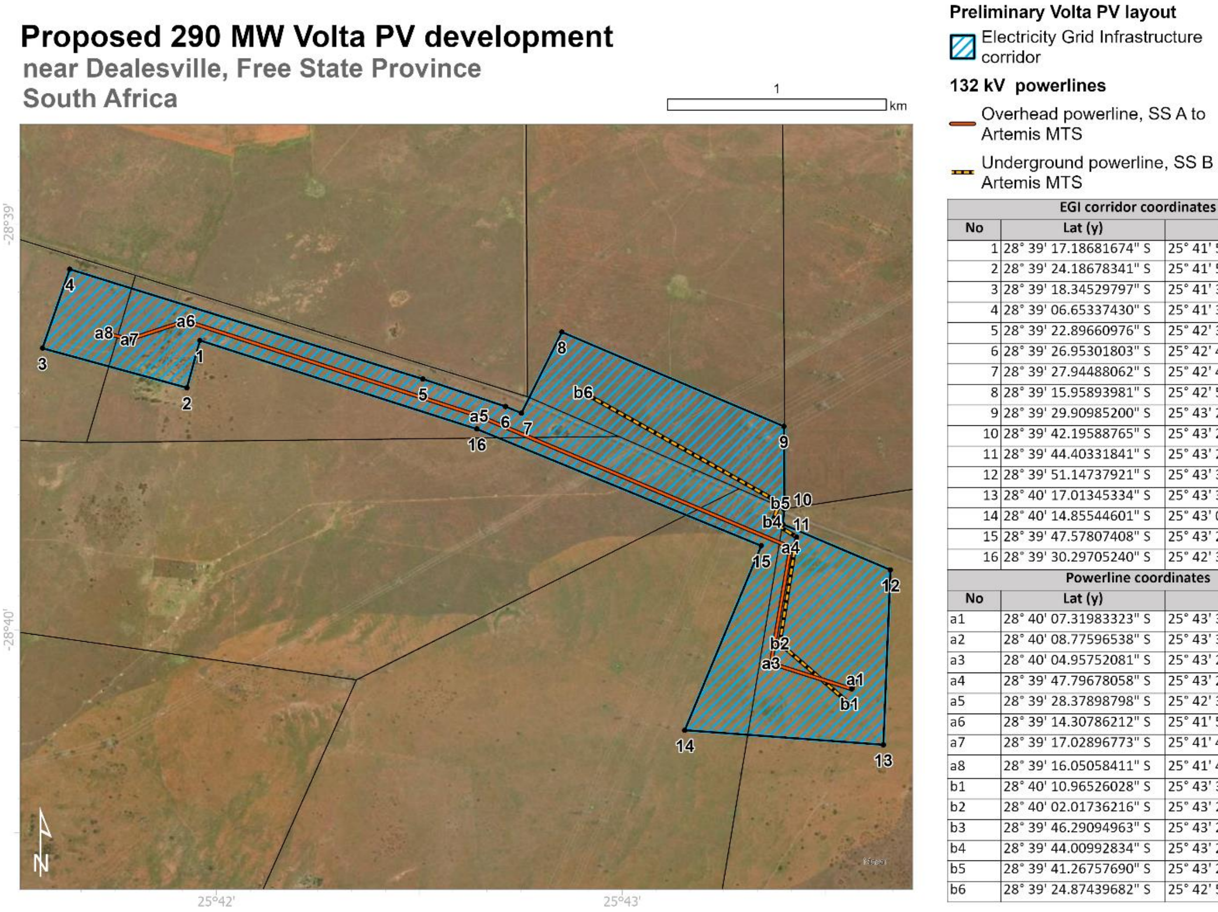
Table A.8. Co-ordinate Points of centroids of VOLTA Substation

SUBSTATION CENTROIDS	No	Lat_y	Long_x
SS A	1	28° 39' 16.19408485" S	25° 41' 39.31018229" E
SS B	1	28° 39' 21.36315937" S	25° 42' 53.42427042" E



Corner coordinates					
No	**Lat (y)**	**Long (x)**	**No**	**Lat (y)**	**Long (x)**
1	28° 38' 45.41165977" S	25° 43' 21.60187681" E	38	28° 38' 42.25584964" S	25° 41' 28.92767132" E
2	28° 38' 53.90710527" S	25° 43' 21.74595436" E	39	28° 38' 51.87913859" S	25° 42' 02.89513230" E
3	28° 38' 53.88374845" S	25° 43' 16.16242035" E	40	28° 38' 51.12300732" S	25° 42' 04.32246439" E
4	28° 39' 02.58530826" S	25° 43' 16.06829054" E	41	28° 38' 50.19844287" S	25° 42' 04.67731062" E
5	28° 39' 09.39124910" S	25° 43' 10.70850330" E	42	28° 38' 48.41738788" S	25° 42' 15.77786968" E
6	28° 39' 08.86345952" S	25° 43' 08.72444791" E	43	28° 38' 43.31491331" S	25° 42' 15.70472673" E
7	28° 39' 03.57915379" S	25° 43' 09.02642479" E	44	28° 38' 43.40610711" S	25° 42' 27.61556876" E
8	28° 39' 02.60749630" S	25° 43' 02.12401013" E	45	28° 38' 48.14994420" S	25° 42' 27.60518591" E
9	28° 39' 22.23941257" S	25° 43' 06.85284164" E	46	28° 39' 04.71869965" S	25° 41' 45.77186074" E
10	28° 39' 18.42333919" S	25° 43' 06.87703228" E	47	28° 39' 23.70813646" S	25° 40' 41.50928324" E
11	28° 39' 05.48198843" S	25° 43' 17.33385169" E	48	28° 38' 59.28199099" S	25° 40' 27.36028941" E
12	28° 39' 06.41673096" S	25° 43' 21.82382912" E	49	28° 38' 45.44629029" S	25° 40' 29.99583768" E
13	28° 39' 13.78979897" S	25° 43' 21.87752283" E	50	28° 39' 03.04104657" S	25° 41' 26.74065074" E
14	28° 39' 13.81553168" S	25° 43' 15.48734146" E	51	28° 39' 12.50338026" S	25° 41' 26.74113826" E
15	28° 39' 23.59238764" S	25° 43' 15.43555509" E	52	28° 38' 26.02121292" S	25° 40' 27.12255936" E
16	28° 39' 24.89827249" S	25° 43' 13.07307289" E	53	28° 38' 26.01321209" S	25° 40' 14.76737771" E
17	28° 38' 44.89060610" S	25° 43' 00.5363257" E	54	28° 38' 20.93610206" S	25° 40' 14.71433936" E
18	28° 38' 35.36660536" S	25° 43' 06.94578737" E	55	28° 38' 20.93469573" S	25° 39' 57.30043533" E
19	28° 38' 35.40213499" S	25° 43' 21.60017773" E	56	28° 38' 16.22587539" S	25° 40' 00.29247432" E
20	28° 38' 40.08305855" S	25° 43' 21.57378223" E	57	28° 38' 05.00705352" S	25° 40' 44.47554199" E
21	28° 38' 49.17288874" S	25° 43' 11.17073101" E	58	28° 38' 28.83110433" S	25° 41' 16.84737699" E
22	28° 38' 58.28820224" S	25° 42' 26.81823873" E	59	28° 38' 39.38197659" S	25° 41' 16.81662016" E
23	28° 38' 51.97091449" S	25° 42' 26.70581412" E	60	28° 38' 47.30611899" S	25° 41' 06.95551748" E
24	28° 38' 52.14178107" S	25° 42' 43.90411159" E	61	28° 38' 47.29035405" S	25° 41' 02.08049776" E
25	28° 39' 13.28436715" S	25° 42' 44.06532282" E	62	28° 38' 51.18709086" S	25° 41' 02.12701149" E
26	28° 39' 20.39760921" S	25° 42' 36.06625489" E	63	28° 38' 40.38459399" S	25° 40' 27.20643041" E
27	28° 39' 18.48577810" S	25° 42' 30.01408675" E	64	28° 39' 30.03555494" S	25° 40' 45.17120569" E
28	28° 39' 08.50558008" S	25° 42' 30.04961823" E	65	28° 39' 26.07705480" S	25° 40' 42.89176076" E
29	28° 39' 08.54975184" S	25° 42' 22.90234571" E	66	28° 39' 15.23963564" S	25° 41' 26.73105689" E
30	28° 38' 58.31739391" S	25° 42' 22.85199530" E	67	28° 39' 31.34202543" S	25° 41' 26.85304335" E
31	28° 38' 52.55552370" S	25° 41' 06.81087108" E	68	28° 39' 31.75892281" S	25° 41' 44.46728959" E
32	28° 38' 48.51400964" S	25° 41' 06.76663739" E	69	28° 39' 25.82922128" S	25° 41' 44.40502722" E
33	28° 38' 34.79408195" S	25° 41' 23.97957002" E	70	28° 39' 27.99558955" S	25° 41' 56.95624093" E
34	28° 38' 34.81094736" S	25° 41' 26.00936648" E	71	28° 39' 18.85868685" S	25° 41' 59.60976367" E
35	28° 38' 29.99712924" S	25° 41' 32.54755946" E	72	28° 39' 18.87830911" S	25° 42' 01.74954771" E
36	28° 38' 35.87558683" S	25° 41' 37.79476157" E	73	28° 39' 27.39379823" S	25° 42' 28.20414058" E
37	28° 38' 40.04648712" S	25° 41' 28.90508156" E	74	28° 39' 31.31658256" S	25° 42' 23.51754997" E

Figure A.3. VOLTA PV Co-ordinate Point Map



EGI corridor coordinates		
No	**Lat (y)**	**Long (x)**
1	28° 39' 17.18681674" S	25° 41' 57.56246888" E
2	28° 39' 24.18678341" S	25° 41' 55.64359684" E
3	28° 39' 18.34529797" S	25° 41' 34.29146782" E
4	28° 39' 06.65337430" S	25° 41' 38.32432389" E
5	28° 39' 22.89660976" S	25° 42' 30.51254835" E
6	28° 39' 26.95301803" S	25° 42' 42.71448473" E
7	28° 39' 27.94488062" S	25° 42' 45.09798272" E
8	28° 39' 15.95893981" S	25° 42' 51.07704303" E
9	28° 39' 29.90985200" S	25° 43' 23.91250079" E
10	28° 39' 42.19588765" S	25° 43' 23.91971880" E
11	28° 39' 44.40331841" S	25° 43' 23.77602303" E
12	28° 39' 51.14737921" S	25° 43' 39.64517742" E
13	28° 40' 17.01345334" S	25° 43' 38.60301969" E
14	28° 40' 14.85544601" S	25° 43' 09.25502455" E
15	28° 39' 47.57807408" S	25° 43' 20.54701821" E
16	28° 39' 30.29705240" S	25° 42' 38.49811551" E

Powerline coordinates			
No	**Lat (y)**	**Long (x)**	
a1	28° 40' 07.31983323" S	25° 43' 34.48868038" E	Overhead SS A to ARTEMIS
a2	28° 40' 08.77596538" S	25° 43' 33.95516950" E	
a3	28° 40' 04.95752081" S	25° 43' 22.00312209" E	
a4	28° 39' 47.79678058" S	25° 43' 24.88347485" E	
a5	28° 39' 28.37898798" S	25° 42' 38.82256148" E	
a6	28° 39' 14.30786212" S	25° 41' 55.47125157" E	
a7	28° 39' 17.02896773" S	25° 41' 47.15048204" E	
a8	28° 39' 16.05058411" S	25° 41' 43.37341950" E	
b1	28° 40' 10.96526028" S	25° 43' 33.63256749" E	Overhead SS B to ARTEMIS
b2	28° 40' 02.01736216" S	25° 43' 23.27324536" E	
b3	28° 39' 46.29094963" S	25° 43' 25.78651447" E	
b4	28° 39' 44.00992834" S	25° 43' 22.14713219" E	
b5	28° 39' 41.26757690" S	25° 43' 23.34530910" E	
b6	28° 39' 24.87439682" S	25° 42' 54.20919388" E	

Figure A.4. VOLTA EGI Co-ordinate Point Map

All specialist assessment who assessed the EGI considered the negotiated powerline route within the assessed EGI corridor.

A.5 Project Description

The technical information on these components is also discussed within this sub-section. It is however important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering phase (subsequent to the issuing of EAs, should such authorisations be granted for the proposed projects) but that the information provided below is seen as the worst-case scenario for the project. The information presented in Table A.9 applies to VOLTA PV and Table A.10 applies to the VOLTA EGI.

A.5.1 VOLTA PV

The proposed solar PV facility and BESS will consist of the key components listed below in Table A.9 and will be developed with a possible maximum installed capacity of 290 MW of electricity from PV

solar energy. The developer has identified the need for two independent BESS storage systems due to the amount of solar PV (at least 1,5GW) connecting to Artemis MTS from multiple developers.
The footprint area of the proposed BESS sites are 48ha in extent. The final footprint of the BESS is however likely to be significantly less, but a larger assessed area allows for micro-siting of the BESS components to avoid possible site sensitivities and implement larger buffers if necessary. Thirty hectares of the BESS sites are within PV footprint areas and 18 ha is allocated as BESS only.

Table A.9. Description of the Project Components for VOLTA PV

Project Description for VOLTA PV 290 MW Solar PV and BESS		
Component	**Dimensions / Specifications**	
Solar PV	Height of PV panels:	Max 3,5m
	Capacity of the PV Facility:	290 MW
	Area of PV Array (i.e. proposed area occupied by PV Modules):	500 hectares
	Total developable area (i.e. the area that includes all associated infrastructure within the **fenced** off area of the PV facility):	720 hectares
	Number of inverter-transformer stations:	1050 inverters 30 inverters (per Tx station) x 35 Tx stations 800V/33000V
	Area occupied by inverter-transformer stations and height:	The inverters are distributed evenly and mounted in the array field on a small plinth 2x2m, the 35 Tx stations are distributed evenly throughout the solar arrays each having underground cables (800V) from 30 inverters trenched to them. The Tx stations will have a 33 kV underground cable that carries the power to two 33/132kV collector stations as shown on the plan as Substations a & b (SSa & SSb).
Construction Compound	Construction camp area (ha):	2 – 3 Ha
	Temporary laydown area (ha):	2 to 3 Ha
Main access roads	Width of access roads (m):	5m
	Length of access roads (km):	Less than 500m
Internal access roads to be constructed between different development portions	Width of access roads (m):	4m
	Length of access roads (km):	Approx. 20km of internal roads – in order for security patrols and to access all the equipment (module cleaning and equipment maintenance)
Upgrading of existing access road/s	Yes / No:	Yes – no tar, only aggregate
	Current width (m):	4m turn into farm
	Upgraded width (m):	5m
Warehouse/Workshop	Maximum height (m):	3,6m
	Footprint (m²):	300m2
Site offices	Number of buildings:	4
	Maximum height (m):	3,6

Project Description for VOLTA PV 290 MW Solar PV and BESS		
Component	**Dimensions / Specifications**	
	Footprint (m²):	500m2
Operational and Maintenance Control Centre Building	Maximum height (m):	2
	Footprint (m²):	300m2
Guard houses	Maximum height (m):	3,6
	Footprint (m²):	100m2
Ablution facilities	Maximum height (m):	3,6
	Footprint (m²):	50m2
Battery storage	Battery technology type (preferred):	Lithium-Ion, Sodium-Ion, Solid State
	Battery technology type (alternative):	Redox Flow, Liquid Metal (https://ambri.com/) and other technology types will be considered
	Approx. footprint (ha):	BESS Site B1:Mooihoek BESS N Mooihoek BESS S & Cornelia BESS = TOTAL 26.31ha BESS Site B2: Oxford BESS N, Oxford BESS C & Oxford BESS N = TOTAL 20.95ha
	Maximum height (m):	Containers approx.. 6x3 x 3 (3m max height)
	Capacity:	BESS Site B1; approx. .550MVA / 2200 Mwh (Store 100% of VOLTA PV average daily yield energy for 4 hours) BESS Site B2: approx. 450MVA / 1800Mwh The same Substations (SSa and SSb) and powerlines to Artemis MTS that are to be used for connecting the Solar PV to the grid will be used the for battery power evacuation at night when solar generation is inactive.
	For the storage and handling of a dangerous goods (e.g., electrolytes), where such storage occurs in containers on site, have a combined capacity of 80 m^3 or more but not exceeding 500 m^3 at any one time?	We have engaged a specialist to advise and ensure we can meet the Health and Safety Compliance and mitigate any hazardous substance risk Debra Mitchell from iSHEcon

A.5.2 VOLTA EGI

The proposed VOLTA EGI will consist of the key components listed below in Table A.10. The proposed project comprises a 132 kV overhead and underground power line from the proposed VOLTA PV collector substations to Artemis MTS near Dealesville in the Free State Province. The line is assessed within a 135 m wide corridor (note this is the narrowest width). There are two project substations, SSa, the westerly one and SSb, the easterly one, each with a footprint of approximately 4 hectares. An overhead power line is planned from substation SSa to Artemis MTS and an underground power line is planned from substation SSb to Artemis MTS.

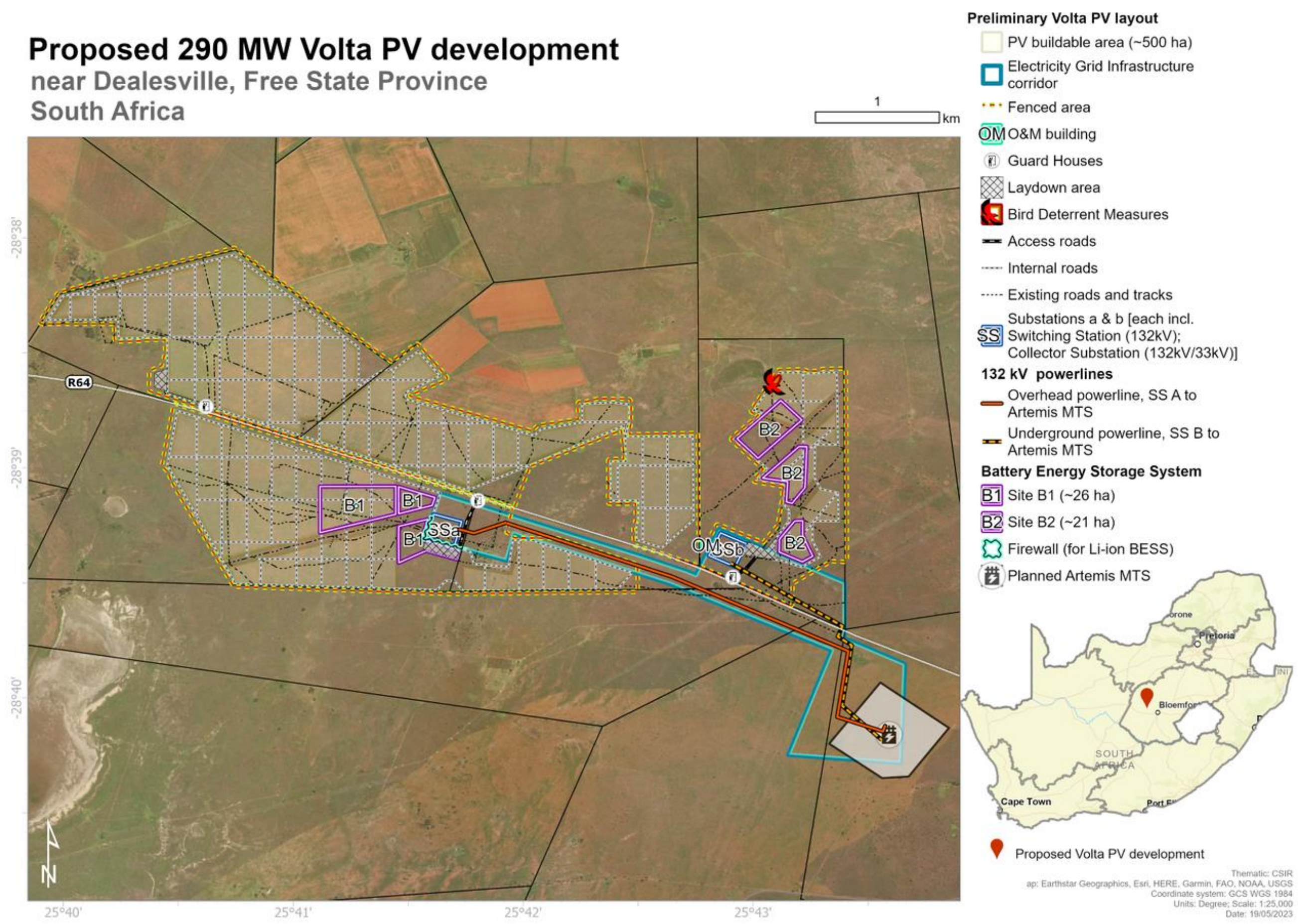


Figure A.5. VOLTA PV and EGI layout

Table A.10. Description of the Project Components for VOLTA EGI

Project Description for VOLTA EGI		
Component	**Dimensions / Specifications**	
On-site substation hub (including collector and/or switching yard)	Number of substation alternatives:	No alternatives as the Artemis MTS position has been set by ESKOM as well as collector substation SSa as they were set for REIPP Rounds 5 and 6 projects. The same Substations (SSa and SSb) and powerlines to Artemis MTS that are to be used for connecting the Solar PV to the grid will be used the for battery power (BESS Site 1 and BESS Site 2) evacuation, at night when solar generation is inactive.
	Footprint (ha):	For each substation SSa and SSb a 0,7 ha platform for substation, surrounded by 4ha, fence. The remainder of 4ha is open ground for overhead lines to turn and connect into the substation

<table>
<tr><th colspan="3">Project Description for VOLTA EGI</th></tr>
<tr><th>Component</th><th colspan="2">Dimensions / Specifications</th></tr>
<tr><td rowspan="2"></td><td>Capacity:</td><td>Each approx. 500MVA on substations SSa and SSb</td></tr>
<tr><td>Height (m):</td><td>Max 30 m (lightening conductors)
132kV OHL pylons need 16m clearance from ground (including earth and structure 20m maximum height)
All other plant including transformers, CTs, VTs Breakers, SCADA and control room, fencing etc will be below 10m</td></tr>
<tr><td rowspan="5">Internal transmission and/or distribution lines</td><td>Under or aboveground:</td><td>Underground</td></tr>
<tr><td>Capacity (kV):</td><td>800V from inverters to containerised mini-subs. 33kV from mini-subs to substations SSa and SSb</td></tr>
<tr><td>If above: height (m)
If below: maximum depth (m)</td><td>Max depth 1M</td></tr>
<tr><td>If above - width of service road below powerline(s) (m):</td><td>As per ESKOM spec- see attached ESKOM restrictions document</td></tr>
<tr><td>Length (m):</td><td>Estimate</td></tr>
<tr><td rowspan="9">Overhead transmission powerlines for connection of PV facility, via SSa to existing national grid and for connecting BESS Site 1 to national grid via SSa, at night when solar generation is inactive.</td><td>Capacity (kV):</td><td>132 kV</td></tr>
<tr><td>Pylon type:</td><td>Monopole Twin circuit – various designs available</td></tr>
<tr><td>Tower type:</td><td>Monopole</td></tr>
<tr><td>Height (m):</td><td>Max 20m</td></tr>
<tr><td>Foundation:</td><td>Concrete with anchors</td></tr>
<tr><td>Width of registered servitude (m):</td><td>See attached ESKOM restrictions document 18 meters</td></tr>
<tr><td>Width of service road below powerline (m):</td><td>5m</td></tr>
<tr><td>Width of powerline corridor for specialist assessment (m):</td><td>30m</td></tr>
<tr><td>Length of powerline (km):</td><td>Less than 4km from VOLTA PV collector substation SSa to Artemis MTS of 132kV overhead line</td></tr>
<tr><td rowspan="8">Underground transmission powerlines for connection of PV facility, via SSb to existing national grid and for connecting BESS Site 2 to national grid via SSb, at night when solar generation is inactive.</td><td>Capacity (kV)</td><td>132 kV</td></tr>
<tr><td>Trench width (m)</td><td>3.6m</td></tr>
<tr><td>Trench Depth (m)</td><td>1.2m</td></tr>
<tr><td>Width of registered servitude (m):</td><td>15m</td></tr>
<tr><td>Width of service road next to powerline (m):</td><td>5m</td></tr>
<tr><td>Width of powerline corridor for specialist assessment (m):</td><td>30m</td></tr>
<tr><td>Length of powerline (km):</td><td>Less than 2.1km from VOLTA PV collector substation SSb to Artemis MTS of 132kV OHL</td></tr>
<tr><td>Any additional infrastructure – please describe?</td><td>Danger tape will be placed 30cm above the cable and 70cm below ground (at least one tape for each circuit) At joins a widening of the trench will be needed (approx. double the width)</td></tr>
</table>

A description of the key components of the proposed projects are described below.

A.5.3 Solar PV and BESS Facilities

As noted above, the total footprint of the solar PV facility is estimated to be approximately 520 hectares (ha). This will include the development of the solar field, BESS buildings and associated infrastructure, as detailed above. With access roads, the PV Facility will cover an area of approximately 540 ha. The exact number of solar panels arrays, confirmation of the foundation type and detailed design will follow as the development progresses but a preliminary site layout plan has been included in Appendix B of this report.

- **PV Modules**

The smallest unit of a PV installation is a cell. A number of cells form a module, and several modules cumulatively form the arrays (Figure A.6). An example of a Solar PV Facility is provided in Figure A.7.

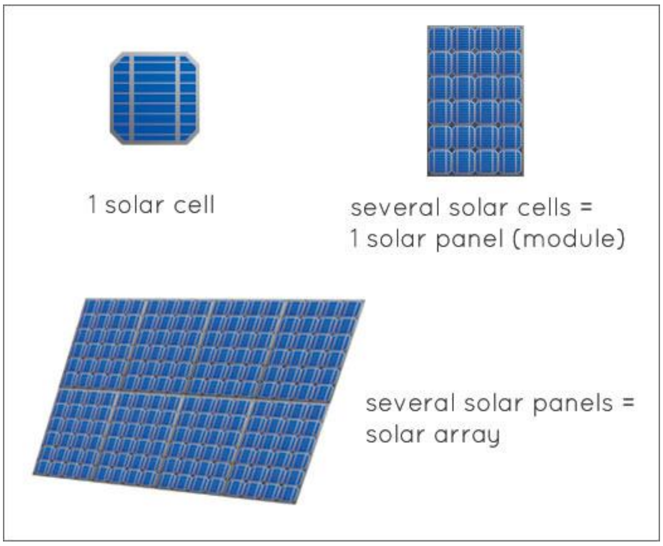


Figure A.6. Components of the Proposed PV Installation

Modules are arranged into strings that form the solar field and are installed on racks which are made of aluminium or galvanised steel. Foundations will likely be drilled and concreted into the ground. The entire structure is not expected to exceed 3.5 m in height (measured from the ground), which is considered the worst-case. This system may be fixed, or may track the movement of the sun, either by adopting Fixed Axis Tracking (aligned east-west), Single Axis Tracking (aligned north-south), Dual Axis Tracking (aligned east-west and north-south), Fixed Tilt Mounting Structures or Bifacial Solar Modules as explained above. Bifacial panels can be up to 20 - 40 % more effective since it also utilises solar radiation reflected from the surfaces onto the rear side of the panels. The tracker design will be confirmed during the detailed engineering phase. The facility illustrations included in Appendix B are based on the tracker rows running from North to South, with east-west tracking.

Figure A.7. Example of PV Technology (DEFF, 2019)

- **Lithium-Ion, Sodium-Ion, Solid State BESS**

The VOLTA Solar PV facility will have Battery Energy Storage Systems (BESS) of up to 2200MWh located adjacent the VOLTA substation SSa named BESS Site 1. A further 1800MWh BESS named BESS Site 2 is planned on the farm Oxford 1/1030, and this will feed to substation SSb then into the Artemis MTS. The preferred battery technology at draft stage was solid state Lithium-ion such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or sodium-ion systems. Alternative technologies being considered include Redox flow (typically vanadium) as well as Liquid Metal (Ambri technology). Since the Draft Basic Assessment was submitted the Redox Flow battery using Vanadium electrolyte has emerged as a new preferred battery technology. There are many advantages in using this

Vanadium Redox Battery (VRB)

- The battery can be scaled up or down in its storage capacity by adding and removing the amount of electrolyte fluid
- It can be charged and discharged at the same time.
- It has a long life span (20 years). This avoids hazardous waste disposal
- The Vanadium is the value item in the battery and it can be recoverd during decommissioning, removoing it form the environment and redeploying/selling it for its mineral value.
- There is more than 70% local content facilitating VRB supply and availability. Vanadium is abundantly available in South Afirca. This local content also makes it attractive from an economic/employment and investor point of view.
- The only risk associated with VFB’s is leaking of mildly acidic electrolyte fluids and this can be effectively avoided by using secondary and even tertiary containment as well as placing the batteries 100m from watercourses
- The other battery technologies do haved some degree of fire and explosion risk although it is low, it is costly to mitigate witth fire suppression, spacing of battery modules and fire-walls/barriers.
- With VRBs there is no fire risk

The specific technology or mix of technologies chosen will only be determined following Engineering, Procurement and Construction (EPC) procurement. It is likely that new technologies will emerge in the 12 to 36 months it takes to complete the detailed design phase. Many factors will be taken into account including: environmental impact, availability, safety, performance and local content, when the technology choices are made.

The BESS will probably be pre-assembled and delivered to site for placement as per specifications of the supplier. It is proposed that the BESS would be housed in containers, with an associated operational, safety and control infrastructure. The BESS will be a sealed unit and will remain sealed during operations. The BESS's will be located adjacent to the on-site substations.

The supplier of the BESS will be confirmed during the detailed design, however the associated impacts and management measures have been captured in Section E of this BA Report, as well as the EMPr included in Appendix G.

The evacuation of power from the VOLTA BESS will use the same VOLTA EGI at night when solar generation is inactive. The substations (SSa and SSb), powerlines and grid connection to the Artemis MTS are all suitable and matched to the planned transmission capacity of the VOLTA BESS.

Battery storage offers a wide range of advantages to South Africa including electricity supply reliability and quality improvement. The main purpose of the BESS is to mitigate intermittency of solar PV energy by storing and dispatching of electricity when needed i.e. to contribute to the grid 24 hours/day, during peak demand at night or during power outages. In essence, this technology allows renewable energy to enter the completely independent power generation market.

- **Converters/Inverters, Low Voltage Cables, and Medium Voltage Cables**

As mentioned above, the solar arrays are typically connected to each other in strings, which are in turn connected to converters/inverters that convert DC to AC. Appendix B of the BA Report includes a facility illustration and example of a typical converter/inverter station. Each converter/inverter station is expected to be lower than 3.6m (apart from lightening conductors) and have a footprint of 18m^2.

The strings will be connected to the converter/inverter stations by low Voltage underground (internal) DC cables (to a maximum depth of 1.4 m) or cable trays. Power from the converter/inverter stations will be collected in medium Voltage transformers through underground (internal) AC cables, cable trays or AC cables which will be below ground or pole-mounted depending on Voltage level and site conditions.

The inverter stations will in turn be connected to the proposed on-site substations, via medium Voltage (33 kV) internal underground cables or above ground power lines. It is highly unlikely that above ground 33 kV power lines will be utilised due to the shading created to the PV plant from the overhead lines. It is more likely that the 33 kV internal cables will be underground to a maximum depth of 1.6 m.

The 33 kV cables or power lines will feed into the on-site substations where the Voltage will be increased to transmit the power via two 132 kV overhead and underground power lines into the national grid system via the planned Artemis MTS.
VOLTA will be responsible for all mini-substations and 33 kV cabling to the substations SSa and SSb. The substations SSa and SSb are dealt with in the EGI BA. VOLTA and other IPP projects will construct the 132 kV substations SSa and SSb and the 132 kV powerlines for their projects, within the

VOLTA EGI, Once completed Eskom will take over EGI, i.e. the substation sections beyond the 33 kV sections, that transform power to 132 kV and the 132 kV powerlines.

- **Internal Roads**

Internal roads will also be constructed within the footprint of the PV Facilities. The internal roads are expected to be composed of gravel and extend approximately 4 m wide. The total internal road length is estimated at approximately 20 km. The total internal road length may vary slightly, depending on the final design.

- **External Access Roads**

The Traffic Impact Statement (Appendix C.10 of the BA Report) states that the existing road network surrounding the proposed development is well established and provides a high degree of mobility and access. The mobility roads join the major centres and towns with each other, while access roads provide access roads from smaller nodes and individual properties than mobility roads. The existing road networks in the Free State Province are predominantly mobility roads; in most cases, the arterials and collector roads are surfaced. The surfaced roads are generally in a fair condition with many of the roads requiring remedial action in the short and medium term. The development is located either side of an existing mobility road. Several existing access points are located along Road P59-2 (R64).

Due to access to different sections of the project directly off the R64 mobility road, only about 500m of gravel road will need upgrading to accommodate larger vehicular traffic from the mobility road to the lay down areas.

Exact specifications of the widening and upgrading of the unnamed farm gravel road will be confirmed during the detailed design phase. The widening and upgrading also depends on the expected vehicular volumes and type of vehicles that would use the road. This will determine the specific road geometry regarding width, road foundational structure (layer thicknesses), etc. ***Typically for PV projects***, the roads classified to accommodate larger vehicular traffic and loads would be upgraded or upsized as follows:

- Wider gravel wearing coarse road widths (ranging up to 5 m) and a thicker dimension (up to 200 mm thick);
- Dependent on the in-situ soil properties, the edge constrains on either side of the gravel wearing coarse might be required in the form of either kerbing or a compacted shoulder to protect the road surface;
- The lower road foundational layers would follow the widened wearing coarse dimensions;
- Additional foundational layers would usually be required in the form and thickness of 150 mm selected quality subgrade materials that would have to attain specific engineering qualities; and
- There might also be specific surface water infrastructure required to manage surface water runoff in the form of side channelling, conduits crossing the road structure or additional earthwork shaping.

Such upgrading and widening has been accommodated for in the relevant listed activities applicable to the proposed project. Refer to Section A.11 of this Final BA Report.

The Traffic Impact Statement (Appendix C.10 of the BA Report) notes that it is anticipated that the imported components required for the solar plants will arrive at the Gauteng and the Port of Durban.

- **Panel Maintenance and Cleaning Area**

During the operational phase, the accumulation of dust on solar panels generally negatively influences the productivity of solar facilities. As such the panels require regular cleaning. It is proposed that panel cleaning will take place quarterly; however, this may be revised should the site conditions warrant more frequent cleaning. A dedicated panel maintenance and cleaning area will be required on site during the operational phase.

- **Storm water**

The following design principles are proposed to manage storm water overland flow and mitigate erosion:

- The area where the solar panels will be installed will not be cleared. The vegetation will only be trimmed and the panels will be installed on steel supporting structures above the height of the vegetation;
- The internal plant roads are proposed to be constructed level with the natural ground level to prevent the channelization of the surface water. This will also prevent concentrated surface runoff erosion;
- For the scattered small ridges that have localized steeper gradients it is proposed that localized storm water cut-off channels be implemented above the areas only when evidence of erosion is observed at the natural state (prior to construction); and
- At loading areas and building structures, allowance will be made to minimize any erosion that might occur. This can be achieved by placing vegetated grass blocks on the verges of these hardened areas to limit flow velocity and to assist with the recharge of the water table.

Therefore, the existing rainfall and storm water runoff characteristics will not be changed with the construction should the proposed design principles be implemented. The solar panels will not replace the vegetated area and thus storm water runoff is not increased due to the proposed PV development.

Details of storm water management are to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. It is proposed that a detailed storm water management plan be developed during the detailed design phase. Recommendations for the management of storm water are discussed in Section D of this BA Report and Appendix G - K (the EMPrs).

- **Building Infrastructure**

The solar field will require on-site buildings, including the following:

- Offices (maximum height 3.6 m and footprint of 500 m^2);
- Operational and maintenance control centre (maximum height 2 m and footprint 300 m^2);
- Warehouse/workshop for storage of equipment (maximum height 3.6 m and footprint 300 m^2);
- Ablution facilities (maximum height 3.6 m and footprint 50 m^2);
- On-site substation building (For each substation SSa and SSb a 0,7 ha platform for substation, 4ha surrounded by a, fence. Maximum height of 20m except for 30m lightening conductors; and

- Guard Houses / security enclosures (height 3.6 m, footprint 100 m^2).

A laydown area with a maximum footprint of 3 ha will also be constructed.

A.5.4 EGI

- **Substations and Power Lines to the Artemis Substation**

The solar PV facility has two substations and two dedicated 132 kV power lines that will connect the proposed facilities to the planned Artemis Substation.

All specialists required to assess the EGI, have assessed the impacts of 132 kV powerlines from the two VOLTA PV substations to the Artemis MTS. The proposed project comprises two 132 kV overhead and underground power lines from the proposed VOLTA PV collector substations to Artemis MTS. There are two project substations, SSa the westerly one and SSb, the easterly one, each with a footprint of approximately 4 hectares. An overhead power line is planned from substation SSa to Artemis MTS and an underground power line is planned from substation SSb to Artemis MTS. The overhead route and SSa is to be shared by the neighbouring project Ngonyama (Part of the ibVogt Marula cluster), awarded preferred bidder status in bid round 6. This sharing avoids duplication of EGI Infrastructure.

The overhead power lines will extend approximately 20 m in height. Each line will be constructed within an approximately 30 m wide servitude on the farm properties affected by the power lines. The underground powerline will require a trench width of approximately 3.6m and a depth of 1.2 m. The estimated power line lengths are noted below:

- Overhead powerline: Approximately 4 km; and
- Underground powerline: Approximately 2.1 km;

The overhead line will consist of either self-supporting suspension structures or guyed monopoles. Insulators will be used to connect the conductors to the towers. The span lengths are estimated to range between 200 m and 300 m.

The underground line will have danger tape placed 30cm above the cable and 70cm below ground (at least one tape for each circuit). After trenching, first bedding (soft garden soil with no rocks, stones, pebbles or any hard objects) about 200 mm thick will form a base layer. Then the cables will be laid and covered afterwards with 300 mm of blanket material – same as the bedding material. This is followed by danger tape (at least one tape for each circuit) and finally the backfill to the top (natural ground level). Seven joins might be required along the length of the line. At each join there will be 9 join containers of about 0.75 m wide x 2m long each, next to each other. At joins a widening of the trench will be needed. A servitude of about 15m width is required for access/construction space. Exact specifications will be confirmed during the detailed design phase.

All power lines will be constructed within the assessed 135 m to approximately 700 m wide EGI corridor and specialists have assessed the proposed routes within the EGI corridor.

- **Associated Infrastructure**

Service roads will also be constructed below the power lines for maintenance purposes. The service roads are expected to be composed of gravel and extend approximately 5 m wide. The road length may vary slightly, depending on the final design.

For the underground powerline, service roads will be positioned adjacent to the 3.6 m wide trench. and 3.6 m wide area cleared of vegetation with maximum 8 m for a short distance at the cable joins.

- **On-site Substations**

The proposed project will also include two on-site substations and/or a switching substation collectively. For each substation SSa and SSb a 0,7 ha platform for a substation, surrounded by 4 ha, fenced area is proposed. The remainder of 4ha is open ground for overhead lines to turn and connect into the substation. The capacity for each of the substations is 500 MVA on SSa and SSb. There is also the requirement for the installation of a lightning mast within the substation yards. The maximum heigh is 30 m for lightening conductors. All other plant including transformers, CTs, VTs Breakers, SCADA and control room, fencing etc. will be below 10m.

It is important to note that all 33 kV infrastructure leading up to the on-site substations (SSa and SSb) (the Points of Connection) are the Project Applicants/VOLTAs sections of the proposed on-site substations and will remain the VOLTA's responsibility. The high voltage (132 kV) infrastructure, from the Points of Connection at the on-site substations SSa and SSb, to the planned Artemis Substation line bay, will be handed over to Eskom and are covered by the EGI section of this BA. This infrastructure that will become Eskom's, includes the 33 kV to 132 kV transformer sections of substations SSa and SSb and the powerlines from substations SSa and SSb to and including the Artemis MTS. The 132KV switchgear and measurement infrastructure, including SCADA, CT's and VT's are transferred to ESKOM, the complete collector, switching substation. This has to be done as EKSOM must integrate these 2 substation SSa and SSb into their distribution network in order to control, co-ordinate and ensure safety of the ESKOM network (fibre optic communication link integrates SSa and SSb into the ESKOM National Control Network.

A.6 Overview of the Project Development Cycle

The following section covers both the PV facility and EGI component of the project. The project can be divided into the following three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Each activity undertaken as part of the above phases may have environmental impacts and, where applicable, has therefore been assessed by the specialist studies (summarised in Section D and full studies included Appendix C of this BA Report).

A.6.1 Construction Phase

The construction phase will take place subsequent to the issuing of EAs from the DFFE and a successful bid in terms of the REIPPPP (i.e., the issuing of a PPA from the DMRE). The construction phase for the proposed project is expected to extend 12 to 18 months.

The main activities that will form part of the construction phase per PV project are:

- Removal of vegetation for the proposed infrastructure, where necessary;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Stockpiling of topsoil and cleared vegetation, where necessary;
- Creation of employment opportunities;
- Transportation of material and equipment to site, and personnel to and from site; and
- Construction of the solar field, and additional infrastructure.

A.6.2 Operational Phase

The following activities will occur during the operational phase of the PV project:

- The generation of electricity from the proposed solar facility; and
- Maintenance of the solar field and associated infrastructure.

During the life span of the proposed project (approximately 20 years), on-going maintenance will be required on a scheduled basis. In general, maintenance on the structures will involve visual inspection, and only equipment that fails will be replaced in manner similar that of construction activities. The EMPrs (Appendix G - K of this BA Report) includes the requirement for method statements to be compiled prior to the operational phase to describe the manner in which maintenance will be undertaken for the structures and infrastructure impacting on watercourses.

A.6.3 Decommissioning Phase

The main aim of decommissioning is to return the land to its original, pre-construction condition. Should the unlikely need for decommissioning arise (i.e., if the actual solar facility becomes outdated or the land needs to be used for other purposes), the decommissioning procedures will be undertaken in line with the EMPr and the sites will be rehabilitated and returned to the pre-construction state.

A.7 Socio-Economic

A.7.1 Employment during Construction

During the construction phase, both skilled and unskilled temporary employment opportunities will be created. It is difficult to specify the actual number of employment opportunities that will be created at this stage; however, employment opportunities are in the region of 250. The skills breakdown of employment opportunities is estimated as 50% low-skilled, 20% semi-skilled and 30% skilled personnel. It should be noted that the employment opportunities provided in this report are estimates and is dependent on the final engineering design and the REIPPPP Request for Proposal provisions at that point in time.

A.7.2 Employment during Operations

The proposed development will create in the region of 20 to 30 full time employment opportunities during the 20 to 25 year operational phase, of which ~ 70% will be unskilled, 25% semi-skilled and 5% skilled personnel. These unskilled jobs will be linked to services such as panel cleaning, maintenance and security.

A.7.3 Socio-Economic Investment and Development

The Applicant will ultimately own the project, if successful, and will compile an Economic Development Plan which will be compliant with REIPPPP requirements and will inter alia set out to achieve the following:

- Create a local community trust or similar (as required by REIPPPP) which has an equity share in the project life to benefit historically disadvantaged communities;
- Initiate a skills development and training strategy to facilitate future employment from the local community;
- Give preference to local suppliers for the construction of the facility; and
- Support local community upliftment projects and entrepreneurship through socio-economic and enterprise development initiatives.

A.8 Traffic Generation

As noted above, in terms of traffic generation, a Traffic Impact Statement, as technical input for this BA, has been commissioned and included in Appendix C.18 of this BA Report. The types of materials and equipment that will need to be transported to site during the construction phase include the following:

- Building materials will be transported by single-unit trucks within the road freight limitations of South Africa;
- Transformers and switch gears will be transported with the following abnormal load dimensions; width: 4.5 m, length: 27 m and height: 4.5 m on double axle trucks within the road freight limitations of South Africa.
- Workers from the surrounding area will be transported by taxi/bus/shuttle or private car.
- Transformers will be transported by abnormal load trucks with the following dimensions: width: 13 m, length: 4.0 m and height: 4.5 m for which a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act and authorisation needs to be obtained from the relevant road authorities to modify the road reserve to accommodate turning movements at intersections.

During the construction, operational and decommissioning phases, the following estimated number of daily trips for the solar PV plant have been calculated:

- **Construction Phase: Total 67 Daily Trips (i.e., in and out)**
  - 44 Light Vehicles trips
  - 5 Heavy Bus trips
  - 9 Heavy Construction Delivery Trips
  - 5 Heavy Delivery trips

- **Operational Phase: Total 25 Daily Trips (i.e., in and out)**

  - Operation & Maintenance Phase (O&M) – 25 Daily Trips
  - 10 Light Vehicles trips
  - 15 Heavy Delivery trips

- **Decommissioning Phase: 10 Daily Trips (i.e., in and out)**
  - 4 Light Vehicles trips
  - 2 Heavy Bus trips
  - 4 Heavy Removal Trips

Refer to Figure A.9 for an illustration of the total number of daily trips for the PV project.

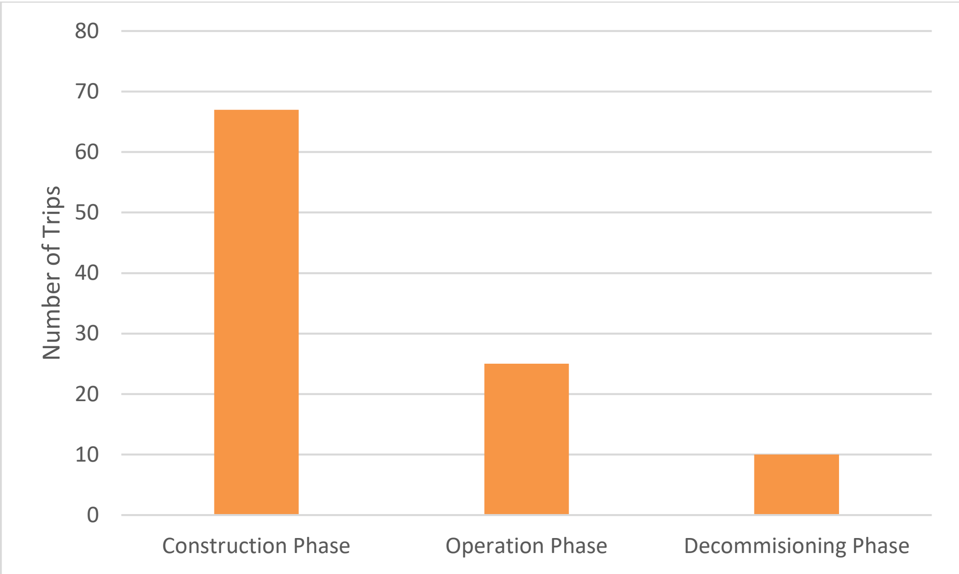


Figure A.8. Total Daily Trips for the VOLTA PV Facility

No additional traffic is expected for the EGI component as construction will occur at the same time as the PV facility.

Refer to the Traffic Impact Statement included Appendix C.18 of this BA Report for a complete description of the assumptions used in the trip calculations noted above. It is important to note that the Traffic Impact Statement has assumed the worst-case construction period of 24 months, and has assumed that water will be trucked in from the municipality (in order to cater for potential traffic generation for water requirements). The section below provides a description of the water usage requirements.

A.9 Service Provision: Water Usage, Sewage, Solid Waste and Electricity Requirements

The Project Applicants have consulted with the Tokologo Local Municipality in order to confirm the supply of services (in terms of water usage, sewage removal, solid waste removal, and electricity requirements) for the proposed project. The municipality was also consulted with as part of the 30-day public review period of the Draft BA Report. The project applicant has had verbal support for municipal services and has received written reply of support which can be found in Appendix M.

However, it must be noted that should the local municipality not have adequate capacity available in the future for any reason, for the handling of solar waste, provision of water and sewage handling provisions; then the Project Applicants will make use of private contractors to ensure that the services are provided. An outline of the services that will be required are discussed below.

A.9.1 Water Usage

During the construction phase, approximately 64 573 m^3 of water will be required per annum. Water will be required for human consumption and construction activities. This is also classified as potable water and should be of a reputable source and conform to SANS quality standards. The decommissioning phase is also expected to result in the same water usage requirements.

During the operational phase, it is estimated that the panel washing process, and human consumption as well as other operational phase activities will require approximately 6 683 m^3 litres of water per year. The water for panel washing does not need to meet the same quality standards as that required for potable water, however the water should be tested to ensure that it does not negatively impact on the mechanical equipment. Potable water is not available from an existing municipal infrastructure system and therefore needs to be sourced and imported and safely stored on site. The low operational annual figure is based on recovery of 50% or more of the panel washing water. The developer recognises the need for water saving measures and recycling of panel washing water is planned. This method uses a mobile filtration de-ioniser, particulate filter and no soaps.

Water required for the construction, operational and decommissioning phases will preferably be sourced from the Tokologo Local Municipality via trucks from Dealesville. Water will be stored on site in the vicinity of the O&M Building. As indicated above, the BA Process has addressed the aspect of trucking in water from the municipality to the proposed project sites (Refer to the Geohydrological Impact Assessment in Appendix C.16 of this BA Report. Although the intention is not to use borehole water, the location of existing boreholes on the PV affected farms are indicated in the Geohydrology Assessment.

The Geohydrology Assessment (Appendix C.16 of the BA Report) notes that should a need arise for the abstraction of underground water from existing boreholes throughout the lifetime of the project, the legal status of groundwater use at each property should be confirmed. If groundwater is available and suitable, water pipelines may need to be constructed in order to transfer groundwater from the existing boreholes to the PV facility.

Storage tanks will also be allowed for at the on-site substation control room, as well as the O&M Building but this is localised small tanks for household use.

A.9.2 Sewage or Liquid Effluent

The proposed projects will require sewage services during the construction, operational and decommissioning phase. Low volumes of sewage or liquid effluent are estimated. More specifically, it is estimated that approximately 55 m^3 per month per project will be generated during the construction phase. During the operational phase, it is estimated that 3 m^3 per month per project will be generated.

Liquid effluent will be limited to the ablution facilities during the construction and operational phases. Portable sanitation facilities (i.e. chemical toilets) will be used during the construction phase, which will be regularly serviced and emptied by a suitable (private) contractor on a regular basis. Permanent ablution facilities may be installed during the operational phase. The effluent will be stored on site in watertight concrete structures (conservancy tanks) and thereafter transported to and disposed of at the Local Municipal sewerage treatment works.

A.9.3 Solid Waste Generation

The quantity of waste generated will depend on the construction phase, which is estimated to extend 12 to 18 months. However, it is estimated that approximately 12 m^3 of waste will be generated every month during the construction phase. During the construction phase, the following waste materials are expected:

- Packaging material, such as the cardboard, plastic and wooden packaging and off-cuts;
- Hazardous waste from empty tins, oils, soil containing oil and diesel (in the event of spills), and chemicals;
- Building rubble, discarded bricks, wood and concrete;
- Domestic waste generated by personnel; and
- Vegetation waste generated from the clearing of vegetation.

Solid waste will be managed via the EMPr during the construction and operational phases (Appendix G - K of the BA Report), which incorporates waste management principles. During the construction phase, general solid waste will be collected and temporarily stockpiled in skips in a designated area on site and thereafter removed, emptied into trucks, and disposed at a registered waste disposal facility on a monthly basis by an approved waste disposal Contractor (i.e., a suitable Contractor) or the municipality. In addition, a skip will be placed on site and any damaged or broken PV panels (i.e., those not returned to the supplier) will be stored in this skip. A specialist waste management company will be commissioned to manage and dispose of this waste.

Any hazardous waste (such as contaminated soil as a result of spillages) will be temporarily stockpiled (for less than 90 days) in a designated area on site (i.e., placed in leak-proof storage skips), and thereafter removed off site by a suitable service provider for safe disposal at a registered hazardous waste disposal facility.

Waste disposal slips and waybills will be obtained for the collection and disposal of the general and hazardous waste. These disposal slips (i.e., safe disposal certificates) will be kept on file for auditing purposes as proof of disposal. The waste disposal facility selected will be suitable and able to receive the specified waste stream (i.e., hazardous waste will only be disposed of at a registered/licenced waste disposal facility). The details of the disposal facility will be finalised during the contracting process, prior to the commencement of construction. Where possible, recycling and re-use of material will be encouraged. Waste management is further discussed in the EMPr (Appendix G - K of this BA Report).

During the operational phase after construction, the facility will produce minor amounts of general waste (as a result of the offices). It is estimated that approximately 2.5 m^3 of waste will be generated every month during the operational phase. Waste management is discussed in the EMPr (Appendix G – K of this BA Report).

A.9.4 Electricity Requirements

In terms of electricity supply for the construction and operational phase, the developer will make use municipal and Eskom services and generators on site during construction.

A.10 Applicable Legislation

The scope and content of this BA Report has been informed by the legislation, guidelines and information series documents listed in Table A.11. It is important to note that the specialist studies included in Appendix C of this BA Report also include a description of the relevant applicable legislation.

Table A.11. Legislation Applicable to the Proposed Projects

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
NEMA (Act 107 of 1998, as amended)	The proposed project will require the implementation of appropriate environmental management practices.	National DFFE	19 November 1998
NEMA EIA Regulations published in GN R982, R983, R984 and R985 on 8 December 2014, and as amended on 7 April 2017 in GN R326, R327, R325 and R324	These Regulations provide the procedures that need to be followed for the BA Process.	National DFFE	8 December 2014 and amended on 7 April 2017
NEMA EIA Regulations published in Government Notice R983 and R985, and as amended on 7 April 2017 in GN R327, R325 and R324	These Regulations contain the relevant listed activities that are triggered, thus requiring a BA. Please refer to Section A (10) of this BA Report for the complete list of listed activities.	National DFFE	8 December 2014 and amended on 7 April 2017
GN 114 and GN 144– Notice of identification in terms of section 24(5)(a) and (b) of the NEMA of the procedure to be followed in applying for EA for large scale wind and solar PV energy development activities identified in terms of section 24(2)(a) of the NEMA when occurring in geographical areas of strategic importance (i.e. REDZs)	The proposed projects fall within REDZ 5 and a BA process is therefore required.	National DFFE	16 February 2018 February 2021
GN 960 – Notice of the requirement to submit a report generated by the National Web Based Environmental Screening Tool, in terms of Section 24(5)(h) of the NEMA and Regulation 16(1)(b)(v) of the 2014 NEMA EIA Regulations (as amended), when submitting an Application for EA in terms of Regulations 19 and 21 of the 2014 NEMA EIA Regulations (as amended)	GN 960 was published on 5 July 2019 and came into effect for compulsory use of the National Web Based Environmental Screening Tool from 4 October 2019. As such, the Applications for EA for the proposed project have been run through the National Web Based Environmental Screening Tool, and associated reports generated and attached to the Applications for EA.	National DFFE	5 July 2019
GN 320 - 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 NEMA, when applying for EA	GN 320 prescribes general requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report content requirements of environmental impacts for environmental themes for activities requiring EA. The Specialist Assessments undertaken as part of this BA Process comply with GN 320, where applicable, such as the Aquatic Biodiversity and Species, Terrestrial Biodiversity and Species, and Agriculture. The Defence and Civil Aviation Site Sensitivity Verifications comply with GN 320. The remaining specialist studies comply with Part A of GN 320, which contains site sensitivity verification requirements where a Specialist	National DFFE	20 March 2020

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
	Assessment is required but no specific assessment protocol has been prescribed. The protocols were enforced within 50 days of publication of the notice i.e. on 9 May 2020.		
GN 1150 - 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, when applying for EA	GN 1150 prescribes protocols in respect of specific environmental themes for the assessment of, as well as the minimum report content requirements on, the environmental impacts for activities requiring EA. GN 1150 includes a protocol for the specialist assessment and minimum report content requirements for environmental impacts on a) terrestrial animal species and b) terrestrial plant species. The requirements of these protocols apply from the date of publication (i.e. from 30 October 2020), except where the Project Applicant provides proof to the competent authority that the specialist assessment affected by these protocols had been commissioned by the date of publication of these protocols in the Government Gazette, in which case Appendix 6 of the 2014 NEMA EIA Regulations will apply to such applications.	National DFFE	30 October 2020
National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)	General and hazardous waste will be generated during the construction phase, which will require proper management. Such management actions are recommended in the Environmental Management Programme (EMPr), which are included in Appendix G - K of this BA Report.	National DFFE National DFFE	6 March 2009 2 June 2014
National Environmental Management: Air Quality Act (Act 39 of 2004)	The proposed stockpiling activities, including earthworks, may result in the unsettling of, and temporary exposure to, dust. Appropriate dust control methods will need to be applied. Such management actions are recommended in the EMPr, which are included in Appendix G - K of this BA Report.	National DFFE	19 February 2005
Water Services Act (Act 108 of 1997)	Water will be required during the construction, operational and decommissioning phases of the proposed projects, for consumption purposes, earthworks and grassing etc. Water will also be required for panel cleaning during the operational phase. Water will either be sourced from the local municipality. Compliance with this act will be	Department of Water and Sanitation	1997

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
	undertaken during the relevant phase of the project, in consultation with the local and district municipalities, if relevant (i.e. if water is sourced from the local municipality).		
Hazardous Substances Act (Act 15 of 1973)	During the proposed project, fuel and diesel will be utilised to power vehicles and equipment (i.e. via a diesel generator). The generator might also be used for power on site during power outages, normal power etc. In addition, potential spills of hazardous materials could occur during the relevant phases. Such management actions are recommended in the EMPr, which are included in Appendix G – K of this BA Report.	Department of Health	1973
National Forests Act (Act 84 of 1998)	Protected Tree species are listed under the National Forests Act (Act 84 of 1998, as amended). In terms of section 15(1) of the act, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. If any protected species are found on site during the search and rescue or construction, the Provincial Department of Agriculture, Forestry and Fisheries will be contacted to discuss the permitting requirements.	DAFF	1998
National Water Act (NWA) (Act 36 of 1998)	Wetlands or riparian zones are excluded from developments unless these developments are authorised by the Department of Human Settlements, Water and Sanitation (DHSWS) for water uses which are defined in Section 21(c) or Section 21 (i). General Authorisation applies in terms of Section 39 of the National Water Act (Act 36 of 1998) for water uses as defined in Section 21(c) or Section 21(i) of the Act (Department of Water and Sanitation, GN 509 of 2016). This General Authorisation replaces the need for a water user to apply for a licence in terms of the National Water Act (Act 36 of 1998) provided that the water use is within limits and conditions of this General Authorisation. A General Authorisation does not	Department of Water and Sanitation	1998

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
	apply to any development within a distance of 500 m upstream or downstream from the boundary (outer edge) of any wetland (GN 1199, Government Gazette 32805 of 2009; Replacement General Authorisation in terms of Section 39 of the National Water Act). The National Water Act controls activities in and around water resources, as well as the general management of water resources, including abstraction of groundwater and disposal of water. Authorisation for changes in land use, up to 500 m from a defined water resource / wetland system will require at the minimum the compilation of a risk assessment and depending upon outcome, an application for use under a General Authorisation or a Water Use Licence from the DHSWS. The requirement for a General Authorisation or Water Use License in terms of Section 21 (c) and 21 (i) of the National Water Act may be required where activities arise in respect of the road upgrading or construction activities. Therefore, the following project is likely to require a Water Use License or similarly a General Authorisation: Both surface and groundwater sources are redefined by the Act as national resources which cannot be owned by any individual, and rights to which are not automatically coupled to land rights, but for which prospective users must apply for authorization and register as users. The National Water Act also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources. The Geohydrology Assessment (Appendix C.8 of the BA Report) notes that only a registration process will have to be followed for the groundwater use (via existing boreholes); i.e. Section 39 of the National Water Act (Act		

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
	36 of 1998) is applicable. The abstraction of groundwater will need to meet other GA requirements for the abstraction of water from a borehole.		
Integrated Environmental Management (IEM) guideline series published by DEFF (various documents dated from 2002 to present)	The IEM Guideline series provides guidance on conducting and managing all phases and components of the required BA and PPP, such that all associated tasks are performed in the most suitable manner. Relevant guidelines have been considered in this BA Process.	National DFFE	2002 - present
National Heritage Resources Act (Act 25 of 1999)	The proposed project may require a permit in terms of the National Heritage Resources Act (Act 25 of 1999) prior to any fossils or artefacts being removed by professional palaeontologists and archaeologists. If archaeological mitigation is needed, then the appointed archaeologist will need to submit a Work Plan to SAHRA to do the work. This must be carried out well in advance of construction to ensure that there is enough time for SAHRA to approve the mitigation work before construction commences. Should professional palaeontological mitigation be necessary during the construction phase, the palaeontologist concerned will need to apply for a Fossil Collection Permit from SAHRA. Palaeontological collection should comply with international best practice. All fossil material collected must be deposited, together with key collection data, in an approved depository (museum / university). Palaeontological mitigation work including the ensuing Fossil Collection reports should comply with the minimum standards specified by SAHRA (2013). Additional information regarding this is provided in the Heritage Impact Assessment and Palaeontological Impact Assessment (Appendix C.3 of the BA Report).	National Department of Arts and Culture	1999
Conservation of Agricultural Resources Act (Act 43 of 1983)	The Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) has categorised a large number of invasive	National Department of Agriculture	1983

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
	plants together with associated obligations of the land owner. Invasive plant species that should be removed or maintained only under certain commercial situations are identified in terms of the CARA. Notably most listed alien invasive species are propagated and driven by the disturbance of land during and following construction. Rehabilitation after disturbance to agricultural land is managed by the CARA. No application is required in terms of CARA. The BA Processes cover the required aspects of this.		
National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended)	This Act serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. Effective disturbance and removal of threatened or protected species encountered on or around the sites, will require specific permission from the applicable authorities. In addition, the management of exotic plant species, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2014. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control. In addition, the most prominent statute containing provisions directly aimed at the conservation of birds is the National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) read with the Threatened or Protected Species Regulations, February 2007 (TOPS Regulations). Chapter 1 sets out the objectives of the Act, and they are aligned with the objectives of the Convention on Biological Diversity, which are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of	National DFFE	September 2004

Title of legislation, policy or guideline	Applicability to the Proposed Projects	Administering Authority	Date
	genetic resources. The Act also gives effect to CITES, the Ramsar Convention, and the Bonn Convention on Migratory Species of Wild Animals. The State is endowed with the trusteeship of biodiversity and has the responsibility to manage, conserve and sustain the biodiversity of South Africa.		
Subdivision of Agricultural Land Act (Act 70 of 1970)	The Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA) requires that any long term lease associated with the renewable energy facility be approved by the Department of Agriculture, Land Reform and Rural Development (DALRRD). The SALA consent is separate from the Application for EA, and needs to be applied for and obtained separately. An application for the change of land use (re-zoning) for the development on agricultural land will be lodged by the Applicant for approval in terms of the SALA as required.	Republic of South Africa	1970
Free State Biodiversity Plan	The purpose of Free State Biodiversity Plan is the spatial conservation planning units and associated management recommendations for the Free State province	Free State Province	2015

A.11 Listed Activities Associated with the Proposed Project

Section 24(1) of the NEMA states: "*In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant environmental authorization*".

The reference to "listed activities" in Section 24 of the NEMA relates to the regulations promulgated in GN R326, R327, R325 and R324, dated 7 April 2017. The relevant GN published in terms of the NEMA collectively comprise the NEMA EIA Regulations listed activities that require either a BA, or Scoping and EIA be conducted. As noted previously, due to the project being proposed in a REDZ, the proposed projects require a BA Process.

The combined Amended Application for EA for this BA Process was submitted to the DFFE together with the Final BA Report, which makes reference to all relevant listed activities forming part of the proposed developments.

Table A.12 below provides a list of the applicable listed activities associated for the proposed project in terms of Listing Notice 1 (GN R 327), Listing Notice 2 (GN R325) and Listing Notice 3 (GN R324) in terms of the 2014 NEMA EIA Regulations (as amended).

Table A.12. Listed Activities in GN R327, GN R325, and GN R324 that will be potentially triggered by the proposed PV project

Activity No(s)	Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of project activity that triggers listed activity
Activity 12 (ii) [(a) and (c)]	The development of: (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- a) within a watercourse; 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; excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14	The proposed solar PV facility, which is considered as commercial/ industrial developments, will have an estimated footprint of approximately 500 ha (excluding access roads). The total estimated developable area including all associated infrastructure of the PV facility is 720 ha. The proposed project will also entail the construction of various infrastructure and structures (such as the solar field, BESS, laydown area, internal roads, and ancillary infrastructure such as O&M building / centre, site office, workshop, staff lockers, bathrooms/ ablutions, warehouse, guard house, etc.). These developments will constitute infrastructure with a physical footprint of more than 100 m² and some may occur within small drainage features and 32 m of the watercourses. The Wetland Ecology Study (Appendix C.12 of this BA Report) notes that the National Freshwater Ecosystem Priority Area (NFEPA) maps indicated that depression, seep, flat, and artificial wetland units are present within the study area. As such, development could occur within 32 metres of a watercourse, thereby triggering this activity. The proposed PV project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Therefore, the proposed project is situated outside of an urban area and this activity would be triggered.

	in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	
Activity 14	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	The proposed PV project will require storage and handling of dangerous goods, including fuel, cement and chemical storage onsite, as well as chemicals relating to the BESS, that will be greater than $80m^3$ but not exceeding $500m^3$.
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; but excluding where such infilling, depositing, dredging, excavation, removal or moving- a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management plan; c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or	The proposed project may entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles or rock from nearby watercourses on site. The proposed project may also entail the infilling of more than 10 m^3 of material into the nearby watercourses, thereby triggering this activity. The Wetland Ecology Study (Appendix C.12 of this BA Report) notes that the National Freshwater Ecosystem Priority Area (NFEPA) wetland units are present within the study area. As such, development could occur within 32 metres of a watercourse. Details of the infilling of, and excavations from, the affected watercourses/drainage features will be confirmed during detailed specialist assessments.

	e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	
Activity 27	The clearance of an area of 1 hectare (ha) or more, but less than 20 ha of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity; or maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed solar PV facility will have an estimated footprint of approximately 500 ha (excluding access roads). The total estimated developable area including all associated infrastructure of the PV facility is 720 ha. The proposed project will also entail the construction of various infrastructure and structures. These developments will constitute infrastructure with a combined physical footprint of more than 1 ha that will require clearance of indigenous vegetation. This activity would therefore be triggered.
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes, or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	The proposed PV project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Some of the farm portions have previously been utilised for agricultural activities. The proposed PV project, which is considered a commercial/industrial development, will have an estimated footprint in excess of 1 ha (minimum footprint of about 500 ha). The proposed project will also entail the construction of various infrastructure and structures.This will constitute infrastructure with a physical footprint of more than 1 ha. This activity would therefore be triggered.
Activity 48 (i) (a) and (c)	The expansion of (i) infrastructure or structures where the physical footprint is expanded by 100 square metre or more, (a) within a watercourse and (c) if no development setback exists, within 32 metres	The proposed project will require the upgrading of existing roads within the project area, as well as watercourse crossing upgrades, where such upgrades may take place within watercourses and within 32 m from the edge of these watercourses. The total footprint of the upgrades to be

	of a watercourse, measured from the edge of a watercourse.	undertaken on the existing roads would be in excess of 100 m^2 within a watercourse, or within 32 m of a watercourse. This will be confirmed and verified during detailed specialist assessments. The Wetland Ecology Study (Appendix C.12 of this BA Report) notes that the National Freshwater Ecosystem Priority Area (NFEPA) maps indicated that depression, seep, flat, and artificial wetland units are present within the study area. As such, development could occur within 32 metres of a watercourse, thereby triggering this activity.
Activity 56 (ii)	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	The Transportation Study (Appendix C.18) notes that the the existing road network surrounding the proposed development is well established and provides a high degree of mobility and access. The study further notes that there are several existing access points and roads located along Road P59-2 (R64) (existing roads roads will be used as far as practically achievable) some of which will require an upgrade to accommodate the proposed adjusted land use. The proposed project will require the upgrading of existing roads within the project area, as well as potential watercourse crossing upgrades, where such upgrades may take place within watercourses and within 32 m from the edge of these watercourses. The total footprint of the upgrades to be undertaken on the existing roads would be in excess of 100 m^2 within a watercourse, or within 32 m of a watercourse, thereby triggering this activity.
Activity No(s):	**Listed Activity(ies) as described in Listing Notice 2 of the EIA Regulations of 2014, as amended**	**Description of project activity that triggers listed activity**
Activity 1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or	The proposed project is a Solar PV Facility (i.e., facility for the generation of electricity from a renewable resource) with a maximum installed capacity of up to 290 MW.

	infrastructure is for photoVOLTAic installations and occurs a) within an urban area; or b) on existing infrastructure.	The proposed PV project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Therefore, the proposed project is situated outside of an urban area and this activity would be triggered. Note that GN 114 states that Applications for EA for large scale Wind and Solar PV energy facilities, when such facilities trigger Activity 1 of Listing Notice 2 of 2014 of the 2014 NEMA EIA Regulations (as amended) and any other listed and specified activities necessary for the realisation of such facilities, and where the entire proposed facility is to occur in such REDZs, must follow a BA Process, in order to obtain EA. As such, the proposed VOLTA PV project will be subject to a BA process instead of a full Scoping and EIA process.
Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for: (i) the undertaking of a linear activity; or (i) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed solar PV facility, which is considered as commercial/ industrial developments, will have an estimated footprint of approximately 500 ha (excluding access roads). The total estimated developable area including all associated infrastructure of the PV facility is 720 ha. The proposed project will also entail the construction of various infrastructure and structures. As a result, more than 20 ha of indigenous vegetation would be removed for the construction of the proposed project. Note that GN 114 states that Applications for EA for large scale Wind and Solar PV energy facilities, when such facilities trigger Activity 1 of Listing Notice 2 of 2014 of the 2014 NEMA EIA Regulations (as amended) and any other listed and specified activities necessary for the realisation of such facilities, and where the entire proposed facility is to occur in such REDZs, must follow a BA Process, in order to obtain EA.

Activity No(s):	Listed Activity(ies) as described in Listing Notice 3 of the EIA Regulations of 2014, as amended	Description of project activity that triggers listed activity
Activity 4 **(b) (i) (ee)**	The development of a road wider than 4 metres with a reserve less than 13,5 metres. b. Free State i. Outside urban areas; ee. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	The proposed project sites can be accessed via several existing access points and roads located along Road P59-2 (R64), some of which will require an upgrade to accommodate the proposed adjusted land use. The length of the access road is ≤ 0.5 km with a width up to 5 m. Exact specifications of the widening and upgrading of the road will be confirmed during the detailed design phase. A typical description is provided in Section A.5 of this BA Report. The proposed PV project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Therefore, the proposed project is situated outside of an urban area, thus triggering the activity. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.9) indicates that the study area is located in a Critical Biodiversity Area (CBA) 1 (Irreplaceable) and Ecological Support Area (ESA) 2 (Degraded, but not totally transformed), in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered.
Activity 12 **(b) (ii) (iv)**	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a	The proposed solar PV facility will have an estimated footprint of approximately 500 ha (excluding access roads). The total estimated developable area including all associated infrastructure of the PV facility is 720 ha. The proposed project will also entail the construction

	maintenance management plan. b. Free State ii. Within critical biodiversity areas identified in bioregional plans; iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	of various infrastructure and structures. This will constitute infrastructure with a physical footprint of more than 1 ha. As a result, more than 300 m² of indigenous vegetation would be removed for the construction of the proposed project and associated infrastructure, thereby triggering this activity. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.9) indicates that the study area is located in a Critical Biodiversity Area (CBA) 1 (Irreplaceable) and Ecological Support Area (ESA) 2 (Degraded, but not totally transformed), in terms of the 2015 Free State Spatial Biodiversity Plan. The Wetland Ecology Study (Appendix C.12 of this BA Report) notes that the National Freshwater Ecosystem Priority Area (NFEPA) maps indicated that depression, seep, flat, and artificial wetland units are present within the study area. As such, development could occur within 100 metres of a watercourse or wetland, thereby triggering this activity. This activity would therefore be triggered.
Activity 14 **(ii) (a) and (c); (b) (i) (ff)**	The development of – (ii) infrastructure or structures with a physical footprint of 10 square metres or more;	The proposed solar PV facility will have an estimated footprint of approximately 500 ha (excluding access roads). The total estimated developable area including all associated infrastructure of the PV facility is 720 ha. The proposed project will also entail the construction of various infrastructure and structures. This will constitute infrastructure with a physical footprint of more than 10 m², and some may occur within small drainage features and 32 m of the watercourses, such as the wetland units present within the study area, as noted by the Wetland Ecology Study (Appendix C.12 of this BA

	where such development occurs – (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; b. Free State i. Outside urban areas ff. Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	Report). This activity would therefore be triggered. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.9) indicates that the study area is located in a Critical Biodiversity Area (CBA) 1 (Irreplaceable) and Ecological Support Area (ESA) 2 (Degraded, but not totally transformed), in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered.
Activity 18 **(b) (i) (ee)**	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. b. Free State i.Outside urban areas: ee. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	The proposed project site can be accessed via several existing access points and roads located along Road P59-2 (R64), some of which will be widened and upgrade to accommodate the proposed adjusted land use. The length of the access road is ≤ 0.5 km with a width up to 5 m. Exact specifications of the widening and upgrading of the road will be confirmed during the detailed design phase. This activity would therefore be triggered. The proposed PV project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Therefore, the proposed project is situated outside of an urban area,

	(hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	thus triggering this activity. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.9) indicates that the study area is located in a Critical Biodiversity Area (CBA) 1 (Irreplaceable) and Ecological Support Area (ESA) 2 (Degraded, but not totally transformed), in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered. The Wetland Ecology Study (Appendix C.12 of this BA Report) notes that the National Freshwater Ecosystem Priority Area (NFEPA) maps indicated that depression, seep, flat, and artificial wetland units are present within the study area. As such, development could occur within 32 metres of a watercourse, thereby triggering this activity.
Activity 23 **(ii) (a) (c) (i) (ee)**	The expansion of: (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a	The proposed solar PV facility will have an estimated footprint of approximately 500 ha (excluding access roads). The total estimated developable area including all associated infrastructure of the PV facility is 720 ha. The proposed project will also entail the construction of various infrastructure and structures. This will constitute infrastructure with a physical footprint of more than 10 m², and some may occur within small drainage features and 32 m of the watercourses, such as the wetlands units identified in the Wetland Ecology Study (Appendix C.12 of this BA Report). This activity would therefore be triggered. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.9) indicates that the study area is located in a Critical Biodiversity Area (CBA) 1

	watercourse, measured from the edge of a watercourse b. Free State i. Outside urban areas: ee. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	(Irreplaceable) and Ecological Support Area (ESA) 2 (Degraded, but not totally transformed), in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered.

Table A.13. Listed Activities in GN R327, GN R325, and GN R324 that will be potentially triggered by the proposed EGI project

Activity No(s)	Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of project activity that triggers listed activity
Activity 11 (i)	The development of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The proposed EGI project will entail the construction and installation of two on-site substation hubs, as well as 132 kV overhead and 132 kV underground transmission powerlines for the connection of the PV facility to the national grid. Each on-site substation complex will have a capacity of approximately 500MVA and will include a collector and/or switching yard. These constitute facilities for the distribution and transmission of electricity of more than 33 kV. The proposed EGI project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Therefore, the proposed project is situated outside of an urban area and this activity would be triggered.
Activity 12 (ii) (a) (c)	The development of: (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- a) within a watercourse; 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; excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area;	The proposed EGI project will entail the construction of 132 kV overhead/ underground powerlines (and associated infrastructure), as well as two on-site substations (each with an estimated footprint of 200 m x 200m). The Wetland Ecology Study (Appendix C.11 of this BA Report) notes that the National Freshwater Ecosystem Priority Area (NFEPA) maps indicated that there are depression, seep, and artificial wetland units within the EGI corridor. As such, the infrastructure and structures are expected exceed a footprint of 100^2 m and some may occur within 32 m of the identified watercourses. This activity would therefore be triggered.

Activity No(s)	Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of project activity that triggers listed activity
	(ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	
Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving- a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management plan; c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	The proposed project will entail the excavation, removal and moving of more than 10 m^3 of soil, sand, pebbles, or rock from nearby watercourses on site, mainly for the purpose of constructing access roads and 132 kV underground powerlines. The proposed project may also entail the infilling of more than 10 m^3 of material into the nearby watercourses, such as the wetland units within the EGI corridor, as identified by the Wetland Ecology Study (Appendix C.11 of this BA Report). This activity would therefore be triggered. The pylon bases for the overhead powerlines will need to avoid these wetlands and the routing for the underground powerlines should not intersect with any watercourses. The details of the pylon and underground powerline placement will be confirmed during the detailed design phase.
Activity 27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed EGI project will entail the construction of 132 kV overhead/ underground powerlines (and associated infrastructure), as well as two on-site substations (each with an estimated footprint of 200 m x 200m). This will constitute infrastructure that will require the clearance 1 hectares or more, but less than 20 hectares, of indigenous vegetation. This activity would therefore be triggered.
Activity 28 (ii)	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes, or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare	The proposed EGI project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Some of the farm portions have previously been utilised for agricultural activities. The proposed EGI project will entail the construction of 132 kV overhead/ underground powerlines (and associated infrastructure), as

Activity No(s)	**Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended**	**Description of project activity that triggers listed activity**
	excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	well as two on-site substations (each with an estimated footprint of 200 m x 200m). The project is considered a commercial/industrial development, and the total footprint will have an estimated area in excess of 1 ha. This activity would therefore be triggered.
Activity No(s):	**Listed Activity(ies) as described in Listing Notice 2 of the EIA Regulations of 2014, as amended**	**Description of project activity that triggers listed activity**
Activity No(s):	**Listed Activity(ies) as described in Listing Notice 3 of the EIA Regulations of 2014, as amended**	**Description of project activity that triggers listed activity**
Activity 4 **(b) (i) (ee)**	The development of a road wider than 4 metres with a reserve less than 13,5 metres. b. Free State i. Outside urban areas; ee. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	The proposed project site can be accessed via several existing access points and roads located along Road P59-2 (R64), some of which will require an upgrade to accommodate the proposed adjusted land use. The length of the access road is ≤ 0.5 km with a width up to 5 m. Exact specifications of the widening and upgrading of the road will be confirmed during the detailed design phase. A typical description is provided in Section A.5 of this BA Report. The proposed EGI project will be constructed on several farm portions, approximately 4 km from Dealesville, within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province. Therefore, the proposed project is situated outside of an urban area, thus triggering this activity. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.10) indicates that the EGI corridor is mainly located in a Critical Biodiversity Area (CBA) 1 (Irreplaceable) with some areas intersecting Degraded, Other Natural Areas (ONAs) and a small section Ecological Support Area (ESA) 2 (Degraded, but not totally transformed), in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered.
Activity 12 **(b) (ii) (iv)**	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	The proposed EGI project will entail the construction of 132 kV overhead/ underground powerlines (and associated infrastructure), as well as two on-site substations (each with an estimated footprint of 200 m x 200m each). As a result, more than 300 m² of indigenous vegetation would be removed for the construction of the proposed

Activity No(s)	Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of project activity that triggers listed activity
	b. Free State ii. Within critical biodiversity areas identified in bioregional plans; iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	project and associated infrastructure, thereby triggering this activity. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.10) indicates that the EGI corridor is mainly located in a CBA 1 with some areas intersecting Degraded, ONAs and a small section ESA 2, in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered. The Wetland Ecology Study (Appendix C.11 of this BA Report) notes that there are wetland units within the EGI corridor. The proposed development could be located within 100 metres from the edge of the wetland, therefore triggering the activity. The pylon bases for the overhead powerlines will need to avoid these wetlands and the routing for the underground powerlines should not intersect with any watercourses. The details of the pylon and underground powerline placement will be confirmed during the detailed design phase.
Activity 14 **(ii) (a) and (c); (b) (i) (ff)**	The development of – (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs – (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; b. Free State i. Outside urban areas ff. Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	The proposed EGI project will entail the construction of 132 kV overhead/ underground powerlines (and associated infrastructure), as well as two on-site substations (each with an estimated footprint of 200 m x 200m). This will constitute infrastructure with a physical footprint of more than 10 m^2, and some may occur within small drainage features and 32 m of the watercourses, such as the wetland units identified by the Wetland Ecology Study (Appendix C.11 of this BA Report). This activity would therefore be triggered. The pylon bases for the overhead powerlines will need to avoid these wetlands and the routing for the underground powerlines should not intersect with any watercourses. The details of the pylon and underground powerline placement will be confirmed during the detailed design phase. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.10) indicates that the EGI corridor is mainly located in a CBA 1 with some areas

Activity No(s)	Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of project activity that triggers listed activity
		intersecting Degraded, ONAs, and a small section ESA 2, in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered.
Activity 18 **(b) (i) (ee)**	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. b. Free State i. Outside urban areas: ee. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The proposed project site can be accessed via several existing access points and roads located along Road P59-2 (R64), some of which will be widened and upgrade to accommodate the proposed adjusted land use, thereby triggering the activity The length of the access road is ≤ 0.5 km with a width up to 5 m. Exact specifications of the widening and upgrading of the road will be confirmed during the detailed design phase. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.10) indicates that the EGI corridor is mainly located in a CBA 1 with some areas intersecting Degraded, ONAs and a small section ESA 2, in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered. The Wetland Ecology Study (Appendix C.11 of this BA Report) notes that wetland units are present within the EGI corridor, which could occur within 100 metres of the proposed development, thereby triggering the activity.
Activity 23 **(ii) (a) (c) (i) (ee)**	The expansion of: (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse b. Free State i. Outside urban areas:	The proposed EGI project will entail the construction of 132 kV overhead/ underground powerlines (and associated infrastructure), as well as two on-site substations (each with an estimated footprint of 200 m x 200m). This will constitute infrastructure with a physical footprint of more than 10 m², and some may occur within small drainage features and 32 m of the watercourses (such as the wetland units identified in the Wetland Ecology Study (Appendix C.11) of this BA Report), thereby triggering this activity. The proposed project will take place outside of an urban area in the Free State, on sites that contain critical biodiversity areas. The Terrestrial Biodiversity BA Report Inputs (Appendix C.10) indicates that the EGI corridor is mainly located in a CBA 1 (Irreplaceable) with some areas intersecting Degraded, ONAs and a small section ESA 2, in terms of the 2015 Free State Spatial Biodiversity Plan. This activity would therefore be triggered.

Activity No(s)	Listed Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Description of project activity that triggers listed activity
	ee. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	

It must be noted that the above listed activities have been identified in line with the following:
- The activities in Listing Notice 2 (GN R325) have been provided above, however as captured in GN 114 of February 2018, a BA Process is required for Renewable Energy Developments in the REDZ.
- Activity 21 of GN R327 (Listing Notice 1) is not applicable at this stage of the BA. However, if the EPC contractor in future determines that a borrow pit is required, then the necessary approvals will be obtained.

A.12 National Web-Based Environmental Screening Tool

As noted above, GN 960 (dated 5 July 2019) published a notice of the requirement to submit a report generated by the National Web Based Environmental Screening Tool, in terms of Section 24(5)(h) of the NEMA and Regulation 16(1)(b)(v) of the 2014 NEMA EIA Regulations (as amended), when submitting an Application for EA in terms of Regulations 19 and 21 of the 2014 NEMA EIA Regulations (as amended). GN 960 came into effect for compulsory use of the National Web Based Environmental Screening Tool from 4 October 2019. As such, the Application for EA for the proposed project has been run through the National Web Based Environmental Screening Tool, and associated reports generated and attached to the combined Applications for EA.

- **VOLTA Solar PV and BESS**

Based on the selected classification, the National Web Based Environmental Screening Tool provides a list of specialist studies that should be undertaken as part of the BA Process, as well as identifies the sensitivities on site that need to be verified by either the EAP or the specialists, where relevant, as noted in the Assessment Protocols of 20 March 2020 (GN 320). The classification that applies to the proposed projects is **Utilities Infrastructure; Electricity; Generation; Renewable; Solar; PV; and Solar PV**.

The following list of Specialist Assessments have been identified by the National Web Based Environmental Screening Tool for inclusion in the BA Report (Table A.14). The National Web Based Environmental Screening Tool Report notes that it is the responsibility of the EAP to confirm this list and to motivate in the BA Report, the reason for not including any of the identified specialist studies.

Table A.14. List of Specialist Assessments identified by the Screening Tool for VOLTA Solar PV

	Specialist Study Required by the Screening Tool	Assessment undertaken in BA	Type of Assessment undertaken in BA	Appendix of BA Report
1	Agriculture and Soils	Yes	Protocol GN 320: Compliance Statement	C.2
2	Landscape / Visual Impact Assessment	Yes	Appendix 6: Impact Assessment	C.4
3	Archaeological and Cultural Heritage Impact Assessment	Yes	Appendix 6: Impact Assessment	C.6
4	Desktop Palaeontology Impact Assessment	Yes	Appendix 6: Impact Assessment	C.8
5	Terrestrial Biodiversity Impact Assessment	Yes	Protocol GN320: Impact Assessment. The Terrestrial Biodiversity Impact Assessment includes feedback on Terrestrial Plant and Animal Species.	C.9
6	Plant Species Assessment			
7	Animal Species Assessment			

	Specialist Study Required by the Screening Tool	Assessment undertaken in BA	Type of Assessment undertaken in BA	Appendix of BA Report
8	Aquatic Biodiversity Impact Assessment	Yes	Protocol GN320: Impact Assessment. The study undertaken as part of the BA is referred to as Aquatic Biodiversity and Species.	C.12
9	Avian Impact Assessment	Yes	Protocol GN320: Impact Assessment in accordance to the Animal Species protocol	C.14
10	Socio-Economic Assessment	Yes	Appendix 6: Impact Assessment	C.15
11	Civil Aviation Assessment	Yes	Protocol GN 320: Site Sensitivity Verification (No requirements for low sensitivity in terms of GN 320)	C.20
12	Defense Assessment	Yes	Protocol GN 320: Site Sensitivity Verification (No requirements for low sensitivity in terms of GN 320)	C.21
13	RFI Assessment	No	Motivation not to undertake a specialist assessment.	N/A
14	Desktop Geotechnical Assessment	No	Appendix 6: Desktop Assessment	C.17

It must however be noted that the Screening Tool did not identify the need for a Geohydrology Assessment, however this has been undertaken as part of the BA Process (Appendix C.16) in order to consider and assess the impact of potentially using groundwater during the construction and operational phases.

It must also be noted that a Traffic Impact Assessment was not identified as a requirement by the Screening Tool. Traffic Impacts are not significant for the proposed project, however to ensure that this impact is considered holistically and to ensure that suitable management actions are recommended, the Applicant, commissioned a ***technical*** Traffic Impact Statement to inform the BA Process. The Traffic Impact Study is included in Appendix C.18 of this BA Report.

- **VOLTA EGI**

Based on the selected classification, the National Web Based Environmental Screening Tool provides a list of specialist studies that should be undertaken as part of the BA Process, as well as identifies the sensitivities on site that need to be verified by either the EAP or the specialists, where relevant, as noted in the Assessment Protocols of 20 March 2020 (GN 320). The classification that applies to the **proposed projects is Utilities Infrastructure; Electricity; Generation; Renewable; Solar; PV; and Solar PV.**

The following list of Specialist Assessments have been identified by the National Web Based Environmental Screening Tool for the EGI component (Table A.15). The National Web Based Environmental Screening Tool Report notes that it is the responsibility of the EAP to confirm this list and to motivate in the BA Report, the reason for not including any of the identified specialist studies.

Table A.15. List of Specialist Assessments identified by the Screening Tool for VOLTA Solar EGI

	Specialist Study Required by the Screening Tool	Assessment undertaken in BA	Type of Assessment undertaken in BA	Appendix of BA Report
1	Agriculture and Soils	Yes	Protocol GN 320: Compliance Statement	C.1
2	Landscape / Visual Impact Assessment	Yes	Appendix 6: Impact Assessment	C.3
3	Archaeological and Cultural Heritage Impact Assessment	Yes	Appendix 6: Impact Assessment	C.5
4	Desktop Palaeontology Impact Assessment	Yes	Appendix 6: Impact Assessment	C.7
5	Terrestrial Biodiversity Impact Assessment	Yes	Protocol GN320: Impact Assessment. The Terrestrial Biodiversity Impact Assessment includes feedback on Terrestrial Plant and Animal Species.	C.10
6	Plant Species Assessment			
7	Animal Species Assessment			
8	Aquatic Biodiversity Impact Assessment	Yes	Protocol GN320: Impact Assessment. The study undertaken as part of the BA is referred to as Aquatic Biodiversity and Species.	C.11
9	Avian Impact Assessment	Yes	Protocol GN320: Impact Assessment in accordance to the Animal Species protocol	C.13
10	Socio-Economic Assessment	Yes	Only relevant for the VOLTA PV and BESS project. Appendix 6: Impact Assessment	C.15
11	Civil Aviation Assessment	Yes	Protocol GN 320: Site Sensitivity Verification (No requirements for low sensitivity in terms of GN 320)	C.20
12	Defense Assessment	Yes	Protocol GN 320: Site Sensitivity Verification (No requirements for low sensitivity in terms of GN 320)	C.21
13	RFI Assessment	No	Motivation not to undertake a specialist assessment. Refer to the motivation provided below.	N/A
14	Geotechnical Assessment	No	Motivation not to undertake a specialist assessment. Refer to the motivation provided below.	C.17

It must however be noted that the Screening Tool did not identify the need for a Geohydrology Assessment, however this has been undertaken as part of the BA Process for the PV component in order to consider and assess the impact of potentially using groundwater during the construction and operational phases The Geohydrology (Appendix C.16) study considered impacts from the VOLTA PV and BESS project. The VOLTA EGI was not assessed as impacts from the EGI components are not substantial.

It must also be noted that a Traffic Assessment was not identified as a requirement by the Screening Tool for the VOLTA PV and BESS as well EGI projects. Traffic Impacts are not significant for the proposed project, however to ensure that this impact is considered holistically and to ensure that suitable management actions are recommended, the Applicant, commissioned a technical Traffic Impact Assessment to inform the BA Process. A BESS Risk Assessment (Appendix C.19) was commissioned by VOLTA as part of this study to identify risks associated to several BESS technologies.

A.12.1 Square Kilometer Array and Radio Frequency Interference

The Astronomy Geographic Advantage (AGA) Act (Act 21 of 2007) aims to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and to provide for matters connected therewith. The purpose of the AGA Act is to preserve the geographic advantage areas that attract investment in astronomy. The AGA Act also notes that declared astronomy advantage areas are to be protected and properly maintained in terms of Radio Frequency Interference (RFI). The AGA Act is administered by the Department of Higher Education, Science and Technology (previously the Department of Science and Technology).

According to the CSIR Wind and Solar Phase 2 SEA (DFFE, 2019: Part 3, Page 2), the majority of the mid-frequency dish array of the Square Kilometre Array (SKA) will be constructed in the core which is in located in the Northern Cape; with dish antennas being located in the spiral arms. The South African component of the SKA will consist of approximately 3 000 receptors comprising dish antennas, each with a diameter of 15 m, and radio receptors known as dense aperture-arrays. The outer stations in the spiral arms will extend beyond the borders of South Africa and at least 3 000 km from the core area. About 80% of the receptors, including a dense core and up to 5 spiral arms, will be located in the Karoo Central Astronomy Advantage Area (KCAAA) (DFFE, 2019: Part 3, Page 2).

The KCAAA, which is located between Brandvlei, Van Wyksvlei, Carnarvon and Williston in the Northern Cape Province, was officially declared in 2014 by the Minister of Science and Technology in terms of the AGA Act for the purposes of protection RFI and Electromagnetic Interference (EMI). The declaration of the KCAAA ensures the long-term viability of the area to be used for astronomical installations (DFFE, 2019: Part 3, Page 2).

PV installations are known to have unintentional radiated emissions from electrical and electronic equipment that have the potential to interfere with the SKA Radio Telescope project in the Northern Cape. This can result in interference to celestial observations and/or data loss. Such interference is typically referred to as RFI (DFFE, 2019: Part 3, Page 2).

The location of the proposed projects does not pose an EMI or RFI risk to the SKA, as the proposed projects are located outside of the Northern Cape and outside of the KCAAA. Refer to Figure A.11 for the location of the proposed project in relation to the SKA and KCAAA. Furthermore, based on the findings of the Wind and Solar Phase 1 SEA (DEA, 2015), the proposed project sites fall within an area of low sensitivity in terms of SKA sensitivity for the development of solar PV energy. This also aligns with the findings of the Screening Tool (i.e., the proposed project sites fall within a low sensitivity in terms of the relative RFI theme sensitivity).

During the pre-application meeting, it was explained that it is not intended to commission a RFI study for the proposed project due to the location of the proposed projects being in the Free State and far away from the SKA and KCAAA; the findings of the Screening Tool and the findings of the Wind and Solar Phase 1 SEA (DEA, 2015). All correspondence relating to the pre-application meeting is addressed in Appendix L of this BA Report.

Furthermore, the SKA is on the project I&AP database as a key stakeholder, and was informed of the availability of the Draft BA Report for a 30-day comment period. No comments were received.

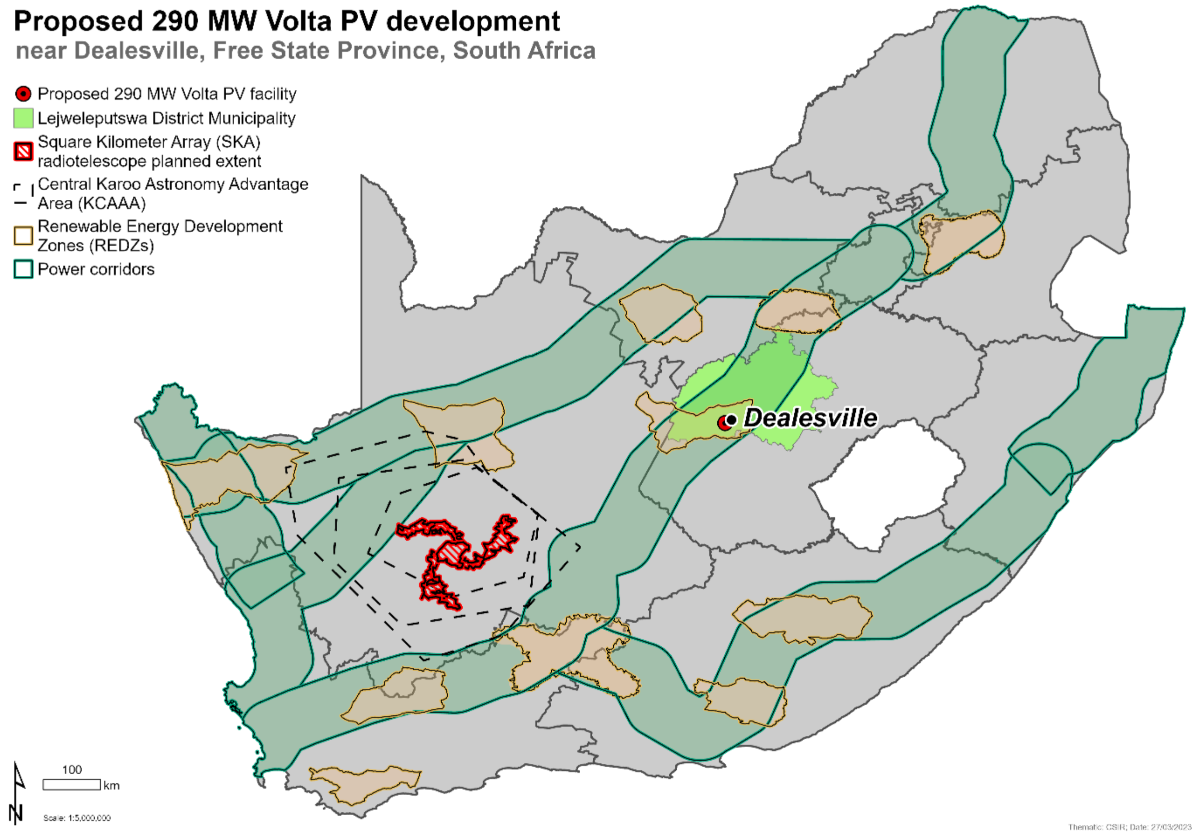


Figure A.9. Location of the proposed projects in relation to the SKA and KCAAA

A.12.2 Geotechnical Assessment

The National Web-based Environmental Screening Tool also identified the need for a Geotechnical Assessment. A Desktop Geotechnical Assessment was undertaken for the solar PV and has not been undertaken for the EGI. An in-depth assessment will be undertaken during the detailed design phase, once preferred bidder status is obtained in terms of the REIPPPP or similar processes. Contractors and suppliers will only be selected and appointed after preferred bidder status is obtained (should it be granted). In line with best practice, and to ensure that all aspects are covered in the assessment, suppliers of sub-structures, inverters and transformers and civil sub-contractors are required to provide input into the scope of work of the Geotechnical Assessment. Therefore, Geotechnical Assessments can only be undertaken during detailed design, if preferred bidder status is obtained.

A.13 Description of Alternatives for both VOLTA PV and BESS and EGI

This section discusses the alternatives that have been considered as part of the BA Process. Sections 24(4) (b) (i) and 24(4A) of the NEMA require an Environmental Assessment to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24O (1)(b)(iv) also requires that the Competent Authority, when considering an application for EA, takes into account “where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment”.

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

The 2014 NEMA EIA Regulations (as amended) defines alternatives, in relation to a proposed activity, as “different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

- property on which or location where the activity is proposed to be undertaken;
- type of activity to be undertaken;
- design or layout of the activity;
- technology to be used in the activity;
- operational aspects of the activity; or
- and includes the option of not implementing the activity”;

Regulation 2 (e) of Appendix 1 of the 2014 NEMA EIA Regulations (as amended) states that one of the objectives of the BA Process is to, through a consultative process, and through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to (i) identify and motivate a preferred site, activity and technology alternative; (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and (iii) identify residual risks that need to be managed and monitored.

This Basic Assessment report has provided a full description of the process followed to reach the proposed preferred activity and technology alternative, site ad location of the development footprint within the site, including details of the alternatives considered and the outcome of the site selection matrix.

A.13.1 No-go Alternative

The no-go alternative assumes that the proposed projects will not go ahead i.e., it is the option of not constructing the proposed solar PV facilities and associated infrastructure. This alternative would result in no environmental impacts on the site or surrounding local area as a result of the proposed projects. It provides the baseline against which other alternatives are compared and is considered throughout the report.

The following implications will occur if the "no-go" alternative is implemented (i.e., the proposed project does not proceed):

- No benefits will be derived from the implementation of an additional land-use;
- No additional power will be generated or supplied through means of renewable energy resources by this project at this location;
- The "no go" alternative will not contribute to and assist the government in achieving its renewable energy target of 26 630 MW total installed capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power);
- Electricity generation will remain constant (i.e. no renewable energy generation will occur on the site for the proposed project) and the local economy in terms of surrounding communities and towns within the local municipality will not be diversified;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised;
- There will be no opportunity for additional employment in an area, where job creation is identified as a key priority;
- The local economic benefits associated with the REIPPPP will not be realised, and socio-economic contribution payments into the local community trust will not be realised;
- The development of solar PV facilities instead of coal fired power stations can directly contribute to South Africa's response to climate mitigation; and
- Wind and solar energy are the cheapest source of electricity in South Africa. The development of the proposed Solar PV Facilities can contribute to the competitive nature of the REIPPPP to drive prices down even further to ensure that South Africans have access to affordable yet clean electricity.

Converse to the above, the following benefits could occur if the "no-go" alternative is implemented:

- Only the agricultural land use will remain;
- No vegetation or species of special concern (flora and fauna) will be removed or disturbed during the development of the proposed projects;
- No aquatic resources will be impacted upon during the construction and operation of the PV and EGI Facility;
- No destruction of habitat will occur;
- No change to the current landscape will occur;
- No avifaunal impacts will occur due to the establishment of the project;
- No additional traffic will be generated; and
- No additional water use will be required.

Table A.16. Summary of the PV No-go Alternative from Specialist Assessments

Specialist Study	No-go Alternative Assessment
Agricultural Compliance Statement	The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. The one identified potential such impact is that due to continued low rainfall in the area, which is likely to be exacerbated by climate change, agriculture in the area will come under increased pressure in terms of economic viability.

Specialist Study	No-go Alternative Assessment
	The development offers an alternative income source to agriculture, but it restricts agricultural use of the site. Therefore, even though the excluded land has insufficient agricultural potential for crop production, the negative agricultural impact of the development is more significant than that of the no-go alternative, and so, purely from an agricultural impact perspective, the no-go alternative is the 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.
Visual Impact Assessment	In the no-go alternative, there would be no PV facility and associated BESS and therefore no additional visual intrusion on the landscape and on surrounding farmsteads. At the same time no renewable energy would be produced at the site for export to the national grid.
Heritage Impact Assessment	The no-go alternative would entail not developing the project and the landscape would remain in its present undeveloped state. Not developing the projects would not result in any new impacts to heritage resources. Existing natural erosion and weathering of artefacts, ruins and buildings would continue but at a very slow rate. Impact significance from the No-go alternative is thus expected to be very low negative for all aspects of heritage.
Palaeontology	The no-go alternative (i.e., no solar PV facility and power line development) will probably have a neutral impact on palaeontological heritage
Terrestrial Biodiversity and Species Impact Assessment	Not developing this PV project and leaving it up to the landowners to make the decision to transform the land to agricultural land and/or intense grazing, which will not assist in protecting the CBA1 or the threatened ecosystem.
Aquatic Biodiversity and Species Impact Assessment	Existing activities within the project area include livestock agriculture, road and electricity infrastructure. These activities have had a moderate to large impact on the status of the watercourses and these systems are considered to be sensitive. The no-go situation indicates the long-term maintenance of the assessed watercourses.
Avifauna Impact Assessment	The no-go option will result in no additional impacts on avifauna and will result in the ecological status quo being maintained, which will be to the advantage of the

Specialist Study	No-go Alternative Assessment
	avifauna. No fatal flaws were discovered in the course of the investigations.
Socio-Economic Impact Assessment	Assuming that the solar facility and associated infrastructure would not be developed at the proposed site, there would be no increase in electricity generation from the facilities, and no economic benefit to the landowners, or additional socio-economic benefits associated with the potential income generated through the construction and operation of the facilities. It should be noted that the development's potential negative impacts may well come into being, regardless of the proposed development as most are associated with non-project-related phenomena which could trigger similar job-seeking, influx, and socio-economic impacts as identified for the proposed development. The potential positive impacts primarily relate to employment opportunities and the Economic Development Plan (EDP). Accordingly, the no-go option is likely to result in negative economic impacts on the project area, as the potentially positive impacts from the construction, operational, and decommissioning phases, including the EDP, employment and growth in the small-scale support industry, will be not be realised. The no-development alternative also poses a lost opportunity for South Africa to supply renewable energy to its consumers. In addition having BESS is essential as a solution to peak time demand and reducing load shedding. This in effect represents a negative social cost. In addition, the no-go option will not assist National or Provincial governments in achieving their renewable energy commitments.
Geohydrology Assessment	In terms of the no-go alternative, the ground water facilities would remain the same as the project does not intend on using ground water.
Geotechnical Assessment	The status quo would remain the same.
Traffic Assessment	Should the project not go ahead, the traffic conditions in the area would remain as is.

As outlined in Section D of this report, the majority of the negative impacts identified as part of this assessment can be reduced to moderate or low significance with the implementation of mitigation measures. None of specialists found that the proposed projects should not go ahead i.e., no fatal flaws were identified. As noted above, the Socio-Economic Impact Assessment identified positive impacts from a social upliftment perspective. These include benefits to the local community via employment opportunities and the development of locally-owned industries to support construction related activities.

Hence, while the “no-go” alternative will not result in any negative environmental impacts as a result of the proposed project; it will also not result in any positive community development or socio-economic benefits. It will not assist government in addressing climate change, reaching its set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. Hence the “no-go” alternative is not a preferred alternative, or a reasonable and feasible alternative considered in this BA Process. Hence, the “no-go” alternative is not currently the preferred alternative.

A.13.2 Land-use Alternatives for VOLTA PV and BESS and EGI

At present the proposed site is zoned for agricultural land-use. The land use on the site and immediate surrounds is mostly grazing but some crop production still occurs in the surrounding area. The land has a long-term grazing capacity of 8 hectares per large stock unit.

The site has extremely limited crop production potential and is therefore not considered particularly preservation worthy as agricultural production land. The classified land capability of the site ranges from 4 to 9, but is mostly between 5 and 8. The small scale differences in the modelled land capability across the project area are not very accurate or significant at this scale and are more a function of how the data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. Values of 1 to 5 translate to a low agricultural sensitivity, values of 6 to 8 translate to a medium agricultural sensitivity and values of 9 to 10 translate to a high agricultural sensitivity.

Due to the low agricultural sensitivity of the site, and the effectively uniform agricultural conditions across the site, it is highly likely that there will be no material difference between the agricultural impact of any possible, alternative layouts on the site.

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has low agricultural sensitivity, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential.

It is important to re-iterate that the economic benefits to the landowner associated with the proposed Solar PV Facility and EGI are likely to be more significant than that of the current farming activities on site. The proposed development offers a land use with much higher income generating capacity than any viable agricultural land use on the site. Based on the above, the agricultural land use is not a preferred alternative.

Refer to Sections B and D of this BA Report for a summary of the Agriculture Compliance Statement, as well as Appendix C.1 and C.2 for the complete report.

A.13.3 Type of Activity - Renewable Energy Alternatives for VOLTA PV and BESS and EGI

Where the “activity” is the generation of electricity from a renewable energy source, possible alternatives that could be considered on the project site include renewable energy technologies such as Hydro Energy, Biomass, and Wind Energy. **However, based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies are deemed to**

be appropriate for the site. The unsuitability of other renewable energy developments for the site, as well as the potential risks and impacts of each, are discussed below.

In terms of the alternatives considered for the EGI to be undertaken, this is entirely dependent on the activity associated with the proposed Solar PV Facility (where the activity associated with the PV Facility is generation of electricity). Essentially, the proposed Solar PV Facility govern the type of activity associated with the proposed EGI project. The activity to be undertaken is therefore the transmission of electricity that will be generated by the proposed Solar PV Facility. The only feasible method of transmitting the electricity that is generated by the proposed Solar PV Facilities to the Artemis Substation is via overhead and underground power lines.

A.13.3.1 Hydro Energy

The proposed project site does not contain any large inland water bodies, which excludes the possibility of renewable energy from small- or large-scale hydro energy generation. Therefore, the implementation of a Hydro Energy Facility at the proposed site is not considered to be a reasonable and feasible alternative to be assessed as part of this BA Process.

A.13.3.2 Biomass Energy

The proposed project sites do not contain any abundant or sustainable supply of biomass. Therefore, the implementation of a Biomass Energy Facility at the proposed site is not considered to be a reasonable and feasible alternative to be assessed as part of this BA Process.

A.13.3.3 2019 IRP, Wind and Solar SEA, Solar Energy and Wind Energy

The 2019 Integrated Resource Plan (IRP) was published in Government Gazette 42784, GN 1360 on 18 October 2019 for the period 2019 to 2030. As indicated in Figure A.12, coal makes up approximately 43 % of the total installed capacity indicated in the 2019 IRP, whereas Wind and Solar PV respectively make up 23 % and 10 %.

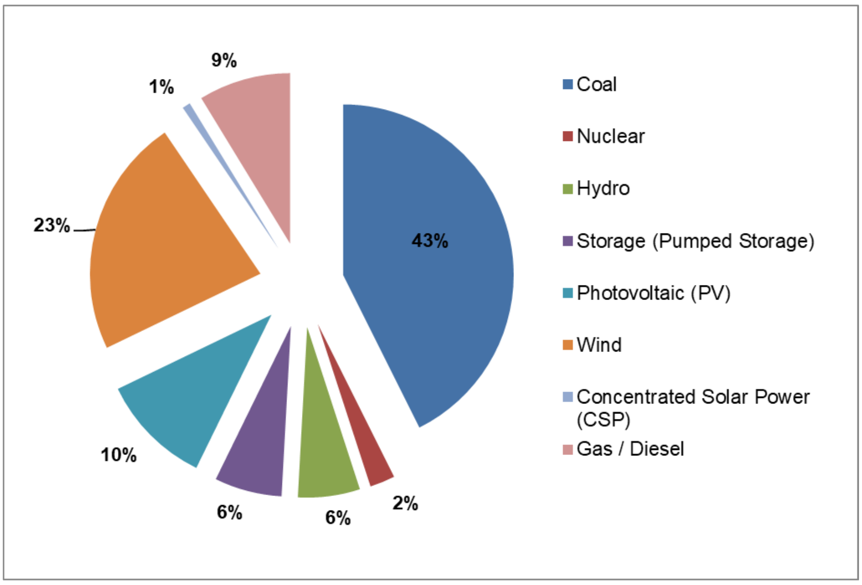


Figure A.10. 2019 IRP Total Installed Capacity (% of MW)

The 2019 IRP proposes to secure 26 630 MW of renewable energy capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power). This amount excludes Hydropower and Pumped Storage. Of this total, 1474 MW of Solar PV, 1980 MW of Wind and 300 MW of Concentrated Solar Power is already installed capacity. In addition, of the 26 630 MW, approximately 814 MW of Solar PV, 1362 of Wind and 300 MW of Concentrated Solar Power is committed or already contracted capacity. Furthermore, 6 000 MW of Solar PV and 14 400 of Wind of this 26 630 MW is new additional capacity. This is indicated in Figure A.13.

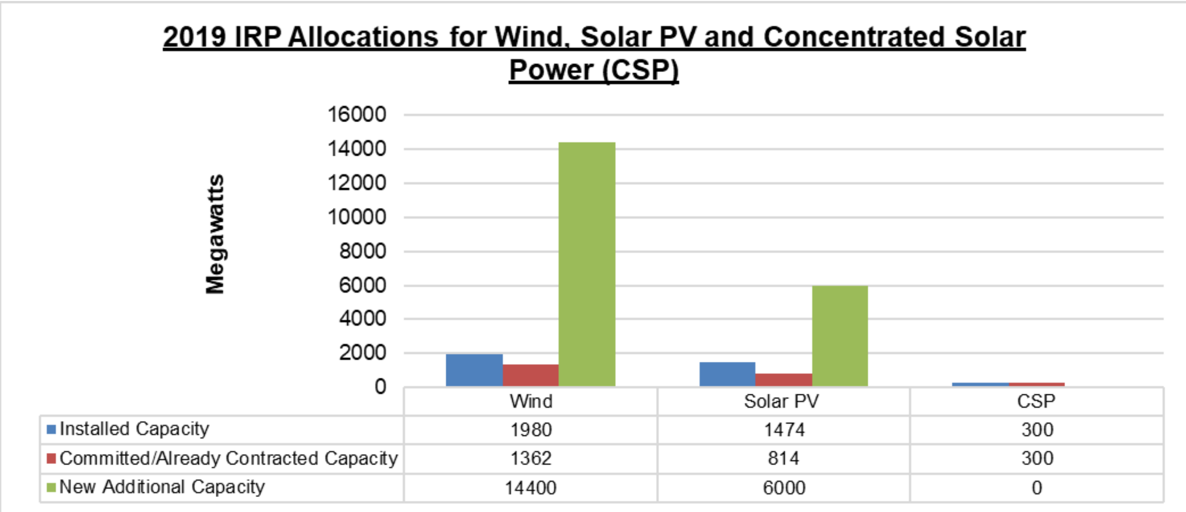


Figure A.11. 2019 IRP Allocations for Wind, Solar and Concentrated Solar Power in MW

Linked to the 2010 IRP, the DMRE entered into a bidding process for the procurement of 3725 MW of renewable energy from IPPs by 2016 and beyond. On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in Government Gazette 39111.

On 7 July 2020, in Government Gazette 43509 and GN 753, the Minister of Mineral Resources and Energy, in consultation with the National Energy Regulator of South Africa (NERSA), determined that new generation capacity needs to be procured to contribute towards energy security. Specifically, 2000 MW will be procured from a range of energy source technologies in accordance with the short-term risk mitigation capacity allocated for the years 2019 to 2022 (under "other" in the allocation table contained in 2019 IRP). In line with this, the Risk Mitigation IPP Procurement Programme (RMIPPPP) was designed and launched in August 2020 by the DMRE in order to fulfil the GN 753 Ministerial Determination.

In order to submit a bid in terms of the REIPPPP, the proponent is required to have obtained an EA in terms of the EIA Regulations as well as several additional authorisations or consents. Linked to this, the National Department of Environmental Affairs (DEA) in discussion with the Department of Energy (DoE) (now respectively operating as the DEFF and DMRE), was mandated by MinMec to commission a SEA to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development. The Phase 1 Wind and Solar PV SEA[1] was completed in 2015 and was in

[1] More information on the SEA can be accessed at https://redzs.csir.co.za

support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. Phase 2 of the SEA was completed in 2019 and identified three additional REDZs. As noted above, the SEA aimed to identify strategic geographical areas best suited for the roll-out of large-scale wind and solar PV energy projects, referred to as REDZs. Through the identification of the REDZs, the key objective of the SEA was to enable strategic planning for the development of large scale wind and solar PV energy facilities in a manner that avoids or minimises significant negative impact on the environment while being commercially attractive and yielding the highest possible social and economic benefit to the country – for example through strategic investment to lower the cost and reduce timeframes of grid access. Following the completion of the SEA, the REDZs were gazetted in February 2018 in GN 114 and 2021 in GN 144 by the Minister of Environmental Affairs. The location of the proposed projects within a REDZ (specifically REDZ 5 (Kimberley REDZ)) supports the development of a large-scale renewable energy project in the location (Refer to Figure A.3). The proposed projects are therefore in line with the national planning vision for wind and solar development in South Africa.

Based on the above, both wind or solar PV projects are supported within the REDZs. In order to ensure that a Wind Energy Facility is successful, a reliable wind resource is required. Wind resource is defined in terms of average wind speed and includes Weibull distribution (used to describe wind speed distributions); turbulence, wind direction, and pattern of wind direction (as depicted by a wind rose). These factors are all key considerations used in determining whether a site is suitable for the development of a Wind Energy Facility. A mean wind power density map has also been created (CSIR, 2018), which is not related to any specific turbine type and demonstrates the wind resource of the country. The mean wind power density map shows that the project area falls within an area that has lower wind power density in comparison to the rest of the country (Figure A.14). Overall, wind energy development can occur within this area but other localities in South Africa may be more favourable for wind energy development. Site specific requirements for wind energy facilities make it a less feasible alternative when compared to solar PV at this specific site. <u>Therefore, the implementation of a Wind Energy Facility at the proposed site is not considered to be a reasonable and feasible alternative to be assessed as part of this BA Process</u>.

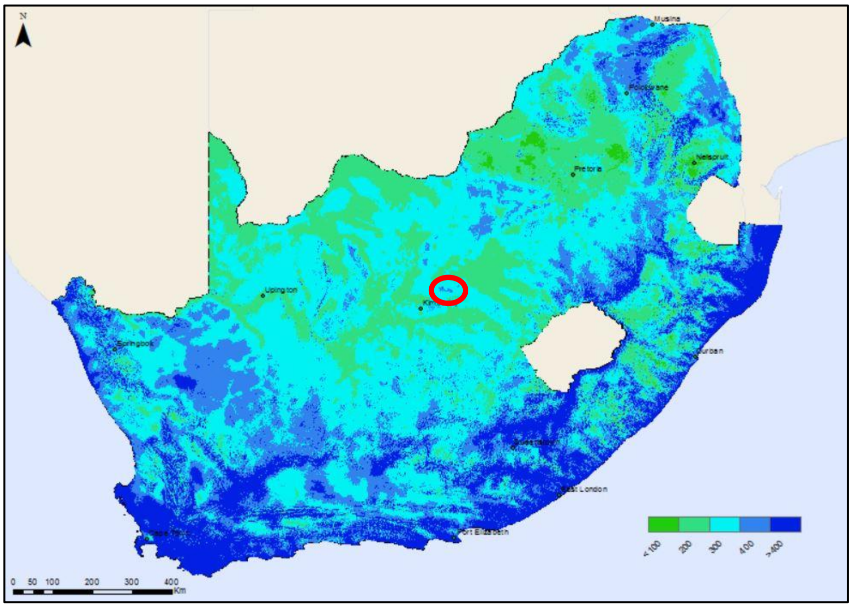


Figure A.12. Mean Wind Power Density for South Africa (CSIR, 2018)

In terms of the suitability of solar development at this location, the proposed project area has a high Global Horizontal Irradiation[2] (GHI), relevant to PV installations (Figure A.15). Therefore, this area is deemed as one of the most suitable for the construction and operation of solar energy facilities as opposed to other areas and provinces within South Africa. For example, coastal regions within the Eastern Cape and Western Cape mainly have a lower solar radiation (shown in the lighter orange shades in Figure A.15), which is not completely feasible for the proposed project.

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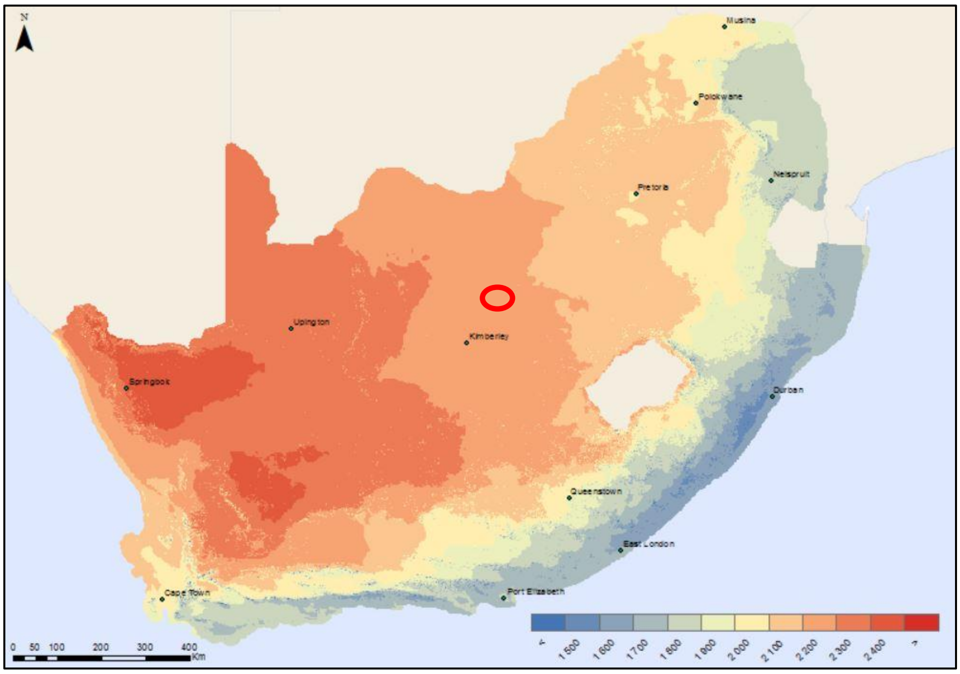


Figure A.13. Solar Resource Availability in South Africa

<u>Therefore, the implementation of solar energy facility at the proposed project site is more favourable and feasible than wind energy development. In terms of project and location compatibility, the proposed solar energy facility is considered to be the most feasible renewable energy activity alternative.</u>

Since the alternative activities considered were deemed not to be reasonable and feasible for the area and the site, no other renewable energy technologies alternatives were further assessed in this BA process.

<u>Table A.17. Summary of Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives</u>

Type of Renewable Energy Alternative	**Are suitable resources available at the proposed project site??**	**Main Potential Impacts and Risks?**	**Is this the preferred Alternative?**
Biomass Energy	No – not suitable	• Significant Waste	No

[2] Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site??	Main Potential Impacts and Risks?	Is this the preferred Alternative?
		Generation • Air Emissions	
Hydro Energy	No – not suitable	Not suitable	No
Wind Energy	Potentially with advanced turbines to harvest wind at low wind power density. Better areas in the country.	• Visual • Noise • Bird and bat collisions • Loss of agricultural land • Impacts on aquatic ad terrestrial biodiversity	No
Solar Energy	Yes	• Visual • Loss of agricultural land • Impacts on heritage resources • Impacts on aquatic ad terrestrial biodiversity	Yes

A.13.4 Technology Alternatives for VOLTA PV and BESS

A.13.4.1 Solar Panel Types

Only the PV solar panel type was considered in the BA. Due to the scarcity of water in the proposed project area and the large volume of water required for Concentrated Solar Power (CSP), this technology is not deemed feasible or sustainable and will not be considered in the BA. This is the main difference between PV and CSP technology that led to the selection of PV as the preferred solar panel technology. Furthermore, CSP technology requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective. As described above, in terms of the 2019 IRP, 300 MW capacity is already installed for CSP; and an additional 300 MW has been allocated for 2019, whilst there is no new additional capacity allocated for this technology. Solar PV is allocated an additional new capacity of 6 000 MW in terms of the 2019 IRP. This means that the need and desirability of CSP is not as evident and justified compared to PV.

A.13.4.2 Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The main mounting systems that will be considered as part of the design are Single Axis Tracking structures (aligned north-south); Fixed Axis Tracking (aligned east-west); Dual Axis Tracking (aligned east-west and north-south); Fixed Tilt Mounting Structure or Bifacial Solar Modules.

A.13.4.3 BESS

The VOLTA Solar PV facility will have Battery Energy Storage Systems (BESS) of up to 2200MWh located adjacent the VOLTA substation SSa named BESS Site 1. A further 1800MWh BESS named BESS Site 2 is planned on the farm Oxford 1/1030, and this will feed to substation SSb then into the Artemis MTS. The preferred battery technology at draft stage was solid state Lithium-ion such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or sodium-ion systems. Alternative technologies being considered include Redox flow (typicaly vanadium) as well as Liquid Metal (Ambri technology). Since the Draft Basic Assessment was submitted the Redox Flow battery using Vanadium electrolyte has emerged as a new preferred battery technology The specific technology will only be determined following Engineering, Procurement and Construction (EPC) procurement.

- There are numerous different battery technologies, but using one consistent battery technology system for the BESS installations associated with all the PV developments in the complex would allow for ease of training, maintenance, emergency response and could significantly reduce risks.

- Where reasonably practicable, state-of-the-art battery technology should be used with all the necessary protective features e.g., draining of cells during shutdown and standby-mode, full BMS with deviation monitoring and trips, leak detection systems.

- **There are no fatal flaws associated with the proposed VOLTA battery installation for either of the three technology types**.

- The overall design should be subject to a full Hazop prior to finalization of the design.

- For the VRFB systems there should be an environmentally friendly method of filling the systems with electrolyte upon startup and an end of life (and for possible periodic purging requirements) solution for the large quantities of hazardous electrolyte should be investigated, e.g., can it be returned to the supplier for re-conditioning.

- Prior to bringing any solid-state battery containers into the country, the contractor should ensure that:

  - An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating.

  - An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers.

- The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another.

- Under certain weather conditions, the noxious smoke from a fire in a lithium battery container could travel some distance from the unit. The smoke will most likely be acrid and could cause irritation, coughing, distress etc. Close to the source of the smoke, the concentration of toxic gases may be high enough to cause irreversible harmful effects. Location of the facilities needs to ensure a suitable separation distance from public facilities/residences etc. The current proposed BESS location is over 500m from isolated farmhouses / other occupied facilities and 100m from the R64 is therefore suitable. The risks of significant impacts is very low.

- Where there is a choice of alternative locations for the BESS, those that are further from water courses would be preferred. VRFB hazards are mostly related to possible loss of containment of electrolyte and solid-state systems may experience fires that may result in loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want these run-offs to enter water courses directly. The buffer distance between water bodies and the facilities containing chemicals should be set in consultation with a water specialist and is therefore not specified in this SHE RA. It should be noted that the locations are well over 100m from the closest water source and will likely be suitable.

- For molten metal batteries the most significant hazards are to persons working with the facilities, e.g. operation and maintenance personnel. Suitable procedures will need to be in place and PPE to be specified.

- Finally, it is suggested once the technology has been chosen and more details of the actual design are available, the necessary updated Risk Assessments should be in place.

Although no final choice is made, the worst case scenario, as discussed in the BESS RA, has no fatal flaws to prevent development. New technology particularly Vanadium Redox Flow, alleviate many environmental and safety concerns.

The BESS complements solar generation. Its immediately dispatchable. The no-go alternative will result in reliance on other power sources at night. Some of them not immediately dispatchable and leading to low grid capacity and load shedding. The current reliance on dispatchable power from diesel generators is a very costly and environmentally hazardous power source."

There are no feasible technology alternatives for Powerlines.

A.13.5 Site Alternatives for VOLTA PV/BESS and EGI

The preferred site within the Free State was selected based on national level considerations (high solar radiation levels) and the fact that the proposed sites fall within the REDZ 5 (as discussed above). The grid connectivity possibilities were a motivating factor. The easing of MW size restrictions allows larger projects and so more farms were optioned to add to the project.

The prospect of many solar farms in the area led to the realization of an opportunity to provide BESS not only for VOLTA energy production but possibly for other projects to supply peak time demand and using the EGI infrastructure during the night. The proximity to three IPP EGIs, improvement in battery technology, lifespans and costs - in conjunction with the increase in electricity pricing - makes large scale BESS feasible at this site.

A detailed screening phase and iterative design approach was adopted, which integrated the screening and assessment of environmental impacts of the technical components of the project, early in the project lifecycle. The DFFE screening tool and prior EA application reports were used to find possible sensitive areas and points that were avoided at this first delineation of the PV/BESS study area. An initial area of approximately 680 ha was identified and screened for approximately 290 MW wind energy facilities. Specialists were appointed to do an initial screening of the area that will influence the project layout. Here, specialist identified wetlands, heritage resources as areas to avoid.

The Project Applicant has subsequently reduced the VOLTA PV area project boundary to avoid the delineated "No-Go" areas and thus refined the project development footprint for further detailed specialist assessment.
The outcome of the site selection process was the identification of approximately 500 ha potentially developable area on which the project is proposed.

Part of the VOLTA EGI (the part south of the R64) will be shared with the neighbouring ibVogt, Marula Cluster projects. Both the Marula Cluster and VOLTA propose to use the substation SSa and the same route for their powerlines from SSa to the Artemis MTS. The Ngonyama solar project (one project of the Marula Cluster) received preferred bidder status in bid round 6 so the EGI and SSa sites and layout were accepted at the outset of the VOLTA project as pre-determined. An EGI expansion is planned for the VOLTA project, to accommodate the substation SSb and the routing of powerlines from SSb to Artemis MTS. The expansion has very few alternative layouts as it is an extension of the pre-determined, shared EGI and so adjacent and along the same road. The substation SSb is placed with relevant offsets from the road and existing powerlines and avoids pans and heritage sensitivities and as far as possible utilised agricultural land. The EGI must incorporate the substation SSb and allow the additional routing of powerlines to the Artemis MTS that may not fit into the shared EGI corridor.
Through this process the most environmentally and socio-economically favourable site layout was thus identified for detailed assessment in this BA Process. On this basis, the preferred layout of the VOLTA PV and EGI projects will be assessed against the "no-go" alternative. The "no-go" alternative is the option of not constructing the proposed project where the status quo of the current farming activities on the site would continue. On a site-specific level, the site selection factors of land availability, environmental sensitivities, distance to the national grid, site accessibility, topography, fire risk, current land use and landowner willingness were all considered to determine the feasible i.e., preferred site.

Refer to Annexure A to this chapter for a detailed description and associated timeline of the site layout plan development process undertaken by the Project Applicant.

For the PV and BESS dual-purpose areas, the choice of PV or BESS will be resolved at the time of development depending on technology and cost/benefit factors.

On a site specific (local) level, the sites on the VOLTA PV and EGI were deemed suitable due to all the site selection factors (such as land availability, distance to the national grid, site accessibility, topography, current land use and landowner willingness) being favourable. The site selection criteria considered by the Applicant are discussed in detail below Table A.18.

Table A.18. Site selection factors and suitability of the site

FACTOR	SUITABILITY OF THE SITE
Land Availability	The proposed farm portions for the VOLTA PV facility is a suitable size for the proposed project. The land available to develop at the preferred site is approximately 1294 ha. This total area was assessed by the specialists, however only an estimated 720 ha will be fenced and 520 ha is needed for the proposed PV and BESS footprints.
Irradiation Levels	2000 – 2200 kWh/m^2
Distance to the Grid	The proposed projects are located approximately 2.1km (via underground powerlines) and 4 km (via overhead powerlines) from the planned Artemis MTS. The PV and BESS

FACTOR	SUITABILITY OF THE SITE
	Facilities will connect to the Artemis Substation.
Grid Infrastructure Developments	The involvement of IPPs in building substations and EGI corridors will benefit this VOLTA project greatly. The Artemis MTS can have sufficient transformer capacity added to allow the VOLTA PV solar and BESS output to be connected to the Eskom grid. The VOLTA EGI will be shared with the neighbouring project (Ngonyama) to route their powerlines to the Artemis MTS. This minimises the duplication of substations and powerline routes and environmental impacts.
Distance to Other Solar Producers	With other projects also transmitting their electricity to the Artemis MTS they pass through or adjacent to the VOLTA farms and could feed into VOLTA BESS for time-shifting electricity supply on the grid.
Site Accessibility	The proposed project site can be accessed via existing farm gravel roads which will be upgraded as part of the proposed project. The site is accessible directly off the P59-2 (R64) road that runs through the project site.
Topography	There are no steep slopes of 1:4 on the proposed project sites.
Current Land Use	Agriculture – Grazing with evidence of degradation regarding: habitat to support biodiversity, pans, and presence of alien species. Heritage sites are not preserved.
Visual Impact	The presence of many overhead powerlines and substations makes the area visually impacted already.
Landowner Willingness	The landowners have signed consent for the use of the land for the proposed project. This is considered an important aspect of the proposed project in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowners are willing and supportive of the proposed projects being undertaken on their farms).

Furthermore, from an impact and risk assessment perspective, the implementation of solar PV and BESS projects on the VOLTA site will most likely result in fewer risks in comparison to its implementation at alternate sites (i.e., regions with similar irradiation levels), based on the following points:

- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example the agricultural potential for alternative sites might be higher and of greater significance.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility on their land and if the landowners strongly object, then the project will not be feasible.
- There is no guarantee that other sites within the Free State will be located close to existing or proposed electrical infrastructure to enable connection to the national grid. The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

In addition, the proximity to the planned Artemis Substation was a major determinant for identifying suitable site for the proposed development.

Given the site selection requirements associated with solar energy facilities and the suitability of the land on the project site and no initial fatal flaws being present, no other site alternatives were considered as part of the BA Process. The VOLTA and EGI sites were therefore deemed feasible and selected as the preferred sites.

A.13.6 Development Footprint Location and Layout Alternatives for VOLTA PV and BESS and EGI

As an initial step, the Project Developer consulted with the National Web-Based Environmental Screening Tool to seek a baseline description of the environmental sensitivities within the proposed site. Consultation with the landowners was also undertaken in order to identify possible areas that should not be proposed for the development. This guided the selection of the best area to be assessed by the specialists, from an environmental sensitivities and practical perspective, covering approximately 720 ha within the project site.

Detailed specialist assessment of the study area during the BA through desktop-based analysis and fieldwork methodologies (where required) resulted in the verification of environmental sensitivities present on site. The proposed permanent development footprint is based on an indicative project layout of the proposed VOLTA PV and EGI projects, which was assessed by the specialists during the BA to indicate potential sensitive areas that should preferably be avoided. Based on these findings from the specialist assessments, the preliminary layout was refined to avoid (where possible) the most sensitive features that were identified by the specialists within the original assessed study area. This revised project infrastructure layout was taken forward for further assessment by the specialist team. The specialists have, based on their impact assessment of the proposed development footprint of the refined their sensitivity mapping of the proposed project layout with recommendations regarding micro siting and selection of infrastructure location alternatives, as well as required mitigation measures and management actions. The larger area of approximately 720 ha was then assessed by the specialists in order to identify sensitive features, using desktop and field work methodologies (where required), which in turn led to the identification of the preferred site for the PV facility and EGI (within the assessed area of approximately 720 ha). The sites for PV facility and EGI were identified to avoid the sensitivities highlighted by the specialists.

Note however that following the receipt of comments from the DFFE during the 30-day public review period on the Draft BA Report and the site layout plan, the BESS that was on the farm Cornelia has been moved outside of delineated CBA1 area – see Figure A.14 and Figure A.15, respectively.

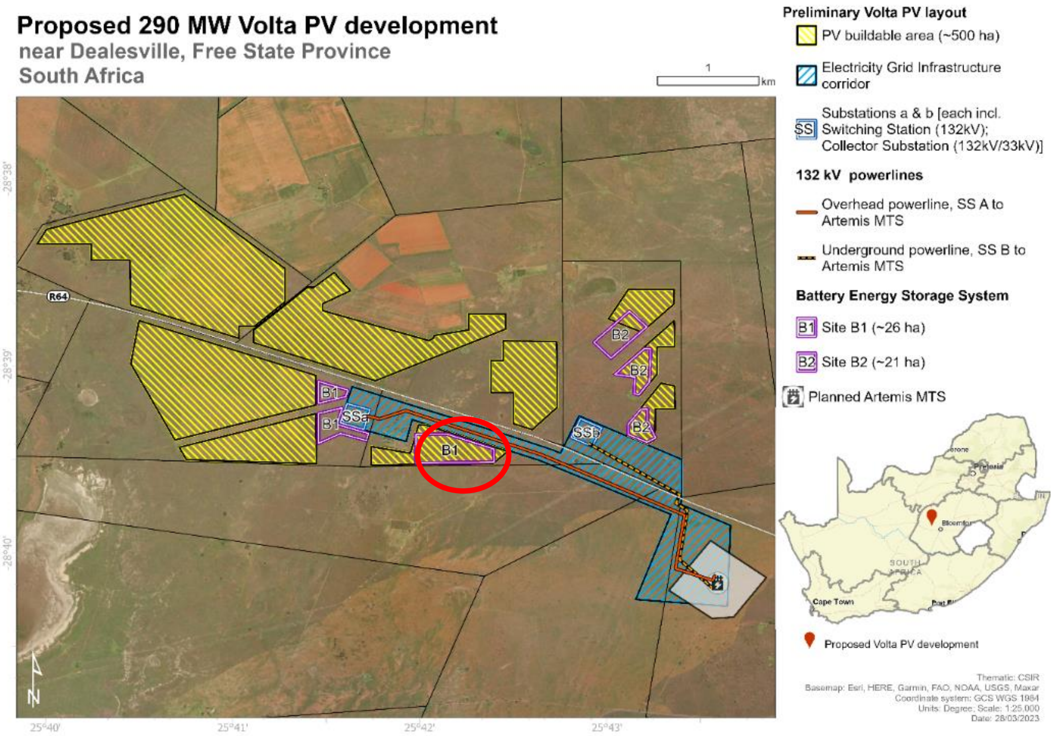


Figure A.14. Locality map showing the BESS B1 locations. All PV buildable areas in yellow were previously assessed. This BESS location was included in the Draft BA Report.

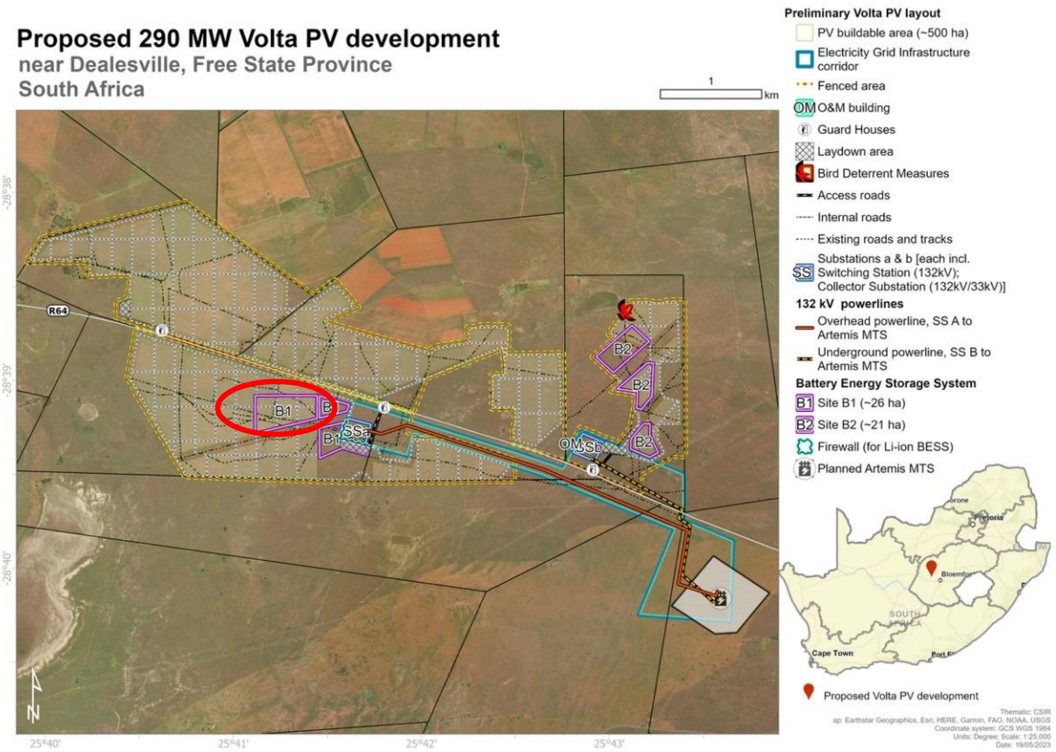


Figure A.15: Locality map showing the <u>revised</u> BESS B1 option, in response to comment received from DFFE Biodiversity Conservation.

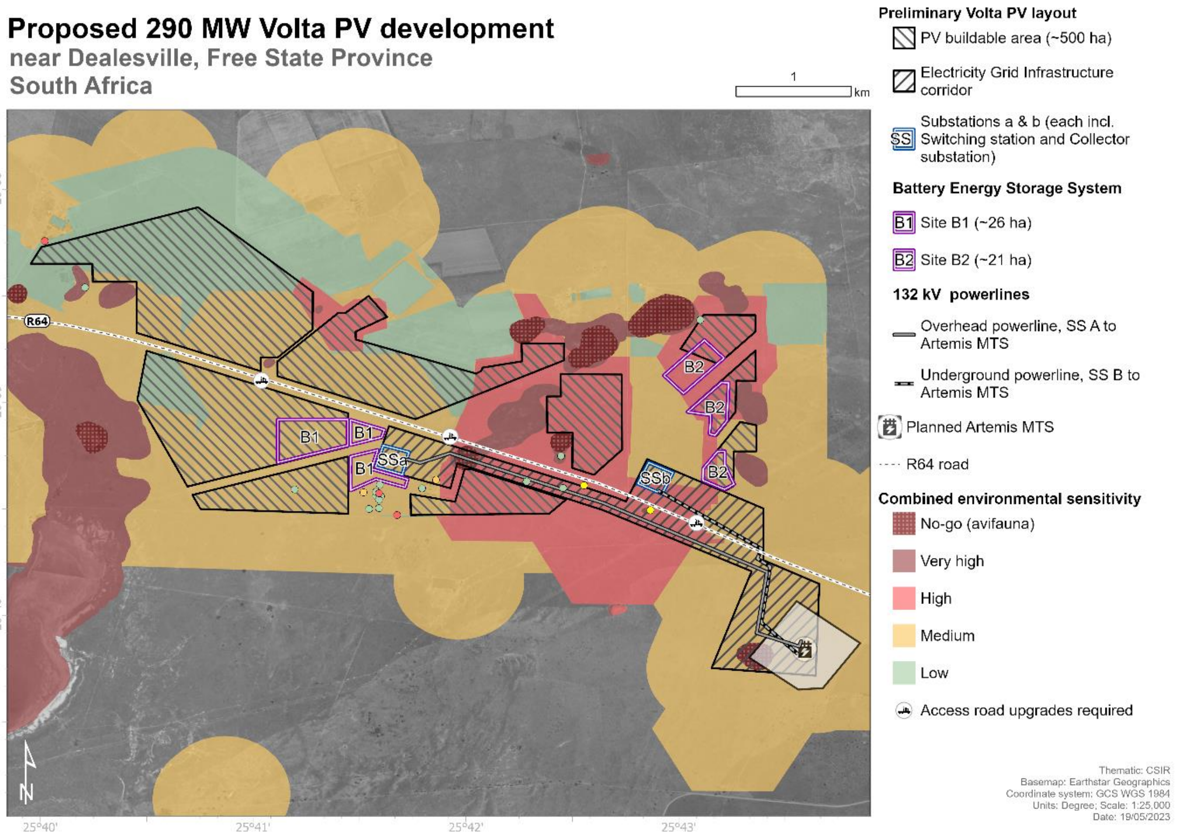


Figure A.16: Locality map showing the <u>revised</u> BESS B1 option, in relation to the various sensitivities identified by specialists.

These maps show the revised and confirmed project infrastructure placements in relation to all identified "no-go" areas for inter alia agriculture, avifauna, bats, aquatic and terrestrial biodiversity, noise sensitive receptors, visual sensitive receptors, heritage features etc. within the project site that was assessed (Figure A.16). The BESS Risk Assessment advises the safe distances BESS should be from settlements, roads, heritage sites and watercourses/boreholes and these have been adhered to. These maps also confirm that the placement of key project infrastructure components is located well outside the identified and mapped "no-go" areas and the project site is therefore more than suited for the development of the proposed projects, given that all measures be taken to avoid, manage or mitigate potential impacts that may be imposed by the proposed development.

Based on the findings of the specialist studies, an environmental sensitivity map has been produced (as included in Section D of this report and Appendix A). This map shows the sensitivities on site (e.g., terrestrial ecology, watercourse features, and sensitive heritage features etc.) within the area identified and assessed.

The sensitive environmental features found within the preferred sites, as described in the specialist studies (Appendix C) and discussed in Sections B and D of this BA Report, are able to be avoided by the location, layout and design of the proposed projects.

Project Infrastructure Location Alternatives:

Based on the specialist assessments, the preliminary project infrastructure layout was revised and infrastructure placement locations selected to avoid (where possible) the most sensitive features that were identified by the specialists within the original assessed study area.

- Temporary Construction Compound Areas:

Placement locations for the construction compound areas have been identified at the proposed project site and were found to be acceptable from an environmental sensitivity perspective. These are the same area where BESS sites will be located (BESS 1 which does not fall within CBA1)

- Temporary Laydown Areas:

Placement locations for the temporary laydown areas have been identified at the proposed project site and were found to be acceptable from an environmental sensitivity perspective.

- Temporary Batching Plant Areas:

Placement locations for the temporary batching plant areas have been identified at the proposed project site and both locations were found to be acceptable from an environmental sensitivity perspective.

Following the exclusion of the required areas, sufficient developable area is still available on site which does not compromise the current ecological integrity of the site or go against the requirements of the landowners.

The current layout is thus a culmination of extensive technical, economic and environmental planning.

A.13.7 Concluding Statement for Alternatives

The following alternatives were considered in the BA Phase:

- **No-go Alternative:**

The no-go alternative assumes that the proposed VOLTA PV and EGI project will not go ahead i.e., it is the option of not constructing the VOLTA PV and BESS and EGI. This alternative would result in no environmental impacts (positive and negative) on the site or surrounding local area, as a result of the proposed facilities. The no-go alternative has been investigated in this BA. **The no-go is not preferred**.

- **Land Use Alternative:**

The site has low agricultural potential because of, predominantly, aridity constraints, but also due to soil constraints. Agricultural land use is limited to low density grazing. The economic benefits to the landowner associated with the proposed Solar PV Facility is likely to be more significant than that of the current farming activities on site. **Based on the above, the agricultural land use is not a preferred alternative.**

- **Type of Activity - Renewable Energy Alternatives:**

In terms of project and location compatibility, the proposed solar energy and BESS facilities and associated EGI are considered to be the most favourable and feasible renewable energy activity alternative (i.e., in comparison to Biomass, Hydro Energy and Wind Energy). **Solar energy is the**

preferred and only renewable energy technology alternative to be developed on site as a result of:

- The proposed VOLTA PV facility falls within the REDZ 5 (Kimberley) and the EGI falls within the central corridor. The proposed project is therefore in line with the criteria of the SEA and located in an area of strategic importance for solar energy development;
- The site is adjacent to other projects and can add the service of BESS to provide about 4GWh of dispatchable power. This will compensate for solar not generating power at night and other generation failures; and
- The site has a very good solar resource availability (i.e., GHI).

- **Technology Alternatives:**

Only the PV solar panel type was considered in the BA, along with various mounting options that will be considered in the design. There are no technology alternatives for transmission lines.

- **Site Alternatives:**

Given the site selection requirements associated with solar energy and BESS facilities and associated EGI and the suitability of the land available on the farm portions and no initial fatal flaws being present, **no other site alternatives were considered as part of the BA Process**.

- **Development Footprint Location and Layout Alternatives:**

An area of approximately 720 ha was assessed by the specialists. The specialists identified environmental sensitivities within this region, which led to the identification of the most suitable area for the PV facility and EGI. In addition, the specialist assessed the EGI corridor and specific routing. Based on the inputs from the specialists, the layout was devised to avoid environmentally sensitive areas (no-go areas), while still retaining technical and financial viability, as well as the requirements of landowners (as applicable). The current proposed layout is the preferred layout that was assessed by all the specialists on the project team (Appendix A of this BA Report).

Summary of Legislative Requirements for the Assessment of Alternatives

The 2014 NEMA EIA Regulations (as amended) (Appendix 3 of the GN R982) have certain requirements in terms of the selection of the **proposed preferred activity, site, and location of the development footprint within the site**. Table A.19 below indicates the requirements of the 2014 NEMA EIA Regulations (as amended) in terms of the process leading to the preferred activity, site, and development footprint location alternatives. Table A.19 also includes a response from the EAP showing how the requirements of the 2014 NEMA EIA Regulations (as amended) have been addressed in this report.

Table A.19. Requirements for the consideration of Alternatives based on the 2014 NEMA EIA Regulations (as amended)

	Section of the EIA Regulations	**Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)**	**Response from EAP**
1.	Appendix 3 – (2)	The objective of the BA Process is to, through a consultative process:	Refer to responses below
2.	Appendix 3 – (2) (c)	• identify the location of the	As noted in the preceding sections of this BA

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
		development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.	Report, the preferred site for the proposed VOLTA PV, BESS and EGI project is approximately 720 ha in extent. The combined environmental sensitivity map is included as Figure 5.6 of this Chapter and included in Section F as well as in Appendix A of this BA Report. The significant environmental features identified by the relevant specialists have been mapped and overlain by the VOLTA PV, BESS and EGI Project study area. The buffers and exclusion areas that need to be applied to the sensitive areas (as identified in the specialist assessments) have also been mapped and overlain by the study area. The remaining areas outside of the sensitive areas and buffers are then regarded as the areas available for development (i.e., the development footprint). Therefore, a suitable project layout within the development footprint has been determined ensuring that the areas that have a high or very high environmental sensitivity will be avoided by the proposed siting of the proposed projects. A single suitable location for the proposed site has been identified based on the sensitivity mapping and the development footprint. As noted above, a worst-case scenario was adopted by the specialists in terms of the area of assessment. The specialist assessments included in Section E of this BA Report therefore include an impact assessment process (inclusive of cumulative impacts) and by default, a ranking process of the identified development footprint focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.
3.	Appendix 3 – (2) (d)	• determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated.	The specialist assessments included in Section E of this BA Report include a description and assessment of the nature, significance, consequence, extent, duration, and probability of the identified impacts for the preferred alternatives. The specialist assessments also include the assessment of the reversibility and irreplaceability of the potential identified impacts, as well as the degree to which the identified impacts can be avoided, managed, or mitigated.
4.	Appendix 3 – (2) (e)	• identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment.	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.
5.	Appendix 3 – (2) (f)	• identify, assess, and rank the impacts the activity will impose on the preferred location through the life of	The specialist assessments included in Section E and Appendix C of this BA Report include a description, identification, and assessment of

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (GN R982)	Response from EAP
		the activity.	identified impacts that the proposed PV, BESS and EGI will impose on the preferred location of the proposed project.
6.	Appendix 3 – (2) (g)	• identify suitable measures to avoid, manage or mitigate identified impacts.	The specialist assessments included in E and Appendix C of this BA Report include an identification of suitable measures to avoid, manage, or mitigate identified impacts.
7.	Appendix 3 – (2) (h)	• identify residual risks that need to be managed and monitored.	The specialist assessments included in E and Appendix C of this BA Report include an identification of residual risks that need to be managed and monitored.
8.	Appendix 3 - (3)(h)	A full description of the process followed to reach the proposed development footprint within the approved site, including – • details of the development footprint alternatives considered; • (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; • (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; • (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and • (x) a concluding statement indicating the preferred alternative development location within the approved site.	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.
9.	Appendix 3 – (3) (l)	An environmental impact statement which contains (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.
10.	Appendix 3 – (3) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Refer to the development footprint and sensitivity mapping approach described in Point 2 above

- **Summary Statement:**

Based on the above, the preferred activity is the development of renewable energy facilities on site using solar PV as the preferred technology. In terms of the preferred location of the site, the following farm portions are preferred:

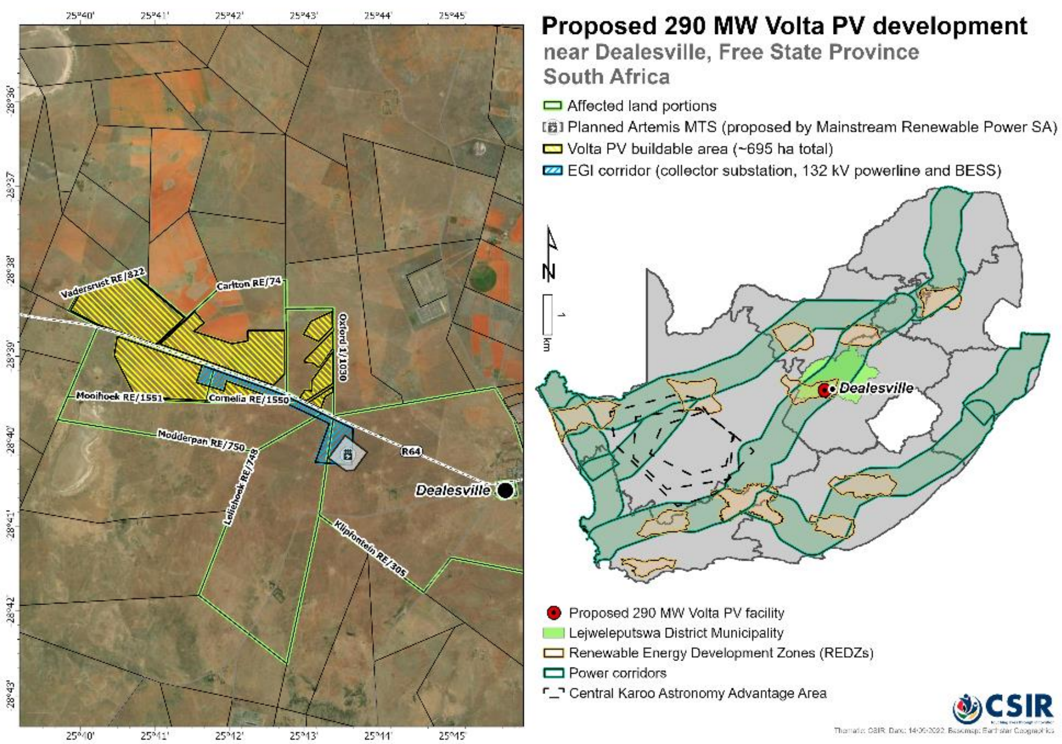
Affected Farm Portion	Mooihoek (RE/1551)	Cornelia (RE/1550)	Carlton (RE/74)	Vadersrust (RE/822)	Modderpan (RE/750)	Oxford (1/1030)	Klipfontein (RE/305)	Leliehoek (RE/748)
VOLTA Solar PV and BESS Facility	✓	✓	✓	✓		✓		
VOLTA EGI	✓	✓			✓	✓	✓	✓

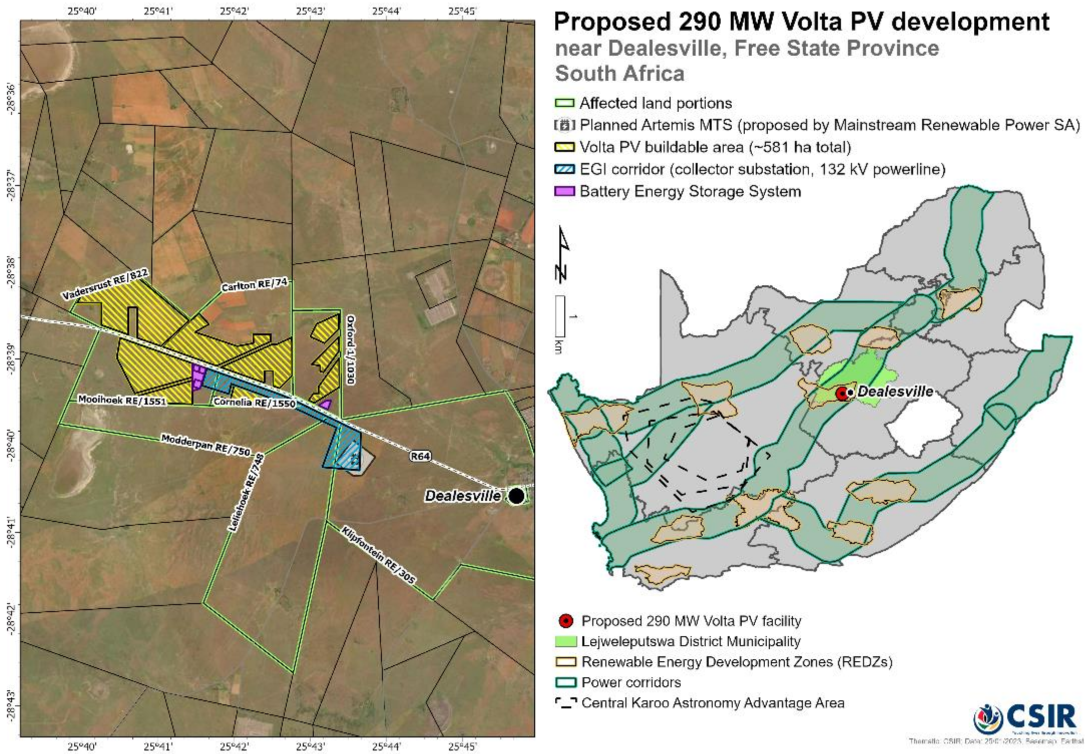
The location and layout of the activity have been informed by the outcomes of the specialist assessments and technical feasibility, as well as landowner requirements. The preferred layout is further discussed in Section D of this report.

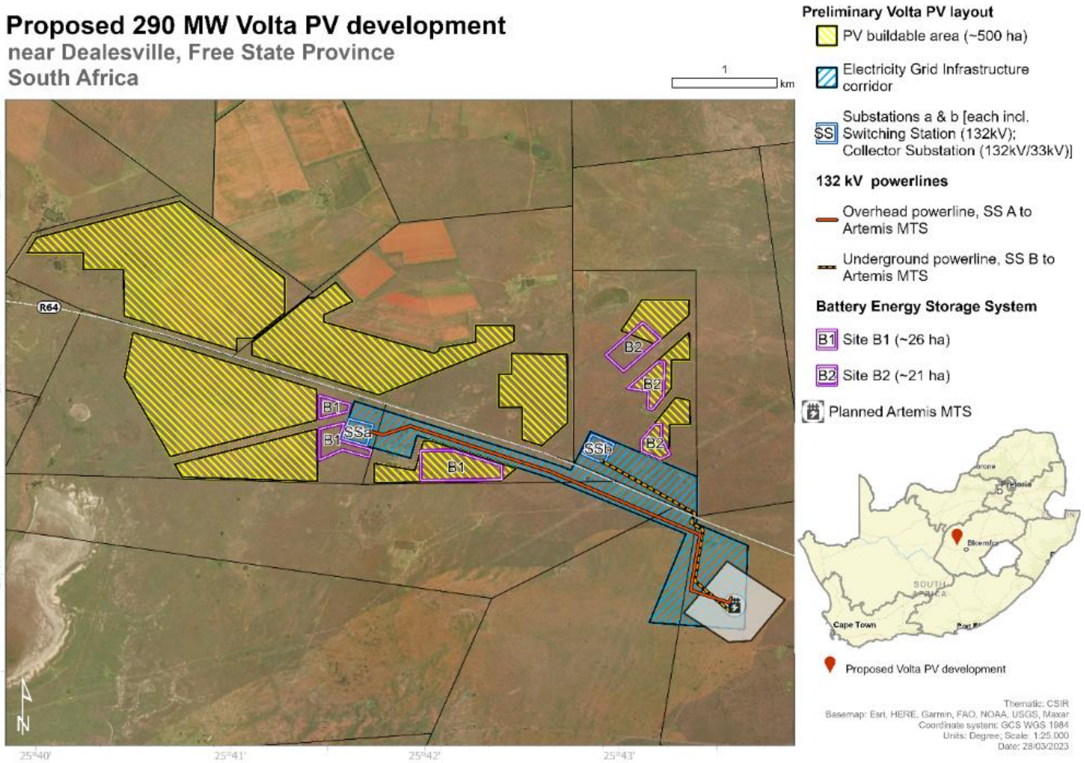
Site Layout Plan Development

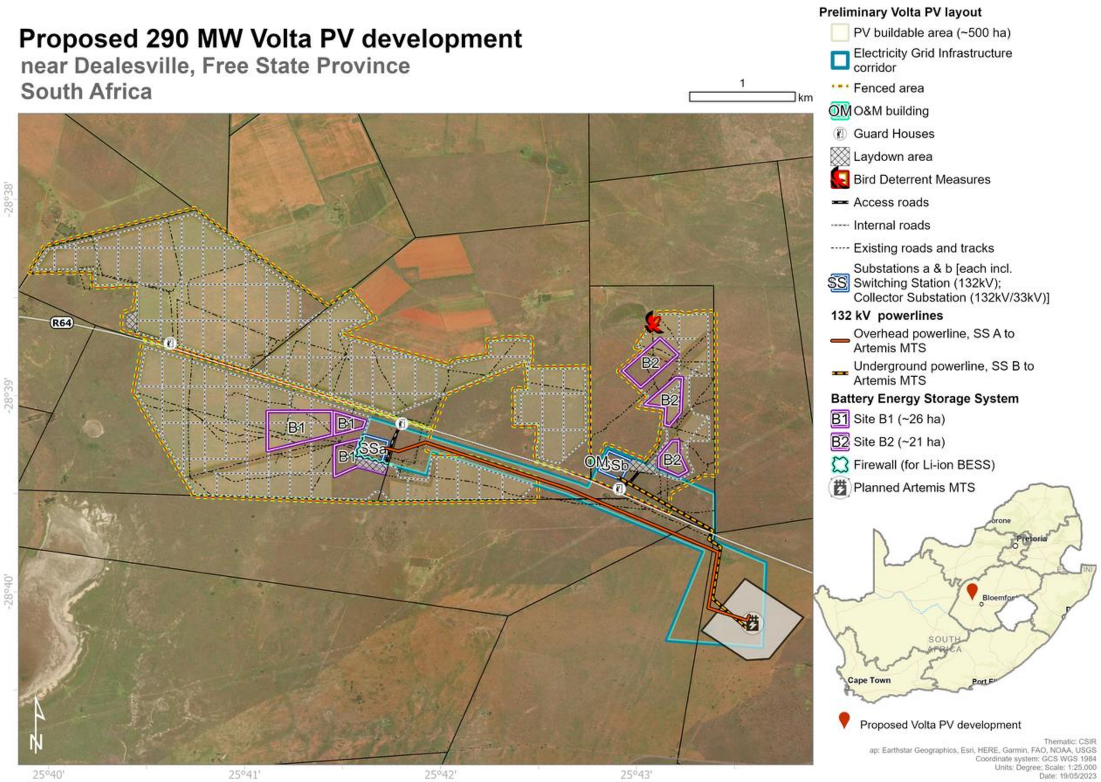
Since project inception, a number of layout iterations have been refined. While the purpose of this document is to demonstrate how the environmental and social constraints have defined the SLP presented in the BAR.

The table below demonstrates the level of avoidance and minimisation of impacts which informed the preferred site layout.

Version	Date	Constraints	Comments
3	December 2022	Wetlands and currently utilised agricultural fields	

			Avoidance of wetlands and heritage features
4	January 2023	Powerlines heritage sites and desktop-identified pans	

5	January 2023	Wetlands pans and seeps as delineated by the aquatic specialist after very heavy rainfall	 Addition of larger BESS areas, Substation SSb, expanded EGI to incorporate SSb and a poweline route from SSb to Artemis and avoidance of wetlands.

6	May 2023	CBA1 corridor	 Cornelia BESS moved to Mooihoek, West of smaller Mooihoek BESS sites. As requested in the DFFE DBAR feedback to reduce the impact on CBA1. Due to land restrictions not all CBA1 areas were avoided.

A.14 Need and Desirability

It is an important requirement in the BA Process to review the need and desirability of the proposed project. Guidelines on Need and Desirability were published in the Government Gazette of 20 October 2014. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place. Table A.20 includes a list of questions based on the DFFE's Guideline to determine the need and desirability of the proposed project. It should be noted this table was informed by the outcomes of the BA Process.

The table below details the need and desirability for both the VOLTA PV and EGI projects.

Table A.20. The Guideline on the Need and Desirability's list of questions to determine the "Need and Desirability" of a proposed project.

NEED	
Question	**Response**
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area)?	
1.1. How were the following ecological integrity considerations taken into account? 1.1.1. Threatened Ecosystems, 1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"), 1.1.4. Conservation targets, 1.1.5. Ecological drivers of the ecosystem, 1.1.6. Environmental Management Framework, 1.1.7. Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).	**The environmental sensitivities present on site and ecological integrity considerations were addressed within the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) and the Aquatic Biodiversity and Species Assessment (Appendix C.11 and C.12 of the BA Report) undertaken as part of this BA Process. The Avifauna Assessment (Appendix C.13 and C.14 of the BA Report) also addresses ecological integrity.** **The above specialist studies explain that the proposed VOLTA PV facility and EGI is located in a CBA Irreplicable and threatened ecosystem and vegetation type classified as endangered, namely the Vaal-Vet Sandy Grassland. No species of conservation concern were recorded on the project site. The specialist report further highlights that <u>considering that the topsoil will not be disturbed, and that heavy machinery will be utilised to only drill holes for the erection of the PV panels, approximately 3.5m above ground, the grassland will not be transformed</u>. In addition, the studies further say <u>the Grassland habitat will not be transformed completely, accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact is considered medium for Grassland and only the Watercourse should be avoided by the development, and an effort must be made to avoid the Grassland, where possible. Appropriate mitigation measures and rehabilitation can reduce the impact to the Grassland to moderate.</u>** **The Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs were included as stakeholders and comments were sought from officials during the 30-day comment period, extending from 30 March to 03 May 2023, subsequent to the release of the DBAR. No comments were received.** **Two principal factors are considered to be the master elements driving the localised ecology. These can be considered to be broadly meteorological**

NEED	
Question	**Response**
	factors, namely wind, rainfall and temperature, while edaphics, particularly giving rise to lithic or sandy environments may be considered a geophysical driver. **The specialists identified all ecological sensitive areas on site that would need to be avoided by the proposed development (e.g. pans, wetland environments), as well as how to suitably develop around and within these areas so that the ecological integrity of the areas is maintained (refer to Section D and Appendix C of this BA Report).** **A sensitivity map produced based on the input obtained from the various specialist studies is included in Section B and D of this Report, as well as in Appendix A.** **The Screening Tool also notes that no intersections with EMF areas have been found.** **The Tokologo Local Municipality were included as stakeholders and comments were sought from officials during the 30-day comment period, extending from 30 March to 03 May 2023, subsequent to the release of the DBAR. No comments were received on the municipality's their alignment with the SDF in terms of electricity development.**
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**The environmental sensitivities present on site and ecological integrity considerations were addressed within the Terrestrial Biodiversity and Species Assessment (Appendix C.4 of the BA Report) and the Aquatic Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) undertaken as part of this BA Process. The Avifauna Assessment (Appendix C.13 and C.14 of the BA Report) also addresses ecological integrity and environmental sensitivities. The specialists identified all ecological sensitive areas on site that would need to be avoided by the proposed development (e.g., pan and wetland environments), as well as how to suitably develop around these areas so that the ecological integrity of the areas is maintained (refer to Section D and Appendix C of this BA Report).**

NEED	
Question	**Response**
	The buffer areas recommended by the specialists have been avoided in the layout of the proposed PV Facility and EGI and buffers have been applied. A sensitivity map produced based on the input obtained from the various specialist studies is included in Section B and D of this Report, as well as in Appendix A. **Measures to avoid, remedy, mitigate and manage impacts are included within the Terrestrial and Aquatic Biodiversity and Species Assessment, as well as the Environmental Management Programme (EMPr), included as Appendix G - K of this BA Report.**
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**This development has the potential to impact on the ecology of the area. The proposed development of the VOLTA PV and EGI projects is expected to result in an overall moderate ecological impact when suitable mitigation measures are employed. Refer to the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) and the Aquatic Biodiversity and Species Assessment (Appendix C.11 and C.12 of the BA Report); as well as Section D of the BA Report.** **Measures to avoid, remedy, mitigate and manage impacts are included within the Terrestrial and Aquatic Biodiversity and Species Assessment, and the EMPr, included as Appendix G – K of this BA Report.**
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	**The description of the potential waste generation is included in Section A of this BA Report (this Section). It is not anticipated that a significant amount of waste will be generated. Waste generation during the construction phase will include liquid effluent and solid waste, and other general and hazardous waste (e.g., contaminated spilled material). Waste generation during the operational phase will be very limited.** **Measures to avoid, remedy, mitigate and manage impacts are included within the EMPr, included as Appendix G – K of this BA Report.**
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid	**A Heritage Impact Assessment and Palaeontology Impact Assessment was undertaken as part of this project (included as Appendix C.5 to C.8 of this BA**

NEED	
Question	**Response**
these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**Report). Potential impacts to heritage resources were identified as an impact during the construction and decommissioning phases. The overall findings of the Heritage Impact Assessment are that the no adverse impact to heritage resources is expected from the Project.** **From a palaeontology perspective, disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance was identified as an impact, rated with an overall very low significance with the implementation of mitigation measures. In addition, the studied concluded that it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation.** **A Heritage profile is included in Section B of this report.** **The applicable measures to avoid, remedy, mitigate and manage impacts are included in Section D and Appendix C (full specialist study) as well as in the EMPr.** **Measures to avoid, remedy, mitigate and manage impacts are included within the Heritage Impact Assessment and Palaeontology, and the EMPr, included as Appendix G – K of this BA Report.**
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	**The proposed project requires water during the construction and operational phases. The water will be sourced from the local municipality. The Geohydrology Assessment (Appendix C.16 of the BA Report) explains that the water requirements can be met via existing boreholes.** **If water is sourced from the municipality, it will be trucked to site via water tankers and stored on site in above ground storage tanks. The option to use water from the municipality has been adequately assessed and considered in this BA Process.**

NEED	
Question	**Response**
	The necessary approvals will be sought from the Department of Water and Sanitation (DWS) should groundwater be sourced from the existing boreholes for the proposed project. **Management actions to ensure the responsible and equitable use of water during the construction, operation and decommissioning phases are provided in the EMPr (Appendix G - K of this BA Report).**
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? 1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life) 1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources of the proposed development alternative?) 1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	**The proposed project aims to harness solar energy for the generation of electricity. This proposed project is seen as a source of 'clean energy' and reduces the dependence on non-renewable energy sources, such as coal fired power plants. The proposed development is located in the Kimberly REDZ. The REDZs represent areas where wind and solar PV energy development is being incentivized from resource, socio-economic and environmental perspectives. For more information, refer to Section A.13 of this BA Report, which deals with Alternatives, and thus outlines the suitability of this activity.** **The environmental sensitivities present on site and ecological integrity considerations were addressed within the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) and the Aquatic Biodiversity and Species Assessment (Appendix C.11 and C.12 of the BA Report) undertaken as part of this BA Process. The Avifauna Assessment (Appendix C.13 and C.14 of the BA Report) also addresses ecological integrity.**
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?: 1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 1.8.2. What is the level of risk associated with the limits of current knowledge?	**The environmental sensitivities present on site and ecological integrity considerations were addressed within the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) and the Aquatic Biodiversity and Species Assessment (Appendix C.11 and C.12 of the BA Report) undertaken as part of this BA Process. The Avifauna Assessment**

NEED	
Question	**Response**
1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	**(Appendix C.13 and C.14 of the BA Report) also addresses ecological integrity.** **The precautionary approach has been adopted for this assessment, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts. For example, the cumulative impact assessment considered that all approved renewable energy projects within the 30 km radius would be constructed. However, in reality it is unlikely that all will be constructed as most will be based on the outcomes of the bidding windows in terms of the REIPPPP. Therefore, this approach is considered to be precautionary in nature. Additionally, the location of the PV facility within the assessed area and the layout thereof was determined based on the specialist findings.** **Refer to Appendix C of this BA Report for the complete specialist studies. These studies outline the assumptions and limitations that were applicable to the respective studies. The risk associated with the limits in knowledge is considered to be low.**
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following: 1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	**Refer to Section D and Appendix C of this BA Report which respectively include the findings of the specialist assessments, as well as the complete studies undertaken.** **The Socio-Economic Assessment (included in Appendix C.15 of this BA Report) notes that, overall, the potential negative impacts are rated with a moderate to low significance, whilst the positive impacts are rated with an overall low to high significance. Creation of employment and business opportunities, generate income for affected landowner/s, promotion of renewable energy projects, and the development and/or growth of locally owned industries were identified as some of the positive socio-economic impacts during the construction and operation phase of the proposed projects.** **With regards to the Visual Impact Assessment (Appendix C.3 and C.2 of this BA Report), the visual impact significance was considered to be high before and moderate after mitigation. This is as a result of some receptors within the**

NEED	
Question	**Response**
	project site. The anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed facility. **The greater environment has been transformed owing to dryland agriculture. Additionally, there are numerous existing powerlines that lie in close proximity to the site and traverse the study area, resulting in an <u>overall low to moderate visual quality</u>.**
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	**This is considered and addressed as part of the Socio-Economic Assessment undertaken for this project (included in Appendix C.15 of this BA Report, and summarised in Section D).** **The study confirmed that it should be accepted that the development of the proposed projects is likely to result in some form of negative social impact to the local community. However, such a negative impact needs to be weighed against the potential benefit likely to result from the same development. Given the overall moderate to low significance of potential negative impacts associated with the project, as compared to the overall low to high significance of potential positive impact of the project. From a socio-economic impact perspective, the specialist conducting the Socio-Economic Assessment recommended that the proposed project should be authorised by the competent authority.** **The above is also supported in terms of the status quo of the socio-economic conditions present in the Tokologo Local Municipality, as indicated in Section B of this BA Report (as well as Appendix C.15 of the BA Report).**
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	**The IDP refers to the LDM Spatial Development Framework, which notes that the solar energy projects at Dealesville and Boshof should be promoted to expand into a solar energy hub for the southwestern part of the district. The towns are indicated as solar energy nodes on the district SDF map.** **In addition, In terms of key focus areas, the IDP lists a number of critical focus issues, including:**

NEED	
Question	**Response**
	• Creation of employment opportunities. **This project contributes towards these objectives.** **The inclusion of renewable energy not only plays to the natural strengths of the area (i.e., good solar irradiation levels), but also appears to be aimed at bringing parity between the existing employment sectors by providing much needed growth within the local construction and electricity employment sectors. The proposed activity therefore does not compromise any of the objectives set within IDP.** **The environmental sensitivities present on site and ecological integrity considerations were addressed within the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) and the Aquatic Biodiversity (Appendix C.11 and C.12 of the BA Report) undertaken as part of this BA Process. The Avifauna Assessment (Appendix C.14 and C.14 of the BA Report) also addresses ecological integrity.**
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	**Refer to Section A.13 of this BA Report, which deals with Alternatives. This section outlines the suitability of the proposed activity.**
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	**Refer to Section D of this BA Report, as well as the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of the BA Report) and the Aquatic Biodiversity (Appendix C.11 and C.12 of the BA Report), which provide a description of the negative direct and cumulative ecological impacts.** **The Aquatic Impact Assessment states that the nature of the soils and flat topography of the region has significant effects on the runoff potential during storm events whereby anticipated impacts are minimal. When considering the additional applications, increased surface areas of hardened surfaces are expected to be developed thereby altering the watershed roughness factors.**

NEED	
Question	**Response**
	However, given the density of depressions in the area, this is not anticipated to have a significant effect owing to the blind nature of the watercourses which flow into depressions as opposed to a singular outlet. Thus, despite additional applications in within the 30km cumulative impact framework, no significant impact to aquatic biodiversity can be expected where only local hydrological changes are anticipated. **The mitigation measures include general management principles as per the EMPr; and ensuring a co-ordinated and sustained management of the VOLTA PV facility and EGI associated with this project.** **From a terrestrial biodiversity point of view, in terms of cumulative impacts, the study states if all these projects receive approval and is constructed, approximately 0.3% of the Gh 10 will be transformed, just with regards to these renewable energy projects. Since <1% of the Gh 10 is formally protected, transformation of 0.3% could be seen as a significant change. Based on the revised national list of threatened ecosystems, the Vaal-Vet Sandy Grassland has experienced extensive spatial declines of approximately 72% since 1750. Considering that less than 30% remains and with hardly any protection of this endangered grassland, development must be carefully scrutinised and appropriate measures must be taken to conserve and protect the remaining extent of this grassland. However, <u>the alternative option of not developing this PV project and leaving it up to the landowners to make the decision to transform the land to agricultural land and/or intense grazing, which will not assist in protecting the CBA1 or the threatened ecosystem</u>. Accordingly, the type of activity needs to be considered for this site, unless conservation in terms of declaring these sites as a nature reserve or similar, it is not feasible to consider no development. Considering that the topsoil will not be disturbed and that heavy machinery will be utilised to only drill holes for the erection of the PV panels, approximately 3.5m above ground, the grassland will not be transformed.** **The cumulative impacts have been rated with a moderate to low significance with the implementation of mitigation measures. Various mitigation measures have been provided, as described in Section D of this BA Report and Appendix**

NEED	
Question	**Response**
	C.9 and C.10 of this BA Report. **The cumulative assessment also considers 32 renewable energy projects within 30 km of the subject site.** **Overall, the majority of the cumulative negative impacts identified for the proposed project were rated with a moderate to low post mitigation impact significance for the construction phase, operational phase, and decommissioning phase.**
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?	
2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area	**The proposed projects support the objectives of the Tokologo Local Municipality's Integrated Development Plan (IDP) and District SDF which identifies renewable energy as a key economic sector.** **The IDP refers to the LDM Spatial Development Framework, which notes that the solar energy projects at Dealesville and Boshof should be promoted to expand into a solar energy hub for the southwestern part of the district. The towns are indicated as solar energy nodes on the district SDF map.** **The inclusion of renewable energy not only plays to the natural strengths of the area (i.e., good solar irradiation levels), but also appears to be aimed at bringing parity between the existing employment sectors by providing much needed growth within the local construction and electricity employment sectors. The proposed activity therefore does not compromise any of the objectives set within IDP. The proposed projects will also be supportive of the IDP's objective of creating more job opportunities.** **The proposed projects will create job opportunities and economic spin offs during the construction and operational phases (if EA is granted by the DFFE). Therefore, the proposed solar PV facilities would help to address the need for increased electricity supply (on a national level) while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.**

NEED	
Question	**Response**
	The proposed projects are also located in REDZ 5 (Kimberley) which is a geographical area that has been identified on a strategic planning level to have reduced negative environmental impacts but high commercial attractiveness (due to its proximity to, inter alia, the national grid) and socio-economic benefit to the country. The development of solar energy is therefore important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability. Therefore, the proposed project is in line with strategic plans and national policy.
2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integration of segregated communities, need to upgrade informal settlements, need for densification, etc.)	**This is not applicable, as the proposed project is located within a rural area and the site is zoned for agricultural use.**
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)	**Refer to Section B and D of this report for a description of the receiving environment and impact assessment, respectively. The impact of the proposed project on heritage features, including archaeology and cultural landscape (Appendix C.5 and C.6 of this BA Report), and palaeontology (Appendix C.5 and C.7 and C.8 of this BA Report) has been assessed the Heritage Impact Assessment and Palaeontology Impact Assessment, respectively.** **The area is a farming area. Low density, natural grazing is by far the predominant agricultural activity in the area.** **It is not expected that this will significantly threaten the agricultural activities present on site. An Agricultural Compliance Statement (Appendix C.1 and C.2 of this BA Report, and summarised in Section D) was undertaken as part of this BA to reflect the impact of the proposed project in terms of agriculture. The conclusion of the Agricultural Compliance Statements is that the proposed developments will not have an unacceptable negative impact on the agricultural production capability of the site.**
2.1.4. Municipal Economic Development Strategy ("LED Strategy").	**The proposed projects support the objectives of the Tokologo Local Municipality's Integrated Development Plan (IDP) and District SDF which identifies renewable energy as a key economic sector.**

NEED	
Question	**Response**
	The IDP refers to the LDM Spatial Development Framework, which notes that the solar energy projects at Dealesville and Boshof should be promoted to expand into a solar energy hub for the southwestern part of the district. The towns are indicated as solar energy nodes on the district SDF map. **Even though the proposed solar facilities will not provide the municipality directly with electricity, the energy produced by the facility will feed into the national grid.** **The proposed project would also provide advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area.**
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? 2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report, for an outline of the socio-economic impacts that could occur due to the proposed development of the solar PV facility.**
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?	
2.5. In terms of location, describe how the placement of the proposed development will:	
2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report, for an outline of the socio-economic impacts that could occur due to the proposed development of the solar PV facility.** **The Socio-Economic Assessment (included in Appendix C.15 of this BA Report) notes that, overall, the potential negative impacts are rated with a moderate to low significance, whilst the positive impacts are rated with an**

NEED		
Question		**Response**
		overall low to high significance. Creation of employment and business opportunities, generate income for affected landowner/s, promotion of renewable energy projects, and the development and/or growth of locally owned industries were identified as some of the positive socio-economic impacts during the construction and operation phase of the proposed projects.
2.5.2.	reduce the need for transport of people and goods,	**Not applicable. This is a renewable energy project proposal.**
2.5.3.	result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),	**Not applicable. This is a renewable energy project proposal.**
2.5.4.	compliment other uses in the area,	**The area is a farming area. Low density, natural grazing is by far the predominant agricultural activity in the area. Should the proposed project proceed, approximately 720 ha of the land will be developed on per PV project, and it is not expected that this will significantly threaten the agricultural activities present on site. An Agricultural Compliance Statement (Appendix C.1 and C.2 of this BA Report, and summarised in Section D) was undertaken as part of this BA to reflect the impact of the proposed project in terms of agriculture. The conclusion of the Agricultural Compliance Statements is that the proposed developments will not have an unacceptable negative impact on the agricultural production capability of the site.**
2.5.5.	be in line with the planning for the area,	
2.5.6.	for urban related development, make use of underutilised land available with the urban edge,	**Not applicable. The proposed projects are located within a rural area and the site is zoned for agricultural use.**
2.5.7.	optimise the use of existing resources and infrastructure,	**The proposed projects will connect to the planned Artemis Substation and will make use of existing access roads as far as possible. The gravel farm road leading to the solar PV facility will be used for access and will be upgraded as part of the proposed project.**
2.5.8.	opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	**These projects are a renewable energy project and not related to bulk infrastructure expansion.**
2.5.9.	discourage "urban sprawl" and contribute to compaction/densification,	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report, for an outline of the socio-economic impacts that could occur due to the proposed development of the**

NEED	
Question	**Response**
	solar PV facilities. One of the impacts identified is the disruption of local social structures as a result of the construction work force and in-migration of job seekers. Adequate management measures have been identified in this regard.
2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	**This is not applicable as the proposed projects are located within a rural area and the sites are zoned for agricultural use.**
2.5.11. encourage environmentally sustainable land development practices and processes,	**Based on the findings of this BA, the proposed projects would not have a significant ("high") negative impact on the receiving environment, with the implementation of suitable mitigation measures (Section D) and will therefore not go against sustainable land development practices and processes. In addition, the proposed projects will be designed according to relevant national specifications and standards which are regarded as best practice in the renewable energy sector. In addition, the proposed projects are located in a REDZ and the development proposal will therefore be aligned with national planning priorities.**
2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	**Refer to Section A.13 of this BA Report, which deals with Alternatives. This section outlines the suitability of the proposed activity, as well as the selection thereof.**
2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report, for an outline of the socio-economic impacts that could occur due to the proposed development of the solar PV facilities. In addition, as noted in the Socio-Economic Assessment, the Applicant will ultimately own the project and, if successful, will compile an Economic Development Plan which will be compliant with REIPPPP requirements and will inter alia set out to achieve the following:** ▪ **Create a local community trust which has an equity share in the project life to benefit historically disadvantaged communities.** ▪ **Initiate a training strategy to facilitate employment from local communities.** ▪ **Give preference to local suppliers of components and/or services for the construction of the facility.**

NEED	
Question	**Response**
2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	**The impact of the proposed project on heritage features, including archaeology and cultural landscape (Appendix C.5 and C.6 of this BA Report), and palaeontology (Appendix C.5 and C.7 and C.8 of this BA Report) has been assessed the Heritage Impact Assessment and Palaeontology Impact Assessment, respectively. Potential impacts to archaeological resources and graves were identified as an impact during the construction and decommissioning phases. Potential impacts to the cultural landscape was identified as an impact during the construction, operation and decommissioning phases. The overall findings of the Heritage Impact Assessment]) is that the impact to heritage resources will be of low significance with the implementation of mitigation measures.** **From a palaeontology perspective, disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance was identified as an impact, rated with an overall very low significance with the implementation of mitigation measures.**
2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	**The proposed facilities are proposed in REDZ 5. Several renewable energy facilities are proposed in the area, which lends itself potentially to a renewable energy development area. Refer to Section D of this BA Report for an outline of the renewable energy projects authorised in a 30 km radius.**
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?	
2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report.**
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	
2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report.**

NEED	
Question	**Response**
not possible, to minimise, manage and remedy negative impacts?	
2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	
2.13. What measures were taken to:	
2.13.1. ensure the participation of all interested and affected parties,	**The Public Participation Process (PPP) that has been undertaken as part of this BA is detailed in Section C of this report, as well as in Appendix D. The Draft BA Report was released for a 30-day comment period, extending from 30 March 2023 to 3 May 2023, to all the relevant authorities and stakeholders. Various methods were employed to notify potential Interested and Affected Parties (I&APs) of the proposed projects, namely, through a newspaper advert, site notice boards and notification letters via email, as well as SMS texts. The BA Process has taken cognisance of all interests, needs and values espoused**
2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
2.13.3. ensure participation by vulnerable and disadvantaged persons,	
2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
2.13.5. ensure openness and transparency, and access to information in terms of	

NEED	
Question	**Response**
the process,	**by all I&APs, where relevant. Opportunity for public participation will be provided to all I&APs throughout the BA process in terms of the 2014 NEMA EIA Regulations (as amended). A detailed Comments and Responses Report has been compiled (Appendix D Part 2).**
2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted.	
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report.**
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	**An EMPr has been developed to address environmental impacts, as well as health and safety concerns. An Environmental Control Officer will be appointed to monitor compliance during the construction and decommissioning phases.**
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1. the number of temporary versus permanent jobs that will be created,	**Refer to the Socio-Economic Assessment summarised in Section D and included in Appendix C.15 of this BA Report.**
2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),	
2.16.3. the distance from where labourers will have to travel,	
2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits),	
2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).	
2.17. What measures were taken to ensure:	
2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment,	**Legislation, policies and guidelines, which could apply to impacts of the proposed project on the environment, have been considered. The scope and content of this BA Report has been informed by applicable integrated environmental management legislation and policies. This has been included in**

NEED	
Question	**Response**
	Section A of this BA Report.
2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	**The Public Participation Process (PPP) that has been undertaken as part of this BA is detailed in Section C of this report, as well as in Appendix D. The Draft BA Report was released for a 30-day comment period, extending from 30 March 2023 to 3 May 2023, to all the relevant authorities and stakeholders. Various methods were employed to notify potential Interested and Affected Parties (I&APs) of the proposed projects, namely, through a newspaper advert, site notice boards and notification letters via email, as well as SMS texts. The BA Process has taken cognisance of all interests, needs and values espoused by all I&APs, where relevant. Opportunity for public participation will be provided to all I&APs throughout the BA process in terms of the 2014 NEMA EIA Regulations (as amended). A detailed Comments and Responses Report has been compiled (Appendix D Part 2).**
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	**The outcomes of this BA process and the associated conditions of the EA (should it be received) will serve to address this question.**
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	**The proposed mitigation measures included in the EMPr and summarised in Section D of this report have been informed by the specialist studies undertaken and this includes a detailed assessment of the environment as well as the impacts associated with the proposed development. Solar energy facilities can be dismantled and completely removed from the site leased for the development and do not permanently prevent alternative land-uses on the same land parcel. Based on material and socio-economic terms, and measured to the value of the best alternative that is not chosen, the proposed project will result in positive opportunity costs.**
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	**The EMPr of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the Applicant.**
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in	**Refer to Section A.13 of this BA Report, which deals with Alternatives. This section outlines the suitability of the proposed activity.**

NEED	
Question	**Response**
the selection of the best practicable environmental option in terms of socio-economic considerations?	
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	**Refer to Section D of this report for a summary of the cumulative impacts. The Socio-Economic Assessment, included in Appendix C.15 of this BA Report, identified the following cumulative impacts:** • **Cumulative impact on sense of place** • **Cumulative impact on local economy (positive); and** • **Cumulative impact on community networks, local services, and accommodation.** **The above impacts have been rated with a low to moderate significance.**
DESIRABILITY	
Is this project part of a national programme to address an issue of national concern or importance?	
Do location factors favour this land use (associated with the development proposal) at this place? (This relates to the contextualisation of the proposed land use on the proposed site within its broader context.)	**The VOLTA PV and BESS and EGI project is located in REDZ 5. REDZs are geographical areas where the development of large-scale wind and solar PV is encouraged and incentivized with a shorter decision time frame.**

The need for large-scale BESS:

The provision of utility scale BESS is going to be important as the solar energy sector increases. There is a need for renewable energy projects to address electricity shortage during peak demand hours. This means that it is critical to store energy produced from solar facilities so that the energy can be utilised when the need arises. The costs and demand for peak time electricity in South Africa is going to increase. A large BESS can time-shift electricity supply from Solar energy collection times to peak times and meet very short-notice demand spikes from unplanned outages. This will make the supply from BESS very desirable as Solar Energy supply increases. Battery technology is providing solutions to battery risks, life-span limitations and are reducing their cost and complexity. BESS assist with addressing the issue of solar PV not being available at peak demand hours and only at low demand (during the day).

The VOLTA PV and BESS and EGI project intends to tender into the REIPPP. This programme is a national initiative to secure renewable energy from IPPs. This contributes towards the IRP (2019) energy mix stipulations. In addition, the VOLTA PV and BESS and EGI project is located in REDZ 5 and Central EGI corridor. REDZs are geographical areas where the development of large-scale wind and solar PV is encouraged and incentivized with a shorter decision time frame. The BESS will contribute towards energy security in the country.

SECTION B: DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section of the BA Report provides a broad overview of the affected environment for the proposed VOLTA PV and EGI project and the surrounding region.

For purposes of this BA Process, the project area is approximately 4 km from the planned Artemis Eskom substation and the main central transmission line.

The receiving environment is understood to include biophysical, socio-economic and heritage aspects which could be affected by the proposed development or which in turn might impact on the proposed development.

This information is provided to identify the potential issues and impacts of the proposed project on the environment. The information presented within this chapter has been sourced from:

- Input from the specialists that form part of the project team;
- Feedback from the Screening Tool, where applicable;
- Review of information available on the South African National Biodiversity Institute (SANBI) Biodiversity Geographical Information System (BGIS) and Agricultural Geo-Referenced Information System (AGIS); and
- The Tokologo Local Municipality and District Municipality Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs).

Feedback from the Screening Tool is provided in the sections below, only where it is applicable. For example, it is not applicable to the Socio-Economic Assessment and the Traffic Impact Statement.

It is important to note that this chapter intends to provide a broad overview of the affected environment. Detailed descriptions of the preferred project site focused on significant environmental aspects of these projects are provided in the relevant specialist studies (Appendix C of this BA Report).

This section applies to both the VOLTA PV and BESS and EGI.

B.1 Background

The proposed VOLTA PV and EGI project are situated on the following farm portions:

Affected Farm Portion	Mooihoek (RE/1551)	Cornelia (RE/1550)	Carlton (RE/74)	Vadersrust (RE/822)	Modderpan (RE/750)	Oxford (1/1030)	Klipfontein (RE/305)	Leliehoek (RE/748)
VOLTA Solar PV Facility	✓	✓	✓	✓		✓		
VOLTA EGI	✓	✓			✓	✓	✓	✓

The preferred sites have a 720 ha developable area. As previously noted, the proposed projects are located within the Togoloko Local Municipality, which falls within the Lejweleputswa District Municipality, and are situated approximately 4 km from Dealesville in the Free State Province. Figure A.2 in Section A of this report provides a locality map of the proposed project area.

B.2 Climate Conditions

The site has a summer rainfall with a mean annual rainfall of between 426 and 464 mm and a mean annual evaporation of approximately 1560 mm (Schulze, 2009). Rainfall increases progressively from west to east in the broader region (Boshof to Bloemfontein). The Dealesville area is characterised by cool temperate climate with the majority of rainfall received during the summer months; frost prevalent during winter months. Dealesville is 30°C in January and the lowest is 16°C in June.

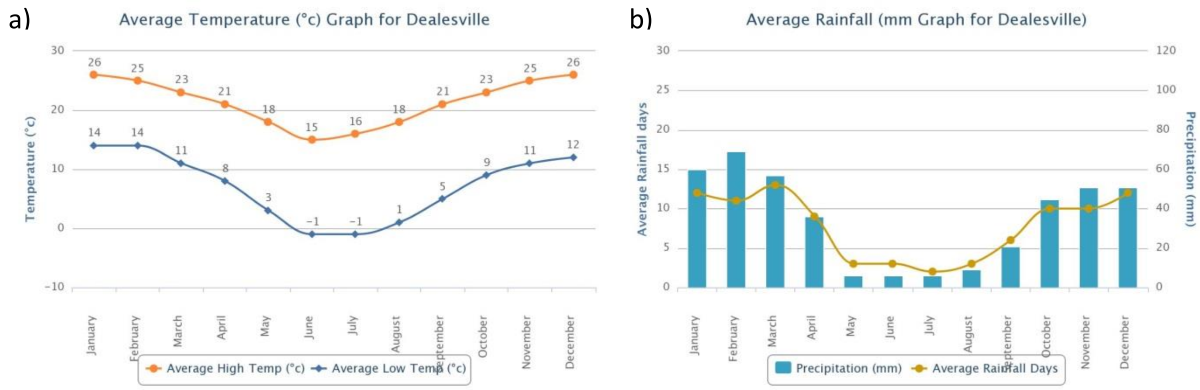


Figure B.1. Long-term mean a) temperatures (°C); and b) mean precipitation (mm) for Dealesville, Free State

The specialist studies included in Appendix C provide additional details regarding the climatic conditions on site.

B.3 Topography and Landscape

The topography is generally undulating with a few low hills or rocky outcrops scattered across the landscape while several pans dot the larger landscape. Multiple burrow pits are situated along the R64 that is now filled with water after the rains.

According to the Visual Impact Assessment (Appendix C.3 and C.4 of the BA Report), The study area occurs on land with an average elevation of approximately 1305 with elevations reaching 1330 on mountain tops such the Grootberg, Spitskop and Rondekop in the west. The mountains are outside of the VOLTA site area. The entire area is predominantly flat with low undulating hills. The topography or terrain morphology of the region is broadly described as Plains and Pans or Slightly Undulating Plains, and is therefore relatively flat. The Visual Impact Assessment (Appendix C.3 and C.4 of the BA Report) the surrounding area is known for numerous salt pans of which Klippan and Annaspan to the north east of the proposed sites are the most prominent.

Detailed descriptions of the topography and landscape are provided in the Specialist Assessments included in Appendix C of this BA Report.

B.4 Regional Geology

The Palaeontology Impact Assessment (Appendix C.7 and C.8 of the BA Report) notes that the project lies in the central part of the main Karoo Basin where the older sediments have are present and have been intruded by the Jurassic dolerite dykes. The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates. In summary, the main geological units mapped within the study area include:

- Kalahari Group, Quaternary;
- Jurassic dykes; and
- Tierberg/Fort Brown Fm, Ecca Group, Karoo SG.

Based on the Geohydrology Assessment (Appendix C.16 of the BA Report), the geological units noted above are composed of (in order of youngest to oldest):

- Calcrete and calcified pan as well as surface limestone;
- Red and grey aeolian dune sand;
- Dolerite); and
- Tierberg Formation of the Ecca Group

A detailed description of the geology of the region is provided in the Palaeontology Impact Assessment (Appendix C.7 and C.8 of the BA Report).

B.5 Agriculture and Soils

B.5.1 VOLTA PV and BESS

According to the Agriculture Compliance Statement for the PV and BESS components (Appendix C.2 of the BA Report), soils across the site vary in depth from only 15 cm to greater than 120 cm. Soils are underlain by hardpan carbonate or bedrock. They are generally sandy soils, but some soils with higher clay content do occur. Soils identified across the site are of the Hutton, Gamoep, Coega, Plooysburg, Mispah and Valsrivier soil forms. Soils with limited depth have insufficient moisture capacity to reliably carry a crop through the season, but even in the deeper soils, limited climatic moisture availability limits crop production potential. Lands that were used for cropping in the past have since been abandoned as cropland because they are no longer worth cropping.

The land use on the site and immediate surrounds is mostly grazing but some crop production still occurs in the surrounding area. The land has a long-term grazing capacity of 8 hectares per large stock unit.

The Screening Tool classifies agricultural sensitivity according to two criteria i.e., the cultivation status and the land capability.

All cultivated land is classified as high sensitivity (or very high sensitivity). This is because there is a scarcity of arable production land in South Africa, in terms of how much is required for food security.

Uncultivated land is classified by the Screening Tool in terms of the land capability. Land capability is defined as the combination of soil, climate and terrain suitability factors for supporting rain fed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land. The higher land capability classes are suitable as arable land for the production of cultivated crops, while the lower suitability classes are only suitable as non-arable grazing land, or at the lowest extreme, not even suitable for grazing. In 2017, the then Department of Agriculture, Forestry and Fisheries (DAFF) released updated and refined land capability mapping across the whole of South Africa; which has greatly improved the accuracy of the land capability rating for any particular piece of land anywhere in the country. The new land capability mapping divides land capability into 15 different categories with 1 being the lowest and 15 being the highest. Values of below 8 are generally not suitable for production of cultivated crops. This land capability data is used by the Screening Tool.

The classified land capability of the site ranges from 4 to 9, but is mostly between 5 and 8. The small scale differences in the modelled land capability across the project area are not very accurate or significant at this scale and are more a function of how the data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. Values of 1 to 5 translate to a low agricultural sensitivity, values of 6 to 8 translate to a medium agricultural sensitivity and values of 9 to 10 translate to a high agricultural sensitivity Figure B.2 below.

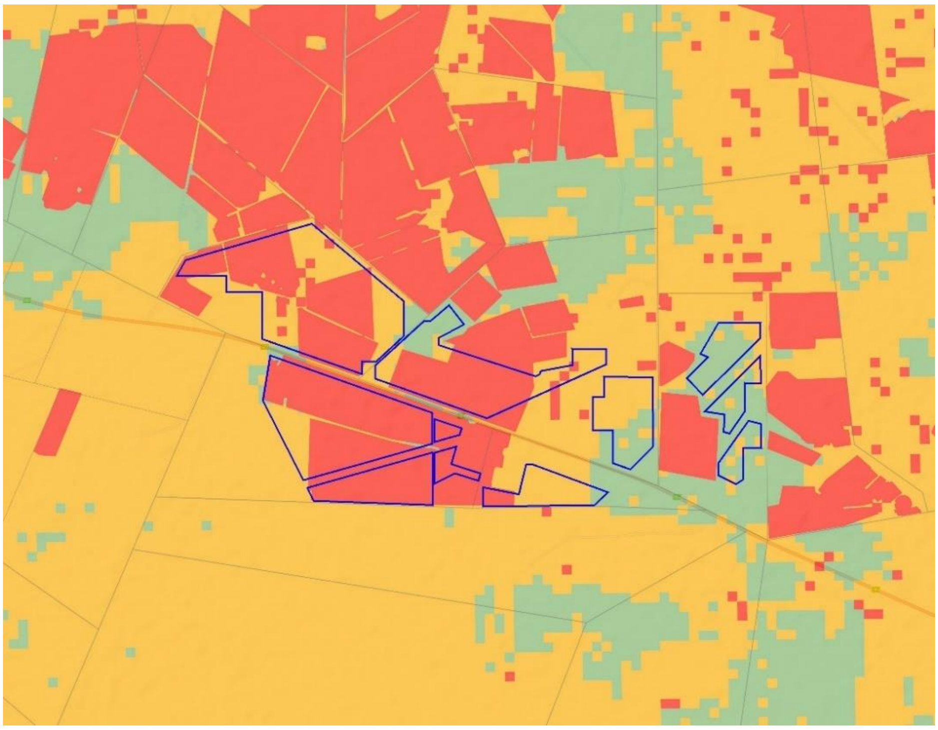


Figure B.2. The PV project study area for VOLTA PV (outlined in blue) overlaid on agricultural sensitivity as identified by the screening tool (low = green; medium = yellow; red = high).

The agricultural sensitivity, as identified by the Screening Tool, is confirmed by the Agriculture Compliance Statement (Appendix C.2 of the BA Report). Much of the site is classified as high agricultural sensitivity (red in Figure 2) because those parts are classified as cropland in the data set used by the screening tool. However, that data set is outdated. None of the land within the development footprint is still cropped and none of it should therefore still be classified as high agricultural sensitivity because of cropping status. The fact that previously cropped lands are no longer viable for cropping is because the suitability for cropping changes with a changing agricultural economy. Poorer soils or marginal climates that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy with higher input costs. Climate change and changes in rainfall patterns have also led to the increasing marginality of poorer soils.

Refer to the Agriculture Compliance Statement (Appendix C.2 of the BA Report) for additional information.

B.5.2 VOLTA EGI

The agricultural sensitivity of the substation footprint is relevant because that land will be permanently removed from agricultural production. Although the screening tool sensitivity of both substation sites is high, this is disputed by this assessment. The substation sites are classified as high agricultural sensitivity because they are classified as cropland in the data set used by the screening tool. However, that data set is outdated. The sites are not still cropped and should therefore not still be classified as high agricultural sensitivity because of cropping status. The fact that previously cropped lands are no longer viable for cropping is because the suitability for cropping changes with a changing agricultural economy. Poorer soils or marginal climates that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy with higher input costs. Climate change and changes in rainfall patterns have also led to the increasing marginality of poorer soils.

According to the Agriculture Compliance Statement for the EGI component (Appendix C.1 of the BA Report), the combination of climate and soils across the site is assessed as being unsuitable for viable crop production. A land capability rating of ≥8 denotes land that is suitable for viable rain fed crop production. The land capability of this site is assessed as being < 8 due to the combination of climate and soil limitations and resultant lack of suitability for viable crop production.

This site sensitivity verification verifies the substation sites as having a land capability of less than 8 and therefore being of medium agricultural sensitivity.

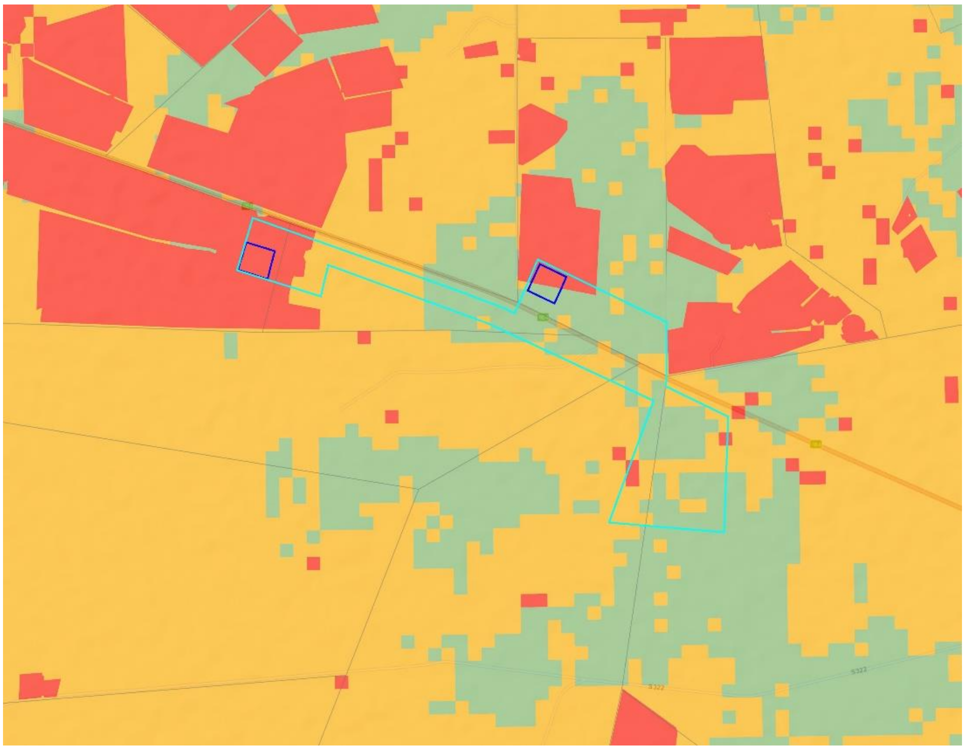


Figure B.3 The EGI project study area for VOLTA EGI (outlined in blue) overlaid on agricultural sensitivity as identified by the screening tool (low = green; medium = yellow; red = high).

B.6 Geohydrology and Geotechnical Assessment for VOLTA PV and BESS

As indicated in the Geohydrology Assessment (Appendix C.8 of the BA Report), the regional aquifer directly underlying the study area is classified by the Department of Water Affairs and Forestry (DWAF) (DWAF, 2002) as a fractured aquifer with an average yield potential of yield potential of 0.5 – 2.0 litres per second (L/s), as indicated in Figure B.4. A fractured aquifer describes an aquifer where groundwater only occurs in narrow fractures within the bedrock.

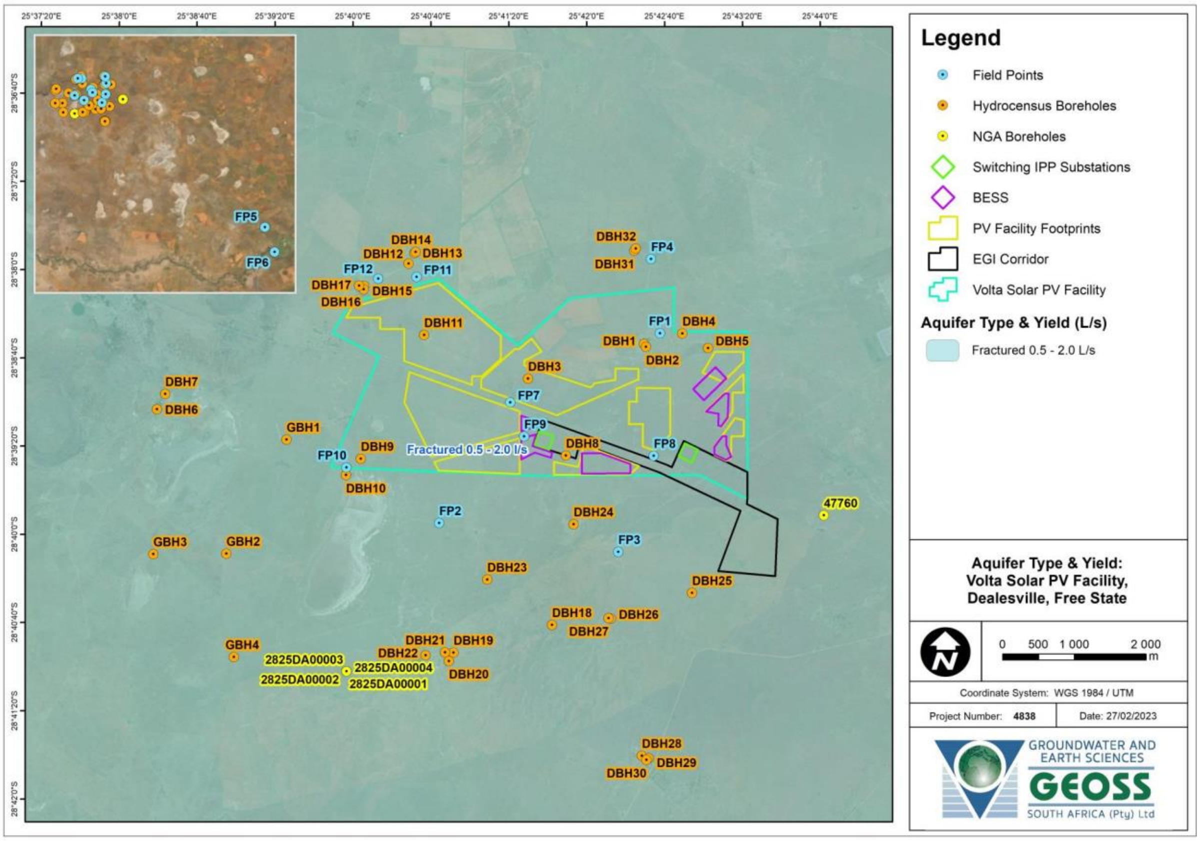


Figure B.4. Regional aquifer yield (DWAF, 2002) and borehole yields (L/s).

Based on the DWAF (2002) mapping of the regional groundwater quality, the electrical conductivity§ (EC) of the groundwater in the area ranges between 70 and 300 milli-Siemens per metre** (mS/m). This is considered "marginal" groundwater quality (Figure B.5), with respect to drinking water standards. Both these classifications are based on regional datasets, and therefore, only provide an indication of the possible/likely conditions. Groundwater in the area is generally considered as being of marginal quality and boreholes have a low yield.

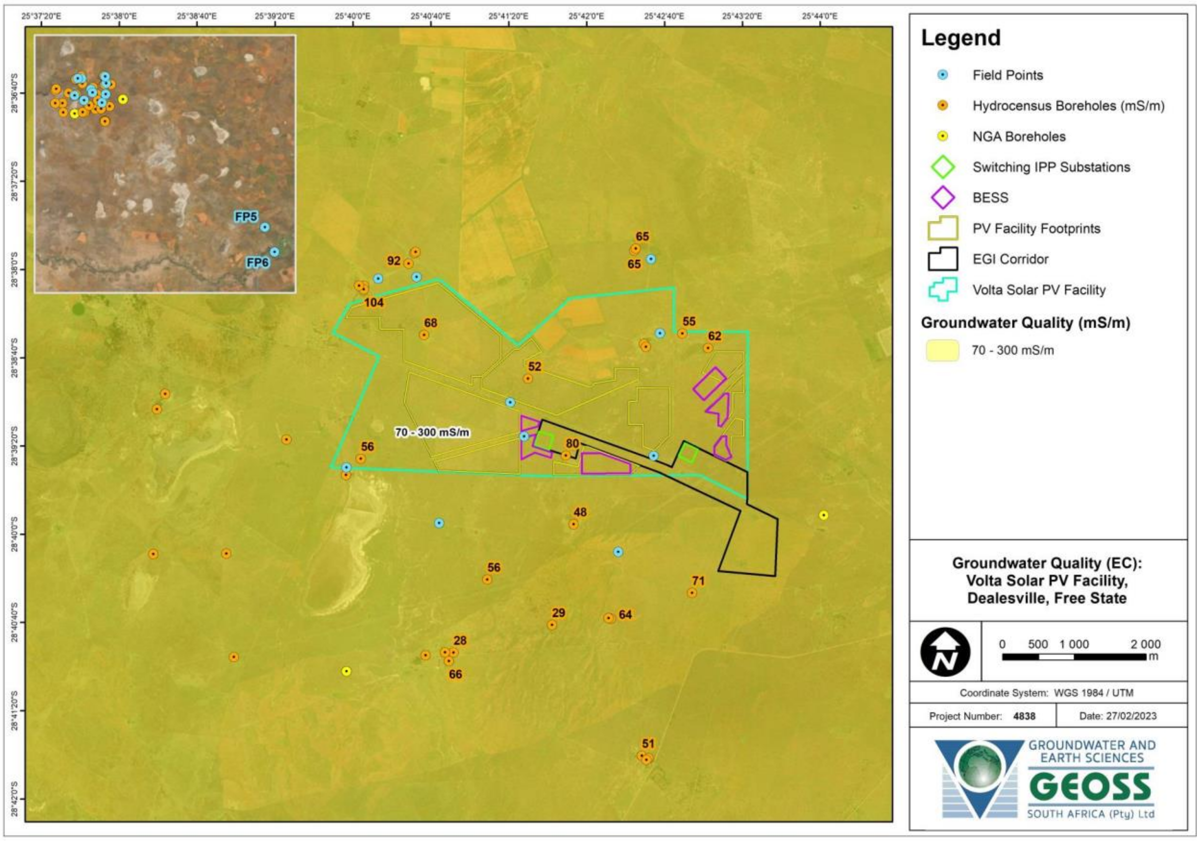


Figure B.5. **Regional groundwater quality (mS/m) from DWAF (2002) and borehole groundwater quality (EC in mS/m).**

The Geohydrology Assessment (Appendix C.16 of the BA Report) included in an assessment of the study area to determine if there are any groundwater users in the area. The National Groundwater Archive (NGA) database provides data on borehole positions, groundwater chemistry and yield, where available. 32 sites were identified, of which 18 boreholes were equipped with windpumps, four boreholes with submersible pumps (two solar powered and two electrically), ten were open boreholes (no equipment/out of order). In total, two boreholes were out of order, and two boreholes could not be accessed.

Figure B.6 below shows the number of boreholes in the vicinity in terms of the NGA, WARMS and GEOSS database, as well as the additional boreholes identified in the study area.

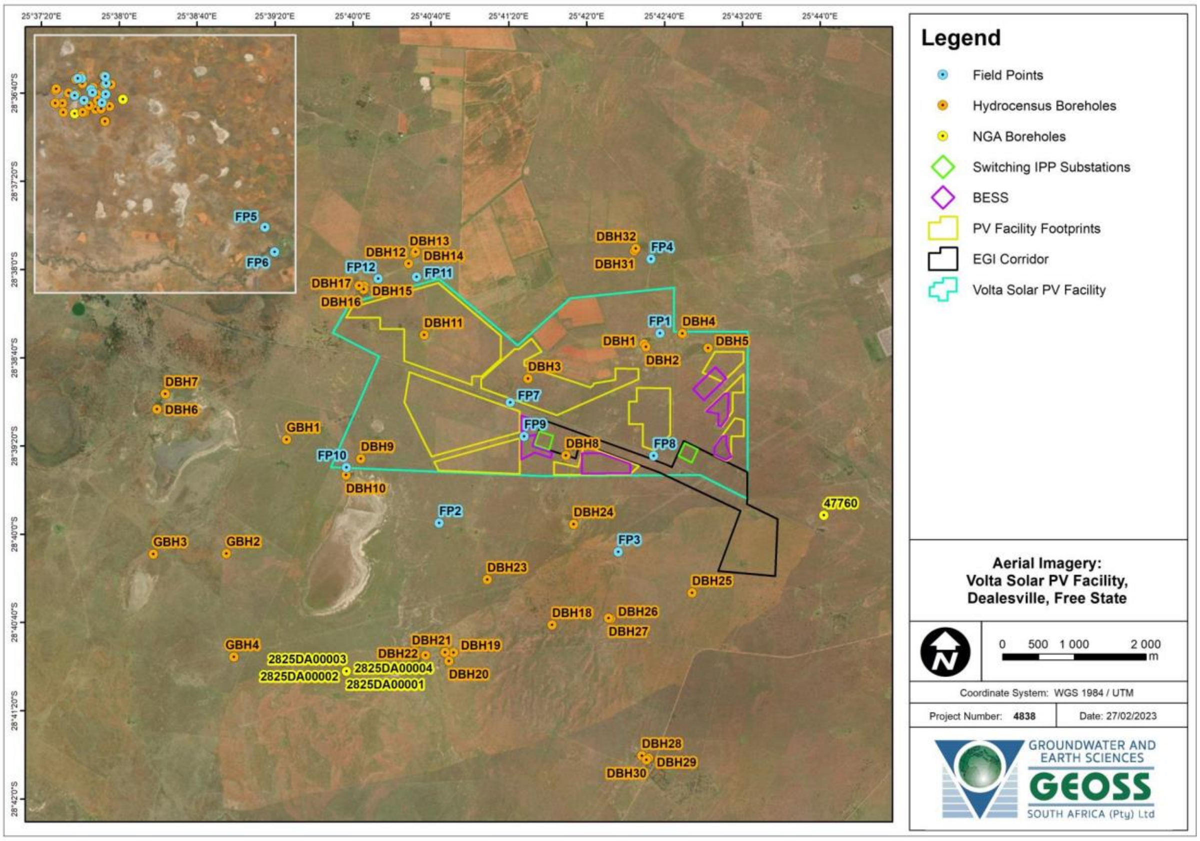


Figure B.6. Number of Boreholes in the vicinity of the proposed projects.

For the Geotechnical desktop study, the VOLTA Solar PV Facility will be located in a region that has a generally flat topography and is characterised by numerous small to large, shallow rounded pans. The upper relatively shallow soils from the region have good drainage potential (Roberts & Lodenkemper, 2020). When this is coupled with a shallow rock mass, which is expected across the VOLTA Solar PV developable area, soils are likely to saturate quickly and facilitate sheet wash drainage, and potential scour of soils. Owing to the relatively flat nature of the site, surface ponding might also transpire following a downpour. Cognisance of this should be taken in further investigations, particularly in areas where slopes are shown to be less than 2°.

Refer to the Geohydrology Assessment (Appendix C.17 of the BA Report) and Appendix C for the Desktop Geotechnical Assessment for further detail on ground water.

B.7 Strategic Water Source Areas

Strategic Water Source Areas (SWSAs) are defined as "areas of land that either: (a) supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or (b) have high groundwater recharge and where the groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b)" (Le Maitre et al., 2018:1 in DEFF, 2019: Page 61). Thirty-seven groundwater SWSAs have been identified in South Africa and are considered to be strategically important at a national level for water and economic security (Le Maitre et al. 2018 in DEFF, 2019: Page 61). The total area for groundwater

SWSAs extends approximately 104 000 km^2 and covers approximately 9% of the land surface of South Africa (Le Maitre et al. 2018, in DEFF 2019: Page 61).

There are no SWSAs on the proposed VOLTA PV and EGI project.

B.8 Aquatic Biodiversity

The below sections apply to both the VOLTA PV and BESS and VOLTA EGI. Various resources, such as, but not limited to, the SANBI BGIS and National Fresh Water Priority Areas (NFEPA), have been used to define the regional vegetation, water resources, fauna and anticipated ecological sensitivity of the study area. A literature review of existing reports, scientific studies, databases, reference works, guidelines and legislation relevant to the study area was conducted to establish the baseline ecological and vegetative condition of the site and associated environment. Details pertaining to the aquatic environment are provided in the Aquatic Biodiversity and Species Assessment (Appendix C.11 and C.12 of this BA Report). The information provided in this section is based on Tate (2023).

B.8.1 General Context

The hydrological setting of the project was within the C52K and C52H (Figure B.7) quaternary catchments of the Vaal Water Management Area. There were no channeled watercourses/features associated with the project. The temporal distribution of rainfall in the Area of Influence consisted of a unimodal flood regime where peak flows are observed in the summer between November and March.

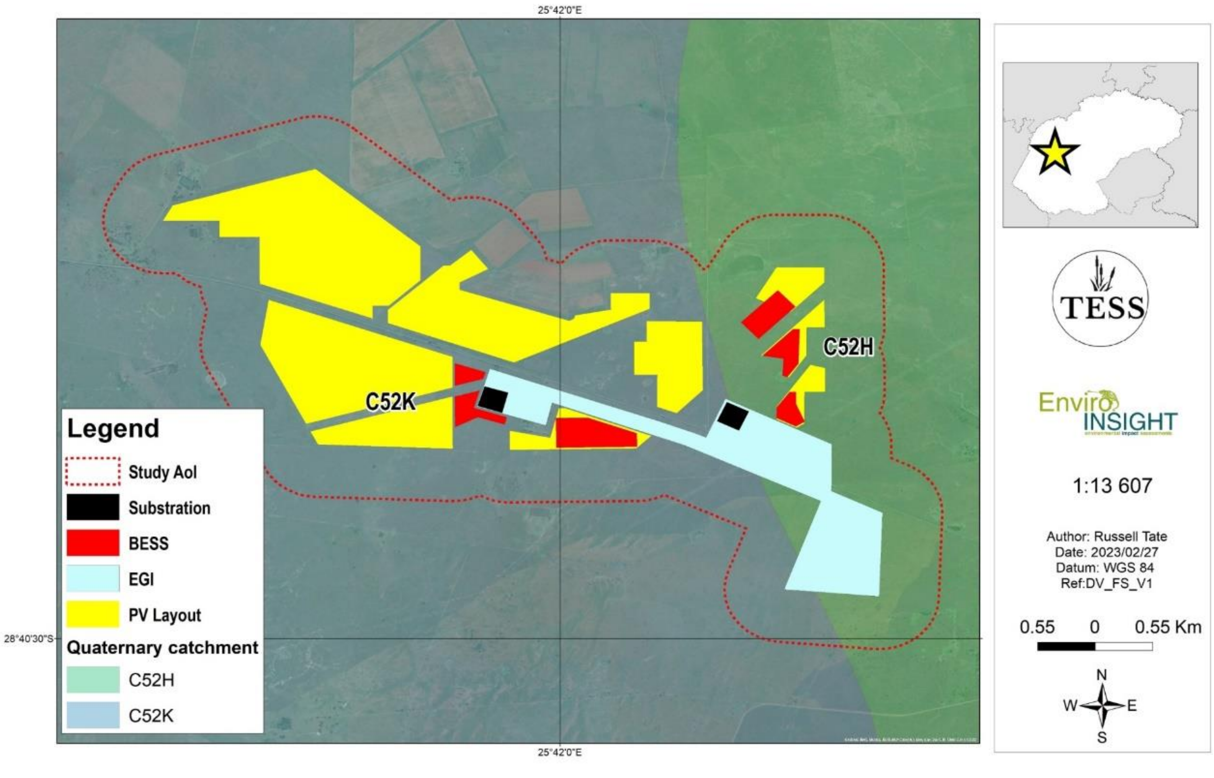


Figure B.7. Hydrological Setting of the Study Area

B.8.2 Biodiversity Conservation Planning

Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) are indicated in terms of the Free State Spatial Biodiversity Plan (FSSBP) (2015). This preliminary data provided by the FBSBP is the product of a systematic biodiversity planning assessment which identifies portions of land that require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and aquatic realms. These spatial priorities are used to inform sustainable development in the province.

In addition to the above, CBAs and ESAs are separated further into CBA 1 and 2 as well as ESA 1 and 2 respectively. It is important to note that CBA 1 show areas in a natural condition and those that are potentially degraded or represent secondary vegetation are considered to be CBA 2. Similarly, a distinction is made between ESAs that are likely to be functional (i.e., in a natural, near-natural or moderately degraded condition; ESA 1), and ESAs that are likely severely degraded or have no natural cover remaining and therefore require restoration where feasible (ESA 2). The ESAs are not considered essential from a conservation perspective for meeting biodiversity targets; however, they may offer some ecological services.

The assessed area for the PV arrays and associated infrastructure, and the power lines, traverse a number of Terrestrial and ESA delineated areas, as indicated in Figure B.8 and B9.

This BA Report has considered the impact of the proposed projects on CBAs and ESAs.

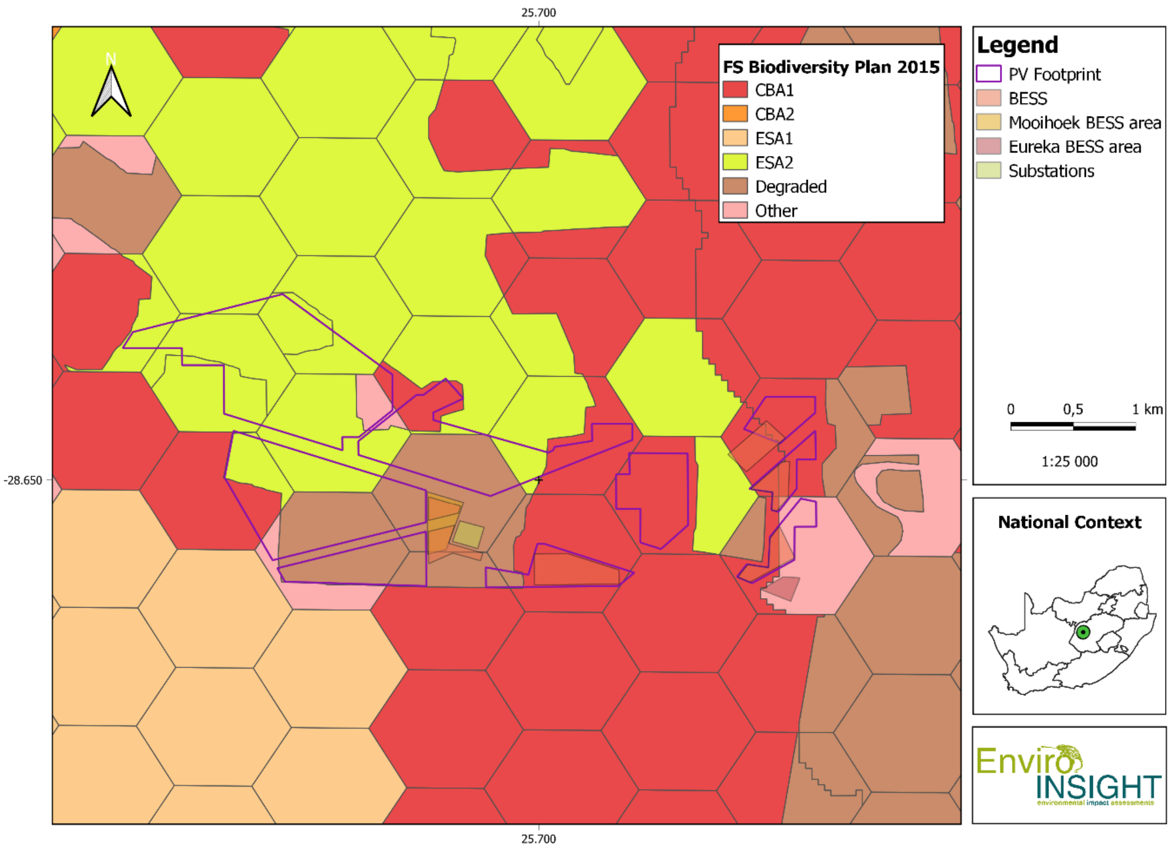


Figure B.8. **CBAs and ESAs for the VOLTA PV in terms of the FSSBP (2015).**

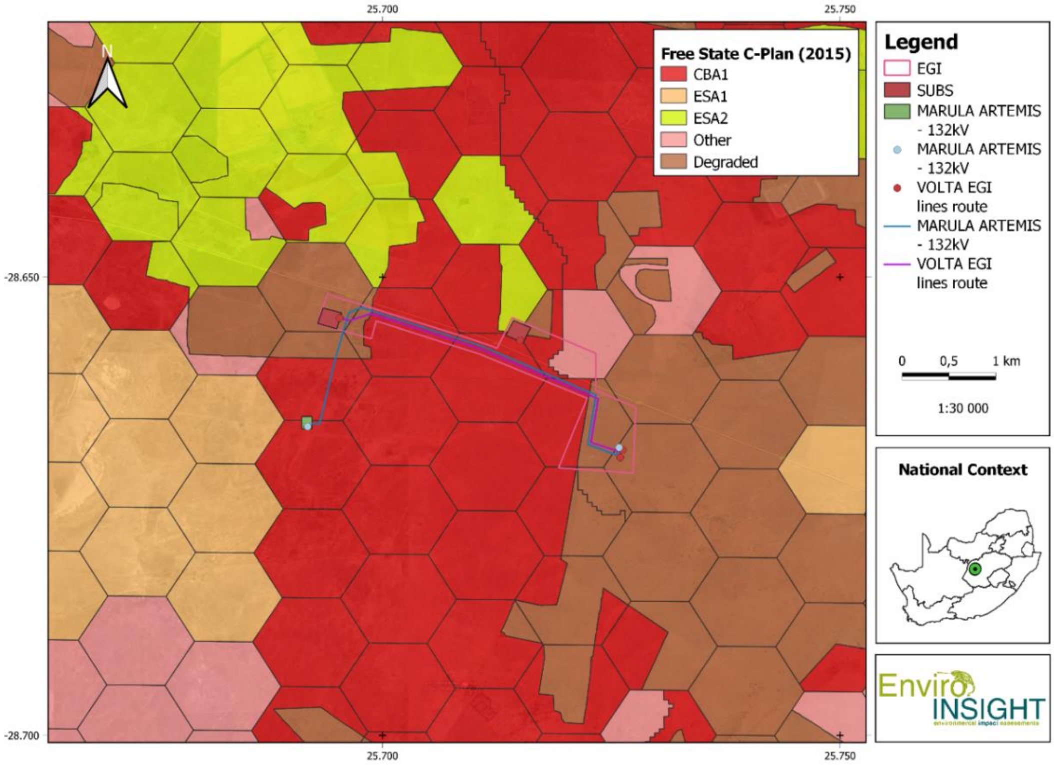


Figure B.9. CBAs and ESAs for the VOLTA EGI in terms of the FSSBP (2015).

Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Area (NFEPA) maps indicated that there are depression, seep and flat wetland units within the established 500m screening zone. From the assessed desktop information provided in the National Biodiversity Assessment (2018), depression wetlands are expected within the study area. Refer to Figure B.10.

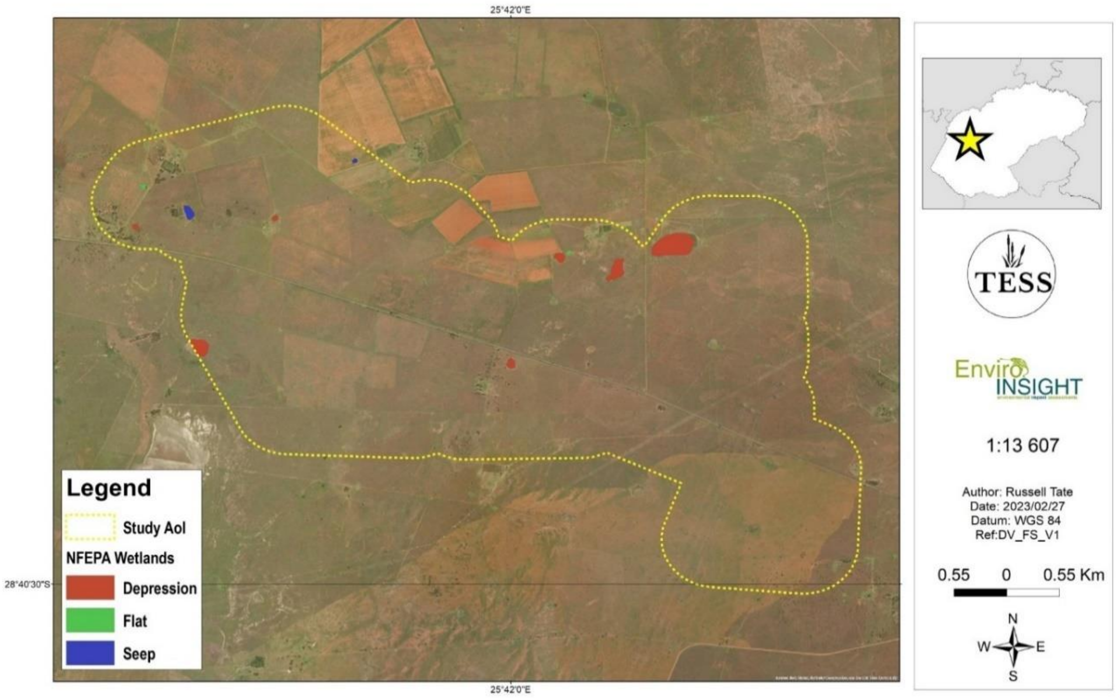


Figure B.10. NFEPAs in relation to the proposed development

Critically Endangered and Threatened Ecosystems

According to the SANBI BGIS, and the terrestrial biodiversity study, the Endangered Vaal-Vet Sandy Grassland (Gh 10) intersects a large section of the Kimberley REDZ in the eastern section (Figure B.11.)

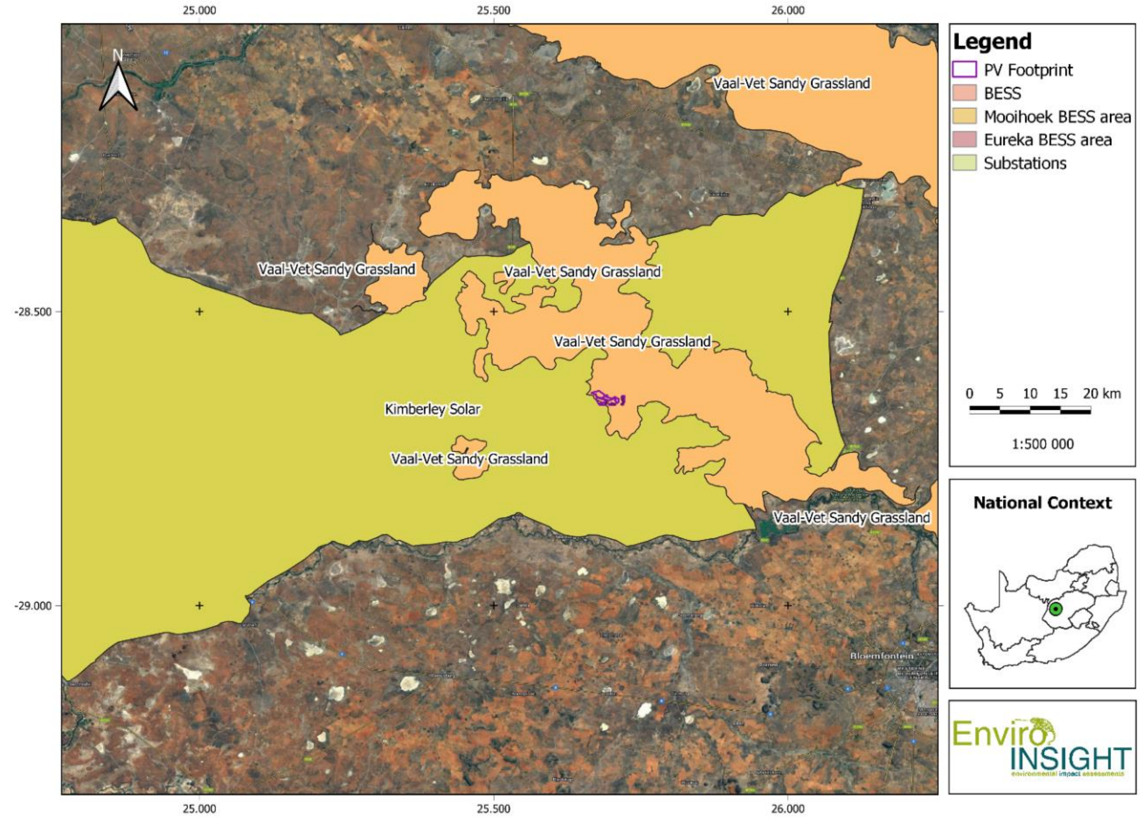


Figure B.11. VOLTA PV development in relation to Kimberley REDZ and the Vaal-Vet Sandy Grassland.

B.8.3 Aquatic Ecosystems

The geomorphology of the region is best summarised in Holmes and Barker (2012) and De Klerk et al. (2016). Based on the above studies, the northwestern and western Free State are classified as plains and pans as well as irregular plains. The region is dominated by plains where slope is typically less than 5%, which was observed within the study area.

The vegetation type present in the project area consisted of the Vaal-Vet Sandy Grassland and Western Free State Clay Grassland. The wetlands were found to be relatively diverse in comparison to the adjacent disturbed grasslands. The primary impacts to vegetation were attributed to livestock activities, pumping of groundwater and direct impacts from pylon structures.

A summary of the PES results is provided in Table B.1.

Table B.1: Wetland PES Summary (February 2023)

Wetland unit	PES
HGM1	Class C
HGM2	Class D
HGM3	Class D
HGM4	Class E
HGM5	Class D
HGM7	Class D
HGM8	Class D
HGM9	Class C
HGM10	Class C
HGM11	Class D
HGM12	Class D
HGM13	Class D
HGM14	Class D
HGM15	Class D
HGM16	Class D
HGM17	Class D
HGM18	Class D

The conservation and threat status of the wetland habitats was investigated using the NBA wetland map 5 dataset while the project area sensitivity. The results of the EIS assessment for the watercourses are presented in Table B.2. The EIS for the wetland units was grouped according to their HGM type. The results of the EIS assessment in indicated values within the 1.2 and 2.3 range where a final high EIS was derived for the various wetland areas considered in this study.

Table B.2: Ecological Importance and Sensitivity for the wetland units considered in this study (February 2023)

Wetland Importance and Sensitivity	Depressions	Seeps
Ecological Importance and Sensitivity	2.3	2.0
Hydrological/functional importance	1.9	2.1
Direct human benefits	1.2	1.2
Highest Value	**2.3**	**2.0**
EIS Category	**High**	**High**

B.8.4 Aquatic Species

No aquatic biota was identified within the pans/wetlands in the project area.

B.8.5 Screening Tool Descriptions and Site Verifications

Figure B.12 and B.13 below presents the information from the Screening Tool for the Aquatic Biodiversity Combined Sensitivity for the VOLTA PV and VOLTA EGI project. Evident from this data is that much of the area under consideration is considered to be of low sensitivity in terms of the aquatic biodiversity prevalent in the region. The data does however indicate "very high" sensitivity in respect of the wetlands and pans. The ecological sensitivity is however believed to approximate that of the Groot River. The Screening Tool identifies the very high sensitivity areas as depression systems. However, it must be noted that the actual footprint of the PV Facility and associated EGI does not intersect with any pans or wetlands.

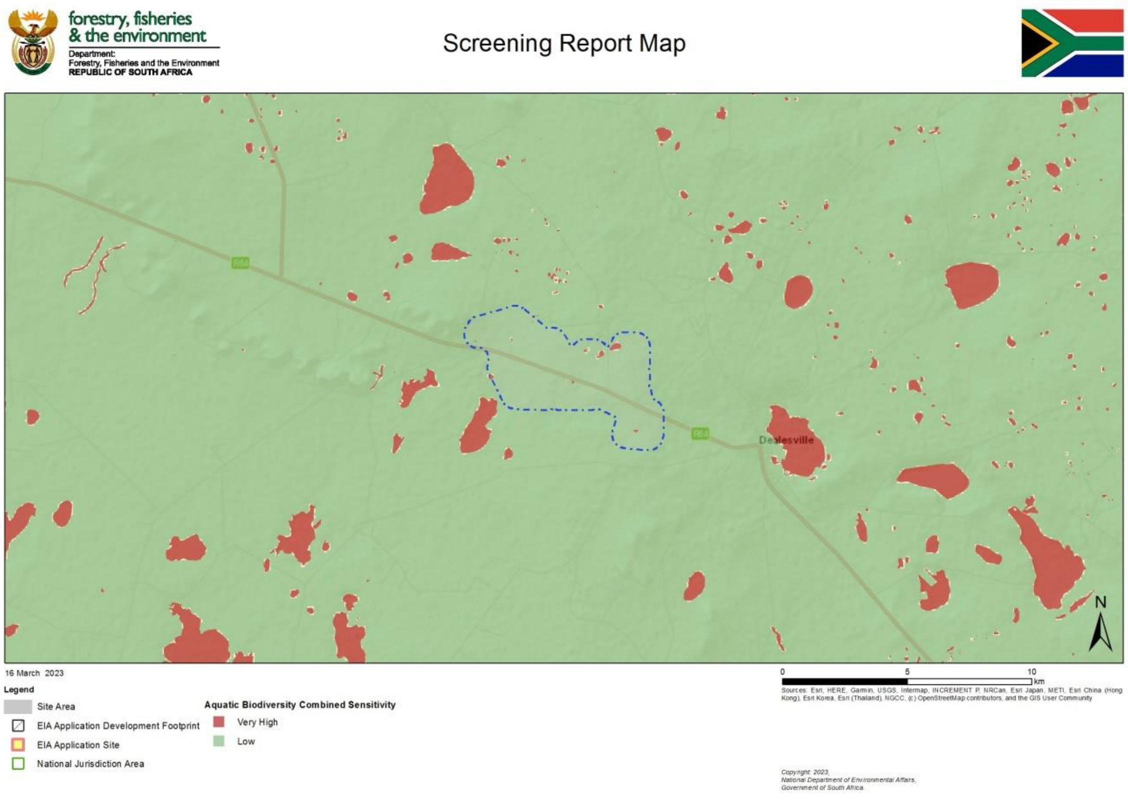


Figure B.12. Map depicting Aquatic Biodiversity Combined Sensitivity in and around the VOLTA PV project (Source DFFE Screening Tool, 2022).

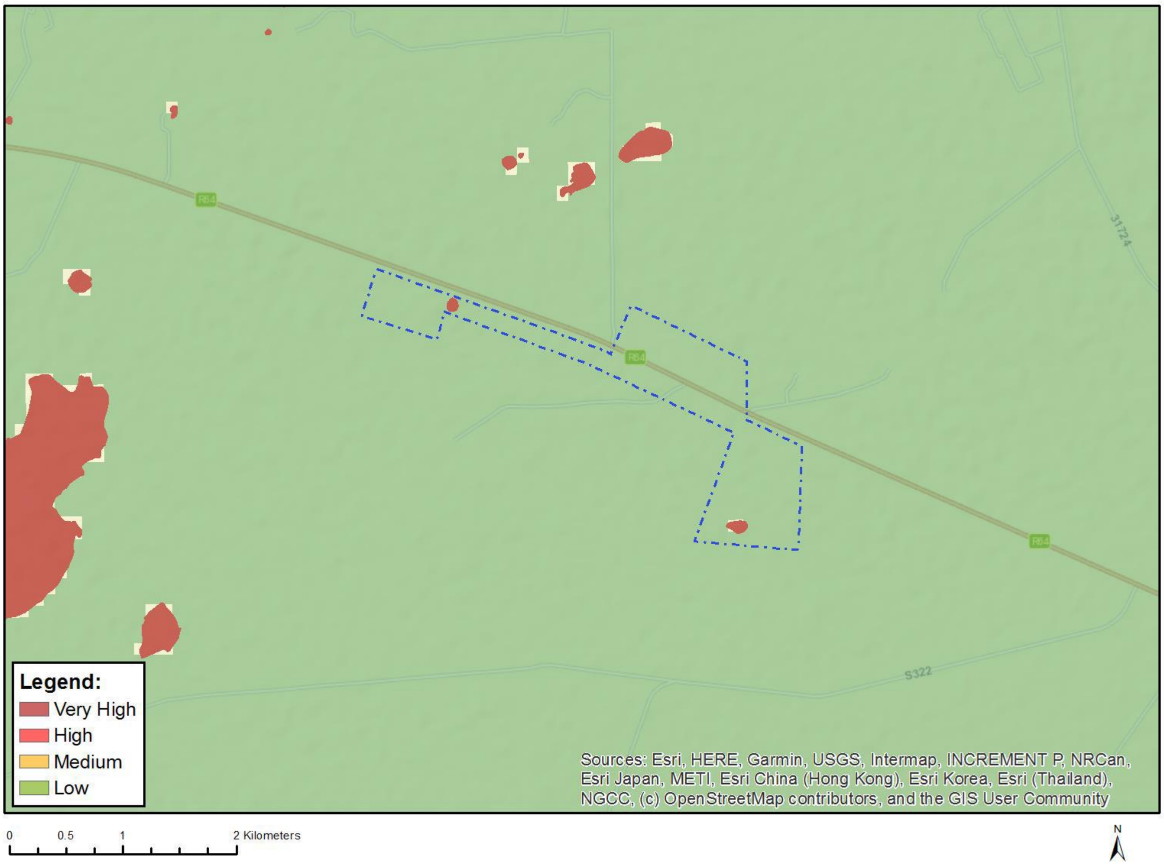


Figure B.13. Map depicting Aquatic Biodiversity Combined Sensitivity in and around the VOLTA EGI project area (Source DFFE Screening Tool, 2022).

B.9 Terrestrial Biodiversity

Various resources, such as, but not limited to, the SANBI BGIS and aerial imagery, have been used to define the regional vegetation, water resources, fauna and anticipated ecological sensitivity of the study area. A literature review of existing reports, scientific studies, databases, reference works, guidelines and legislation relevant to the study area was conducted to establish the baseline ecological and vegetative condition of the site and associated environment. Details pertaining to the terrestrial environment are provided in the Terrestrial Biodiversity and Species Assessment (Appendix C.9 and C.10 of this BA Report). The information provided in this section is based on Niemandt, 2023.

B.9.1 General Context

Refer to Section B.8.1 above for information on the general context of the site from an ecological perspective.

B.9.2 Biodiversity Conservation Planning

Refer to Section B.8.2 above for information on the biodiversity conservation planning of the site from an ecological perspective.

B.9.3 Terrestrial Ecosystems

The study area is located in the Vaal-Vet Sandy Grassland based on Mucina & Rutherford (2006, as amended). The Vaal-Vet Sandy Grassland vegetation type (Gh10) covers the majority of the study area which is listed nationally as Endangered (EN) in Mucina and Rutherford (2009), but provincially it was upgraded from EN to Critically Endangered (CR) (Collins, 2016) (Figure B.14 for VOLTA PV and Figure B.15 for VOLTA EGI). It is also listed as a threatened ecosystem with a threat status of Endangered (A3), mainly due to National land cover data indicating that it has experienced extensive spatial declines of approximately 72% since 1750. It has a conservation target of 24% with less than 1% statutorily conserved in the Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves.

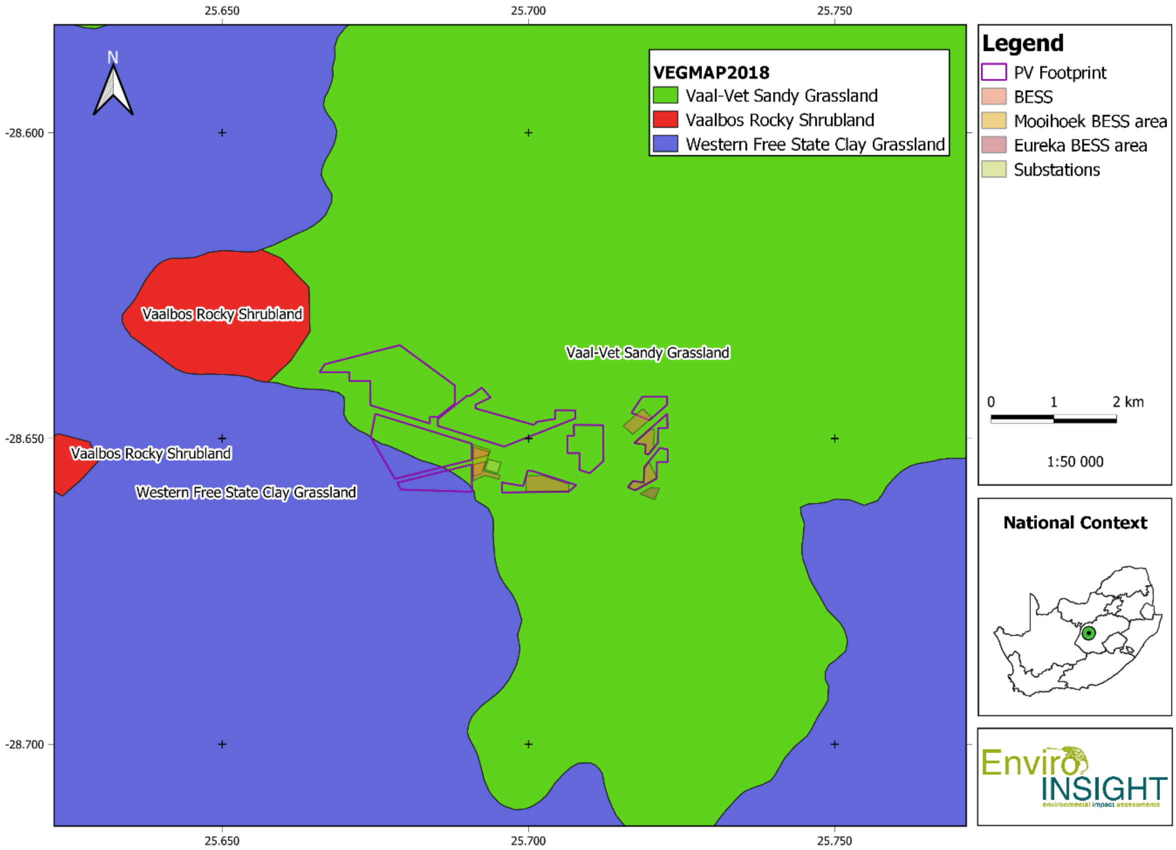


Figure B.14. Map depicting Vegetation or Veld Types for the proposed VOLTA PV development.

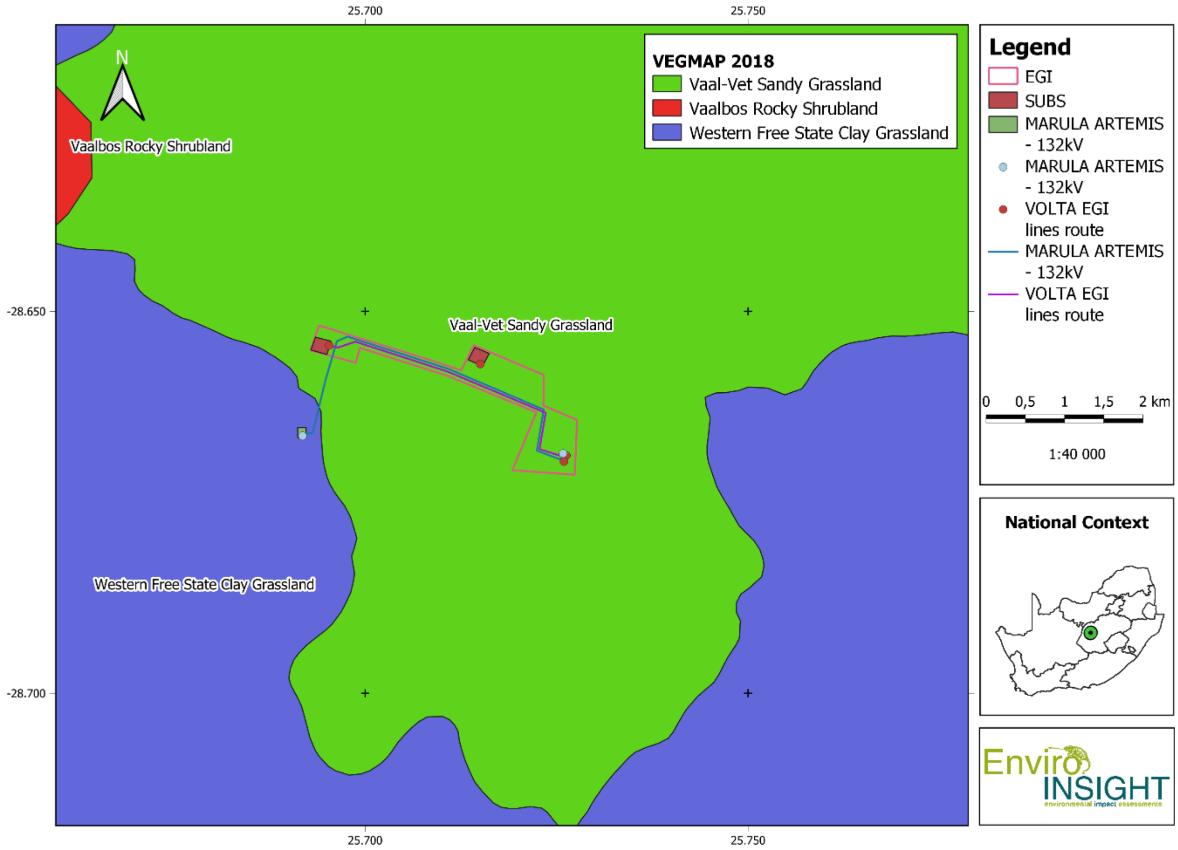


Figure B.15. Map depicting Vegetation or Veld Types for the proposed VOLTA EGI development.

B.9.4 Ecological Processes, Functioning and Drivers

Two principal factors are considered to be the main elements driving the localised ecology. These can be considered to be meteorological factors, namely wind, rainfall and temperature, while edaphics, particularly giving rise to lithic or sandy environments may be considered a geophysical driver. Notably, anthropogenic factors have over the previous century proven to be a key driver in contemporary habitat form and structure.

B.9.5 Terrestrial Species

The field surveys focused on identifying dominant flora species, main habitat types as well as the actual and potential presence of SCC (either classified as Threatened by the International Union for Conservation of Nature (IUCN) (2022), protected by the National Environmental Management: Biodiversity Act (NEMBA) (2007, as amended) or other legislation applicable provincially or nationally).

No SCC were recorded during the survey, and a probability of possible occurrence is low.

Dominant species recorded include:

- Grasses – *Aristida adscensionis, Aristida bipartita, Aristida congesta, Cymbopogon pospischilli, Cynodon dactylon, Digitaria eriantha, Eragrostis chloromelas, E. curvula, E.*

lehmanniana, E. obtusa, E. superba, Heteropogon contortus, Setaria cf. incrassate, Tragus sp. and Themeda triandra.

- Small trees – *Vachellia tortillis, V. karroo*
- Low Shrubs – *Chrysocoma ciliata, Pentzia globosa, Seriphium plumosom and Lycium crinium*
- Geophytic Herbs – *Oxalis depressa, Bulbine narcissifolia*
- Succulent shrubs – *Ruschia cf. intricata*
- *Succulent – Aloe sp.*
- Herbs – *Arctotis* sp., *Berkheya onopordifolia, Commelina africana, Commelina cf. livingstonii, Cyanotis speciosa, Felecia filifolia, Felecia muricata, Gnaphalium luteo-alba, Gomphocarpus fruticosus, Helichrysum lineare, Helichrysum cf. rugulosum, Hermannia depressa, Kohautia , Lessertia frutescens, Hilliardiella oligocephala, Indigofera alternans, Nidorella anomala, Ornithogalum sp., Oncosiphon sp., Oxalis depressa, Polygala hottentotta, Selago densiflora,*

B.9.6 Key Landscape Features

Refer to Section B.8.1 above for information on the general context of the site from an ecological perspective including landscape features.

B.9.7 Screening Tool Descriptions and Site Verification

B.9.7.1 VOLTA PV

Figures B.16 to B.18 below indicate the results of the Screening Tool in terms of terrestrial plant species, terrestrial animal species, and the terrestrial biodiversity combined sensitivity, respectively, for the VOLTA PV EGI project.

Figure B.16. Map indicating the Map of relative Terrestrial Biodiversity theme sensitivity for the VOLTA PV project. (Source: DFFE Screening Tool, 2022).

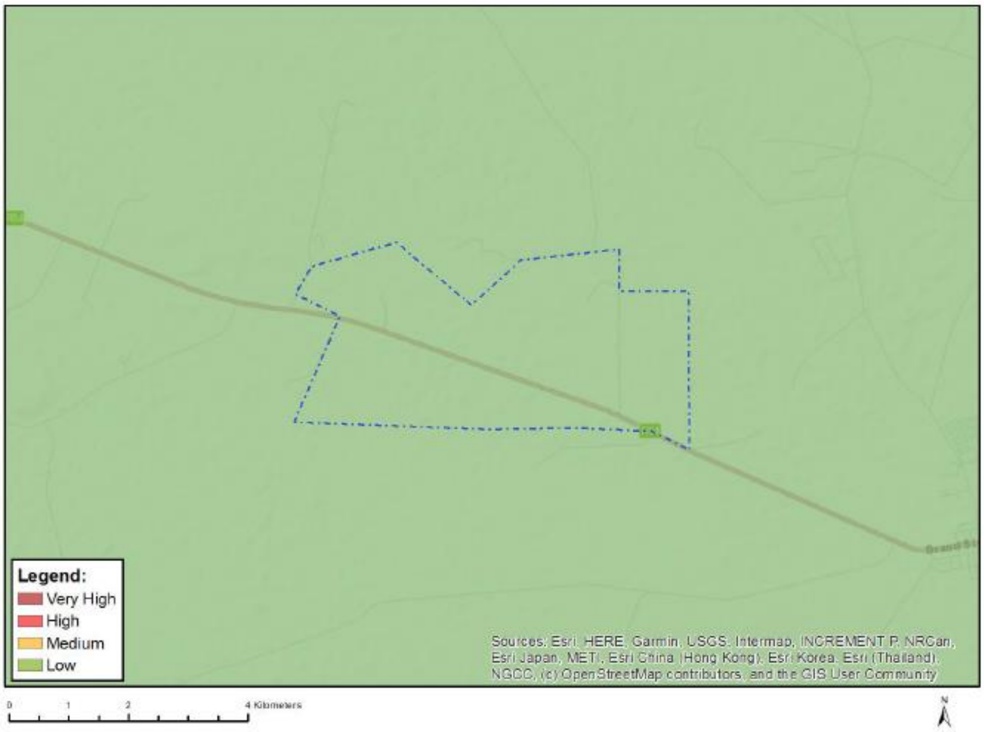


Figure B.17. Map indicating the Map of relative Plant Species theme sensitivity for the VOLTA PV project. (Source: DFFE Screening Tool, 2022).

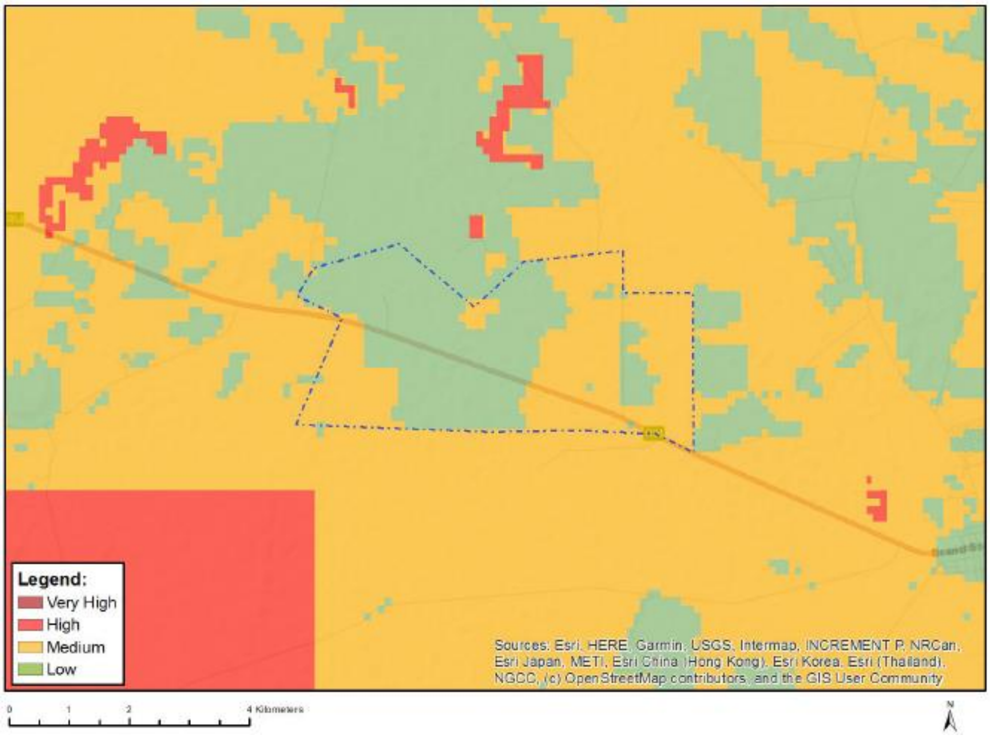


Figure B.18. Map indicating Map of relative Animal Species theme sensitivity for the VOLTA PV project. (Source: DFFE Screening Tool, 2022).

Based on the screening report generated, the Terrestrial Biodiversity Combined Sensitivity Theme (Figure B.16) is indicated as Very High as the proposed projects are located in a:

- Critical biodiversity area 1
- Ecological support area 1
- Ecological support area 2
- Endangered ecosystem

The plant species theme indicates Low sensitivity (Figure B.17).

The Animal species theme is indicated as Medium sensitivity due to the presence of sensitive avifauna species (Figure B.18) while the remaining taxa groups are considered to be low.

In terms of the verification, prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool had to be confirmed by undertaking a site sensitivity verification.

The findings of the site verification, which included a desktop assessment, confirmed the Very High environmental sensitivity of the Terrestrial Biodiversity theme and Low sensitivity for sensitive plant species and all other animal taxa groups excluding avifauna which is addressed in the Avifauna Impact Assessment).

B.9.7.2 VOLTA EGI

Based on the screening report generated, the Terrestrial Biodiversity Combined Sensitivity Theme (Figure B.19) is indicated as **Very High** as the proposed projects are located in a:

- Critical biodiversity area 1
- Endangered ecosystem

Accordingly, a Terrestrial Biodiversity Specialist Assessment must be conducted based on the Protocols (published on 20 March 2020).

The plant species theme indicates **Low** sensitivity (Figure B.20). Accordingly, a Plant Species Compliance Statement is required.

The Animal species theme is indicated as **Medium** sensitivity (Figure B.21) due to the presence of sensitive avifauna species, while the remaining taxa groups are considered to be low. Accordingly, only a compliance statement is required.

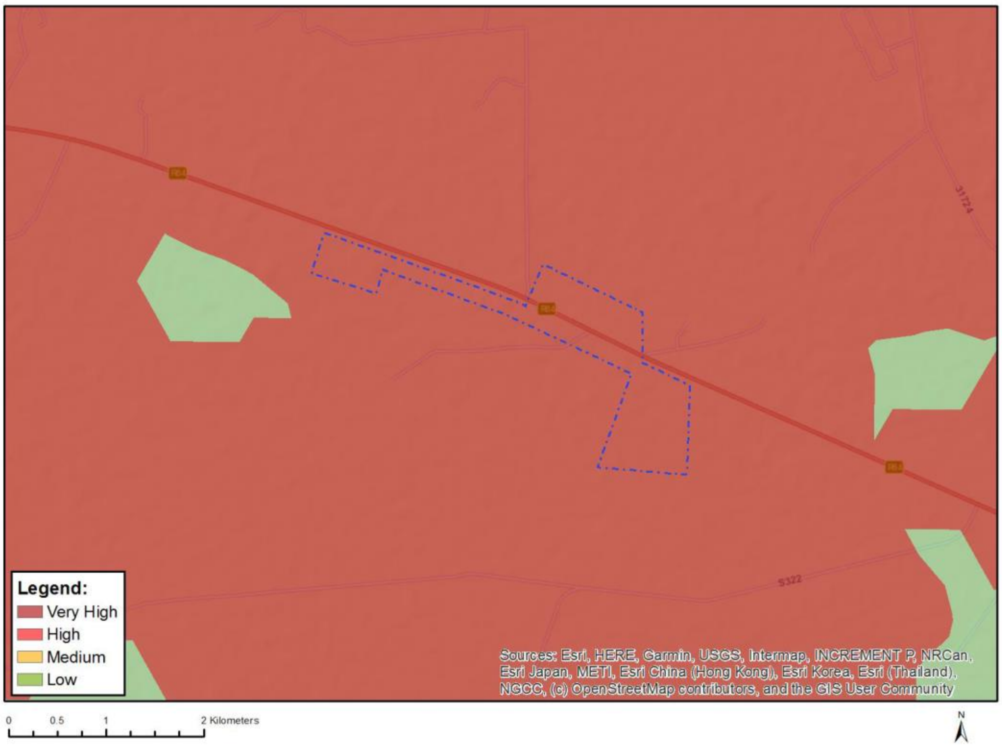


Figure B.19. Map indicating the Map of relative Terrestrial Biodiversity theme sensitivity for the VOLTA EGI project. (Source: DFFE Screening Tool, 2022).

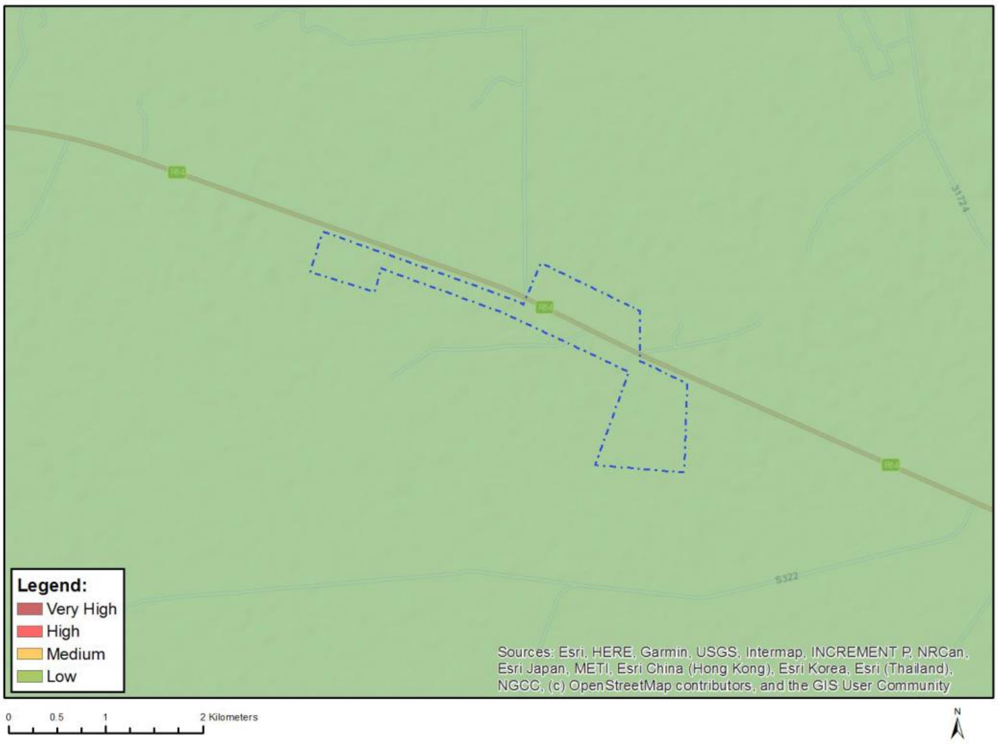


Figure B.20. Map indicating the Map of relative Plant Species theme sensitivity for the VOLTA EGI project. (Source: DFFE Screening Tool, 2022).

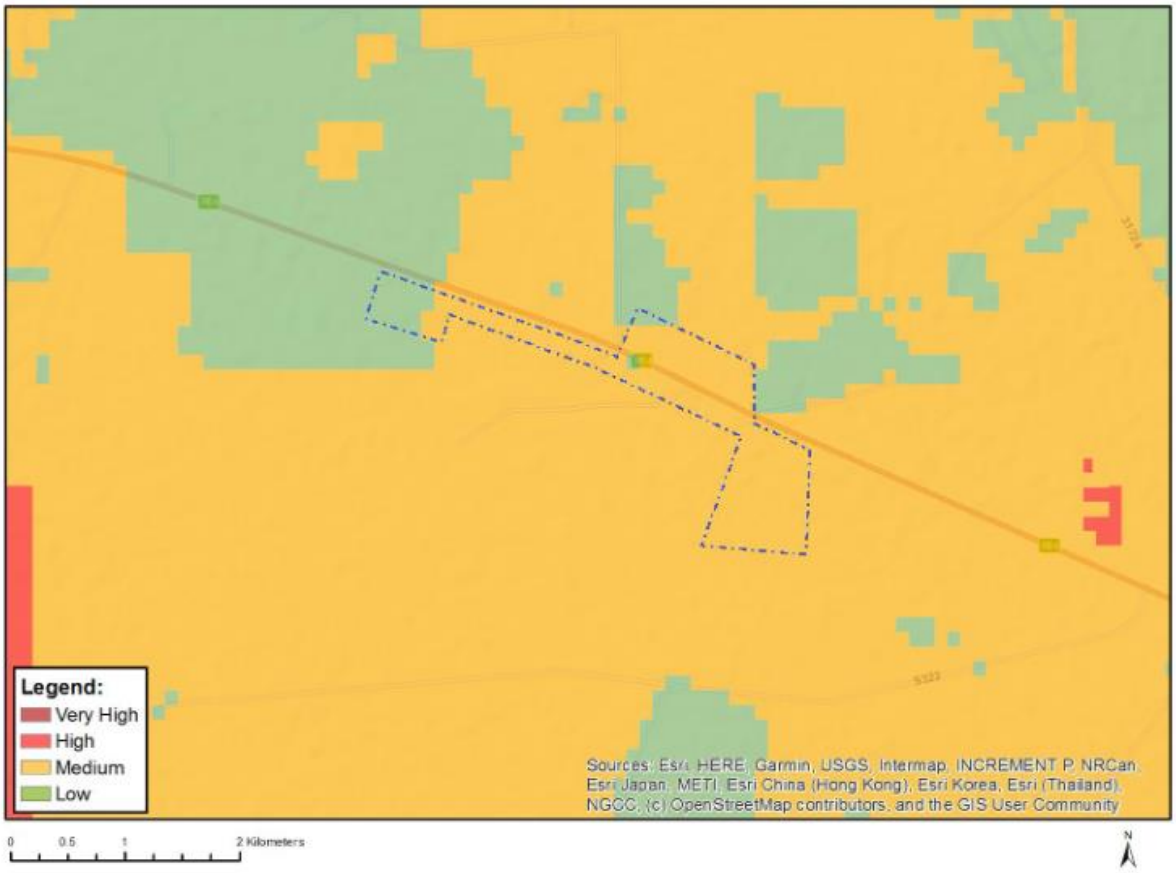


Figure B.21. Map indicating Map of relative Animal Species theme sensitivity for the VOLTA EGI project. (Source: DFFE Screening Tool, 2022).

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool had to be confirmed by undertaking a site sensitivity verification.

Site verification was undertaken on 30 January 2023 by a SACNASP registered ecologist. The purpose of this preliminary on-site inspection was to confirm the current use of the land and environmental sensitivities as identified by the screening tool. The findings of the site verification, which included a desktop assessment, confirmed the **Very High** environmental sensitivity of the Terrestrial Biodiversity theme and **Low** sensitivity for sensitive plant species and all other animal taxa groups (addressed in the Avifauna Impact Assessment).

The initial desktop review focused mainly on the BRAHMS Online BODATSA database. The species lists generated from existing botanical reports for the surrounding wind farms were also scrutinised and included in the expected species list.

B.10 Protected Areas

Several protected areas are located within a 15km radius from the study area (Figure B.22), including Blenheim Hunting Farm (15 km N), Kareelaagte Game Reserve (15 km NW), Nielsview Nature Reserve (15 km S) and Rooikraal Game Ranch (15 km S).

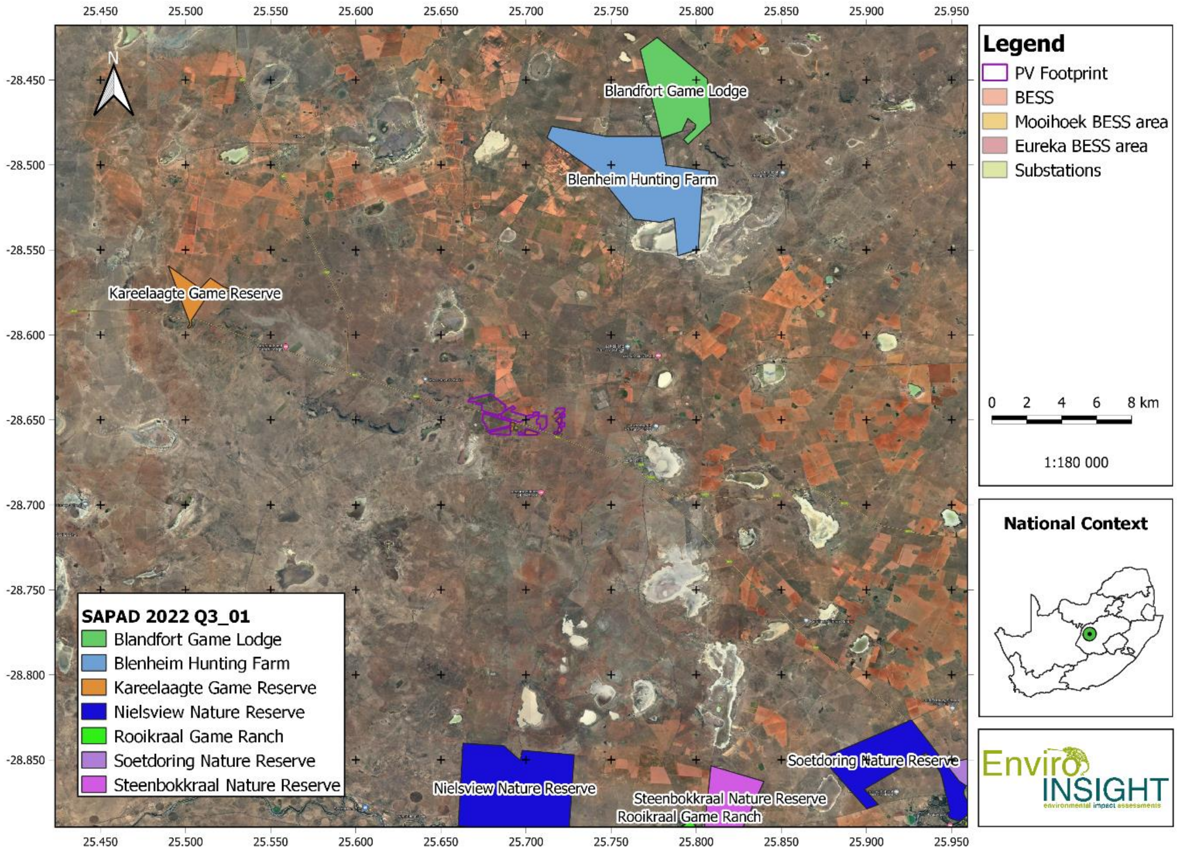


Figure B.22. Locality of the Project in relation to Protected Areas.

The study area also does not fall within any National Protected Areas Expansion Strategy (NPAES) areas.

B.11 Avifauna

The Avifauna Assessment (Appendix C. 13 and C.14 of the BA Report) undertaken for the proposed project includes detailed feedback on avifauna species encountered during the site monitoring. The information provided in this section is extracted from the Avifauna Assessment (Appendix C.13 and C.14 of the BA Report).

The below section applies to both VOLTA PV and VOLTA EGI projects.

The Project Area of Influence is not located within any Protected or Important Bird Areas (IBA). The closest IBA is the Soetdoring Nature Reserve, which is about 30 km SE from the PAOI (Figure B.2).

Protected areas surrounding the PAOI >15 km away include Blenheim Hunting Farm (15 km N), Kareelaagte Game Reserve (15 km NW), Nielsview Nature Reserve (15 km S) and Rooikraal Game Ranch (15 km S).

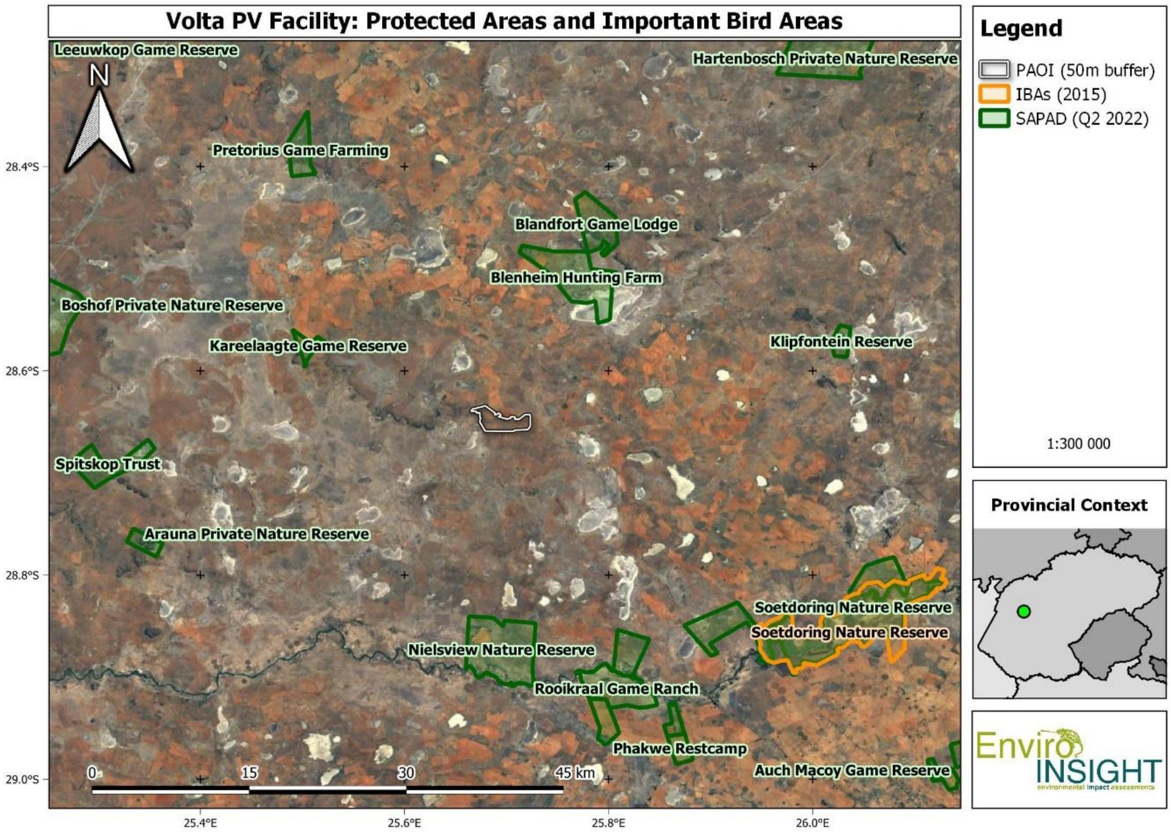


Figure B.23. The proposed VOLTA PV facility and BESS in relation to the surrounding Protected Areas and Important Bird Areas (IBA).

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The Avifauna specialist conducted on-site surveys from during October 2022 (Survey 1) and February (Survey 2) 2023 according to the best practice guidelines for avifaunal impact studies for solar developments, compiled by BirdLife South Africa (BLSA) in 2017 (Jenkins *et al.,* 2017).

Based on the desktop study and field observations, a relatively high diversity of 198 bird species could potentially occur within the PAOI. During the October 2022 and February 2023 site visits, a total of 69 and 55 bird species respectively were recorded from the observation of 590 and 942 individuals respectively. The total number of birds species observed in the PAOI was 76 from 1492 individuals. The complete list of expected avifauna species, along with the observed densities per species and per season is provided in the Avifauna Specialist Assessment.

In general, the density and diversity of the avifauna observations was lower than expected, most likely due to the absence of large congregations of waterbirds. Ground-dwelling species (e.g., Larks & Chats) were observable in high densities as were species capable of taking advantage of the agricultural activities (e.g., Quelea). Raptors and other large-bodied birds were present in low densities, except for Guineafowl. The most common grassland-associated species observed was the Desert Cisticola.

The combined walk-and-drive transect surveys details for each of the survey days during both seasonal surveys are shown in Table B.3, comprising a total of 236.7 km spanning a duration of 35.5 active survey hours. Species were categorised into four groups as per Jenkins *et al.* (2017) and enumerated for each survey day, which was then also expressed as the number of individuals encountered per hour as a measure of survey effort (Table B.3). The total survey effort encounter rates show very low densities of waterbirds and raptors per unit effort. The higher encounter rate for "large birds" is mostly due to the presence of Helmeted Guineafowl. Relatively consistent high densities of smaller birds were encountered throughout the study area on all days.

Table B.3: Observed densities (in brackets) and encounter rates (per hour of survey effort) for four avifauna species groups observed during the October 2022 and February 2023 avifauna surveys.

Date	Duration (h)	Distance (km)	Small Bird (<30cm)	Large Bird (>30cm)	Raptor	Water Bird (Associated)
19 October 2022	8.4	65.3	14.5 (122)	7.1 (60)	0.7 (6)	0.8 (7)
20 October 2022	5.6	36.7	27.7 (155)	5.7 (32)	1.3 (7)	0.7 (4)
21 October 2022	4.4	25.4	28.9 (127)	11.6 (51)	1.4 (6)	7.1 (31)
Spring	18.4	127.4	21.9 (404)	7.8 (143)	1 (19)	2.3 (42)
17 February 2023	4.6	36.5	35.9 (164)	5.5 (25)	0 (0)	2.4 (11)
18 February 2023	7.7	32.0	25 (192)	2.9 (22)	0 (0)	2.2 (17)
19 February 2023	4.9	40.8	31.4 (153)	3.1 (15)	0.4 (2)	1.2 (6)
Summer	17.1	109.3	29.7 (509)	3.6 (62)	0.1 (2)	2 (34)
Grand Total	**35.5**	**236.7**	**185.3 (1317)**	**43.6 (348)**	**4.8 (40)**	**16.7 (118)**

The Avifauna Specialist concluded the main species of conservation concern (SCC) that were discussed in relation to the anticipated impacts from the development are White-backed Vulture (*Gyps africanus*), Lanner Falcon (*Falco biarmicus*), Blue Korhaan (*Eupodotis caerulescens*), Secretarybird (*Sagittarius serpentarius*) and Flamingos *(Phoeniconaias minor* & *Phoenicopterus roseus*). However, there are no major negative impacts to avifauna SCC expected from the proposed development, provided that the proposed mitigation measures described are applied.

In terms of the Screening Tool, report indicated areas of medium sensitivity for the PAOI due to the modelled probability of Ludwig's Bustard (*Neotis ludwigii*) occurring in the PAOI (Figure B.24 for the VOLTA PV project and Figure B.25 for the VOLTA EGI project).

Habitat conditions on site have been verified to be suboptimal for Ludwig's Bustard. Consequently, it is recommended that the screening tool sensitivity should be updated and changed to low for this species in this location.

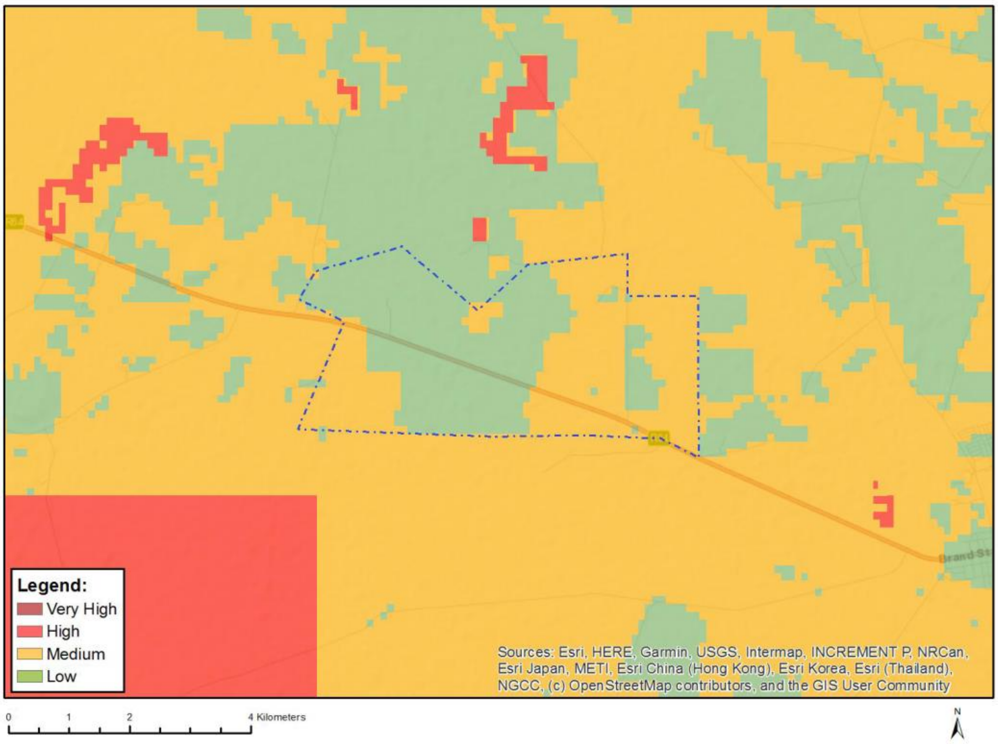

Figure B.24. Screening Tool outcomes of the relative animal species them for the VOLTA PV project area of influence

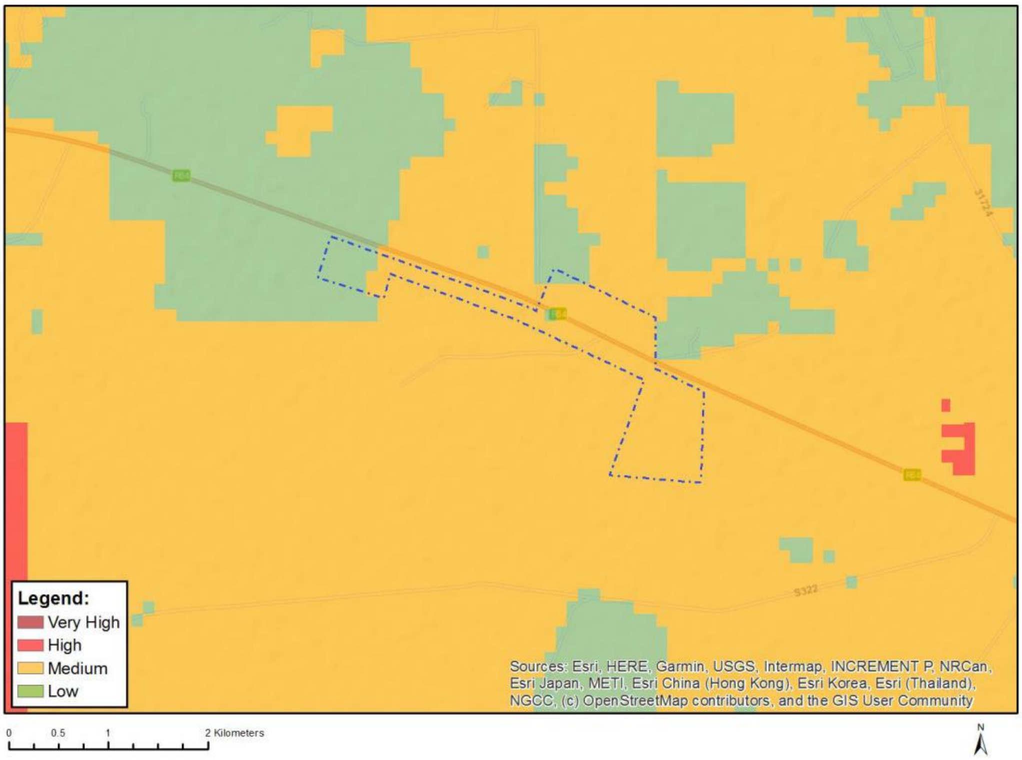

Figure B.25. Screening Tool outcomes of the relative animal species them for the VOLTA PV project area of influence

Highly sensitive areas were identified for the animal species theme related to avifauna which do not appear in the Screening Tool were the wetland systems in the PAOI. For these wetland systems, no evidence was obtained to suggest that large congregations of water associated birds utilize these habitats regularly. In fact, the observed encounter rate of waterbirds did not differ meaningfully between the dry and wet seasons and numerous waterbird species were entirely absent from the PAOI. Consequently, these aquatic habitats within the PAOI do not warrant extensive buffers, if additional mitigation measures are applied to the proposed infrastructure in close proximity to the aquatic habitats. Therefore, a 50 m buffer was applied around all of the wetland and dam habitats delineated by the wetland specialist (Tate 2023) which must be considered as part of the wetland ecosystem and may not be infringed upon by any infrastructure or development activities (No-go) (Figure B.26).

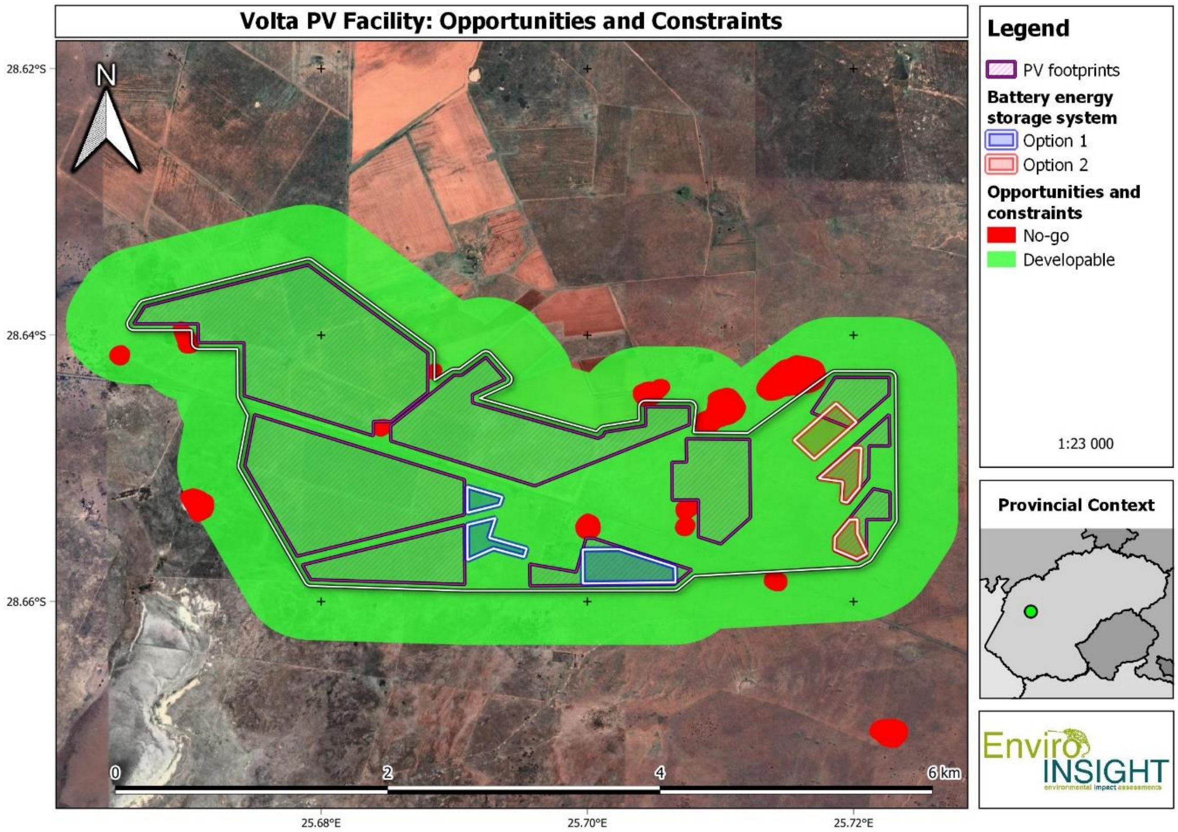

Figure B.26. Opportunities and constraints (No-go areas) map for the proposed VOLTA PV facility and BESS

For the EGI project, it is not possible to develop strict no-go areas for Overhead Powerlines based on likely collisions (other than significantly buffering major attractions like large freshwater pans). Furthermore, such desirable avoidance mitigation is typically not practically possible due to many other constraints, such as rules and regulations governing the placement of new OHPLs in close proximity to existing Eskom OHPLs. Therefore, none of the EGI areas for proposed infrastructure can be considered as no-go but strong emphasis must therefore be placed on minimisation mitigation and in this case, ensuring that no electrocutions or collisions of SCC take place.

B.12 Visual Aspects and Sensitive Receptors

The Visual Impact Assessment is included in Appendix C.3 and C.4 of the BA Report, and includes details on landscape and sensitive receptors. The information provided in this section is extracted from the Visual Impact Assessment. The following section applies to both the VOLTA PV and the VOLTA EGI projects.

The Visual Impact Assessment provides information on landscape, geology, and vegetation, as described above, as well as other aspects such as land use and sensitive receptors.

The site location can be described as fairly remote, with the only populated area being the town of Dealesville. A number of homesteads occur throughout the study area. Some of these in the study area include:

- Carlton
- Valleidam
- Modderpan
- Gouda
- Beestedam
- Oxford
- Kelverdon

Roosteyn Safari’s, who specialise in hunting safaris, is located 2.5 km northwest of the proposed site, while Tarentaalrand Safari Lodge, a guesthouse, is located 10 km northwest.

Industrial infrastructure in the region is very prominent and consists of the Perseus substation (located 2 km northeast of the proposed sites) and an extensive network of high voltage powerlines that congregate at the substation.

The Screening Tool shows that the site for the proposed VOLTA PV and BESS facility contains sensitivities ranging from medium to very high (Figure B.27) owing to the fact that the site is located within 500 m of a town or village and located on mountain tops and high ridges.

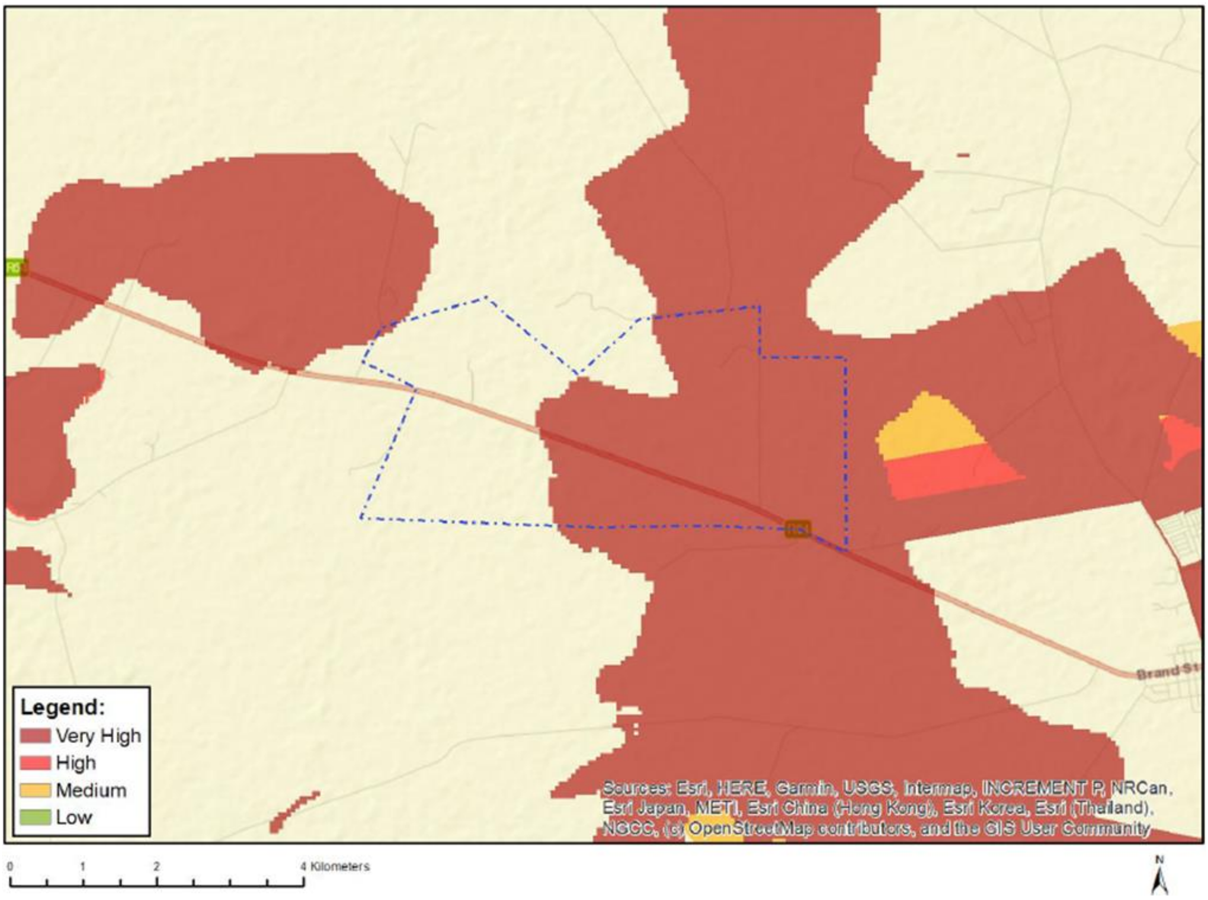

Figure B.27. Landscape (Solar) Combined Sensitivity as depicted on the Screening Tool.

The current visual sensitivity mapping undertaken in the Visual Impact Assessment is in greater detail at the site scale and takes into account detailed viewshed mapping and local site conditions, as indicated in Figure B.28.

There are no designated protected areas within the region and no major tourist attractions or destinations were identified within the study area. Except for pans, there are no topographic or scenic features of note in the study area.

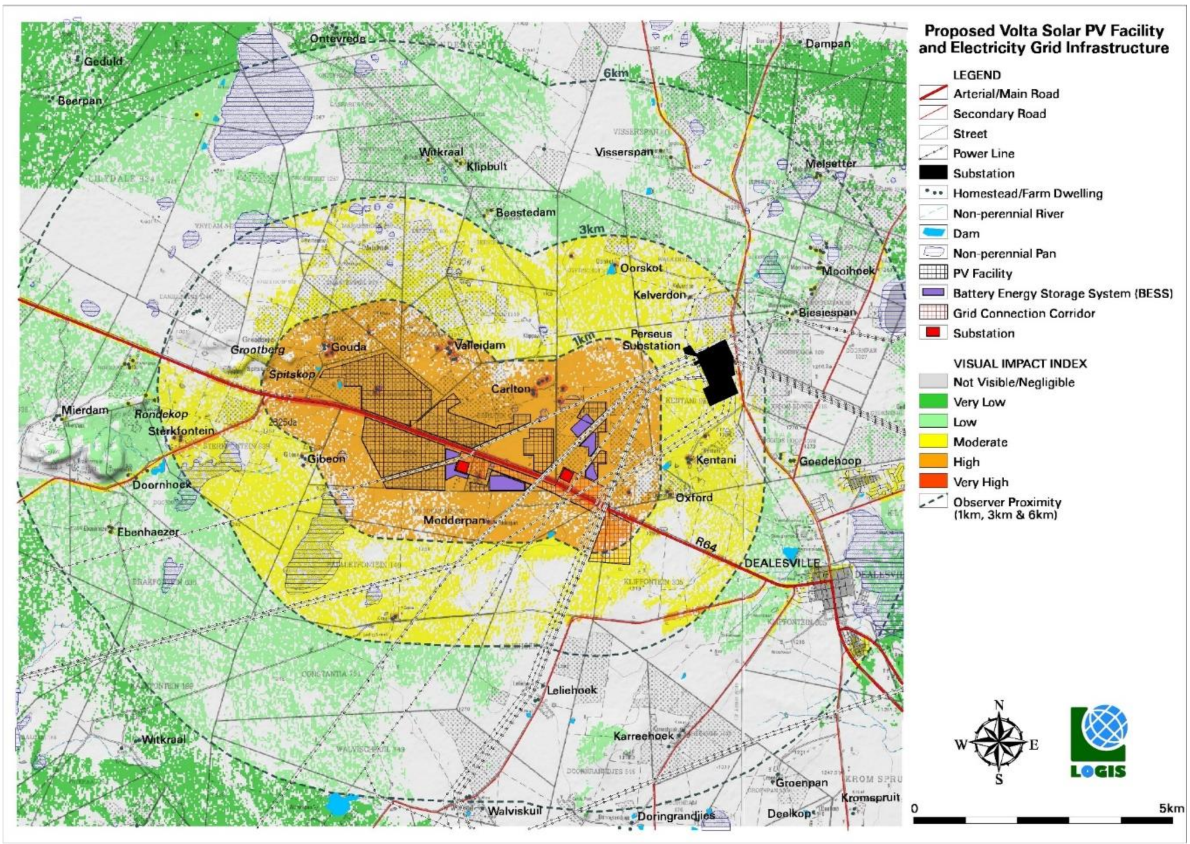

Figure B.28. **Detailed Visual impact index for the VOLTA PV project.**

The visual sensitivities described above and in Figure B.27 correspond roughly with the Screening Tool sensitivities, the former being more detailed and specific to the study area.

No specific mention to visual impact sensitivity was made in the DFFE screening tool report with regards to the grid connection infrastructure. Based on the site sensitivity verification report, the sensitivity of the visual environment for the proposed grid connection infrastructure has been determined to be moderate owing to the low occurrence of visual receptors within 500nm of the proposed alignment, occurrence of numerous existing high voltage power lines that traverse the immediate area and the location of the alignment within a Strategic Transmission Corridor. It is envisaged that the grid connection infrastructure, where visible from shorter distances (e.g., less than 0.5nkm and potentially up to 3 km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be low, due to the generally remote location of the proposed infrastructure and the low number of potential observers. It should once again be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing power line infrastructure in the study area.

B.13 Heritage: Archaeology and Cultural Landscape

A detailed description of the archaeological features and cultural landscape within the study area is included in the Heritage Impact Assessment, which is included in Appendix C.5 and C.6 of this BA Report. The information presented in this section is based on the Heritage Impact Assessment.

The section below applies to both the VOLTA PV and BESS project and the VOLTA EGI.

A site visit was undertaken by the specialist in the week of 11 November 2022 & 27 February 2023. The Heritage Impact Assessment, included in Appendix C.5 and C.6 of this BA Report, provides a list and description of all heritage resources recorded during the ground survey. Some of the relevant information has been extracted from the Heritage Impact Assessment as noted below in Table B.4.

Table B.4. Recorded heritage features in the VOLTA study area. Observations highlighted in orange are located within the PV footprint and BESS area and applicable to this assessment.

LABEL	Orton Sites 2016	LONGITUDE	LATITUDE	TYPE SITE	SIGNIFICANCE
VT001		25° 41' 11.7241" E	28° 39' 24.5485" S	Stone Age Find Spot	Low
VT002	872; 873; 874	25° 41' 31.1136" E	28° 39' 25.3801" S	Multiple Occupation site – Stone Age and historical occupation	Medium
VT003	877	25° 41' 32.6688" E	28° 39' 30.0421" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT004	878	25° 41' 35.5055" E	28° 39' 29.7575" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT005		25° 41' 34.6272" E	28° 39' 26.3197" S	Potential grave site / built environment	Low significance unless proven to be a grave
VT006		25° 41' 35.6425" E	28° 39' 26.5104" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT007	876	25° 41' 34.6416" E	28° 39' 25.1676" S	Built Environment (Ephemeral stone foundations)	Low - Risk = Unmarked graves
VT008	875	25° 41' 35.7180" E	28° 39' 23.2165" S	Built Environment (Ephemeral brick foundations)	Low - Risk = Unmarked graves
VT009	870	25° 41' 47.6663" E	28° 39' 24.1993" S	Built Environment (Cattle Kraal)	Low
VT010		25° 41' 40.5493" E	28° 39' 31.7304" S	Cemetery	High Social significance
VT011		25° 42' 26.7949" E	28° 39' 15.0407" S	Built Environment (remains of excavations)	Low
VT012		25° 43' 06.0636" E	28° 38' 36.6721" S	Stone Age Find Spot	Low
VT013		25° 40' 12.6445" E	28° 38' 27.5605" S	Built Environment (Retainer wall)	Low
VT014		25° 42' 17.1577" E	28° 39' 22.2805" S	Stone Age Find Spot	Low
VT015		25° 42' 27.3671" E	28° 39' 24.1236" S	Stone Age Find Spot	Low
VT016		25° 42' 52.0057" E	28° 39' 30.3876" S	Stone Age Background Scatter	Low to medium

LABEL	Orton Sites 2016	LONGITUDE	LATITUDE	TYPE SITE	SIGNIFICANCE
VT017		25° 42' 33.3020" E	28° 39' 23.3802" S	Stone Age Background Scatter	Low to medium
VT101		25° 40' 01.2505" E	28° 38' 14.5211" S	Small burial site situated on the western boundary of the project area ~ 20 from the fence line under a large pepper tree. The burial site contains multiple graves marked by packed stone borders and headstones. Most of the headstones have fallen over and the graves have become overgrown. The graves date from 1880 to 1920.	High – Social Significance
	871	25°41'51.60"E	28°39'21.80"S	Various stone, brick and cement features in this area. Not very old cement. This is also the southern end of the tree-lined avenue. It is only the avenue that is significant.	Medium AVOID avenue
	879	25°41'36.10"E	28°39'26.50"S	Stone foundation	Low
	880	25°41'35.50"E	28°39'27.39"S	Stone foundation	Low
	881	25°41'35.50"E	28°39'25.60"S	A single grave packed with dolerite	High Social significance

Large scale cultivation occurred throughout much of the study area. These activities would have destroyed surface indicators of heritage sites if any ever existed in these areas and based on HIA's conducted in the area heritage finds are located at pans or river gravels, rocky outcrops/hills and at farmsteads. The study area (and adjacent farm portions) was previously assessed by Orton (2016) that recorded Stone Age scatters, Historical Ruins, Burial sites, and a potential stock enclosure. The current assessment concurs with the findings made by Orton (2016).

An adjacent landowner, Mr. Gert Jonker, indicated that there are graves of children located on a portion of Vadersrust 882, apparently near the boundary with Gouda 32, and thus potentially within the PV development area. The headstones have apparently toppled over, and the graves are no longer easy to see. Mr. Jonker indicated that he knows this from having leased Vadersrust for a few years from the previous owner. The graves were recorded as VT101 and are located outside of the impact area.

In terms of cultural landscape, regionally the area is mostly cultivated, and forms part of a landscape characterised by wide scale cultivation and agricultural activities. Development in the study area is limited to farming infrastructure such as access roads, powerline infrastructure, fences, and agricultural structures. A gum tree-lined avenue leading into the farm Cornelia and a large cluster of gum trees marking the site of an old farm complex. The landscape is evolving from a vast open agricultural landscape to a landscape dominated by renewable energy developments and associated infrastructure.

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), ''cultural significance'' means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined in Section 3(3) of the NHRA.

Figure B.29 provides an aerial view of the VOLTA PV and BESS study area. Based on the current lay out the low-density background Stone Age scatters at VT01 and VT12 will be directly affected by the PV development. These isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report and the impact on the occurrences is low.

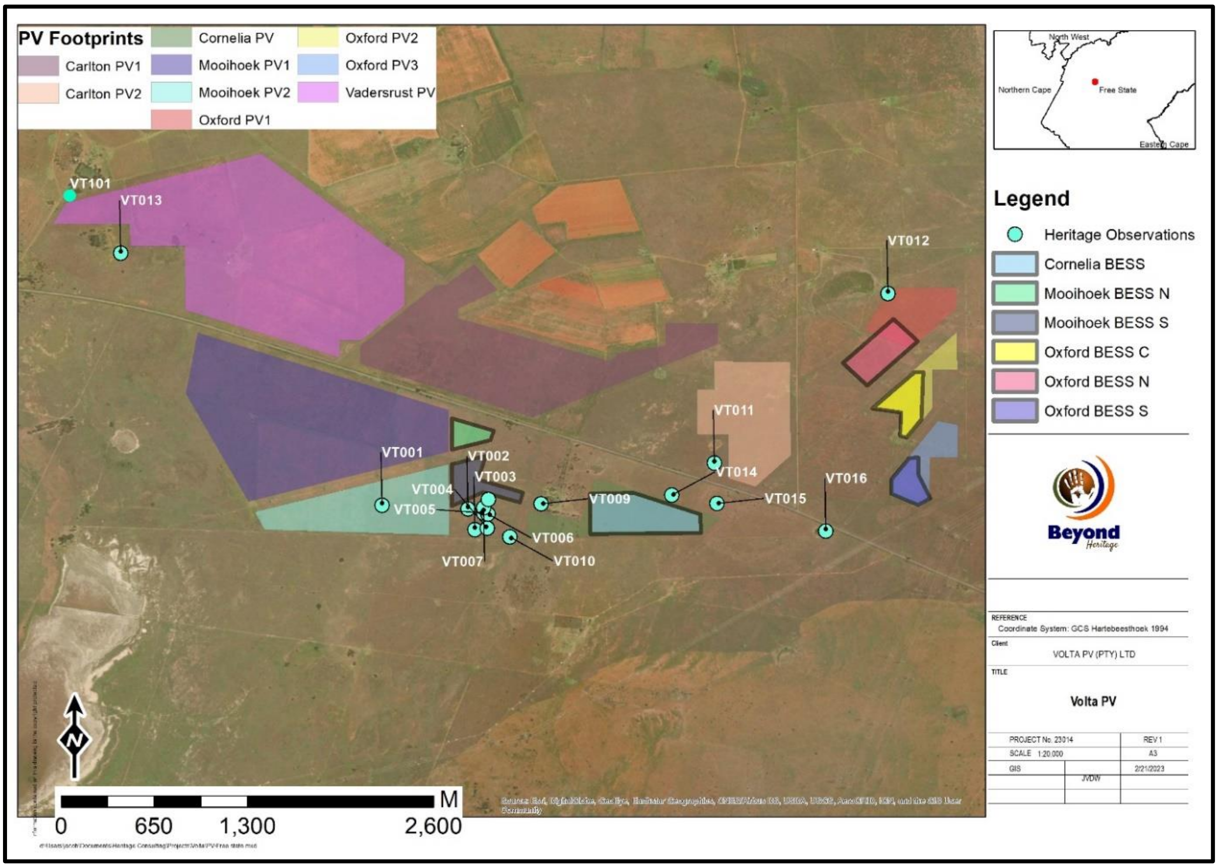

Figure B.29. Site distribution map showing sites from the current assessment for VOLTA PV and BESS

For the EGI component, based on the current lay out the low-density background Stone Age scatters at VT014, VT015 and VT016 will be directly affected by the EGI development. These isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report. Furthermore, based on the work done by Sampson (1986) the impacts by powerlines on Stone Age artefacts is limited and the impact on these occurrences is therefore low (Figure B.30).

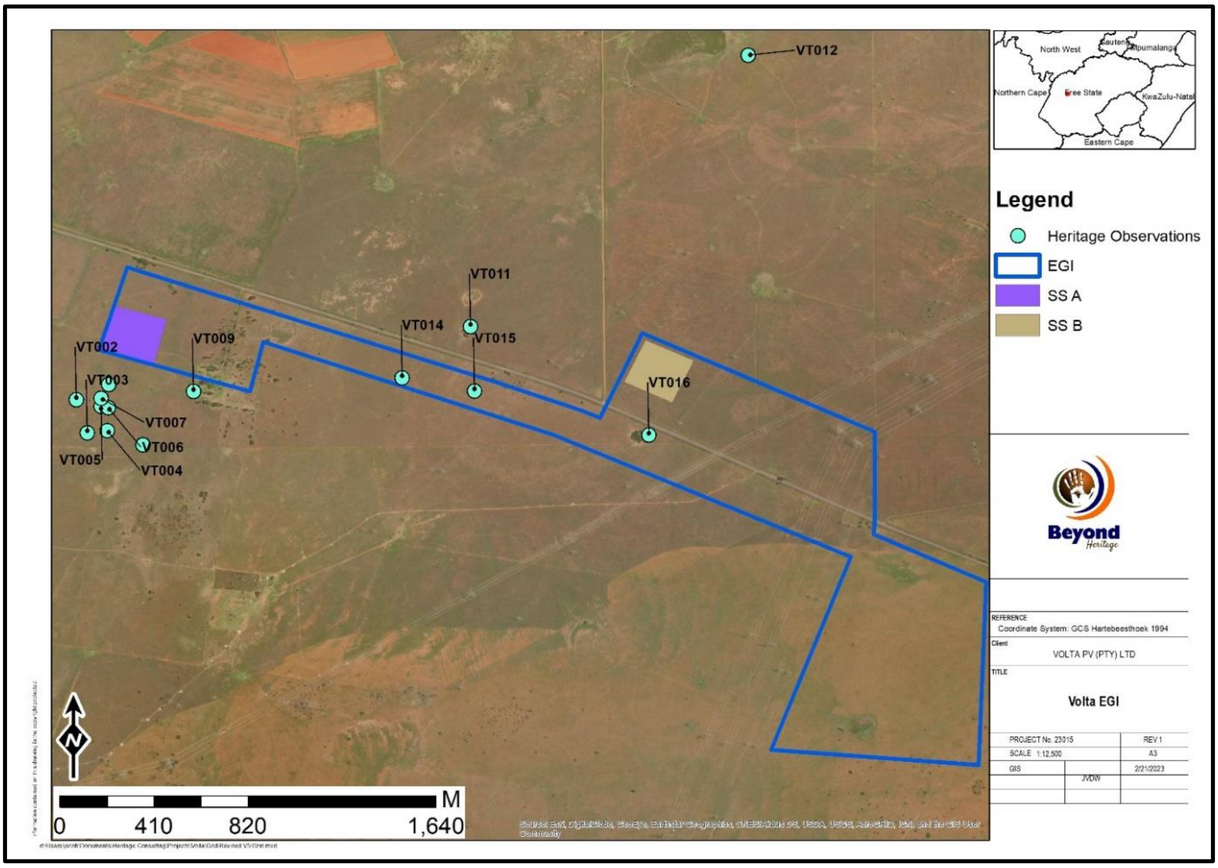

Figure B.30. Site distribution map showing sites from the current assessment for VOLTA EGI

B.13.1 Screening Tool Descriptions and Site Verification

Figure B.31 and Figure B.32 indicates the archaeological and heritage sensitivity as captured on the Screening Tool. It can be derived from the Screening Tool that the sensitivity is very high for both the VOLTA PV and BESS and the VOLTA EGI project as a result of the study area intersecting with some graded heritage sites discussed above. The site visit undertaken by the specialist confirms the sensitivities identified by the Screening Tool.

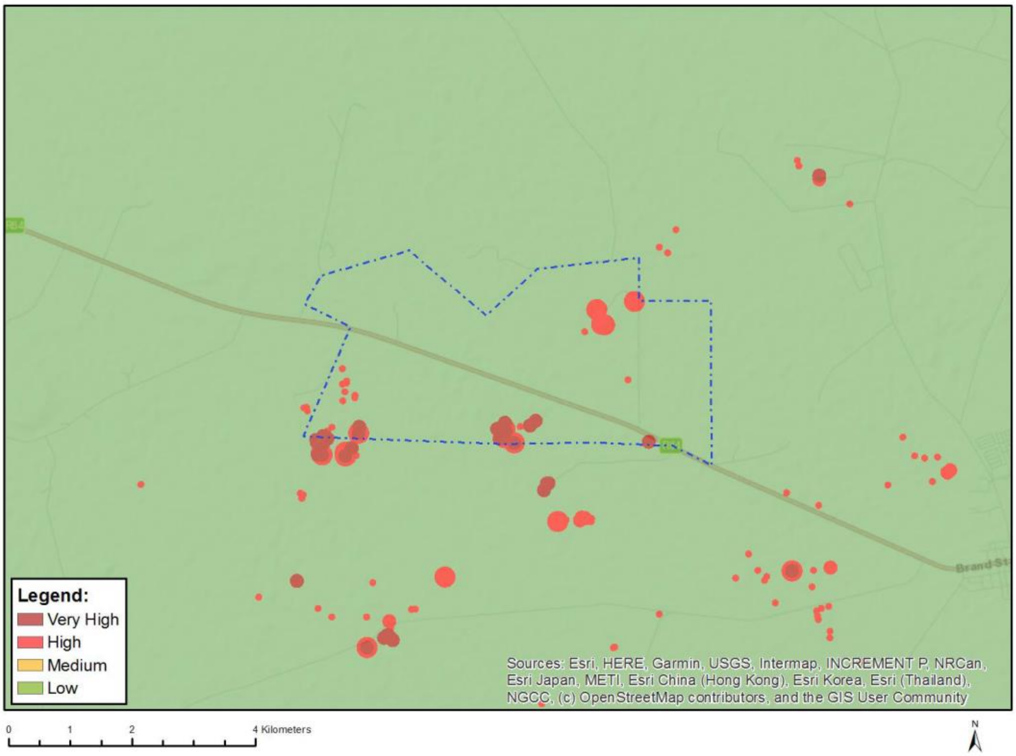

Figure B.31. The Screening Tool map for Archaeology and Cultural Heritage Combined Sensitivity for the VOLTA PV and BESS project.

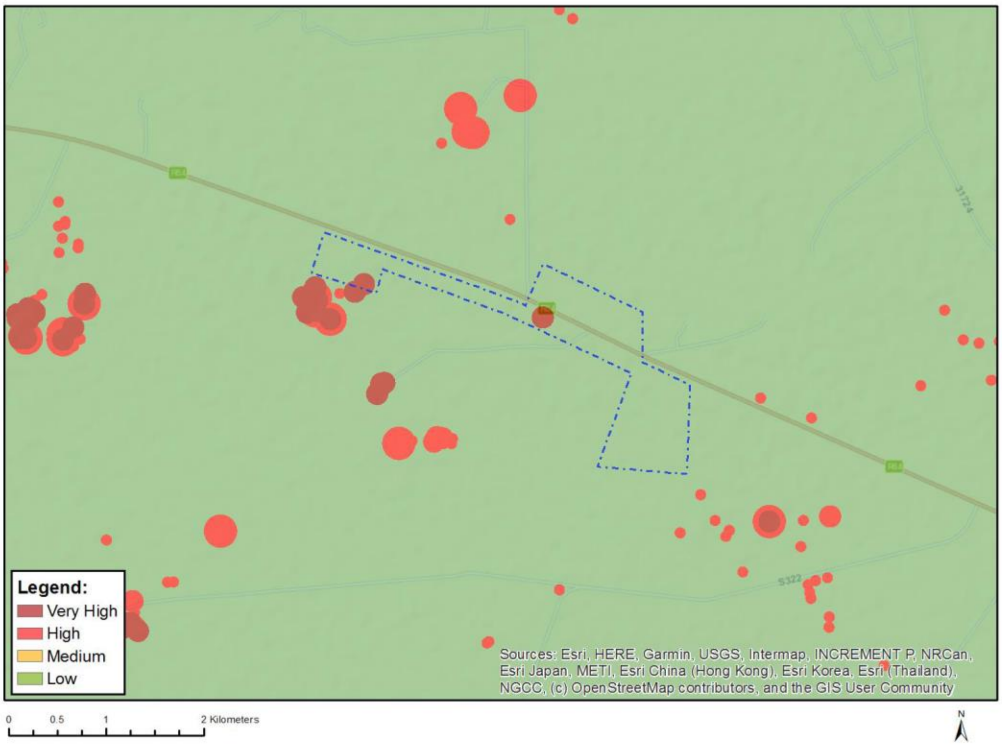

Figure B.32. The Screening Tool map for Archaeology and Cultural Heritage Combined Sensitivity for the VOLTA EGI project.

B.14 Palaeontology

A detailed description of the palaeontological features within the study area is included in the Palaeontology Impact Assessment, which is included in Appendix C.7 and C.8 of this BA Report. The information presented in this section is based on the Palaeontology Assessment.

The below section applies to both the VOLTA PV and BESS project and the VOLTA EGI project.

The South African Heritage Resources Information System (SAHRIS) Palaeosensitivity map shows the study area to be of high; moderate; and insignificant sensitivity for the VOLTA PV and BESS and VOLTA EGI project.

The project lies in the central part of the main Karoo Basin where the older sediments are present and have been intruded by the Jurassic dolerite dykes. Unconformably overlying much of the area are younger Quaternary sands and calcrete of the Kalahari Group.

Bamford (2023) states that from the geology and literature we know there is a chance of fossils occurring in the project footprint, but the type of fossil and likelihood vary. However, until the excavations commence it is not possible to know if fossils are below the ground.

B.14.1 Screening Tool Descriptions and Site Verification

On the basis of information sources listed previously, the Screening Tool palaeosensitivity map in Figure B.33 and Figure B.34 is disputed. The main reasons for this are: Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr.

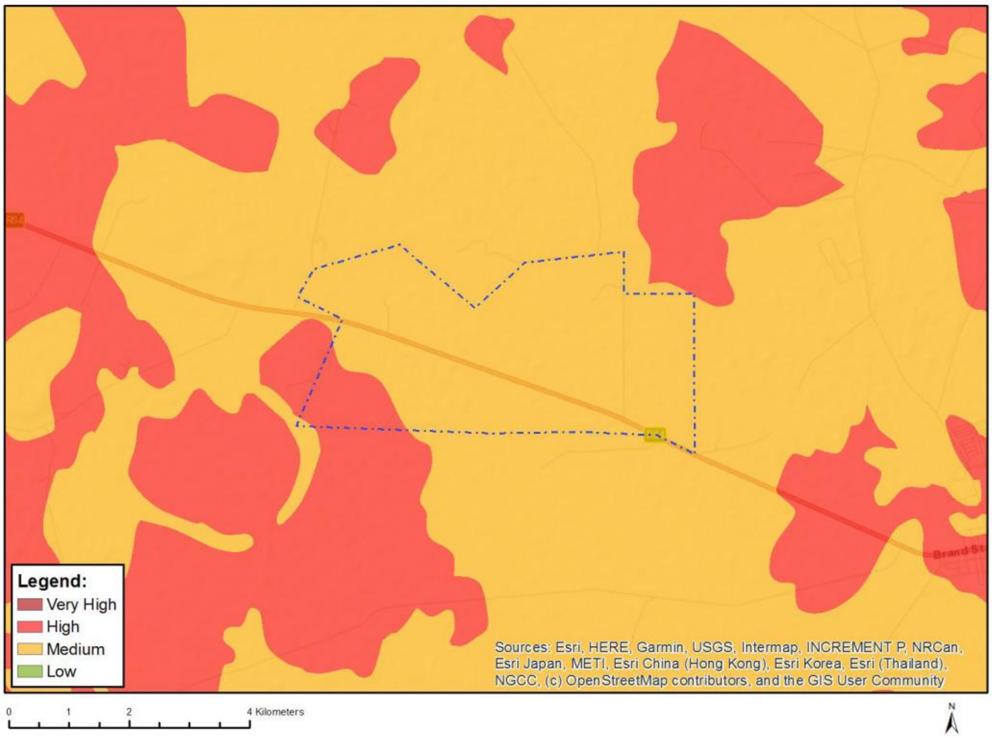

Figure B.33. The Screening Tool map for Palaeontology Combined Sensitivity for the proposed VOLTA PV and BESS development area.

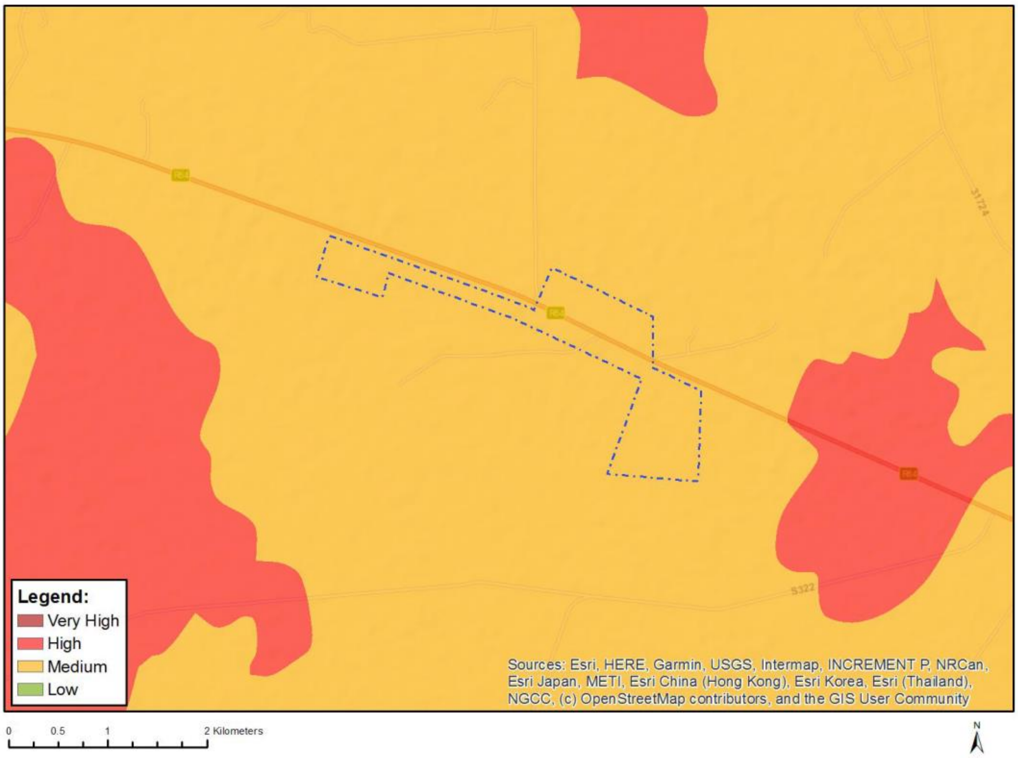

Figure B.34. The Screening Tool map for Palaeontology Combined Sensitivity for the proposed VOLTA EGI development area.

B.15 Socio-Economic Character

The information provided below has been extracted from the Socio-Economic Assessment, which is included in Appendix C.15 of this BA Report.

This Socio-Economic Assessment covers the individual land parcels on which the proposed projects will be developed if approved, and the nearest towns, Dealesville, as the anticipated socio-economic impacts will be spread to varying degrees across these localities. The project site falls within the Tokologo Local Municipality (TLM). The study area falls within the Lejweleputswa District Municipality (LDM).

Based on the Household Community Survey (2016), the population of the TLM was 29 147 in 2016, which represented ~ 4.5% of the total population of the LDM (646 920). The total number of households in 2016 was 9 832, giving an average household size of 3. Of the total number of households, the majority were formal houses (74.6%), followed by shacks (14.4%) and flats in backyards (5.8%). Poverty remains a huge socio-economic challenge facing the Free State Province. The total number of grants paid grew from approximately 98 000 in 1995 to near 850 000 in 2010, this is about 30% of the Free State population (Free State Growth and Development Strategy (FSGDS).

Based on the 2016 household community survey 13.7% of the TLM's working age population was officially unemployed in 2016. This was lower than the district (19.9%) and Provincial level (17.5%). The level of youth unemployment rate is likely to be considerably higher (Table B.5). The national youth unemployment level in 2019 was 39.6%, one of the highest in the world. Due to the COVID 19 pandemic current unemployment in the TLM likely to be higher.

Table B.5. Employment levels in TLM).

Column	Tokologo		Lejweleputswa		Free State	
Discouraged work-seeker	5.3%	973	5.8%	23,929	5.6%	99,949
Employed	36.3%	6,618	34.6%	142,679	36.2%	649,661
Other not economically active	44.6%	8,141	39.8%	164,285	40.8%	732,517
Unemployed	13.7%	2,504	19.9%	81,955	17.5%	313,793
Unspecified	0%	0	0%	0	0%	0

In terms of education, based on the 2016 Community Survey 11.9% of the population over the age of 20 had no education, while 25.1% had matric, and 2.4% and 0.9% has an undergraduate and post graduate qualification respectively. The percentage of the population over the age of 20 with no education and matric rate for the TLM were lower than the district (4.6% and 31.9%) and provincial level (5.9% and 33%) respectively. The low education levels in the TLM pose a challenge in terms of employment and development.

Household income an indicator of current poverty levels and provides information about the living standards prevalent in a particular community. Based on the data from the 2011 Census, 10.3% of the population of the TLM had no formal income, 4.7% earned under R 4 800 per annum, 8.3% earned between R 5 000 and R 10 000, 28.2% between R 10 000 and 20 000 and 24.6% between R 20 000 and R 40 000 per annum.

In terms of basic services, based on the 2016 Community Survey, 87.9% of households in the TLM were provided with water by a service provider, namely the TLM, while 10.5% relied on their owns services (Table 3.2). The figures for the TLM are lower than the district and provincial figures. Of the households serviced by a service provider, 80.1% of households had piped water inside the yard while only 7.3% had piped water inside their houses, while 3.9% relied on boreholes. These figures reflect the rural nature of the TLM. Further, the 2016 Community Survey found that 79.4% of households in the TLM had in-house prepaid meters, while 12.4% had conventional meters. 5.1% of households reported having no access to electricity. The community survey also found that only 32.9% of the households in the TLM had flush toilets, while 55.3% relied on pit toilets and 7% on bucket toilets. 4% of households reported that they had no access to sanitation facilities.

In terms of contribution to GDP, the most important sector was Agriculture (24.6%) followed by Mining (21.6%) and Community Services (20.7%). These three sectors made up ~ 67% of the economic activities in the TLM). The Agricultural sector was the most important sector, making up 38.9% of the employment opportunities, followed by households (28.07%) and Community Services (13.31%). Together these three sectors made up 80.28% of the jobs in the TLM.

The impact of PV facilities on property values is likely to be lower than the impact of WEFs due to the reduced visual impact. The Impact of the proposed PV facility on general property values in the area is therefore likely to be limited, specifically given the location of the site Eskom Perseus substation to the east of the site and the associated transmission lines. In this regard, most of the affected landowners interviewed did not raise concerns regarding impact on property values.

B.16 Transportation Impact Assessment

The potential impacts on traffic have been addressed in the Transportation Study (Appendix C.18). The main objective of the 'Transportation Study' is to determine the impact/s of the proposed development on the immediate and greater area concerning transportation.

Further to the game reserves, game farms, nature reserves and National Parks noted above, further high-level research has been undertaken to document some of the key eco-tourism activities in the area. The assessment considered the transportation of normal and abnormal vehicles, which are made up of, among other things; - PV components, BESS components, construction materials, equipment, construction workers and employees.

The development is located in close proximity to an existing road network. Several existing access points are located along Road P59-2 (R64), and to accommodate the adjusted land use, the selected access position must obtain the recommended sight distances of 300 m. Any upgrades or changes to access positions require approval, and a wayleave application will be required to the Free State Department Police, Roads and Transport (DPRT) before work commences. The construction phase for this development will typically generate the highest number of additional vehicles. However, it will be temporary, and impacts are considered nominal.

Le Maitre (2023) did not foresee any major risks concerning the proposed development and therefore include the recommendations in the report to take note of before and during the detailed design and construction stages.

B.17 Civil Aviation and Defence

As required by GN 320, Civil Aviation and Defence Site Sensitivity Verifications were compiled. These are included in Appendix C.20 and C.21 of this BA Report. Overall, the proposed project areas fall within a low sensitivity area from a Civil Aviation and Defence perspective.

B.18 Bats

A sperate bat assessment is not required for Solar PV developments. This is covered under the animal species assessment. The Wind and Solar SEA Phase 1 and Phase 2, explain that “to date, Solar PV developments have not been found to present a significant direct impact on bat populations” (DEFF, 2019, Part 3.2, Page 2). In terms of the potential impact of habitat disturbance of bat communities through land clearance, it must be reiterated that the vegetation beneath the PV panels will not be cleared but will be trimmed.

SECTION C: PUBLIC PARTICIPATION

C.1 Introduction to the Public Participation Process

This section provides an overview of the tasks undertaken during the BA, with a particular emphasis on providing a clear record of the Public Participation Process (PPP) that was followed. An integrated PPP has been undertaken for the BA Processes (i.e., VOLTA PV and BESS and the VOLTA EGI). The integrated PPP for the proposed projects ensured that all public participation documents (such as newspaper advertisements, site notices, notification letters, emails etc.) served to notify Interested and Affected Parties (I&APs), Stakeholders and Organs of State of the availability of the combined report for the abovementioned projects and provided I&APs with an opportunity to comment on the report. This approach was undertaken due to the projects entailing the same activity (i.e., generation of energy using a renewable source (i.e. Solar PV), and distribution of electricity via power lines).

The PPP for this BA Process is driven by a stakeholder engagement process that includes inputs from authorities, I&APs, technical specialists and the project proponent. Guideline 4 on "Public Participation in support of the EIA Regulations" published by the former Department of Environmental Affairs and Tourism (DEAT) in May 2006, states that public participation is one of the most important aspects of the EA Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority (CA) to make informed decisions and results in improved decision-making as the view of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently. The DEAT guideline states the following in terms of PPP:

- "*Provides an opportunity for I&APs, EAPs and the CA to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;*
  - *Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;*
  - *Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;*
  - *Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;*
  - *Is an important aspect of securing transparency and accountability in decision-making; and*
  - *Contributes toward maintaining a health, vibrant democracy*."

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;

- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion documents, meetings, workshops, focus group discussions, and the printed and broadcast media;
- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via written submissions or direct contact with members of the BA team; and
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, public participation aims to generate issues that are representative of societal sectors, not each individual. Hence, the PPP will be designed to be inclusive of a broad range of sectors relevant to the proposed project.
- The PPP will aim to raise a diversity of perspectives and will not be designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP will aim to obtain an indication of trade-offs that all stakeholders (i.e., I&APs, technical specialists, the authorities and the development proponent) are willing to accept with regard to the ecological sustainability, social equity and economic growth associated with the project.

The Department of Environmental Affairs (2017), Public Participation guideline in terms of NEMA EIA Regulations was also considered during this BA Process.

The key steps in the PPP for the BA are described below. This approach is structured in line with the requirements of Chapter 6 (PPP) of the 2014 NEMA EIA Regulations (as amended, i.e., GN R326), as well as the approved Public Participation Plan, as described below. Various mechanisms have been undertaken to provide notice to all potential and registered I&APs of the proposed projects, as described below.

The BA Processes commenced in November 2022, whereby the specialist studies were commissioned and the Draft BA Reports were being compiled. The Draft BA Reports were released to I&APs, Stakeholders and Organs of State (including the National DFFE) for a 30-day comment period, extending from 31 March 2023 to 3 May 2023. The Application for EA was submitted to the National DFFE at the same time as the Draft BA Reports.

C.2 Pre-Application Meeting and Consultation with the DFFE

A Pre-Application Meeting took place with the Competent Authority, the National Department of Environment, Forestry and Fisheries (DFFE), on 08 November 2022 (Reference Number: 2022-10-0002), in order to discuss and agree on various aspects with the DFFE prior to release of the BA Report. The following points were discussed with the DFFE:

- An overview of the project description;
- Confirmation on the approach towards including Battery Energy Storage Systems in the project description;
- Findings of the National Web-Based Screening Tool Reports;
- Discussion and confirmation on the specialist assessments and compliance statements to be undertaken;
- Discussion and confirmation on the approach towards the specialist reporting (GN 320, dated 20 March 2020);
- Approach to the Public Participation Process;
- Discussion and confirmation on the proposed project schedule and overall process for the BA, including the applicable Listed Activities and Cumulative Impact Assessment approach; and
- Points for clarification.

Refer to Appendix L of this BA Report for a copy of the Pre-Application Meeting Request Form submitted to the DFFE; Appendix L for a copy of the presentation delivered at the Pre-Application Meeting; Appendix L for a copy of the Pre-Application Meeting Notes. The Pre-Application Meeting Notes were submitted to the DFFE via email on 15 February 2023.

As noted above, a request for a combination application and multiple EA approach was formally submitted to the DFFE on 28 February 2023, and thereafter approved on 13 March 2023. A copy of this approval letter from the DFFE is included in Appendix L of this BA Report.

C.3 Landowner Written Consent

Regulation 39 (1) of the 2014 NEMA EIA Regulations (as amended) states that "*if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land*".

Regulation 39 (2) of the 2014 NEMA EIA Regulations (as amended) further states that "*sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014*".

The proposed VOLTA Solar PV and BESS constitute non-linear activities, and landowner consent is therefore required for the land portions.

Written consent has been obtained from the landowners on which the non-linear infrastructure is proposed to be located. The written consent has been included as an appendix to the Amended Application for EA, which is being submitted to the DFFE, together with the Final BA Report.

Landowner consent for the negotiated powerline route within the assessed EGI corridor is also required. This is included as an appendix to the Amended Application for EA, which is being submitted to the DFFE, together with the Final BA Report.

C.4 Site Notice Boards

One specific mechanism of informing I&APs of the proposed projects includes the placement of site notice boards. Regulation 41 (2) (a) of the 2014 NEMA EIA Regulations (as amended) requires that a notice board providing information on the project and BA Process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site.

Notice boards were placed at the entrance of the key affected farm portions on which the proposed projects will be constructed, as well as at strategic locations, government facilities, and well-known retail facilities in Dealesville. The site notice boards were placed on 17 February 2023. Table C.1 provides a breakdown of the locations at which the site notice boards were placed.

Table C.1. Site Notice Board Placement for the Proposed Projects

No.	Locality/ Description	Co-ordinates
1.	Site Notice board placed at the Tokologo Local Municipality Office in Dealesville	-28°40'27.29" S; 25°46'0.56" E
2.	Site Notice board placed at the BKB Retail Shop in Dealesville	-28°40'23.16" S; 25°46'1.71" E
3.	Site Notice board placed at Wilmarne Liquors in Dealesville	-28°40'26.16" S; 25°46'1.27" E
4.	Site Notice board placed at Tshwaraganang Community Health Centre in Dealesville	-28°39'50.73" S; 25°45'57.52" E
5.	Site Notice board placed at an entrance gate to the Remaining Extent of Farm Cornelia No. 1550 on the R64 near Dealesville	-28°39'10.30" S; 25°41'54.96" E
6.	Site Notice board placed at an entrance gate to the Remaining Extent of Farm Carlton No. 74 on the R64 near Dealesville	-28°39'23.64" S; 25°42'40.50" E

Site notice boards were placed in English, seTswana and Afrikaans; and included the following, in compliance with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended):

- The details of the proposed project that are subjected to public participation;
- Explanation that a BA procedure is applicable to the proposed project;
- The nature and location of the proposed project;
- Details on where further information on the BA project can be obtained; and

- The manner in which and the person to whom representations in respect of the BA Project can be made.

Refer to Appendix D of this BA Report for copies and proof of placement of the site notice boards.

C.5 Newspaper Advertisements

Regulation 41 (2) (c) of the 2014 NEMA EIA Regulations (as amended) requires the placement of a newspaper advertisement in one local newspaper or any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of the NEMA EIA Regulations.

In line with this, in order to notify and inform the public of the proposed projects, to invite I&APs to register on the project database, as well as to inform I&APs of the release of the Draft BA Report for comment, the BA Process was advertised in two local newspapers at the commencement of the 30-day comment period for the Draft BA Reports. Specifically, newspaper advertisements were placed in the Express in English and seTswana or Bloemnuus in Afrikaans. The content of the newspaper advertisement complies with Regulation 41 (3) of the 2014 NEMA EIA Regulations (as amended). The newspaper advertisements also included the details of the project website, where information available on the proposed project can be downloaded from. Refer to Appendix D of this BA Report for copies the content of and proof of placement of the newspaper advertisements.

C.6 Determination of Appropriate Measures

Refer to the section below which provides a detailed outline of the measures taken to include all potential I&APs, stakeholders and Organs of State in the BA Process.

In terms of Regulation 41 (2) (e) of GN R326, no persons have been identified as desiring but unable to participate in the process. All comments received during the 30-day review period will be captured and adequately responded to in the Comments and Responses Report.

Therefore, no alternative methods have been agreed to by the competent authority. It was proposed that if during the BA Process, persons are identified as desiring but unable to participate due to illiteracy, disability or any other disadvantage, then the EAP will contact the I&AP to discuss the proposed projects and provide assistance, where needed.

In line with Regulation 41 (2) (b) of GN R326 and prior to the commencement of the BA Process (and advertising the EA Process in the local print media), an initial database of I&APs (including key stakeholders and Organs of State) was developed for the BA Process. This was undertaken based on research and other projects in the project area. Appendix D of this BA Report includes a copy of the I&AP Database, which indicates interaction with I&APs, key stakeholders and all I&APs that have been added to the project database.

In line with Regulation 41 (2) (b) of GN R326, the database includes the details of the following:

- Landowners of the affected farm portions;
- Occupiers of the affected farm portions;

- Landowners of the neighbouring adjacent farm portions;
- The municipal councillor of the ward in which the proposed projects will be undertaken;
- The municipality which has jurisdiction in the area (i.e., Tokologo Local Municipality and the Lejweleputswa District Municipality);
- Relevant Organs of State that have jurisdiction in respect of any aspect of the activity; and
- Any other party as required by the competent authority.

The I&AP database contains, as a minimum, the competent authority (DFFE); relevant state departments (e.g. the Free State Department of Small Business Development, Tourism and Environmental Affairs (DESTEA)), Department of Water and Sanitation (DWS), Department of Mineral Resources and Energy (DMRE) etc.); relevant organs of state (e.g. Tokologo Local Municipality and the Lejweleputswa District Municipality, Eskom SOC Ltd etc.); as well as potential and registered I&APs (e.g. landowners, neighbours etc.).

The above stakeholders, Organs of State and I&AP received written notification of the release of the Draft BA Report for comment and will receive written notification of the submission of the Final BA Report, as well as the outcome of the EA Application.

While I&APs have been encouraged to register their interest in the project from the start of the process, following the public announcements, the identification and registration of I&APs is ongoing for the duration of the study. Stakeholders from a variety of sectors, geographical locations and/or interest groups are expected to show an interest in the proposed project, for example:

- Provincial and Local Government Departments;
- Local interest groups, for example, Councillors and Rate Payers associations;
- Surrounding landowners;
- Farmer Organisations;
- Environmental Groups and NGOs; and
- Grassroots communities and structures.

As per Regulation 42 of the GN 326, in terms of the electronic database, I&AP details are captured and automatically updated as and when information is distributed to or received from I&APs. This ongoing record of communication is an important component of the PPP. It must be noted that while not required by the regulations, those I&APs proactively identified at the outset of the BA Process will remain on the project database throughout the process and will be kept informed of all opportunities to comment and will only be removed from the database by request.

C.7 Approach to the PPP

In terms of Regulation 41 (6) of GN R326 the section below outlines the PPP for this assessment in order to provide potential I&APs, Stakeholders and Organs of State access to information on the project and the opportunity to comment at the various stages of the assessment process.

C.7.1 BA Report Phase - Review of the Draft BA Report

As noted above, the Draft BA Report for the proposed projects was released to I&APs, Stakeholders and Organs of State for a 30-day comment period. The section below summarises the PPP undertaken for the review of the BA Report.

- **Database Development and Maintenance**: In line with Regulation 41 (2) (b) of GN R326, an initial database of potential I&APs was developed for the BA Process, and has been updated throughout the process.
- **Site Notice Board**: As noted in Section C (5) above, notice boards were placed for the proposed projects. A copy of the notice boards is included in Appendix D of this BA Report.
- **Advertisements to Register Interest:** An advertisement was placed in the Express in English and seTswana; and in the Bloemnuus in Afrikaans at the commencement of the 30-day review period for the Draft BA Reports. A copy of the content of and proof of placement of the advertisements is included in Appendix D of this BA Report.
- **Submission of the Application Form and Draft BA Reports to the DFFE**: The Application Form for EA and Draft BA Report were submitted to the DFFE via the DFFE Novell Filr System and proof of upload was emailed to the DFFE on 30 March 2023. Proof of submission of the Draft BA Report to the DFFE and proof of upload to the DFFE Novell Filr System is included in Appendix D of this BA Report.
- **Letter 1 to I&APs (Commencement of the BA Process)**: Written notification of the availability of the BA Report (i.e. Letter 1) was sent to all I&APs and Organs of State (including landowners and adjacent landowners) included on the project database (at the time of releasing the Draft BA Report for comment) via email, where email addresses were available. This letter was sent at the commencement of the 30-day review period on the BA Report, and included information on the projects and notification of the release and availability of the reports. Letter 1 was written in English, seTswana and Afrikaans. Proof of the email, as well as copies of the Letter 1 sent are included in Appendix D of this Final BA Report, which has been submitted to the DFFE for decision-making. A follow up email was also sent to all I&APs on the database to serve as a reminder of the closure of the comment period and to seek as many comments as possible.
- **Personalised Letters:** Such letters were sent via email to the DFFE, Tokologo Local Municipality; Lejweleputswa District Municipality; Free State Department of Small Business Development, Tourism and Environmental in order to seek comments on the Draft BA Report. Proof of the personalised letters sent via email are included in Appendix D of this Final BA Report.
- **Text Messaging**: SMS texts were also sent on 30 March 2023 to all I&APs on the database (at the time of releasing the Draft BA Report for comment), where cell phone numbers were available, to inform them of the proposed project and how to access the Draft BA Report. Furthermore, a reminder SMS text was also sent to all I&APs on the database (at the time) to request for comment on the Draft BA Report and to remind I&APs of the comment period closure. Proof of text messaging is included in Appendix D of this BA Report.
- **Executive Summaries of the BA Report**: Executive Summaries of the BA Report were also emailed to I&APs on the database together with Letter 1, and uploaded to the project website and Google Drive.
- **30-day Comment Period**: As noted above, potential I&APs, including authorities and Organs of State, were notified via Letter 1, of the 30-day comment and registration period within which to submit comments on the BA Report and/or to register on the I&AP database. The comment period extended from 31 March 2023 to 3 May 2023 and in line with the 2014 NEMA EIA Regulations (as amended), public holidays were excluded from the reckoning of days.
- **Availability of Information:** The Draft BA Report was made available for a 30-day comment period, and was distributed to ensure access to information on the project and to communicate the outcome of specialist studies. The Draft BA Report was uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment) for I&APs to access it. As a supplementary mechanism, the Draft BA Report was also uploaded to an alternative web-platform

(i.e. Google Drive[3]). Proof of upload of the Draft BA Report to the project website and Google Drive is included in Appendix D of this BA Report. If an I&AP could not access the report via the project website, via the alternative web-platforms such as Google Drive, and if additional information is required (other than what is provided in the Executive Summaries), then the I&AP could contact the EAP, who would have then make an electronic copy available (where feasibly possible).

- **Comments Received**: A key component of the BA Process is documenting and responding to the comments received from I&APs and the authorities. Copies of all comments received during the review of the Draft BA Report will be included as an Appendix D Part 1of the Final BA Reports, and in the Comments and Response Report (Appendix D Part 2).

C.7.2 Compilation of Final BA Report for Submission to the DFFE

Following the 30-day commenting period of the BA Report and incorporation of the comments received into the reports, the Final BA Report were updated and submitted to the DFFE in line with Regulation 19 (1) (a) of the 2014 NEMA EIA Regulations (as amended).

In line with best practice, I&APs on the project database will be notified via Letter 2 via email (where email addresses are available) of the submission of the Final BA Reports to the DFFE for decision-making. To ensure ongoing access to information, a copy of the Final BA Report has been submitted for decision-making and the Comments and Response Reports (detailing comments received during the BA Phase and responses thereto) will be placed on the project website (i.e. https://www.csir.co.za/environmental-impact-assessment). As a supplementary mechanism, the Final BA Report will also be uploaded to other alternative web-platforms such as Dropbox or Google Drive.

The Final BA Report which has been submitted for decision-making to the DFFE will include proof of the PPP that was undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the BA Report for the 30-day review (as explained above).

The DFFE will have 57 days (from receipt of the Final BA Report) to either grant or refuse EA (in line with Regulation 20 (1) of the 2014 NEMA EIA Regulations (as amended) and GN 114 of February 2018).

C.7.3 Environmental Decision-Making and Appeal Period

Subsequent to the decision-making phase, if EAs are granted by the DFFE for the proposed projects, all registered I&APs, Organs of State and stakeholders on the project database will receive notification of the issuing of the EAs and the associated appeal period. The 2014 NEMA EIA Regulations (as amended) (i.e. Regulation 4 (1)) states that after the Competent Authority has a reached a decision, it must inform the Applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) of the 2014 NEMA EIA Regulations (as amended) stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EAs and the appeal procedure, as well as the respective timelines.

The distribution of the EAs (should such authorisations be granted by the DFFE), as well as the notification of the appeal period, will include a letter (i.e., Letter 3 (Release of Environmental

Authorisation and Notification of Opportunity to Appeal)) to be sent via email to all registered I&APs, Stakeholders and Organs of State on the database, where email addresses are available. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EAs. A copy of the EAs will be emailed with Letter 3. The EAs will also be uploaded to the project website (i.e. https://www.csir.co.za/environmental-impact-assessment). SMS texts will also be sent to all I&APs on the database, where cell phone numbers are available, to inform them of the EAs (should they be granted).

C.8 Issues Raised by Stakeholders and Comments and Responses Report

Issues raised by I&APs during the release of the Draft BA Report for comment will be captured in Appendix D Part 1 of the Final BA Report, and responses to the comments will be provided by the project team in the Comments and Responses Report (Appendix D Part 2).

Table C.2. Summary of Key Issues Raised during the 30-Day Review Period

Key Issue	Response
Requests to register on the I&AP database	These comments relate to the requests to register interest, submission of comments, and acknowledgement of receipts. These have all been included in Appendix D this Final BA Report.
Clarification and confirmation of the applicable listed activities	Section A.11 of the Final BA Report has been updated to include feedback on some of the listed activities that are no longer applicable to the project. The listed activities relating the IPP substation have ben removed from the Solar PV application.
Request for various feature, sensitivity maps and layout maps by the DFFE	The relevant feature, layout and sensitivity maps requested by the DFFE have been included in Section D of this BA Report, as well as Appendix A, as applicable. Where certain maps could not be combined due to scale, separate maps were then provided.
Public Participation requirements and opinions on the manner in which the process has been undertaken	As indicated above, the Public Participation Process undertaken has complied with the 2014 NEMA EIA Regulations (as amended). Various mechanisms, as described above, have been adopted to ensure that the BA Process notification is widespread. This included sending out emails and text messages, and placement of site notice boards and newspaper advertisements. A detailed copy of the I&AP database is included in Appendix D of this Final BA Report. The database includes the names, contact details and addresses of the I&APs, as well as an indication of the interaction with I&APs, as well as all I&APs that have been added to the project database based on requests, submission of comments or based on research. This complies with Regulation 42 of the 2014 NEMA EIA Regulations (as amended). Copies of all comments received during the 30-day comment period of the Draft BA Report have

Key Issue	Response
	been captured in Appendix D of this Final BA Report. A detailed Comments and Responses Report is included as Appendix D.1 of this Final BA Report. Proof of correspondence with various stakeholders is included in Appendix D of this Final BA Report.
Need for a Generic EMPr for Substations and EMPr for the PV Facility	The Draft BA Report included five Environmental Management Programmes, as follows: • Appendix G: EMPr for the 123kV Overhead powerline • Appendix H: EMPr for the Eskom Substation • Appendix I: EMPr for the IPP substation • Appendix J: EMPr for PV and BESS facility • Appendix K: EMPr for 132 kV Underground cable
Heritage: • Approval from SAHRA on the management actions provided in the Heritage Impact Assessment.	• As noted above, the Heritage Impact Assessment was submitted to and approved by SAHRA on 08 June 2023. • The recommendations provided in the Heritage Impact Assessment have been captured in the EMPr accordingly.
Terrestrial Ecology and Biodiversity: • Query on the location of the BESS and PV panels in relation to CBA1 • Recommendation to move infrastructure that interacts with CBA1 including moving a portion of BESS 1 B1	• The terrestrial specialist has noted that the sensitive grassland will not be irreversibly modified under the panels and has highlighted that only the wetlands should be completely avoided. • The terrestrial specialist has written a response which can be found in Appendix D of this A Report. • The project applicant has moved a portion of BESS B1 to a degraded area to reduce impact on CBA1. Due to project viability and land constraints the locations of BESS B2 has not been modified. • The EMPr for the proposed projects has been updated to include the various management actions.

SECTION D: IMPACT ASSESSMENT

This section includes a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the construction phase, operational phase, and decommissioning phase, in line with the requirements of the 2014 NEMA EIA Regulations (as amended).

D.1 Approach to the BA: Methodology of the Impact Assessment

The identification of potential impacts includes impacts that may occur during the construction, operational and decommissioning phases of the proposed development. The assessment of impacts includes direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed projects is well understood so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts includes:

- Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured;
- Determining future changes to the environment that will occur if the activity does not proceed;
- Develop an understanding of the activity in sufficient detail to understand its consequences; and
- The identification of significant impacts which are likely to occur if the activity is undertaken.

The impact assessment methodology has been aligned with the requirements for BA Reports as stipulated in Appendix 1 (3) (1) (j) of the 2014 NEMA EIA Regulations (as amended), which states the following:

"A BA Report must contain the information that is necessary for the Competent Authority to consider and come to a decision on the application, and must include an assessment of each identified potentially significant impact and risk, including –

(i) cumulative impacts;
(ii) the nature, significance and consequences of the impact and risk;
(iii) the extent and duration of the impact and risk;
(iv) the probability of the impact and risk occurring;
(v) the degree to which the impact and risk can be reversed;
(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
(vii) the degree to which the impact and risk can be mitigated".

As per the then Department of Environmental Affairs and Tourism (DEAT) Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.

- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The cumulative impacts have been assessed by identifying other renewable energy projects and other applicable (and relevant) projects, such as construction and upgrade of electricity generation, and transmission or distribution infrastructure in the local area (i.e., within 30 km of the proposed solar PV facility and EGI). There are various renewable energy projects being investigated in the local area that are at different stages of planning, ranging from projects that were awarded Preferred Bidder status in terms of the REIPPPP.

The approach for this BA is that the assessment includes all renewable energy and EGI projects within 30 km that have received an EA at the time of starting this BA (i.e., Oct 2022), as well as the proposed project. The information was collected from the National DFFE Renewable Energy EIA Application (REEA) database, 2022 Quarter 3 as well as from the South African Heritage Resources Information System (SAHRIS), and Eskom's Generation Connection Capacity Assessment (2020). This is the most accurate and up-to-date data available to the project team. There may be some projects with "in-process" applications for which data is not yet publicly available. This is the data found to be available and efforts were made to determine gaps and recent amendments. The REEA database contains land parcels, and not the Solar PV footprints. In most cases the actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. Hence the land parcels are larger than the land the PV will occupy. Some of the projects may not get developed. For these reasons this data tends towards a worst-case scenario as it will be an overestimation of the extent of the land covered by Solar PV panels.

Table D.1, Table D.2 and Table D.3 provides more details; and Figure D.1 provides an illustration of the projects considered in the cumulative impact assessment.

A summary of the process flow followed in the cumulative impact assessment is provided below:

- A list of authorised Renewable Energy and EGI projects within a 30 km radius was identified based on research, SAHRIS, REEA and the Eskom GCCA.
- This resulted in 39 Renewable Energy Projects. Of these, all are solar PV projects.
- In addition to the above, the VOLTA PV and EGI projects as part of this VOLTA development was also considered in conjunction.
- Considering all of the above, the cumulative impacts were then clearly defined, and where possible the size of the identified impact was quantified and indicated, i.e., hectares of cumulatively transformed land. With regards to the levels of transformation, the current state of the affected area was also taken into consideration. In most cases the actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. For example, the REEA database contains land parcels, and not the footprints. Hence the land parcels were considered, which took into account the worst case. This typically allowed the determination of the following aspects (or similar aspects) in the **relevant** specialist assessments:
    - The total affected land parcel area taken up by authorised renewable energy projects and their grid connections within the 30 km radius.

  - The total affected land parcel area of the VOLTA PV project and grid connections.
  - Combined land parcel area affected by renewable energy developments within the 30 km radius around the VOLTA PV and EGI projects.
  - The total area within the 30 km radius around the proposed projects.
  - The total combined size of the land parcels affected by renewable energy projects and their grid connections as a percentage of the available habitat in the 30 km radius.
- Therefore, the assessment of cumulative impacts was based on the specialist and EAP's knowledge of similar approved Renewable Energy and EGI projects in the 30 km radius. However, the following points are important to note in terms of the cumulative impact assessment:
  - The assessment of cumulative impacts is not necessarily solely focused on an assessment of impacts linked to previously authorised similar developments and consideration of their mitigation measures, but also about the sensitivities of the land on which the projects take place. For example, from a heritage point of view, it is also about other heritage resources, the type of locations they could occur in, and any other developments that may have impacted on heritage resources.

Table D.1. Proposed renewable energy and EGI projects that have received EA within 30 km of the proposed projects (Source: DFFE REEA and SAHRIS, 2022)

Technology	MW/ kV	Status	Project Title
Solar PV	100	Approved	The development of 100 MW Visserspan solar photovotaic facility project 2 on the farm Visserspan No.40 in the Free State Province
Solar PV	100	Approved	The development of 100 MW Visserspan solar photovotaic facility project 2 on the farm Visserspan No.40 in the Free State Province
Solar PV	100	Approved	The proposed Visserspan solar photovoltaic facility project 3 on the farm Visserspan No.40 in the Free State Province
Solar PV	100	Approved	The proposed up to 100 MW Visserspan solar photovoltaic facility project 4 on the farm Visserspan No.40 in the Free State Province
Solar PV	75	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Eksteen
Solar PV	200	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Irene
Solar PV	100	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Meeding
Solar PV	150	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Boschrand 2
Solar PV	100	Approved	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State Province: Klipfontein 1
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Klipfontein. 75 MW in initial application, upgraded to 100MW
Solar PV	75	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State Province: Sonoblomo
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State Province: Kentani
Solar PV	75	Approved	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State Province: Braambosch
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State: Klipfontein 2
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State Province: Boschrand 1 (Now Braklaagte)
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic Solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa Mainstream Renewable Power Developments (Pty) Ltd near Dealesville in the Free State: Leliehoek
Solar PV	75	Approved and Operational	Proposed 75MW Sebina Letsatsi Solar PV Facility near Dealesville, Free State Province

Technology	MW/ kV	Status	Project Title
Solar PV	290	Approved	Photovoltaic (PV) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Edison (Now Indlovu)
Solar PV	140	Approved	Photovoltaic (PV) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Maxwell (Now Ngonyama) 240Mw was approved. 140 was awarded for bid round 6
Solar PV	125	Approved	Photovoltaic (PV) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipalityin the Free State Province: Marconi (Now Amagama)
Solar PV	125	Approved	Photovoltaic (PV) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Watt (Now Leopard Ingwe)
Solar PV	125	Approved	Photovoltaic (PV) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local municipality in the Free State Province: Faraday (Now Umkhombe)
Solar PV	1000	Pre-application	Basic Assessment Processes for the proposed Notsi PV Cluster and Notsi Grid Connection, near Dealesville, Free State Province
Solar PV	250	Approved	The proposed development of the Springhaas Solar Facility 1 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	Approved	The proposed development of the Springhaas Solar Facility 3 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	Approved	The proposed development of the Springhaas Solar PV facility 4 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	Approved	The proposed development of the Springhaas Solar Facility 5 and associated infrastructure near Dealesville, Bloemfontein
Solar PV	250	Approved	The proposed development of the Springhaas Solar Facility 6 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	Approved	The proposed development of Springhaas Solar Facility 8 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	To be confirmed	The proposed development of Springhaas Solar Facility 9 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	100	Approved and Preferred Bidder (BW6)	Proposed IPP Renewable Energy Projects located on the Farm Goede Hoop 1028, Boshof RD and Farm Epsom Downs 1216, Boshof RD (Good Hope 1 Solar Park), within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province.
Solar PV	100	Approved and Preferred Bidder (BW6)	Proposed IPP Renewable Energy Projects located on the Farm Gedenksrust 1029, Boshof RD and Farm De Werf 1013, Boshof RD (Good Hope 2 Solar Park), within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province.

Table D.2. Proposed and existing EGI projects within 30 km of the proposed projects (Source: REA and SAHRIS)

Technology	MW/ kV	Status	Project Title
OPL, Collector Station, MTS	Unknown	Unknown	Proposed Visserspan Solar PP Grid Connection On the farms Visserspan No. 40, Mooihoek No. 1547, Vasteveld No. 1548 and Kinderdam No. 1685, near Dealesville, Tokologo Local Municipality, Free State Province
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 1 to Collector Substation B, near Dealesville, Bloemfontein, Free State (Line 1)
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 3 to Collector Substation B, near Dealesville, Bloemfontein, Free State (Line 2)
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 4 to Collector Substation A, near Dealesville, Bloemfontein, Free State (Line 3)
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 5 to Collector Substation A, near Dealesville, Bloemfontein, Free State (Line 4)
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 6 to Collector Substation B, near Dealesville, Bloemfontein, Free State (Line 5)
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 8 to Collector Substation B, near Dealesville, Bloemfontein, Free State (Line 6)
OPL	275 kV	Unknown	The proposed overhead powerlines up to 275kV in capacity from the Springhaas Solar Facility 9 to Collector Substation A, near Dealesville, Bloemfontein, Free State (Line 7)
LiLo	400 kV	Unknown	The proposed LiLo Connection of up to 400kV in capacity from Springhaas Collector Substation A to Beta/ Hydra 400kV overhead line, near Dealesville, Bloemfontein, Free State (LiLo 1)
LiLo	400 kV	Unknown	The proposed LiLo Connection up to 400kV in capacity from the Springhaas Collector Substation B to the existing 400kV Overhead Lines, near Dealesville, Bloemfontein, Free State (LiLo 2)
SS	400 kV	Unknown	The proposed construction and operation of Springhaas Collector Substation A, a Collector/ Switching/ Transformation Substation with a Capacity of up to 400kV and associated infrastructure, near Dealesville, Bloemfontein, Free State (Collector Substation A)
SS	400 kV	Unknown	The proposed construction and operation of Springhaas Collector Substation B, a Collector/ Switching/ Transformation Substation with a Capacity of up to 400kV and associated infrastructure, near Dealesville, Bloemfontein, Free State (Collector Substation B)
OPL	132 – 400kV	Unknown	BA for the proposed 132kV_400kV on-site MTS and associated infrastructure, near Dealesville, FS
OPL	132kV	Approved	EGI to be shared by VOLTA PV (this applicant) and IBVogt Ngonyama Marula

Technology	MW/ kV	Status	Project Title
SS	132 kV	Approved	132kV Harvard Southdrift
OPL; SS	400 kV	Unknown	Eskom Kimberley Strengthening Phase 4: Beta to Boundary Project

Industrial infrastructure in the region is very prominent and consists of the Perseus substation (located 2 km northeast of the proposed sites) and an extensive network of high voltage powerlines that congregate at the substation. These include:

- Hydra/Perseus 2 400kV Overhead Line
- Hydra/Perseus 3 400kV Overhead Line
- Leander/Perseus 1 400kV Overhead Line
- Perseus/Theseus 1 400kV Overhead Line
- Beta/Perseus 2 400kV Overhead Line
- Beta/Perseus 3 400kV Overhead Line
- Grootvlei/Perseus 1 400kV Overhead Line
- Perseus/Harvard 1 275kV Overhead Line
- Perseus/Harvard 2 275kV Overhead Line
- Everest/Perseus 1 275kV Overhead Line
- Perseus/Boundary 1 275kV Overhead Line
- Perseus/Boundary 2 275kV Overhead Line
- Hydra/Perseus 1 765kV Overhead Line
- Alpha/Beta 2 765kV Overhead Line
- Alpha/Beta 1 765kV Overhead Line
- Mercury/Perseus 1 765kV Overhead Line
- Beta/Perseus 1 765kV Overhead Line
- Gamma/Perseus 1 765kV Overhead Line

Table D.3. Proposed VOLTA PV Developments and EGI

TECHNOLOGY	MW	STATUS	PROJECT TITLE
PV	175	BA in Progress	Basic Assessment for the proposed development of the 290 MW VOLTA Solar Photovoltaic (PV) Facility (i.e., VOLTA PV Facility), Battery Energy Storage System (BESS) and associated infrastructure, near Dealesville, Free State.
EGI	132kV	BA in Progress	Basic Assessment for the proposed development of a 132 kV Overhead and Underground Power line and associated EGI (i.e., VOLTA EGI) from the VOLTA PV Facility to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State

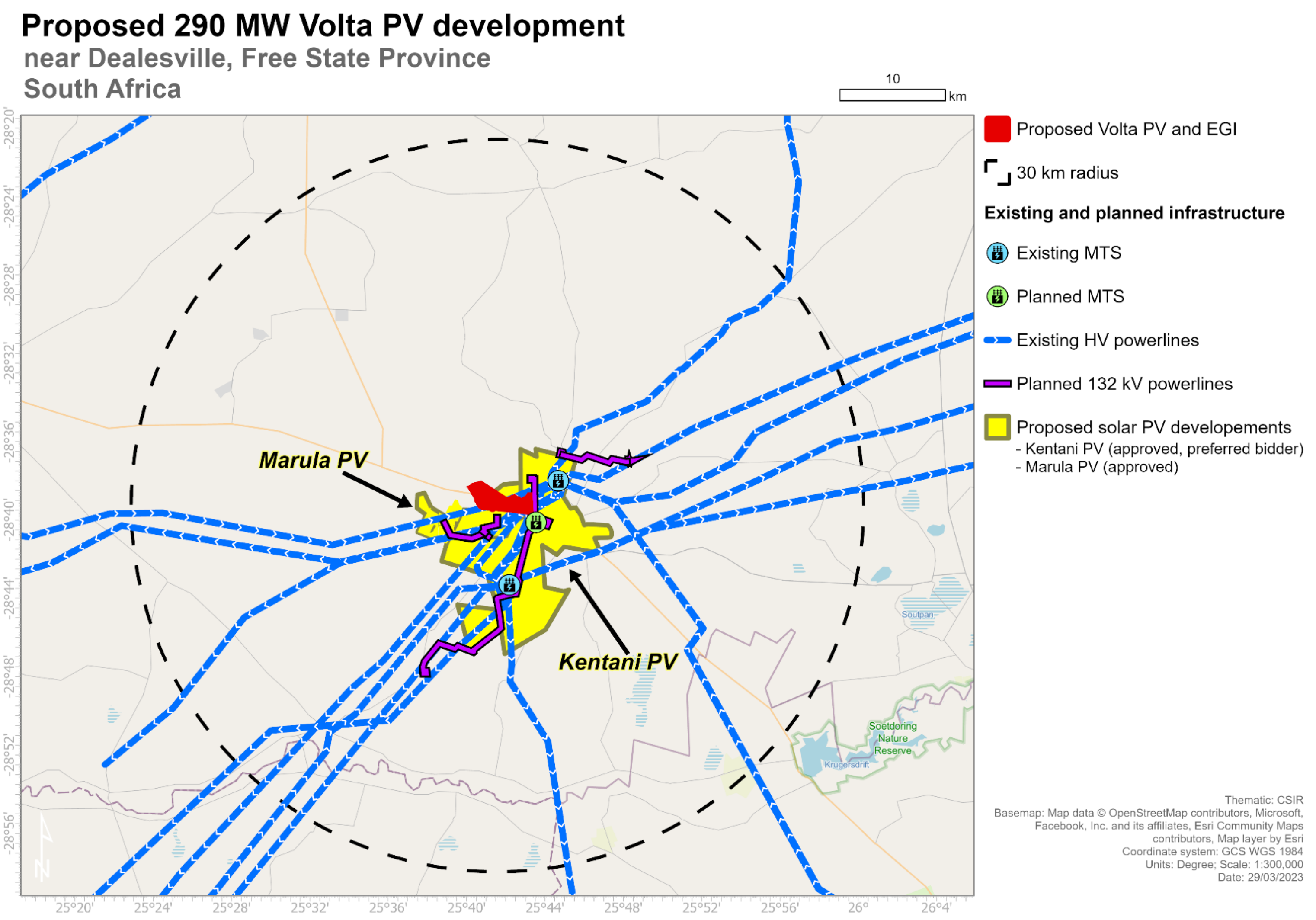

Figure D.1. Projects within the 30 km radius considered for the Cumulative Impact Assessment

In addition to the above, the impact assessment methodology includes the following aspects:

Nature of impact/risk - The type of effect that a proposed activity will have on the environment.

Status - Whether the impact/risk on the overall environment will be:
- Positive - environment overall will benefit from the impact/risk;
- Negative - environment overall will be adversely affected by the impact/risk; or
- Neutral - environment overall not be affected.

Spatial extent – The size of the area that will be affected by the impact/risk:
- Site specific;
- Local (<10 km from site);
- Regional (<100 km of site);
- National; or
- International (e.g., Greenhouse Gas emissions or migrant birds).

Duration – The timeframe during which the impact/risk will be experienced:
- Very short term (instantaneous);
- Short term (less than 1 year);
- Medium term (1 to 10 years);
- Long term (the impact will cease after the operational life of the activity (i.e., the impact or risk will occur for the project duration)); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e., the impact will occur beyond the project decommissioning)).

Consequence – The anticipated consequence of the risk/impact:
- Extreme (extreme alteration of natural systems, patterns or processes, i.e., where environmental functions and processes are altered such that they permanently cease);
- Severe (severe alteration of natural systems, patterns or processes, i.e., where environmental functions and processes are altered such that they temporarily or permanently cease);
- Substantial (substantial alteration of natural systems, patterns or processes, i.e., where environmental functions and processes are altered such that they temporarily or permanently cease);
- Moderate (notable alteration of natural systems, patterns or processes, i.e., where the environment continues to function but in a modified manner); or
- Slight (negligible alteration of natural systems, patterns or processes, i.e., where no natural systems/environmental functions, patterns, or processes are affected).

Reversibility of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):
- High reversibility of impacts (impact is highly reversible at end of project life i.e., this is the most favourable assessment for the environment);
- Moderate reversibility of impacts;
- Low reversibility of impacts; or
- Impacts are non-reversible (impact is permanent, i.e., this is the least favourable assessment for the environment).

Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):

- High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e., this is the least favourable assessment for the environment);
- Moderate irreplaceability of resources;
- Low irreplaceability of resources; or
- Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e., this is the most favourable assessment for the environment).

Using the criteria above, the impacts are further assessed in terms of the following:

Probability – The probability of the impact/risk occurring:

- Extremely unlikely (little to no chance of occurring);
- Very unlikely (<30% chance of occurring);
- Unlikely (30-50% chance of occurring)
- Likely (51 – 90% chance of occurring); or
- Very Likely (>90% chance of occurring regardless of prevention measures).

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure D.2). This approach incorporates internationally recognised methods from the Intergovernmental Panel on Climate Change (IPCC) (2014) assessment of the effects of climate change and is based on an interpretation of existing information in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the municipal capacity, a sensitive wetland), qualitatively (very low, low, moderate, high, and very high) against a predefined set of criteria (i.e. probability and consequence):

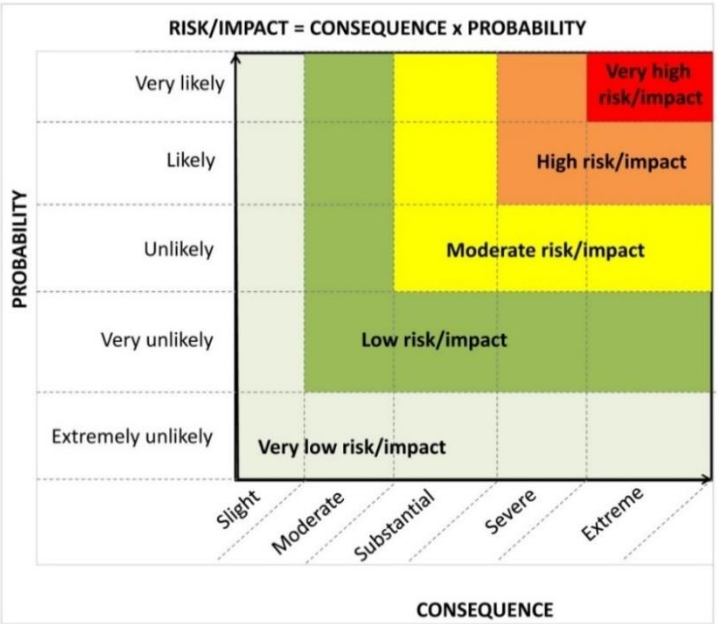

Figure D.2. Guide to assessing risk/impact significance as a result of consequence and probability

Significance – Will the impact cause a notable alteration of the environment?

- Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
- Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);
- Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);
- High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and
- Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).

With the implementation of mitigation measures, the residual impacts/risks will be ranked as follows in terms of significance (based on Figure D.2):

- Very low = 5;
- Low = 4;
- Moderate = 3;
- High = 2; and
- Very high = 1.

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- Low;
- Medium; or
- High.

Impacts have been collated into the EMPr (Appendix G - K of the BA Report) and these include the following:

- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements (as applicable). This includes a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.
- Identifying negative impacts and prescribing mitigation measures to avoid or reduce negative impacts. Where no mitigatory measures are possible this is stated.
- Positive impacts and augmentation measures have been identified to potentially enhance positive impacts where possible.

Other aspects to be taken into consideration in the assessment of impact significance are:

- Impacts are evaluated for the construction and operational phases of the development. The assessment of impacts for the decommissioning phase is brief, as there is limited understanding at this stage of what this might entail. The relevant rehabilitation guidelines and legal requirements applicable at the time will need to be applied;

- Impacts have been evaluated with and without mitigation in order to determine the effectiveness of mitigation measures on reducing the significance of a particular impact;
- The impact evaluation has, where possible, taken into consideration the cumulative effects associated with this and other facilities/projects which are either developed or in the process of being developed in the local area; and
- The impact assessment attempts to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are used as a measure of the level of impact.

D.2 Assessment of Environmental Risks and Impacts

The issues and impacts presented in this Section have been identified via the environmental *status quo* of the receiving environment (environmental, social and heritage features present on site - as discussed in Section B of this BA Report) and input from specialists that form part of the project team. The impact assessments of the specialist studies undertaken to inform this BA have been summarised in this section. It should be noted that unless otherwise stated, impacts identified and their associated significance are deemed to be negative.

Refer to Appendix C of this report for the full specialist studies undertaken (including the Terms of Reference for each study). All proposed mitigation measures, as relevant, have been carried over into the EMPr, included in Appendix G of this report.

D.2.1 Agriculture

The Agriculture Compliance Statement was undertaken by Johann Lanz to inform the outcome of this BA from an agricultural and soils perspective. The complete Agriculture Compliance Statement is included in Appendix C.1 and C.2 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Agriculture Compliance Statement. The information below is extracted from Lanz (2023).

D.2.1.1 Approach and Methodology

An Agricultural Compliance Statement for both the VOLTA PV and BESS project and the VOLTA EGI project was required and undertaken in terms of the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more*, gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998). As per the requirement of the Protocol in GN 320, the assessment was based on a desktop analysis of existing soil and agricultural potential data for the site. Various information and desktop sources of information were used.

D.2.1.2 Relevant Project Aspects relating to Agricultural Impacts

For agricultural impacts, the exact nature of the different infrastructure within a development has very little bearing on the significance of impacts. What is of most relevance is simply the occupation of the land and whether it is being occupied by a solar panel, a road, a building or a substation makes no difference. What is of most relevance and addressed in this assessment, therefore, is simply the total footprint of the facility that excludes agricultural land use or impacts agricultural land.

D.2.1.3 Potential Impacts for VOLTA PV and BESS

Two direct mechanisms have been identified that lead to decreased agricultural potential for the VOLTA PV and BESS project by:

- **Occupation of land** - Agricultural land directly occupied by the development infrastructure will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime.
- **Soil erosion and degradation –** Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Soil erosion and loss of topsoil are completely preventable. The stormwater management that will be an inherent part of the engineering on site and standard, best-practice erosion control and topsoil management measures recommended and included in the Environmental Management Programme (EMPr), are likely to be effective in preventing soil erosion and loss of topsoil.

Two indirect mechanisms have been identified that could lead to increased agricultural potential through:

- **Increased financial security for farming operations –** Reliable and predictable income will be generated by the farming enterprises through the lease of the land to the energy facilities. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.
- **Improved security against stock theft and other crime** due to the presence of security infrastructure and security personnel at the energy facility.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

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

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

The cumulative impact assessment has considered all renewable energy projects within a 30 km radius. All of these projects have the same agricultural impacts in an almost identical agricultural environment, and therefore the same mitigation measures apply to all.

In quantifying the cumulative impact, the area of land taken out of grazing as a result of all the projects (total generation capacity of 4990 MW) will amount to a total of approximately 12,475 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30 km radius (approximately 282,700 ha), this amounts to 4.41% of the surface area. That is within an acceptable limit in terms of loss of land which is only suitable for grazing, and of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

In order for South Africa to develop the renewable energy generation that it urgently needs, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of lower potential agricultural land in a region which has been designated as a REDZ, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country.

In terms of the loss of agricultural land to renewable energy, it should also be noted that renewable energy development can only be located in fairly close proximity to a substation that has available capacity. This effectively protects most agricultural land in the country from renewable energy development because only a small proportion of the country's total land surface is located in close enough proximity to an available substation to be viable for renewable energy development.

As discussed above, the risk of a loss of agricultural potential by soil degradation can effectively be mitigated for renewable energy developments and therefore does not pose a cumulative risk.

Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential is assessed as low. It will not have an unacceptable negative impact on the agricultural production capability of the area and it is therefore recommended that the development be approved.

D.2.1.4 Concluding Statement

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.

Nevertheless, it is hereby confirmed that the agricultural impact of the proposed PV development is assessed as being of low significance, predominantly because of the lack of crop production potential of the site, and the impact is therefore acceptable.

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

D.2.1.5 Potential Impacts for VOLTA EGI

The proposed overhead and underground powerline has negligible agricultural impact, regardless of its route and design and the agricultural potential of the land it traverses. All agricultural activities can continue completely unhindered underneath or above the powerline. This is because its direct, permanent, physical footprint that has any potential to interfere with agriculture (pylon bases and servitude track, where it is needed), is insignificantly small and the pylons can mostly be located outside of or on the edges of cropland where they minimise interference with crop production. There will therefore be negligible reduction in future agricultural production potential underneath the powerline. The only potential source of impact of the powerline 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 generic DFFE EMPr.

The only impact of this development is therefore the loss of approximately 8.2 hectares 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 fairly small and the land is of insufficient land capability for crop production. The significance of the agricultural impact is therefore assessed as low.

The potential cumulative agricultural impact of importance is a regional loss of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

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

Because this grid connection itself leads to a very small loss of production potential, its cumulative impact is low. 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. Many times more electricity grid infrastructure than currently exists, or is currently proposed, can be accommodated before acceptable levels of change in terms of loss of production potential are exceeded. In reality the landscape in this environment could be covered with powerlines and agricultural production potential would be minimally affected.

Due to the considerations discussed above, the cumulative impact of loss of future agricultural production potential can confidently be assessed as being low and therefore having an acceptable impact on the area. In terms of cumulative impact, the proposed development is therefore acceptable and it is therefore recommended that it be approved.

The conclusion of the Agriculture Assessment for the VOLTA EGI is that the proposed development will have low agricultural impact and will therefore be acceptable in terms of its impact on the agricultural production capability of the site.

The powerline has insignificant agricultural impact because all agricultural activities that are viable in this environment, can continue completely unhindered underneath the powerline and there will therefore be negligible loss of agricultural production potential underneath it. The only potential source of impact from the powerline 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 DFFE Generic EMPr. The impact of the substations is a loss of approximately 8.2 hectares of agricultural land. The amount of land loss is fairly small and the land is of insufficient land capability for crop production. The significance of the agricultural impact is therefore assessed as low.

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 generic mitigation.

D.2.2 Visual Impact Assessment

The Visual Impact Assessment was undertaken by Lourens du Plessis and Bryony van Niekerk to inform the outcome of this BA from a visual perspective. The complete Visual Impact Assessment is included in Appendix C.3 and C.4 of this report. The following section provides a summary of the

Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Visual Impact Assessment. The information below is extracted from du Plessis and van Niekerk (2023).

D.2.2.1 Approach and Methodology

The methodology of the Visual Impact Assessment involved a number of standard procedures including those in the "Guideline for Involving Visual and Aesthetic Specialists" (Oberholzer,2005).

Various base data was used in the assessment.

D.2.2.2 Relevant Project Aspects relating to Visual Impacts for VOLTA PV and BESS

Facilities of the proposed project that could have visual implications are listed below:

- SEF project area;
- Solar PV arrays;
- Offices;
- Operations and maintenance control centre;
- Warehouse/workshop;
- Ablution facilities;
- Converter/inverter stations;
- On-site substation and/or switching station;
- BESS;
- Guard house;
- Internal power lines;
- Internal service roads;
- Access roads;
- Water storage tanks;
- Security fencing;
- Security Lighting; and
- Construction phase laydown area.

D.2.2.3 Potential Impacts

The potential visual impacts resulting from the proposed VOLTA PV and BESS project on landscape features and receptors are listed below for each of the project phases, including cumulative impacts.

Direct Impacts

Construction Phase:
- Impact 1: Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed facility and ancillary infrastructure.

Operational Phase:
- Impact 1: Potential visual impact on sensitive visual receptors located within a 1km radius of the PV facility.
- Impact 2: Potential visual impact on sensitive visual receptors within a 1 – 3km radius
- Impact 3: Potential visual impact on sensitive visual receptors within a 3 – 6km radius

- Impact 4: Potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the proposed facility.
- Impact 5: Potential visual impact of solar glint and glare as a visual distraction and possible air/road travel hazard.
- Impact 6: Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity to the PV facility.

Decommissioning Phase:

- Impact 1: increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in closer proximity (< 1 km) to the decommissioning activities.

Cumulative Impacts:

- Impact 1: The potential cumulative visual impact of the facility on the visual quality of the landscape.

Indirect Impacts:

- Impact 1: The potential visual impact of the proposed facility on the sense of place of the region during operational lifespan.

D.2.2.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts and indirect** impacts identified for the **VOLTA PV and BESS** facility for the construction, operational and decommissioning phases.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1 for the construction phase	*Status*	**Negative**	**High (Level 2)**	▪ Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible. ▪ Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. ▪ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ▪ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. ▪ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). ▪ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ▪ Rehabilitate all disturbed areas (if present/if required) immediately after the completion of construction works.	**Moderate (Level 3)**	**High**
	Spatial Extent	**Local**				
	Duration	**Short Term**				
	Consequence	**Moderate**				
	Probability	**Definite**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
DIRECT IMPACTS - OPERATIONAL PHASE						
Impact 1 for the operational phase	*Status*	**Negative**	**High (Level 2)**	Maintain the general appearance of the facility as a whole	**Moderate (Level 3)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Definite**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
Impact	*Status*	**Negative**	**Moderate**		**Low**	

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
2 and Impact 3 for the operational phase	*Spatial Extent*	**Local**	**(Level 3)**		**(Level 4)**	
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Definite**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
Impact 4 for the operational phase	*Status*	**Negative**	**High (Level 2)**	▪ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). ▪ Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights. ▪ Make use of minimum lumen or wattage in fixtures. ▪ Make use of down-lighters, or shielded fixtures. ▪ Make use of Low Pressure Sodium lighting or other types of low impact lighting. ▪ Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.	**Moderate (Level 3)**	**Medium**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Highly probable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
Impact 5 and Impact 6 for the operational phase	*Status*	**Negative**	**Moderate (Level 3)**	▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint. ▪ Use anti-reflective panels and dull polishing on structures, where possible and industry standard. ▪ If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible.	**Low (Level 4)**	**Medium**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Probable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Impact 1 for the decommissioning phase	*Status*	**Negative**	**High (Level 2)**	▪ Remove infrastructure not required for the post-decommissioning use of the site. ▪ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ▪ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.	**Moderate (Level 3)**	**Medium**
	Spatial Extent	**Local**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Definite**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Reversibility	**High**				
	Irreplaceability	**Low**				

The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** facility and associated infrastructure for the construction, operational and decommissioning phases.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
INDIRECT IMPACTS						
Indirect Impact 1	*Status*	**Negative**	**Low risk (Level 4)**	▪ Maintain the general appearance of the facility as a whole.	**Low risk (Level 4)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Improbable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
CUMULATIVE IMPACTS - OPERATIONS						
Cumulative Impact 1	*Status*	**Negative**	**Low risk (Level 4)**	▪ Maintain the general appearance of the facility as a whole.	**Moderate risk (Level 3)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

D.2.2.5 Concluding Statement for VOLTA PV and BESS

The findings of the Visual Impact Assessment undertaken for the proposed VOLTA PV Facility and BESS is that the visual environment surrounding the site, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility, may be visually impacted during the anticipated operational lifespan of the facility (i.e., a minimum of 20 years).

The anticipated visual impacts listed above (i.e., post mitigation impacts) range from moderate to low significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed facility.

Considering all factors, it is recommended that the development of the facility as proposed be supported; subject to the implementation of the recommended mitigation measures.

D.2.2.6 Potential impacts relating to Visual Impacts for VOLTA EGI

The potential visual impacts resulting from the proposed VOLTA EGI project on landscape features and receptors are listed below for each of the project phases, including cumulative impacts. Note that the Visual Impact Assessment indicated that underground cables would somewhat reduce the visual impact.

Direct Impacts

Construction Phase:

- Impact 1: Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed infrastructure

Operational Phase:

- Impact 1: Potential visual impact on sensitive visual receptors located within a 0.5 km radius of the grid connection infrastructure.
- Impact 2: Potential visual impact on sensitive visual receptors within a 0.5 – 1.5 km radius
- Impact 3: Potential visual impact on sensitive visual receptors within a 1.5 – 3km radius

Decommissioning Phase:

- Impact 1: increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in closer proximity (< 0.5 km) to the decommissioning activities.

Cumulative Impacts:

- Impact 1: The potential impact on the sense of place of the region.

D.2.2.7 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA EGI** facility for the construction, operational and decommissioning phases.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
				DIRECT IMPACTS - CONSTRUCTION PHASE		
Impact 1 for the construction phase	*Status* *Spatial Extent* *Duration* *Consequence* *Probability* *Reversibility* *Irreplaceability*	**Negative** **Local** **Short Term** **Moderate** **Definite** **High** **Low**	**High (Level 2)**	▪ Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible. ▪ Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. ▪ Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. ▪ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. ▪ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). ▪ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ▪ Rehabilitate all disturbed areas (if present/if required) immediately	**Moderate (Level 3)**	**High**
				DIRECT IMPACTS - OPERATIONAL PHASE		
Impact 1 for the operational phase	*Status* *Spatial Extent* *Duration* *Consequence* *Probability* *Reversibility* *Irreplaceability*	**Negative** **Local** **Long Term** **Moderate** **Improbable** **High** **Low**	**Moderate (Level 3)**	▪ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ▪ Consult adjacent landowners (if present) in order to inform them of the development and to identify any (valid) visual impact concerns. ▪ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.	**Moderate (Level 3)**	**High**
Impact 2 ,	*Status* *Spatial Extent*	**Negative** **Local**	**Low (Level 4)**	▪ Maintain the general appearance of the facility as a whole.	**Low (Level 4)**	

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
Impact 3 and Impact 4 for the operational phase	*Duration*	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Improbable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Probable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Impact 1 for the decommissioning phase	*Status*	**Negative**	**High (Level 2)**	▪ Remove infrastructure not required for the post-decommissioning use of the site. ▪ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ▪ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.	**Moderate (Level 3)**	**Medium**
	Spatial Extent	**Local**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Definite**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
CUMULATIVE IMPACTS						
Cumulative Impact 1	*Status*	**Negative**	**Low (Level 4)**	▪ Maintain the general appearance of the facility as a whole.	**Moderate (Level 3)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long term**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Consequence	**Moderate**				
	Probability	**Improbable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
INDIRECT IMPACTS						
Indirect Impact 1	*Status*	**Negative**	**Low (Level 4)**	▪ Maintain the general appearance of the facility as a whole.	**Low (Level 4)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Improbable**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

D.2.2.8 Concluding Statement for VOLTA EGI

The findings of the Visual Impact Assessment undertaken for the proposed grid connection infrastructure is that the visual environment surrounding the site, especially within a 0.5 km radius (and potentially up to a radius of 1.5 km) of the proposed infrastructure, may be visually impacted during the anticipated operational lifespan of the grid connection infrastructure.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from moderate to low significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed infrastructure are not considered to be fatal flaws.

D.2.3 Heritage Impact Assessment (Archaeology and Cultural Landscape)

The Heritage Impact Assessment was undertaken by Jaco van der Walt to inform the outcome of this BA from an archaeology and cultural landscape perspective. The complete Heritage Impact Assessment is included in Appendix C.5 and C.6 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Heritage Impact Assessment. The information below is extracted from Van der Walt (2023).

D.2.3.1 Approach and Methodology

A Heritage Impact Assessment is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. The Heritage Impact Assessment aims to fulfill the requirements of the heritage authorities such that a comment can be issued by them for consideration by the DFFE. The Heritage Impact Assessment outlines any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted. The methodology of the Heritage Impact Assessment involved a literature review, field survey, impact assessment and grading of the sites found on site.

D.2.3.2 Relevant Project Aspects relating to Heritage Impacts

All aspects of the proposed development are relevant since excavations for foundations may impact on archaeological and/or palaeontological remains, while the above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

D.2.3.3 Potential Impacts for the VOLTA PV and BESS project

The potential impacts identified during the Heritage Impact Assessment include:

Construction Phase

- Impact assessment of the Project on isolated Stone Age scatters (VT01 and VT12).

Operational Phase

- Potential visual impacts to the cultural landscape and sense of place – see Visual Impact Assessment

Decommissioning Phase

- Potential impacts to the cultural landscape

Cumulative impacts

- Potential impacts to heritage resources

No indirect impacts are anticipated for the Heritage Impact Assessment.

D.2.3.4 Impact Assessment

The impact assessments for both projects are the same. The assessments for palaeontology are provided in the following section. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** for the construction, operational and decommissioning phases.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Potential impacts to archaeological and cultural resources	*Status*	**Negative**	**Low (Level 4)**	▪ The Stone Age Scatters are isolated, out of context and scattered too sparsely to be of significance apart from mentioning them in this report. No additional preconstruction mitigation is required for this aspect.	**Low (Level 4)**	**High**
	Spatial Extent	**Site specific**				
	Duration	**Permanent**				
	Consequence	**Moderate**				
	Probability	**Probable**				
	Reversibility	**Non-reversible**				
	Irreplaceability	**High**				
DIRECT IMPACTS - OPERATIONAL PHASE						
Potential impacts to the cultural landscape	*Status*	▪ See Visual Impact Assessment.				
	Spatial Extent					
	Duration					
	Consequence					
	Probability					
	Reversibility					
	Irreplaceability					
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Potential impacts to the cultural landscape	*Status*	**Negative**	**Low (Level 4)**	▪ Employ best practice. ▪ Minimise the disturbance footprint. ▪ Employ dust suppression measures. ▪ Ensure effective rehabilitation of all areas.	**Low (Level 4)**	**Medium**
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Reversibility	**Non-reversible**				
	Irreplaceability	**High**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS – CONSTRUCTION; OPERATIONAL AND DECOMMISSIONING PHASES						
Cumulative impacts to all heritage resources	*Status*	**Negative**	**Low (Level 4)**	▪ Pre-construction archaeological surveys with sampling as needed. ▪ Minimise areas disturbed. ▪ Minimise light pollution and signage. ▪ Effective rehabilitation	**Low (Level 4)**	**High**
	Spatial Extent	**Regional**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Reversible**				
	Irreplaceability	**High**				

D.2.3.5 Concluding Statement for VOLTA PV and BESS

Based on the current lay out the low-density background Stone Age scatters at VT01 and VT12 will be directly affected by the PV development. These isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report and the impact on the occurrences is low.

No adverse impact to heritage resources is expected from the Project and it is recommended that the Project can commence on the condition that the recommendations from the HIA are implemented as part of the EMPr and based on approval from SAHRA.

D.2.3.6 Potential Impacts for the VOLTA EGI project

The potential impacts identified during the Heritage Impact Assessment (Appendix C.5) include for both the overhead and underground powerlines:

Construction Phase

- Impact assessment of the project on isolated Stone Age scatters and various stone, brick and cement features in this area. Not very old cement. This is also the southern end of the tree-lined avenue. It is only the avenue that is significant.

Operational Phase

- Potential visual impacts to the cultural landscape and sense of place – see Visual Impact Assessment

Decommissioning Phase

- Potential impacts to the cultural landscape

Cumulative impacts

- Potential impacts to heritage resources

No indirect impacts are anticipated for the Heritage Impact Assessment.

The impact assessments for both projects are the same. The assessments for palaeontology are provided in the following section. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA EGI** overhead and underground for the construction, operational and decommissioning phases.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - CONSTRUCTION PHASE						
Potential impacts to archaeological and cultural resources	*Status*	**Negative**	**Low (Level 4)**	▪ The Stone Age Scatters are isolated, out of context and scattered too sparsely to be of significance apart from mentioning them in this report. No additional preconstruction mitigation is required for this aspect.	**Low (Level 4)**	**High**
	Spatial Extent	**Site specific**				
	Duration	**Permanent**				
	Consequence	**Moderate**				
	Probability	**Probable**				
	Reversibility	**Non-reversible**				
	Irreplaceability	**High**				
DIRECT IMPACTS - OPERATIONAL PHASE						
Potential impacts to the cultural landscape	*Status*	▪ See Visual Impact Assessment.				
	Spatial Extent					
	Duration					
	Consequence					
	Probability					
	Reversibility					
	Irreplaceability					
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Potential impacts to the cultural landscape	*Status*	**Negative**	**Low (Level 4)**	▪ Employ best practice. ▪ Minimise the disturbance footprint. ▪ Employ dust suppression measures. ▪ Ensure effective rehabilitation of all areas.	**Low (Level 4)**	**Medium**
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Non-**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
		reversible				
	Irreplaceability	**High**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS – CONSTRUCTION; OPERATIONAL AND DECOMMISSIONING PHASES						
Cumulative impacts to all heritage resources	*Status*	**Negative**	**Low (Level 4)**	▪ Pre-construction archaeological surveys with sampling as needed. ▪ Minimise areas disturbed. ▪ Minimise light pollution and signage. ▪ Effective rehabilitation	**Low (Level 4)**	**High**
	Spatial Extent	**Regional**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Reversible**				
	Irreplaceability	**High**				

D.2.3.7 Concluding Statement

Based on the current lay out the low-density background 871 Tree Lined Avenue that is located within the EGI was rated as being of medium significance. Orton recommended avoidance of the feature. And including avoidance of VT016 that will be directly affected by the EGI development. These isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report. Furthermore, based on the work done by Sampson (1986) the impacts by powerlines on Stone Age artefacts is limited and the impact on these occurrences is therefore low.

No adverse impact to heritage resources is expected by the Project and it is recommended that the Project can commence on the condition that the recommendations in the HIA are implemented as part of the EMPr and based on approval from SAHRA.

D.2.4 Palaeontology Impact Assessment

The Palaeontology Impact Assessment was undertaken by Prof Marion Bamford to inform the outcome of this BA from a palaeontological perspective. The complete Palaeontology Impact Assessment is included in Appendix C.7 and C.8 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Palaeontology Impact Assessment. The information below is extracted from Almond (2023) (Appendix C.7 and C.8 of the BA Report).

D.2.4.1 Approach and Methodology

The approach to this palaeontological heritage study can be briefly summarized as follows. Fossil bearing rock units occurring within the broader study area (including all relevant land parcels) were determined from geological maps and relevant geological sheet explanations as well as satellite images. Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer or other responsible person, once excavations for poles, foundations and amenities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

D.2.4.2 Relevant Project Aspects relating to Palaeontological Impacts

All aspects of the proposed development are relevant since excavations for foundations may impact on archaeological and/or palaeontological remains.

D.2.4.3 Potential Impacts for VOLTA PV and BESS

The key impacts on local palaeontological heritage resources considered are direct and relate to the potential disturbance, damage, destruction or sealing-in of scientifically important and legally-protected fossils preserved at or beneath the surface of the ground due to construction phase excavations (e.g. PV module footings, building foundations, underground cables, storm water channels), and ground clearance (e.g. access roads, solar arrays).

The impacts identified only apply to the construction phase of the proposed developments since further significant impacts on fossil heritage during the planning, operational and decommissioning phases of the facilities are not anticipated.

It should be noted that, should the recommended mitigation measures for the construction phase of the solar PV development be fully and consistently implemented, the impact significance would remain very low but would entail both *positive* and negative impacts. Residual negative impacts from inevitable loss of some fossil heritage would be partially offset by an improved palaeontological database for the study region as a direct result of appropriate mitigation. This is a positive outcome because any new, well-recorded and suitably curated fossil material from this palaeontologically little-known region would constitute a useful addition to our scientific understanding of South African fossil heritage. Since each site is unique as far as the palaeontology is concerned, there will be no cumulative impact from the other energy projects in the area. The rocks within a 30 km radius of the VOLTA site are the same and there are no very highly sensitive rocks in this region.

Construction Phase

- Disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance.

No indirect impacts were identified for the Palaeontology Impact Assessment.

D.2.4.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** for the construction phase.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance	*Status*	**Negative**	**Low (Level 4)**	▪ Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the Environmental Control Officer (ECO) on an on-going basis during the construction phase. ▪ Remove any fossils found when excavations commence Professional mitigation, involving the recording and judicious sampling of fossil material together with pertinent field data (stratigraphy, taphonomy), should conform to best practice. Fossil material collected must be curated within an approved repository (university or museum collection). ▪ Refer to and implement the general protocol for Chance Fossil Finds which is appended to the Palaeontology Impact Assessment Report (Appendix C.8 of the BA Report).	**Very Low (Level 5)**	**High**
	Spatial Extent	**Site specific**				
	Duration	**Permanent**				
	Consequence	**Slight**				
	Probability	**Very likely**				
	Reversibility	**Non-reversible**				
	Irreplaceability	**Low**				

D.2.4.5 Concluding Statement for VOLTA PV and BESS

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer or other responsible person, once excavations for poles, foundations and amenities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low pre-mitigation and very low post-mitigation (removal of fossils if they are found in the footprint), so as far as the palaeontology is concerned, the project should be authorised.

There will be no cumulative impact from other projects – because each site is unique and independent. In addition, the 30km radius is also on highly sensitive or moderately sensitive rocks. There is no no-go area.

D.2.4.6 Potential Impacts for VOLTA EGI

The key impacts on local palaeontological heritage resources considered are direct and relate to the potential disturbance, damage, destruction or sealing-in of scientifically important and legally-protected fossils preserved at or beneath the surface of the ground due to construction phase excavations (e.g., building foundations, underground cables,).

The impacts identified only apply to the construction phase of the proposed developments since further significant impacts on fossil heritage during the planning, operational and decommissioning phases of the facilities are not anticipated.

It should be noted that, should the recommended mitigation measures for the construction phase of the EGI development be fully and consistently implemented, the impact significance would remain very low but would entail both *positive* and negative impacts. Residual negative impacts from inevitable loss of some fossil heritage would be partially offset by an improved palaeontological database for the study region as a direct result of appropriate mitigation. This is a positive outcome because any new, well-recorded and suitably curated fossil material from this palaeontologically little-known region would constitute a useful addition to our scientific understanding of South African fossil heritage. Since each site is unique as far as the palaeontology is concerned, there will be no cumulative impact from the other energy projects in the area. The rocks within a 30 km radius of the VOLTA site are the same and there are no very highly sensitive rocks in this region.

Construction Phase

- Disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance.

No indirect impacts were identified for the Palaeontology Impact Assessment.

D.2.4.7 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA EGI** for the construction phase.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Disturbance, damage or destruction of fossils within the development footprint due to excavations and surface clearance	*Status*	**Negative**	**Low (Level 4)**	▪ Monitoring for fossil material of all major surface clearance and deeper (>1m) excavations by the Environmental Control Officer (ECO) on an on-going basis during the construction phase. ▪ Remove any fossils found when excavations commence Professional mitigation, involving the recording and judicious sampling of fossil material together with pertinent field data (stratigraphy, taphonomy), should conform to best practice. Fossil material collected must be curated within an approved repository (university or museum collection). ▪ Refer to and implement the general protocol for Chance Fossil Finds which is appended to the Palaeontology Impact Assessment Report (Appendix C.7 of the BA Report).	**Very Low (Level 5)**	**High**

D.2.4.8 Concluding Statement for VOLTA EGI

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying sands and alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer or other responsible person, once excavations for poles, foundations and amenities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low pre-mitigation and very low post-mitigation (removal of fossils if they are found in the footprint), so as far as the palaeontology is concerned, the project should be authorised.

There will be no cumulative impact from other projects – because each site is unique and independent. In addition, the 30km radius is also on highly sensitive or moderately sensitive rocks.
There is no no-go area.

D.2.5 Terrestrial Biodiversity and Species

The Terrestrial Biodiversity and Species Assessment was undertaken by Corné Niemandt. The complete Terrestrial Biodiversity and Species Assessment is included in Appendix C.9 and C.10 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Terrestrial Biodiversity and Species Assessment. The information below is extracted from Niemandt (2023) (Appendix C.9 and C.10 of the BA Report).

D.2.5.1 Approach and Methodology

The approach and methodology adopted in the Terrestrial Biodiversity and Species Assessment is described in this section.

A biophysical reconnaissance and site evaluation of the assessed area was undertaken 30 January - 1 February 2023. The study also included a literature review of the region to confirm or corroborate findings, as well as to consider the likelihood of specific fauna that may be of conservation value. The literature review utilized various sources including the South African National Biodiversity Institute (SANBI) data and other relevant sources. In addition, recent and historical aerial imagery of the site was also reviewed in order to identify points for investigation during the field survey.

All data collected in the field and during the literature review was evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level, together with specific evaluation of data relating to habitat form and structure. The evaluation also sought to identify any anomalies within the prevailing environment.

The following key approach was used for evaluating the study area on site:

- Identification of the key ecological drivers within the region and determination of their relevance within the site; and
- Identification of habitat forms and structures within site and identification of their ecological significance;

In order to evaluate faunal presence and plant species composition the following actions were undertaken:

- Specific habitat was traversed on foot identifying inter alia evidence of fauna (through spoor, scat or other features) or actual siting of specimens. The presence of such species was noted in relation to the habitat under investigation.

D.2.5.2 Relevant Project Aspects relating to Terrestrial Biodiversity and Species Impacts

The following project related activities are relevant from a terrestrial biodiversity perspective:

For solar PV and BESS
- Clearance or partial clearance of vegetation, where applicable, during the construction phase.
- Establishment of roadways (i.e. access roads leading to the site and internal gravel access roads) and hard panning of surfaces, with minor storm water management aspects being introduced during the construction and operational phases.
- Establishment of modular arrays with concomitant cabling and provision of invertors within the arrays.
- The establishment of a BESS; offices and related infrastructure, as well as a yard for storage and general operations.

For EGI:
- Establishment of step-up transformers and two on-site substations, which will be fenced and isolated from the balance of the site.
- Establishment of underground Powerline
- Placement of pylons for Overhead powerline pylons

D.2.5.3 Potential Impacts for VOLTA PV and BESS

A number of direct and cumulative impacts on the localised and broader ecology of the region can be identified as a consequence of the implementation of the proposed project. Direct impacts are those that are directly attributable to the implementation and operation of the project, while indirect impacts are consequential effects of the proposed project that may not be directly attributable to the development. Cumulative impacts are those externalities that arise from the proposed development and compound existing effects or influences on the ecology of the region. These impacts occur during the construction, operational and decommissioning phases, as relevant, and are listed below.

Construction Phase:

- Potential Impact 1: Loss of habitat and sensitive features;
- Potential Impact 2: Loss of protected species;
- Potential Impact 3: Introduction and spread of alien invasive species
- Potential Impact 4: Increased erosion and soil compaction;
- Potential Impact 5: Littering and General Pollution;

Operational Phase:

- Potential Impact 6: Increase in alien invasive species;

- Potential Impact 7: Loss of species composition and diversity;
- Potential Impact 8: Littering and General Pollution;

Decommissioning Phase:

Such alterations and changes will be dependent upon the expectant post-decommissioning land use and operation cease of the PV Facilities and associated infrastructure. However, abandonment of the site would probably result in:

- Potential Impact 9: Alien invasive species management;
- Potential Impact 10: Loss of habitat;

Cumulative Impacts:

The cumulative impact assessment considers other proposed, approved and existing power lines within the 30 km radius.

Given the above, cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

- Potential Impact 11: Habitat loss and fragmentation.

D.2.5.4 Impact Assessment

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** facility and associated infrastructure for the **construction phase**.

<table>
<tr><th>Impact</th><th colspan="2">Impact Criteria</th><th>Significance and Ranking (Pre-Mitigation)</th><th>Potential mitigation measures</th><th>Significance and Ranking (Post-Mitigation)</th><th>Confidence Level</th></tr>
<tr><td colspan="7">DIRECT IMPACTS - CONSTRUCTION PHASE</td></tr>
<tr><td rowspan="7">Habitat loss and fragmentation</td><td>Status</td><td>Negative</td><td rowspan="7">High (Level 2)</td><td rowspan="7">• No development should take place within High sensitivity areas or buffer zones. Accordingly, the Watercourse habitats should be avoided. The Grassland should be avoided where possible, but with appropriate mitigation and rehabilitation impacts can be reduced.
• No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the high sensitivity areas.
• The topsoil must not be disturbed and heavy machinery must only be utilised to only drill holes for the erection of the PV panels, approximately 3.5m above ground.
• The grassland must not be transformed. Should this happen, a biodiversity offset agreement must be put into place prior to the commencement of development activities.</td><td rowspan="7">Moderate (Level 3)</td><td rowspan="7">Medium</td></tr>
<tr><td>Spatial Extent</td><td>Site specific</td></tr>
<tr><td>Duration</td><td>Long term</td></tr>
<tr><td>Consequence</td><td>Severe</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td>Reversibility</td><td>Low reversibility</td></tr>
<tr><td>Irreplaceability</td><td>Moderate irreplaceability</td></tr>
<tr><td rowspan="7">Loss of species of conservation concern</td><td>Status</td><td>Negative</td><td rowspan="7">Low (Level 4)</td><td rowspan="7">• Avoidance is the best measure. All suitable habitats should be excluded from the proposed development, where relevant.</td><td rowspan="7">Low (Level 4)</td><td rowspan="7">Medium</td></tr>
<tr><td>Spatial Extent</td><td>Site specific</td></tr>
<tr><td>Duration</td><td>Long term</td></tr>
<tr><td>Consequence</td><td>Extreme</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td>Reversibility</td><td>Irreversible</td></tr>
<tr><td>Irreplaceability</td><td>High irreplaceability</td></tr>
<tr><td rowspan="3">Loss of protected species</td><td>Status</td><td>Negative</td><td rowspan="3">Moderate (Level 3)</td><td rowspan="3">Where the approved layout designs impact on individuals, permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature</td><td rowspan="3">Low (Level 4)</td><td rowspan="3">High</td></tr>
<tr><td>Spatial Extent</td><td>Site specific</td></tr>
<tr><td>Duration</td><td>Long term</td></tr>
</table>

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Consequence	**Severe**		Conservation Ordinance 8 of 1969).		
	Probability	**Very Likely**				
	Reversibility	**Irreversible**				
	Irreplaceability	**High irreplaceability**				
Increased alien invasive species	*Status*	**Negative**	**Moderate (Level 3)**	Compile an alien and invasive species control and monitoring plan in terms of NEMBA.	**Moderate (Level 3)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**			**Low (Level 4)**	
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
Increased erosion and soil compaction	*Status*	**Negative**	**Moderate (Level 3)**	• Utilise existing access routes as far as possible. • Confine the movement of vehicles to the access routes to and from the site and to the construction and operation areas. • Do not drive in the natural veld. • Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. • Monitor the entire site for signs of erosion throughout the construction, operational and decommissioning phases of the project. • Refer to Aquatic Report mitigation measures relevant to watercourse crossings and development close to watercourses.	**Low (Level 4)**	Medium
	Spatial Extent	**Site specific**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
Littering and general pollution	*Status*	**Negative**	**Moderate (Level 3)**	• The site camp must not be located in high sensitivity areas and their buffer zones. • Dangerous goods may not be stored within 100 m of a watercourse – refer to the BESS assessment for more details. • Hydrocarbon fuels must be stored in a secure, bunded area. • Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis.	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short to Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate**				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
		reversibility		• Ablution facilities must be located outside sensitive areas and their buffer zones. • Portable ablution facilities must be regularly cleaned and maintained in good working condition. • Any spillage from ablution facilities must be cleaned up immediately and disposed of in an • appropriate manner. • Vehicles must be in good working condition, with no oil, water or fuel leaks. Vehicles must be regularly inspected and any problems corrected. • Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in sensitive areas. • Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.		
	Irreplaceability	**Low irreplaceability**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential direct impacts identified for the **VOLTA PV and BESS** facility and associated infrastructure for the **operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - OPERATIONAL PHASE						
Loss of species composition and diversity	*Status*	**Negative**	**Moderate (Level 3)**	• The loss of species composition and diversity cannot be mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation. • A rehabilitation plan is required to restore each habitat to a natural state that is representative of the respective vegetation type after decommissioning.	**Moderate (Level 3)**	Medium
	Spatial Extent	**Site specific**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Moderate**				

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
		irreplaceability				
Increased alien invasive species	*Status*	**Negative**	**Moderate (Level 3)**	Compile an alien and invasive species control and monitoring plan in terms of NEMBA.	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
Littering and general pollution	*Status*	**Negative**	**Moderate (Level 3)**	• Vehicles must be in good working condition, with no oil, water or fuel leaks. • Vehicles must be regularly inspected and any problems corrected. • Refuelling may only take place in an appropriate, designated bunded area. • Any spillages must be reported immediately and dealt with appropriately. • Spill kits must be available on site in case of accidental spillage. • Sufficient waste disposal bins must be available on site and clearly marked.	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short to Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential direct impacts identified for the **VOLTA PV and BESS** facility and associated infrastructure for the **decommissioning phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DECOMMISSIONING PHASE						
Loss of habitat	*Status*	**Negative**	**Low (Level 4)**	• The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided. • A rehabilitation plan is required to restore each habitat to a natural state after decommissioning.	**Very Low (Level 5)**	Medium
	Spatial Extent	**Site specific**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
Increased alien invasive species	*Status*	**Negative**	**Moderate (Level 3)**	• Compile an alien and invasive species control and monitoring plan in terms of NEMBA.	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
	Irreplaceability	**Low irreplaceability**				

The impact assessments for both projects are the same. The table below includes an assessment of the **cumulative impacts** identified for the **VOLTA PV and BESS** facility and associated infrastructure for the **construction**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - CONSTRUCTION PHASE						
Loss of vegetation	*Status*	**Negative**	**Moderate (Level 3)**	• Transformation is considered low for this vegetation type but increased renewable developments could change this.	**Moderate (Level 3)**	Medium
	Spatial Extent	**Local**				
	Duration	**Permanent**				
	Consequence	**Substantial**				
	Probability	**Very Likely**			**Low (Level 4)**	
	Reversibility	**Low reversibility**				
	Irreplaceability	**Moderate irreplaceability**				

D.2.5.5 Concluding Statement for the VOLTA PV and BESS

The proposed VOLTA PV facility is located in a CBA Irreplicable and threatened ecosystem and vegetation type classified as endangered, namely the Vaal-Vet Sandy Grassland. The Grassland habitat will not be transformed completely, accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact is considered medium for Grassland.

The loss of topsoil and fragmentation of natural habitats that is virtually unavoidable with any type of development, has a negative impact on the regional ecosystem as it disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. The impact of clearing of the vegetation is High Negative. No meaningful mitigation measures are possible, and rehabilitation post-construction and post-operational are required. Accordingly, the grass and herbaceous layer underneath the PV panels will persist during the operational phase, but certain important ecological processes, such as fire, will be excluded which will change the species composition over time (owing to the exclusion of fire as an ecosystem driver) and accordingly the functioning of the system will change over time. For this reason, the seedbank located in the topsoil will need to be protected during the construction period, strips of natural grassland will have to persist between the PV panels in order to create islands for grassland succession, and active rehabilitation post-construction and decommissioning will have to take place to ensure the viability of the ecosystem during the lifetime of the project and after the decommissioning process. Where possible, landowners should convert disturbed areas and transformed agricultural land back to natural grassland through restoration efforts.

The alternative option of not developing this PV project and leaving it up to the landowners to make the decision to transform the land to agricultural land and/or intense grazing, which will not assist in protecting the CBA1 or the threatened ecosystem. Accordingly, the type of activity needs to be considered for this site, **unless conservation in terms of declaring these sites as a nature reserve or similar, it is not feasible to consider no development**. **Considering that the topsoil will not be disturbed and that heavy machinery will be utilised to only drill holes for the erection of the PV panels, approximately 3.5m above ground, the grassland will not be transformed**. An effective rehabilitation and management plan needs to be drafted to ensure the continuous functionality of the grassland system taking the construction phase impacts into account, as well as the possible risk of fires. As the main grass species is *Themeda triandra,* the species is resistant to fire, and grows to about 1.5m. Accordingly, over time, the species will become less dominant due to the absence of fire, but other species including *Eragrostis spp* and *Aristida* spp, along with shade-tolerant forbs will dominate the vegetation layer. As little is known about the impacts of solar panels on vegetation in South Africa, it is unclear whether there would be a significant change to the system, and whether additional rehabilitation efforts and the extent of success will be required post-operational phase of the facility.

Further, with the movement of BESS B1 from CBA to a disturbed area, this further decreases the CBA 1 area that will be impacted by the project. Please see specialist response letter for further details. Appendix C and Appendix D.

D.2.5.6 Potential Impacts for the VOLTA EGI project

These impacts occur during the construction, operational and decommissioning phases, as relevant, for the underground and overhead powerline and are listed below. It is important to note that specialists assessed both options and the below impacts are reflective of the impacts for both options.

Construction Phase:

- Potential Impact 1: Loss of habitat and sensitive features;
- Potential Impact 2: Loss of protected species;
- Potential Impact 3: Introduction and spread of alien invasive species
- Potential Impact 4: Increased erosion and soil compaction;
- Potential Impact 5: Littering and General Pollution;

Operational Phase:

- Potential Impact 6: Increase in alien invasive species;
- Potential Impact 7: Loss of species composition and diversity;
- Potential Impact 8: Littering and General Pollution;

Decommissioning Phase:

Such alterations and changes will be dependent upon the expectant post-decommissioning land use and operation cease of the PV Facilities and associated infrastructure. However, abandonment of the site would probably result in:

- Potential Impact 9: Alien invasive species management;
- Potential Impact 10: Loss of habitat;

Cumulative Impacts:

The cumulative impact assessment considers other proposed, approved and existing power lines within the 30 km radius.

Given the above, cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

- Potential Impact 11: Habitat loss and fragmentation.

D.2.5.7 Impact Assessment

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA EGI** and associated infrastructure for the **construction phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Habitat loss and fragmentation	*Status*	**Negative**	**Moderate (Level 3)**	• Limited development should take place within High sensitivity areas or buffer zones. Accordingly, the Watercourse habitats should be avoided for the placement of pylons and underground cabling. The Grassland should be avoided where possible, but with appropriate mitigation and rehabilitation impacts can be reduced. • No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the high sensitivity areas. • The topsoil and vegetation disturbed for the underground trenches must be replaced and rehabilitated where necessary. • Only the planned placement of powerlines must be disturbed. Vegetation and topsoil removal outside of these areas must be avoided	**Low (Level 4)**	Medium
	Spatial Extent	**Site specific**				
	Duration	**Medium term**				
	Consequence	**Severe**				
	Probability	**Very Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
Loss of species of conservation concern	*Status*	**Negative**	**Low (Level 4)**	• Avoidance is the best measure. All suitable habitats should be excluded from the proposed development, where relevant.	**Low (Level 4)**	High
	Spatial Extent	**Site specific**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Unlikely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
	Status	**Negative**	**Moderate**	Where the approved layout designs impact on individuals,	**Low**	High

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
Loss of protected species	*Spatial Extent*	**Site specific**	**(Level 3)**	permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance 8 of 1969).	**(Level 4)**	
	Duration	**Medium term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
Increased alien invasive species	*Status*	**Negative**	**Moderate (Level 3)**	Compile an alien and invasive species control and monitoring plan in terms of NEMBA.	**Moderate (Level 3)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Moderate**				
	Probability	**Likely**			**Low (Level 4)**	
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
Increased erosion and soil compaction	*Status*	**Negative**	**Moderate (Level 3)**	• Utilise existing access routes as far as possible. • Confine the movement of vehicles to the access routes to and from the site and to the construction and operation areas. • Do not drive in the natural veld. • Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. • Monitor the entire site for signs of erosion throughout the construction, operational and decommissioning phases of the project. • Refer to Aquatic Report mitigation measures relevant to watercourse crossings and development close to watercourses.	**Low (Level 4)**	Medium
	Spatial Extent	**Site specific**				
	Duration	**Medium term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
Littering and general polluti	*Status*	**Negative**	**Moderate (Level 3)**	• The site camp must not be located in high sensitivity areas and their buffer zones. • Dangerous goods may not be stored within 100 m of a	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short to Medium**				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
		term		watercourse – refer to the BESS assessment for more details. • Hydrocarbon fuels must be stored in a secure, bunded area. • Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis. • Ablution facilities must be located outside sensitive areas and their buffer zones. • Portable ablution facilities must be regularly cleaned and maintained in good working condition. • Any spillage from ablution facilities must be cleaned up immediately and disposed of in an • appropriate manner. • Vehicles must be in good working condition, with no oil, water or fuel leaks. Vehicles must be regularly inspected and any problems corrected. • Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in sensitive areas. • Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.		
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				

The table below includes an assessment of the potential direct impacts identified for the **VOLTA EGI** facility and associated infrastructure for the **operational phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - OPERATIONAL PHASE						
Loss of species composition and diversity	*Status*	**Negative**	**Moderate (Level 3)**	• The loss of species composition and diversity cannot be mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation. • A rehabilitation plan is required to restore each habitat to a natural state that is representative of the respective vegetation type after decommissioning.	**Low (Level 4)**	Medium
	Spatial Extent	**Site specific**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
Increased alien invasive species	*Status*	**Negative**	**Moderate (Level 3)**	• Compile an alien and invasive species control and monitoring plan in terms of NEMBA.	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
Littering and general pollution	*Status*	**Negative**	**Moderate (Level 3)**	• Vehicles must be in good working condition, with no oil, water or fuel leaks. • Vehicles must be regularly inspected and any problems corrected. • Refuelling may only take place in an appropriate, designated bunded area. • Any spillages must be reported immediately and dealt with appropriately. • Spill kits must be available on site in case of	**Low (Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short to Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	*Low irreplaceability*		accidental spillage. • Sufficient waste disposal bins must be available on site and clearly marked.		

The table below includes an assessment of the potential direct impacts identified for the **VOLTA EGI** and associated infrastructure for the **decommissioning phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Loss of habitat	*Status*	**Negative**	**Low (Level 4)**	• The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided. • A rehabilitation plan is required to restore each habitat to a natural state after decommissioning.	**Very Low (Level 5)**	*Medium*
	Spatial Extent	**Site specific**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low reversibility**				
	Irreplaceability	**Moderate irreplaceability**				
Increased alien invasive species	*Status*	**Negative**	**Moderate (Level 3)**	• Compile an alien and invasive species control and monitoring plan in terms of NEMBA.	**Low (Level 4)**	*Medium*
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate reversibility**				
	Irreplaceability	**Low irreplaceability**				
	Irreplaceability	**Low irreplaceability**				

The table below includes an assessment of the potential cumulative impacts identified for the **VOLTA EGI** and associated infrastructure for the **construction**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS - CONSTRUCTION PHASE						
Loss of vegetation	*Status*	**Negative**	**Moderate (Level 3)**	• Transformation is considered low for this vegetation type but increased renewable developments could change this.	**Moderate (Level 3)**	Medium
	Spatial Extent	**Local**				
	Duration	**Permanent**				
	Consequence	**Substantial**				
	Probability	**Very Likely**			**Low (Level 4)**	
	Reversibility	**Low reversibility**				
	Irreplaceability	**Moderate irreplaceability**				

D.2.5.8 Concluding Statement for the VOLTA EGI

The proposed VOLTA EGI facility is located in a CBA Irreplicable and threatened ecosystem and vegetation type classified as endangered, namely the Vaal-Vet Sandy Grassland.

The loss of vegetation and fragmentation of natural habitats that is virtually unavoidable with any type of development, has a negative impact on the regional ecosystem as it disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. The impact of clearing of the vegetation is Medium Negative. Limited meaningful mitigation measures are possible, and rehabilitation post-construction and post-operational are required.

Considering that less than 30% of the Vaal-Vet Sandy Grassland remains and with hardly any protection of this endangered grassland, development must be carefully scrutinised and appropriate measures must be taken to conserve and protect the remaining extent of this grassland. Since the Vaal-Vet Sandy Grassland is an extensive system and not confined to VOLTA, the cumulative impact would be Medium-Low Negative and the loss of resources similar.

The alternative option of not developing this PV project and leaving it up to the landowners to make the decision to transform the land to agricultural land and/or intense grazing, which will not assist in protecting the CBA1 or the threatened ecosystem. Accordingly, the type of activity needs to be considered for this site, unless conservation in terms of declaring these sites as a nature reserve or similar is considered, it is not feasible to consider no development. Considering that the topsoil will not be disturbed, the grassland will not be transformed completely. An effective rehabilitation and management plan needs to be drafted to ensure the continuous functionality of the grassland system taking the construction phase impacts into account, as well as the possible risk of fires. As the main grass species is *Themeda triandra,* the species is resistant to fire, and grows to about 1.5 m. Accordingly, over time, the species will become less dominant due to the absence of fire, but other species including *Eragrostis spp* and *Aristida spp*, along with shade-tolerant forbs will dominate the vegetation layer.

D.2.6 Aquatic Biodiversity and Species

The Aquatic Biodiversity Assessment was undertaken by Russel Tate to inform the outcome of this BA from an aquatic biodiversity perspective. The complete Aquatic Biodiversity and Species Assessment is included in Appendix C.11 and C.12 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Aquatic Biodiversity and Species Assessment. The information below is extracted from Tate (2023).

D.2.6.1 Approach and Methodology

The approach and methodology adopted in the Aquatic Biodiversity and Species Assessment is described in this section.

A biophysical reconnaissance and site evaluation of the assessed area was undertaken over a 2-day period in 30th of January and 1 February 2023, during which specific primary data was collected and evaluated. In addition, the identification of key hydrological features on site and an interpretation of the prevailing flora and fauna, as well as other features was undertaken. The study also included a literature review of the region to confirm or corroborate findings. The literature review utilised various sources including the National Fresh Water Priority Areas (NFEPA), South African National Biodiversity Institute (SANBI) data and other relevant sources.

All data collected in the field and during the literature review was evaluated and interpreted in order to provide an understanding of the nature of the prevailing environment at a landscape and habitat level, together with specific evaluation of data relating to habitat form and structure.

An Environmental Importance and Sensitivity (EIS) and Present Ecological State (PES) was undertaken (i.e. it was not possible to evaluate aquatic biota or undertake water chemistry analysis).. The results of the PES or ecological status of the system provide an indication of the level of importance of the pans and wetlands according to a ranking.

The method used for the EIS determination takes into consideration PES scores obtained for WET-Health as well as function and service provision to enable the assessor to determine the most representative EIS category for the wetland feature or group being assessed. A series of determinants for EIS are assessed on a scale of 0 to 4, where 0 indicates no importance and 4 indicates very high importance.

D.2.6.2 Relevant Project Aspects relating to Aquatic Biodiversity and Species Impacts

The development of a PV facility and associated infrastructure within the study area will by necessity, be undertaken on land that meets a number of criteria including, inter-alia, level or gradual falls, generally suitable founding conditions and avoidance of areas that may be inundated by flooding. As a consequence, the proposed PV facility will avoid all pans and wetland environments.

The following project related activities are relevant from an aquatic biodiversity perspective:

- Site access and clearing of vegetation for permanent structures, laydown yards and roads.
- Establishment of laydown yard/construction camps;
- Excavations and earthworks for infrastructure setting;
- Stockpiling and movement of soils and construction materials;
- Storage and use of chemicals, fuels and oils;
- Diversion and crossing of watercourses by roadways;
- Storm-water management.

D.2.6.3 Potential Impacts for the VOLTA PV and BESS

Direct impacts are those that are directly attributable to the implementation and operation of the project, while indirect impacts are consequential effects of the proposed project that may not be directly attributable to the development. Cumulative impacts are those externalities that arise from the proposed development and compound existing effects or influences on the ecology of the region. These impacts occur during the construction, operational and decommissioning phases, as relevant, and are listed below.

Construction Phase:

- Potential Impact 1: Operation of equipment and machinery
- Potential Impact 2: Clearing vegetation for laydown yards and buildings

- Potential Impact 3: Stockpiling of and placement construction materials
- Potential Impact 4: Excavating/shaping landscape
- Potential Impact 5: Final landscaping, backfilling and postconstruction rehabilitation

Operational Phase:

- Potential Impact 4: Alteration of drainage
- Potential Impact 5: Alteration of surface water flow dynamics
- Potential Impact 5: Establishment of alien plants on disturbed areas

Decommissioning Phase:

Such alterations and changes will be dependent upon the expectant post-decommissioning land use and operation cease of the PV Facilities and associated infrastructure. However, abandonment of the site would probably result in:

- Potential Impact 6: Operation of equipment and machinery.
- Potential Impact 7: Clearing vegetation
- Potential Impact 8: Stockpiling of and placement construction materials
- Potential Impact 9: Excavating/shaping landscape
- Potential Impact 10: Final landscaping, backfilling and postconstruction rehabilitation

Cumulative Impacts:

The cumulative assessment considers other proposed, approved and existing power lines within the 30 km radius.

Given the above, cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

Construction Phase:

- Potential Impact 1: Operation of equipment and machinery
- Potential Impact 2: Clearing vegetation for laydown yards and buildings
- Potential Impact 3: Stockpiling of and placement construction materials
- Potential Impact 4: Excavating/shaping landscape
- Potential Impact 5: Final landscaping, backfilling and postconstruction rehabilitation

Operational Phase:

- Potential Impact 4: Alteration of drainage
- Potential Impact 5: Alteration of surface water flow dynamics
- Potential Impact 5: Establishment of alien plants on disturbed areas

Decommissioning Phase:

- Potential Impact 6: Operation of equipment and machinery.
- Potential Impact 7: Clearing vegetation

- Potential Impact 8: Stockpiling of and placement construction materials
- Potential Impact 9: Excavating/shaping landscape
- Potential Impact 10: Final landscaping, backfilling and postconstruction rehabilitation

D.2.6.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **construction phase**.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
			DIRECT IMPACTS - CONSTRUCTION PHASE			
Impact 1: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ The implementation of the buffer zone stipulated in this report; ▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; ▪ A clear storm-water management plan for hardened surfaces must be implemented; ▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 2: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 3: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 4: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 5: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

The table below includes an assessment of the potential direct impacts identified for the **VOLTA PV and BESS** and associated infrastructure for the **operational phase**.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - OPERATIONAL PHASE						
Impact 6: Alteration of drainage	*Status*	**Negative**	**Low (Level 4)**	▪ The implementation of the buffer zones provided in this report; ▪ Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods; ▪ An effective storm-water management plan for the solar farm must be implemented; ▪ The revegetation of disturbed non active cleared areas must take place within 1 month of completing the construction phase; ▪ The above must be audited within 3 months of completing the	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Likely**	**Moderate risk (Level 3)**			
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Alteration of surface water flow dynamics	*Status*	**Negative**	**Low (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
	Probability	**Likely**	**Moderate risk (Level 3)**	phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.		
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Establishment of alien plants on disturbed areas	*Status*	**Negative**	**Low (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

The table below includes an assessment of the potential direct impacts identified for the **VOLTA PV and BESS** and associated infrastructure for the **decommissioning phase**.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 8: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ The implementation of the buffer zone stipulated in this report; ▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; ▪ A clear storm-water management plan for hardened surfaces must be implemented; ▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 9: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 10: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 11: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 12: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** for the **construction and operational and decommissioning phases**.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ The implementation of the buffer zone stipulated in this report; ▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; ▪ A clear storm-water management plan for hardened surfaces must be implemented; ▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 2: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	**Low**		Domestic water must be reused for dust suppression.		
Impact 3: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**	▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 4: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 5: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE - DECOMISSIONING PHASE						
Impact 6: Alteration of drainage	*Status*	**Negative**	**Low**	▪ The implementation of the buffer zones provided in this report;	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Duration	**Long term**	**(Level 4)**	▪ Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods; ▪ An effective storm-water management plan for the solar farm must be implemented; ▪ The revegetation of disturbed non active cleared areas must take place within 1 month of completing the construction phase; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.		
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Alteration of surface water flow dynamics	*Status*	**Negative**	**Low (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Establishment of alien plants on disturbed areas	*Status*	**Negative**	**Low (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS - DECOMISSIONING PHASE						
Impact 8: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ The implementation of the buffer zone stipulated in this report; ▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; ▪ A clear storm-water management plan for hardened surfaces	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	**Low**		must be implemented;		
Impact 9: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**	▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 10: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 11: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 12: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

D.2.6.5 Concluding Statement for the VOLTA PV and BESS

The outcomes of the risk assessment indicate minor impacts from the proposed activities. The minor impacts can be attributed to gentle topography and the nature of the project. Should avoidance and basic mitigation actions be implemented, limited impacts to aquatic biodiversity can be expected.

In the view of the proposed new activities, should the proposed mitigation actions be implemented, no fatal flaw was identified. In line with the recommendations, avoidance must be implemented.

D.2.6.6 Relevant Project Aspects relating to Aquatic Biodiversity and Species Impacts

The development of a PV facility and associated infrastructure within the study area will by necessity, be undertaken on land that meets a number of criteria including, inter-alia, level or gradual falls, generally suitable founding conditions and avoidance of areas that may be inundated by flooding. As a consequence, the proposed PV facility will avoid all pans and wetland environments.

The following project related activities are relevant from an aquatic biodiversity perspective:

- Site access and clearing of vegetation for permanent structures, laydown yards and roads.
- Establishment of laydown yard/construction camps;
- Excavations and earthworks for infrastructure setting;
- Stockpiling and movement of soils and construction materials;
- Storage and use of chemicals, fuels and oils;
- Trenching for underground cable.
- Storm-water management.

D.2.6.7 Potential Impacts for the VOLTA EGI

Direct impacts are those that are directly attributable to the implementation and operation of the project, while indirect impacts are consequential effects of the proposed project that may not be directly attributable to the development. Cumulative impacts are those externalities that arise from the proposed development and compound existing effects or influences on the ecology of the region. These impacts occur during the construction, operational and decommissioning phases, as relevant, and are listed below.

Construction Phase:

- Potential Impact 1: Operation of equipment and machinery
- Potential Impact 2: Clearing vegetation for 75 m^2 for substations and pylon footings
- Potential Impact 3: Stockpiling of and placement construction materials
- Potential Impact 4: Excavating/shaping landscape for the underground cable
- Potential Impact 5: Final landscaping, backfilling and postconstruction rehabilitation

Operational Phase:

- Potential Impact 4: Alteration of drainage

- Potential Impact 5: Alteration of surface water flow dynamics
- Potential Impact 5: Establishment of alien plants on disturbed areas

Decommissioning Phase:

Such alterations and changes will be dependent upon the expectant post-decommissioning land use and operation cease of the PV Facilities and associated infrastructure. However, abandonment of the site would probably result in:

- Potential Impact 6: Operation of equipment and machinery.
- Potential Impact 7: Clearing vegetation for laydown areas
- Potential Impact 8: Stockpiling of and placement construction materials
- Potential Impact 9: Excavating/shaping landscape
- Potential Impact 10: Final landscaping, backfilling and postconstruction rehabilitation

Cumulative Impacts:

The cumulative assessment considers other proposed, approved and existing power lines within the 30 km radius.

Given the above, cumulative impacts arising from the implementation of this project and other land use changes in the region are likely to exhibit the following:

Construction Phase:

- Potential Impact 1: Operation of equipment and machinery
- Potential Impact 2: Clearing vegetation for laydown yards and buildings
- Potential Impact 3: Stockpiling of and placement construction materials
- Potential Impact 4: Excavating/shaping landscape
- Potential Impact 5: Final landscaping, backfilling and postconstruction rehabilitation

Operational Phase:

- Potential Impact 4: Alteration of drainage
- Potential Impact 5: Alteration of surface water flow dynamics
- Potential Impact 5: Establishment of alien plants on disturbed areas

Decommissioning Phase:

- Potential Impact 6: Operation of equipment and machinery.
- Potential Impact 7: Clearing vegetation
- Potential Impact 8: Stockpiling of and placement construction materials
- Potential Impact 9: Excavating/shaping landscape
- Potential Impact 10: Final landscaping, backfilling and postconstruction rehabilitation

D.2.6.8 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA EGI** for the **construction phase**.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-go areas and basic environmental awareness using the mitigation provided in this report. ▪ Access routes adjacent to the wetlands must make use of existing roadways and crossings where possible; ▪ Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided; ▪ Stormwater generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. ▪ Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion; ▪ Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow; ▪ The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourses); ▪ Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in this report for each	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 2: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 3: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 4: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
	Consequence	**Moderate**		respective activity; ▪ No vehicles shall enter watercourse buffer zones outside of construction footprints; ▪ No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite;		
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 5: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**	▪ Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone; ▪ Disturbed areas must be re-vegetated after completion of the phase; ○ A three-month timeframe for the initiation of this action; ○ Ripping of the soils should occur in two directions; and ○ Removed vegetation and topsoil can be harvested and applied here. ▪ Drainage channels constructed for the access roads must be constructed so as not to result in erosion; ▪ An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented; ▪ Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs); ▪ An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points; ▪ General storm-water management practices should be included in the design phase and implemented during the construction phase of this project; and ▪ Following the completion of the phase, all construction materials and debris should be removed and disposed of in a	**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
				suitable off-site area. An inspection should be completed within a week after the phase is completed. ▪ Where trenches are required for the underground powerline, it is recommended that the removed soils are stockpiled in a sequential fashion where topsoil's are not mixed with the subsoils. Once trenching is complete and backfilling is required, these soils must be put back in the logical order with sub-soils placed in the trench and covered by topsoil's. ▪ The underground powerlines must be protected from lateral sub-surface flows by using a suitable casing of the engineers choice. ▪ Where sub-surface flows during trench construction are encountered it is recommended that trenching does not concentrate or divert these. Where there is significant sub-surface flows encountered a hydropedology study may be required.		

The table below includes an assessment of the potential direct impacts identified for the **VOLTA EGI** for the **operational phase**.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - OPERATIONAL PHASE						
Impact 6: Alteration of drainage	*Status*	**Negative**	**Low risk (Level 4)**	▪ The implementation of a suitable storm-water management plan for the disturbance footprint must be in place and implemented by this phase; ▪ The access road and silt traps (if installed) must be inspected monthly for signs of erosion. When erosion is observed, the area should be rehabilitated within 3 months. In addition, inspections following a >200mm/24 hr rainfall event must	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Alteration of surface	*Status*	**Negative**	**Low risk**		**Low risk**	High

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
water flow dynamics	*Spatial Extent*	**Local**	**(Level 4)**	occur within 3 months of the event; ▪ An annual audit of the roads for signs of environmental disturbance outside of the footprint area must be conducted; and ▪ Alien invasive management programmes should continue throughout the duration of the activity. ▪ Watercourse monitoring should take place annually as part of the environmental management plan.	**(Level 4)**	
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Establishment of alien plants on disturbed areas	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

The table below includes an assessment of the potential direct impacts identified for the **VOLTA EGI** for the **decommissioning phase**.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - DECOMISSIONING PHASE						
Impact 8: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ A suitable rehabilitation and closure plan must be developed for the project. ▪ It is recommended that all infrastructure installed is effectively decommissioned and removed from the site. ▪ All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-go areas and basic environmental awareness using the mitigation provided in this report. ▪ Access routes into or adjacent to the wetlands must make use of existing road ways and crossings where possible; ▪ Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided; ▪ Storm-water generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. ▪ Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion; ▪ Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow; ▪ The installation of sedimentation/erosion protection measures must be implemented before the start of construction, e.g., several rows of silt traps and fences (this is particularly important in the access roads leading or adjacent to the watercourses); ▪ Stockpiling or storage of materials and/or waste must be	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 9: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 10: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 11: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Irreplaceability	**Low**		placed beyond the defined buffers in this report for each respective activity;		
Impact 12: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**	▪ No vehicles shall enter watercourse buffer zones outside of construction footprints; ▪ No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite; ▪ Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone; ▪ Disturbed areas must be re-vegetated after completion of the phase; o A three-month timeframe for the initiation of this action; o Ripping of the soils should occur in two directions; and o Removed vegetation and topsoil can be harvested and applied here. ▪ Drainage channels constructed for the access roads must be constructed so as not to result in erosion; ▪ An inspection of the drainage channels must be completed within 3 months following the end of activities and within a month after the first rainfall event which exceeds 50mm. Should excessive sediment be transported down the channels it is recommended that sediment screens are implemented; ▪ Sediment screens must be inspected, maintained and cleared every month or after significant rainfall (>150mm/24hrs); ▪ An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points; ▪ General storm-water management practices should be included in the design phase and implemented during the construction phase of this project; and ▪ Following the completion of the phase, all construction	**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
				materials and debris should be removed and disposed of in a suitable off-site area. An inspection should be completed within a week after the phase is completed.		

The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA EGI** for the **construction and operational and decommissioning phases**.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1: Operation of equipment and machinery	*Status*	**Negative**	**Low risk (Level 4)**	▪ The implementation of the buffer zone stipulated in this report; ▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods; ▪ A clear storm-water management plan for hardened surfaces must be implemented; ▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 2: Clearing vegetation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 3: Stockpiling of and placement construction materials	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 4: Excavating/shaping landscape	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 5: Final landscaping, backfilling and postconstruction rehabilitation	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
CUMULATIVE - OPERATIONAL PHASE						
Impact 6: Alteration of drainage	*Status*	**Negative**	**Low (Level 4)**	▪ The implementation of the buffer zones provided in this report; ▪ Clean and dirty surface water separation and storm-water management plan must be put into place via standard best practice methods; ▪ An effective storm-water management plan for the solar farm must be implemented; ▪ The revegetation of disturbed non active cleared areas must	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Alteration of surface	*Status*	**Negative**	**Low risk**		**Low risk**	High

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
water flow dynamics	*Spatial Extent*	**Local**	**(Level 4)**	take place within 1 month of completing the construction phase; ▪ The above must be audited within 3 months of completing the phase; ▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression. Should domestic water be required to be discharge, the management of nitrogen concentrations is imperative. ▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench directed to a Pollution Control Dam or via a berm.	**(Level 4)**	
	Duration	**Long term**				
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				
Impact 7: Establishment of alien plants on disturbed areas	*Status*	**Negative**	**Low risk (Level 4)**		**Low risk (Level 4)**	
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Substantial**	**Moderate risk (Level 3)**			
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

<table>
<tr><th>Impact</th><th colspan="2">Impact Criteria</th><th>Significance / Ranking (Pre-Mitigation)</th><th>Potential mitigation measures</th><th>Significance / Ranking (Post-Mitigation)</th><th>Confidence Level</th></tr>
<tr><td colspan="7">CUMULATIVE IMPACTS - CONSTRUCTION PHASE</td></tr>
<tr><td rowspan="7">Impact 8: Operation of equipment and machinery</td><td>Status</td><td>Negative</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="29">▪ The implementation of the buffer zone stipulated in this report;
▪ Clean and dirty surface water separation and a storm-water management plan must be put into place via standard best practice methods;
▪ A clear storm-water management plan for hardened surfaces must be implemented;
▪ The revegetation of disturbed non-active cleared areas must take place within the first growing season between September and March following completion of the activity;
▪ The above must be audited within 3 months of completing the phase;
▪ No discharge of domestic water must occur if possible. Domestic water must be reused for dust suppression.
▪ All stockpiles and hazardous waste storage areas must be bunded by either a cut-off trench or berm directed to a Pollution Control Dam inline with best practice surface water management guidelines.</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7">High</td></tr>
<tr><td>Spatial Extent</td><td>Local</td></tr>
<tr><td>Duration</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Moderate</td></tr>
<tr><td>Probability</td><td>Likely</td></tr>
<tr><td>Reversibility</td><td>Low</td></tr>
<tr><td>Irreplaceability</td><td>Low</td></tr>
<tr><td rowspan="7">Impact 9: Clearing vegetation</td><td>Status</td><td>Negative</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7">High</td></tr>
<tr><td>Spatial Extent</td><td>Local</td></tr>
<tr><td>Duration</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Substantial</td></tr>
<tr><td>Probability</td><td>Likely</td></tr>
<tr><td>Reversibility</td><td>Low</td></tr>
<tr><td>Irreplaceability</td><td>Low</td></tr>
<tr><td rowspan="7">Impact 10: Stockpiling of and placement construction materials</td><td>Status</td><td>Negative</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7">High</td></tr>
<tr><td>Spatial Extent</td><td>Local</td></tr>
<tr><td>Duration</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Moderate</td></tr>
<tr><td>Probability</td><td>Likely</td></tr>
<tr><td>Reversibility</td><td>Low</td></tr>
<tr><td>Irreplaceability</td><td>Low</td></tr>
<tr><td rowspan="7">Impact 11: Excavating/shaping landscape</td><td>Status</td><td>Negative</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7">Low risk (Level 4)</td><td rowspan="7"></td></tr>
<tr><td>Spatial Extent</td><td>Local</td></tr>
<tr><td>Duration</td><td>Medium</td></tr>
<tr><td>Consequence</td><td>Substantial</td></tr>
<tr><td>Probability</td><td>Likely</td></tr>
<tr><td>Reversibility</td><td>Low</td></tr>
<tr><td>Irreplaceability</td><td>Low</td></tr>
<tr><td>Impact 12: Final landscaping,</td><td>Status</td><td>Negative</td><td>Low risk</td><td>Low risk</td><td></td></tr>
</table>

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
backfilling and postconstruction rehabilitation	*Spatial Extent*	**Local**	**(Level 4)**		**(Level 4)**	
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Low**				

D.2.6.9 Concluding Statement for the VOLTA EGI

The outcomes of the risk assessment indicate minor impacts from the proposed activities. The minor impacts can be attributed to gentle topography and the nature of the project. Should avoidance and basic mitigation actions be implemented, limited impacts to aquatic biodiversity can be expected.

In the view of the proposed new activities, should the proposed mitigation actions be implemented, no fatal flaw was identified. In line with the recommendations, avoidance must be implemented.

D.2.7 Avifauna Impact Assessment

The Avifauna Impact Assessment was undertaken by Luke Verburgt, Lindsay Mandy, AE Van Wyk and Alex Rebelo of EnviroInsight to inform the outcome of this BA from an avifaunal perspective. The complete Avifauna Impact Assessment is included in Appendix C.13 and C.14 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Avifauna Impact Assessment. The information below is extracted from Verburgt *et al.* (2023).

D.2.7.1 Approach and Methodology

The Avifauna Impact Assessment includes a description of the affected environment from an avifaunal perspective, mapping of the sensitivity of the site in terms of avifaunal features such as habitat use, roosting, feeding and nesting / breeding, feedback of the sensitivity in terms of the Screening Tool, an assessment of the potential impacts of the proposed development on avifauna including cumulative impacts, and recommendations for sufficient mitigation measures. The study considered various desktop information sources and data to source information on the impacts of solar facilities on avifauna; as well as on-site surveys which were conducted from 19 -21 October 2022 (Survey 1) and 17 – 19 February 2023 (Survey 2) according to the best practice guidelines for avifaunal impact studies for solar developments, compiled by BirdLife South Africa (BLSA) in 2017 (Jenkins *et al.,* 2017).

D.2.7.2 Relevant Project Aspects relating to Avifaunal Impacts

Components of the proposed project that are relevant in terms of avifauna are listed below:

- Solar Field, comprising Solar Arrays;
- Building Infrastructure including of14ices; operational and maintenance control centre; warehouse/workshop; ablution facilities; converter/inverter stations; on-site substation and/or a switching substation; and guard houses; associated infrastructure;
- Internal 33 kV power lines/underground cables;
- BESS;
- Access roads;
- Internal gravel roads;
- Fencing around the PV Facilities; and
- Construction work area (i.e. laydown area).

D.2.7.3 Potential Impacts for VOLTA PV and BESS

The potential impacts include:

Construction Phase:

- Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting;
- Loss of habitat due to clearing, alteration and exclusion from previously accessible habitats.

Operational Phase:

- Continued disturbance due to operational activities (use of vehicles, lights etc.);
- Loss of habitat due to altered and excluded habitats;
- Direct mortality from electrocution or collision with infrastructure (solar panels or associated power lines);
- Poisoning and death from chemical use to clean and maintain solar panels;
- Attraction to the facility exacerbating potential impacts described above.

Decommissioning Phase:

- Continued disturbance due to operational activities (use of vehicles, lights etc.);
- Habitat loss reclamation from rehabilitation activities.

Cumulative Impacts:

- Please see Appendix C.14 for a detailed description of cumulative impacts

No indirect impacts were identified.

D.2.7.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the construction, operational and decommission phases.

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1: Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting	*Status*	**Negative**	**Low risk (Level 4)**	▪ Adopt temporal avoidance strategies to prevent executing the most intensive activities generating noise and dust during the most sensitive period of breeding activity for SCC. Secretarybirds can breed throughout the year but usually breeding is more likely August to March. This is also the most likely time that waterbirds will be attracted the PAOI due to the presence of water (December to March). Therefore, intensive activities should be scheduled as far as practically possible between April-July. Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. ▪ Demarcate the NO-GO areas (wetlands) with danger tape forming a perimeter and install signage indicating a sensitive ecological area and stipulate that under no circumstances is any person allowed within the demarcated area. ▪ Minimise light pollution and fit external lighting with downward facing hoods. ▪ Enforce a speed limit of 40 km/h on site. ▪ If necessary apply dust-suppression measures (road wetting) to limit dust.	**Very Low risk (Level 5)**	High
	Spatial Extent	**Site specific**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 2: Loss of habitat due to clearing, alteration and exclusion from previously accessible habitats and fire.	*Status*	**Negative**	**Low risk (Level 4)**	▪ Limit the areas cleared for construction purposes (e.g. laydown areas). ▪ Do not implement a bare earth policy for construction of solar panels, rather mow the grass. ▪ Use the SEI spatial layers and/or Opportunities and Constraints map to appropriately position all surface infrastructure so as to minimise loss of Medium-High sensitivity avifaunal habitat, in this case only the wetland areas with 50 m buffer. ▪ Demarcate such areas on the ground during construction and sign post them as “Environmentally sensitive areas - keep out!”.	**Very Low risk (Level 5)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
	Reversibility	**High**		▪ The BESS must be covered in non-reflective surfaces and protected against thermal discharge, as well as the risk of veld fires as a result. ▪ Rehabilitate all areas disturbed immediately after construction. ▪ Prioritise existing roads for access routes. ▪ Develop and implement an Alien and Invasive Plant Control Plan. ▪ All staff must undergo a strict induction process to inform them of the importance of preventing fires.		
	Irreplaceability	**Moderate**				
OPERATIONAL PHASE						
Impact 3: Continued disturbance due to operational activities (use of vehicles, lights etc.)	*Status*	**Negative**	**Low risk (Level 4)**	▪ See construction phase mitigation measures.	**Very low risk (Level 5)**	High
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 4: Loss of habitat due to altered and excluded habitats and threat of fire	*Status*	**Negative**	**Low risk (Level 4)**	▪ See construction phase mitigation measures.	**Very low risk (Level 5)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				

<table>
<tr><th>Impact</th><th colspan="2">Impact Criteria</th><th>Significance / Ranking (Pre-Mitigation)</th><th>Potential mitigation measures</th><th>Significance / Ranking (Post-Mitigation)</th><th>Confidence Level</th></tr>
<tr><td></td><td>Irreplaceability</td><td>Moderate</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="7">Impact 4: Direct mortality from electrocution and collision with infrastructure (solar panels or associated power lines)</td><td>Status</td><td>Negative</td><td rowspan="7">Moderate risk (Level 3)</td><td rowspan="7">It is recommended that wherever possible, existing electrical transmission infrastructure is utilised. Where the creation of new transmission lines is necessary attempts should be made to minimise the route length to the closest existing substation and that the route be aligned with existing powerlines as far as possible. Additionally, the route should avoid or minimise wetland/riverine crossings.
Install Eskom-approved bird flight diverters (flappers or coils) on new transmission lines (particularly the earth wire). This can help to increase the visibility of transmission lines especially the thinner earth line with which most collisions tend to be associated. If the transmission lines are long or if budget is constraining then prioritise portions of the transmission lines that pass near to or cross wetlands/riverine habitats.
Design of overhead electrical lines must take into account potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal “streamers” or large open wings creating a short.
All power cables within the project area should be fully insulated and preferably buried in demarcated corridors.
White strips or simply the exposed (lustrous) aluminium frames along the edges of the solar panels appear to help to increase visibility and deter birds and are recommended as far as practically feasible.
Installation of bird deterrent devices on and around solar panels and on transmission line poles, pylons and / or monopoles as well as security/boundary fences, will be required to limit collision risk. This is especially relevant for the solar panel clusters in close proximity to the No-go wetland buffers.
In all areas where service road intersect with semi natural or natural habitat, all fences must be set back at least (strictly) 75 metres from the edge of every service road in order to allow for vulnerable species such as bustards, storks, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. Alternatively, the fences must be placed completely adjacent to the roads with a maximum of 3 metres buffer and marked with fence flappers in order to</td><td rowspan="7">Very low risk (Level 5)</td><td rowspan="7">High</td></tr>
<tr><td>Spatial Extent</td><td>Site Specific</td></tr>
<tr><td>Duration</td><td>Long term</td></tr>
<tr><td>Consequence</td><td>Substantial</td></tr>
<tr><td>Probability</td><td>Very Likely</td></tr>
<tr><td>Reversibility</td><td>High</td></tr>
<tr><td>Irreplaceability</td><td>Low</td></tr>
</table>

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
				reduce flush-related collisions..		
Impact 6: Poisoning and death from chemical use to clean and maintain solar panels	*Status*	**Negative**	**Low risk (Level 4)**	▪ Avoid or minimise the use of chemical surfactants and dust suppressants on site; ▪ Where necessary ensure that none of the cleaning water enters nearby wetlands and seeps through runoff; ▪ Do not clean before an imminent rainstorm. ▪ Apply mitigation described in the BESS RA to address potential leakage impacts.	**Very low risk (Level 5)**	*High*
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 7: Attraction to the facility exacerbating potential impacts	*Status*	**Negative**	**Low risk (Level 4)**	▪ Install bird deterrent devices around panels and on transmission line poles, pylons and / or monopoles to limit perching and minimise collision and electrocution risk.	**Very low risk (Level 5)**	*High*
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
DIRECT IMPACTS – DECOMMISSIONING PHASE						
Impact 8: Continued disturbance due to decommission activities (use of vehicles, lights etc.)	*Status*	**Negative**	**Low risk (Level 4)**	▪ See construction phase mitigation	**Very low risk (Level 5)**	High
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Likely**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 9:: Habitat loss reclamation from rehabilitation activities	Status	**Negative**	**Moderate risk (Level 3)**	▪ Remove all infrastructure not originally present prior to the construction phase; ▪ Rehabilitate all areas disturbed immediately after decommission activities and removal of infrastructure. ▪ Continue to implement an Alien and Invasive Plant Control Plan until the rehabilitation specialist deems it unnecessary.	**Moderate risk (Level 3)**	*Moderate*
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Very Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Moderate**				

D.2.7.5 Concluding Statement for VOLTA PV and BESS

The Avifauna study has appropriately demonstrated that there are no major negative impacts to avifauna SCC expected from the proposed VOLTA PV facility and BESS development, provided that the proposed mitigation measures described above are applied appropriately and that continued adaptive management take place throughout the lifespan of the facility.

If the Applicant agrees to implement the above-described mitigation measures and post-construction monitoring, the specialists recommends that the Competent Authority should grant environmental authorisation for this proposed development (exclusive of any transmission lines which are to be evaluated separately).

D.2.7.6 Relevant Project Aspects relating to Avifaunal Impacts

Components of the proposed project that are relevant in terms of avifauna are listed below:

- Overhead powerline
- Underground powerline;
- Substations (x2); and
- Construction work area (i.e. laydown area).

D.2.7.7 Potential Impacts for VOLTA EGI

The potential impacts include:

Construction Phase:
- Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting;
- Loss of habitat due to clearing, trenching for the underground cable, alteration and exclusion from previously accessible habitats.

Operational Phase:
- Continued disturbance due to operational activities (use of vehicles, lights etc.);
- Loss of habitat due to altered and excluded habitats;
- Direct mortality from electrocution or collision with infrastructure (specifically power lines);
- Attraction to the facility exacerbating potential impacts described above.

Decommissioning Phase:
- Continued disturbance due to operational activities (use of vehicles, lights etc.);
- Habitat loss reclamation from rehabilitation activities.

Cumulative Impacts:
- Please see Appendix C.13 for a detailed description of cumulative impacts

No indirect impacts were identified.

D.2.7.8 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA EGI** for the construction, operational and decommission phases.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
				DIRECT IMPACTS - CONSTRUCTION PHASE		
Impact 1: Disturbance of foraging and breeding behaviours of birds due to noise, dust and lighting	*Status*	**Negative**	**Low risk (Level 4)**	▪ Adopt temporal avoidance strategies to prevent executing the most intensive activities generating noise and dust during the most sensitive period of breeding activity for SCC. Secretarybirds can breed throughout the year but usually breeding is more likely August to March. This is also the most likely time that waterbirds will be attracted the PAOI due to the presence of water (December to March). Therefore, intensive activities should be scheduled as far as practically possible between April-July. Note that light activities such as normal vehicle use of the roads are not affected by this mitigation measure and these may proceed year-round. ▪ Minimise light pollution and fit external lighting with downward facing hoods. ▪ Enforce a speed limit of 40 km/h on site. ▪ If necessary apply dust-suppression measures (road wetting) to limit dust.	**Very Low risk (Level 5)**	High
	Spatial Extent	**Site specific**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 2: Loss of habitat due to clearing, alteration and exclusion from previously accessible habitats and fire.	*Status*	**Negative**	**Low risk (Level 4)**	▪ Limit the areas cleared for construction purposes (e.g. laydown areas). ▪ Do not implement a bare earth policy for construction of solar panels, rather mow the grass. ▪ Rehabilitate all areas disturbed immediately after construction. ▪ Prioritise existing roads for access routes. ▪ Develop and implement an Alien and Invasive Plant Control Plan. ▪ All staff must undergo a strict induction process to inform them of the importance of preventing fires.	**Very Low risk (Level 5)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**High**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
	Irreplaceability	**Moderate**				
				OPERATIONAL PHASE		
Impact 3: Continued disturbance due to operational activities (use of vehicles, lights etc.)	*Status*	**Negative**	**Low risk (Level 4)**	▪ See construction phase mitigation measures.	**Very low risk (Level 5)**	High
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 4: Loss of habitat due to altered and excluded habitats and threat of fire	*Status*	**Negative**	**Low risk (Level 4)**	▪ See construction phase mitigation measures.	**Very low risk (Level 5)**	High
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 5: Direct mortality from	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ It is recommended that wherever possible, alignment to existing electrical transmission infrastructure is undertaken. ▪ Where the creation of new transmission lines is necessary, attempts should be	**Very low risk (Level 5)**	High
	Spatial Extent	**Site Specific**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
electrocution and collision with infrastructure (e.g. fences, overhead power lines)	*Duration*	**Long term**		made to minimise the route length to the closest existing substation and that the route be aligned with existing powerlines/roads as far as possible. Additionally, the route should avoid wetland crossings or potentially be routed underground if this is not possible. ▪ Install Eskom-approved bird flight diverters (flappers or coils) on the new above-ground transmission lines and any guide-wires used to anchor infrastructure such as pylons. This can help to increase the visibility of transmission lines and other infrastructure, especially the thinner earth line with which most collisions tend to be associated. ▪ Bird flight diverters need to be closely spaced (<15 m[4]) on OHPLs and must glow in the dark or have a light source to make the transmission lines more visible .This is specifically important because the proposed OHPL will be placed underneath existing OHPLs at right angles and will need to take every precaution to prevent collisions by flamingos that migrate at night. ▪ Design of overhead electrical lines must take into account potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal "streamers" or large open wings creating a short. ▪ In all areas where service road intersect with semi natural or natural habitat, all fences must be set back at least (strictly) 75 metres from the edge of every service road in order to allow for vulnerable species such as bustards, storks, cranes and korhaans to obtain adequate height after being flushed by vehicle traffic. Alternatively, the fences must be placed completely adjacent to the roads with a maximum of 3 metres buffer and marked with fence flappers in order to reduce flush-related collisions.		
	Consequence	**Substantial**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 6: Attraction to the facility	*Status*	**Negative**	**Low risk (Level 4)**	▪ Install bird deterrent devices around panels and on transmission line poles, pylons and / or monopoles to limit perching and minimise collision and electrocution risk.	**Very low risk (Level 5)**	*High*
	Spatial Extent	**Site specific**				

[4] The spacing between diverters along a power line should take into account the width of the binocular field and typical flight speed of the most susceptible species. In a test case using Canada Goose as the subject, this requirement meant that diverters needed to be placed every 12.5 m along a line (Martin 2022).

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation)***	***Confidence Level***
exacerbating potential impacts	*Duration*	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
DIRECT IMPACTS – DECOMMISSIONING PHASE						
Impact 7: Continued disturbance due to decommission activities (use of vehicles, lights etc.)	*Status*	**Negative**	**Low risk (Level 4)**	▪ See construction phase mitigation	**Very low risk (Level 5)**	High
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Moderate**				
Impact 8: Habitat loss reclamation from rehabilitation activities	Status	**Negative**	**Moderate risk (Level 3)**	▪ Remove all infrastructure not originally present prior to the construction phase; ▪ Rehabilitate all areas disturbed immediately after decommission activities and removal of infrastructure. ▪ Continue to implement an Alien and Invasive Plant Control Plan until the rehabilitation specialist deems it unnecessary.	**Moderate risk (Level 3)**	*Moderate*
	Spatial Extent	**Site specific**				
	Duration	**Long term**				
	Consequence	**Substantial**				
	Probability	**Very Likely**				
	Reversibility	**Low**				
	Irreplaceability	**Moderate**				

D.2.7.9 *Concluding Statement for VOLTA EGI*

The Avifauna study has appropriately demonstrated that there are no major negative impacts to avifauna SCC expected from the proposed VOLTA EGI development, provided that the proposed mitigation measures described above are applied appropriately and that continued adaptive management take place throughout the lifespan of the facility.

Without long-term data to present the flight paths of large-bodied SCC prone to collision, it is not possible to develop strict no-go areas for OHPLs based on likely collisions (other than significantly buffering major attractions like large freshwater pans). Furthermore, such desirable avoidance mitigation is typically not practically possible due to many other constraints, such as rules and regulations governing the placement of new OHPLs in close proximity to existing ESKOM OHPLs.

Therefore, none of the EGI areas for proposed infrastructure can be considered as NO-GO but strong emphasis must therefore be placed on minimisation mitigation and in this case, ensuring that no electrocutions or collisions of SCC take place. It is for this reason that the entire proposed OHPL will require extensive application (every ~ 15 m) of bird flight diverters that are visible in the dark. Furthermore, if possible, **underground cabling or re-alignment of the proposed OHPL** route should be implemented in the 50 m buffers surrounding the western-most depression wetland, to further minimise avoid the likelihood risk of collisions around this habitat. The current alignment of the OHPL is not suitable. Finally, bird perching deterrents, especially for large SCC such as White-backed Vultures must be installed on OHPL pylons to discourage their use.

Post-construction avifauna monitoring as stipulated in Jenkins *et al.* (2017) must take place for the VOLTA PV facility following construction and at the onset of operation. It is strongly recommended that this monitoring must include bird carcass monitoring activities along the proposed OHPL, with the goal of adaptively managing unforeseen impacts.

If the Applicant agrees to implement the above-described mitigation measures and post-construction monitoring, the specialists recommends that the Competent Authority should grant environmental authorisation for this proposed EGI development.

D.2.8 *Socio-Economic Assessment*

The Socio-Economic Assessment was undertaken by Tony Barbour and Schalk van der Merwe to inform the outcome of this BA from a socio-economic perspective. The complete Socio-Economic Assessment is included in Appendix C.15 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Socio-Economic Assessment. The information below is extracted from Barbour and van der Merwe (2023) (Appendix C.15 of the BA Report).

D.2.8.1 *Approach and Methodology*

The Socio-Economic Assessment includes the individual land parcels on which the proposed projects will be developed if approved, and the nearest town, Dealesville, as the anticipated socio-economic impacts will be spread to varying degrees across these localities. To create a comprehensive understanding of the socio-economic environment that might be affected by the proposed development, a socio-economic overview was developed incorporating both secondary and primary data collection. Data sources consulted to compile the socio-economic baseline include internet sources, for example, Statistics South Africa, to provide a broad overview of the socio-economic setting of the area; National, provincial and local policy and plans to determine whether the proposed project is aligned with the planning objectives of the various spheres of government, as well as previously conducted EIAs conducted to determine the potential impact and linkages to this assessment. Primary data collection was done through face-to-face and/or telephonic interviews with landowners of the affected properties to obtain additional context-specific information.

Data analysis was then conducted by evaluating relevant data from various sources published over different time periods in order to gain a long-term perspective. Information was analysed to establish status quo socio-economic conditions, prevailing social structures, local demographic trends, and potential change processes present in the study area. The overview was then used to interpret the impacts and measure the extent of socio-economic impacts that could be derived from the proposed activities.

D.2.8.2 Relevant Project Aspects relating to Socio-Economic Impacts

From a socio-economic perspective, the most important project related aspects are employment creation over the lifetime of the project; and the Economic Development Plan (EDP) the Applicant is to develop for implementation should the projects obtain preferred bidder status in terms of the REIPPPP.

D.2.8.3 Potential Impacts

The potential impacts identified for the Socio-Economic Assessment include:

Construction Phase:

- Potential impact 1: Creation of employment and business opportunities during the construction phase
- Potential impact 2: Impacts associated with the presence of construction workers on local communities
- Potential impact 3: Impacts related to the potential influx of job-seekers
- Potential impact 4: Increased risks to livestock and farming infrastructure associated with the construction related activities and presence of construction workers on the site
- Potential impact 5: Increased risk of grass fires associated with construction related activities
- Potential impact 6: Nuisance impacts, such as noise, dust, and safety, associated with construction related activities and vehicles
- Potential impact 7: Impact on productive farmland

Operational Phase:

- Potential impact 1: Development of infrastructure to improve energy security and support renewable sector
- Potential impact 2: Creation of employment and business opportunities associated with the operational phase
- Potential impact 3: The generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for farm outputs and inputs, such as fuel, feed etc.
- Potential impact 4: Visual impact associated with the proposed SEF and associated infrastructure and the potential impact on the areas rural sense of place
- Potential impact of the SEF on property values. This is usually linked to the visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place

- Potential impact of SEF on local tourism. This is usually linked to the visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.

Decommissioning Phase:

- Potential impact 1: Social impacts associated with retrenchment including loss of jobs, and source of income. Decommissioning will also create temporary employment opportunities, which would represent a positive temporary impact

Cumulative Impacts:

- Cumulative impact 1: Visual impacts associated with the establishment of more than one REF and the potential impact on the area's rural sense of place and character of the landscape
- Cumulative impact 2 The establishment of a number of renewable energy facilities and associated projects, such as the proposed SEF, in the TLM has the potential to place pressure on local services, specifically medical, education and accommodation
- Cumulative Impact 3:The establishment of renewable energy facilities and associated projects, such as the SEF, in the TLM will create employment, skills development and training opportunities, creation of downstream business opportunities

No indirect impacts were identified.

D.2.8.4 Impact Assessment

The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** facility and associated infrastructure for the construction, operational and decommissioning phases.

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation and Pre-Enhancement)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation and Post-Enhancement)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1: Creation of employment and business opportunities during the construction phase	*Status*	**Positive**	**Low risk (Level 4)**	In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented: **Employment** ▪ Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. ▪ Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. ▪ Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. ▪ Before the construction phase commences the proponent should meet with representatives from the MM to establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the construction phase. ▪ The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.	**Moderate risk (Level 3)**	High
	Spatial Extent	**Regional**				
	Duration	**Medium Term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**N/A**				
	Irreplaceability	**N/A**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation and Pre-Enhancement)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation and Post-Enhancement)*	*Confidence Level*
				▪ Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. ▪ The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. **Business** ▪ The proponent should liaise with the GMM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g., construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction service providers. These companies should be notified of the tender process and invited to bid for project-related work. ▪ .		
Impact 2: Impact of construction workers on local communities	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ The proponent should investigate the option of providing accommodation for workers in Bloemfontein. ▪ Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. ▪ Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. ▪ The SEP and CHSSP should include a Grievance Mechanism that enables stakeholders to report resolve incidents. ▪ Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. ▪ The proponent should consider the option of establishing a Monitoring Committee (MC) for the construction phase that representatives from local landowners, farming associations, and the local municipality. This MC should be established prior to commencement of the construction phase and form part of the	**Low risk (Level 4)**	High
	Spatial Extent	**Regional**				
	Duration	**Medium term**				
	Consequence	**Moderate**				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation and Pre-Enhancement)	Potential mitigation measures	Significance / Ranking (Post-Mitigation and Post-Enhancement)	Confidence Level
	Probability	**Likely**		SEP. ▪ The proponent and contractor should develop a Code of Conduct (CoC) for construction workers. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be subject to appropriate disciplinary action and/or dismissed. All dismissals must comply with the South African labour legislation. The CoC should be signed by the proponent and the contractors before the contractors move onto site. The CoC should form part of the CHSSP. ▪ The proponent and the contractor should implement an HIV/AIDS, COVID-19 and Tuberculosis (TB) awareness programme for all construction workers at the outset of the construction phase. The programmes should form part of the CHSSP. ▪ The contractor should provide transport for workers to and from the site on a daily basis. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site. ▪ The contractor must ensure that all construction workers from outside the area are transported back to their place of residence within 2 days for their contract coming to an end. ▪ No construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
	Reversibility	**Moderate**				
	Irreplaceability	**Low**				
Impact 3: Impact of job seekers on local communities	*Status*	**Negative**	**Low risk (Level 4)**	It is impossible to stop people from coming to the area in search of employment. However, as indicated above, the proponent should ensure that the employment criteria favour residents from the area. In addition: • Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. • Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. • The proponent, in consultation with the TLM, should investigate the option of establishing a MC to monitor and identify potential problems that may arise due to the influx of job seekers to the	**Low risk (Level 4)**	High
	Spatial Extent	**Regional**				
	Duration	**Medium term**				
	Consequence	**Slight**				
	Probability	**Unlikely**				
	Reversibility	**Moderate**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation and Pre-Enhancement)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation and Post-Enhancement)***	***Confidence Level***
	Irreplaceability	**Low**		area. The MC should also include the other proponents of solar energy projects in the area. • The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities. • The proponent should implement a policy that no employment will be available at the gate.		
Impact 4: Potential risk to farmers and farm workers, livestock and damage to farm infrastructure associated with the presence and activities of construction workers on site	*Status* *Spatial Extent* *Duration* *Consequence* *Probability* *Reversibility* *Irreplaceability*	**Negative** **Local** **Medium term** **Moderate** **Unlikely** **High** **Low**	**Moderate risk (Level 3)**	▪ Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. ▪ The proponent should engage with the local farming association and other PV SEF developers to identify was in which PV SEF developers can contribute towards improving security in the area. ▪ The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. ▪ All farm gates must be closed after passing through. ▪ Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. ▪ The proponent should establish a MC and CoC for workers (see above). ▪ The proponent should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the CoC to be signed between the proponent, the contractors, and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below). ▪ The proponent should implement a Grievance Mechanism that provides local farmers with an effective and efficient mechanism to address issues related to report issues related to damage to farm infrastructure, stock theft and poaching etc. ▪ The Environmental Management Plan Report (EMPr) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested. ▪ Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the	**Low risk (Level 4)**	High

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation and Pre-Enhancement)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation and Post-Enhancement)*	*Confidence Level*
				conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. ▪ Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the CoC. All dismissals must be in accordance with South African labour legislation. ▪ It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
Impact 5: Increased risk of grass fires	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. ▪ Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. ▪ The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc., during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. ▪ Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas. ▪ Smoking on site should be confined to designated areas. ▪ Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high-risk dry, windy winter months. ▪ Contractor should provide adequate fire-fighting equipment on-site, including a fire fighting vehicle. ▪ Contractor should provide fire-fighting training to selected construction staff. ▪ No construction staff, with the exception of security staff, to be accommodated on site overnight. ▪ In the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Moderate**				
	Probability	**Unlikely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation and Pre-Enhancement)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation and Post-Enhancement)***	***Confidence Level***
				should also compensate the fire-fighting costs borne by farmers and local authorities.		
Impact 6: Nuisance impacts associated with construction related activities	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ Preparation and implementation of a Stakeholder Engagement Plan (SEP) prior to and during the construction phase. ▪ Preparation and implementation of a Community Health, Safety and Security Plan (CHSSP) prior to and during the construction phase. ▪ Timing of construction activities should be planned to avoid / minimise impact on key farming activities, including planting and harvesting operations. ▪ The proponent should establish a MC to monitor the construction phase and the implementation of the recommended mitigation measures. The MC should be established before the construction phase commences, and should include key stakeholders, including representatives from local farmers and the contractor(s). The MF should also address issues associated with damage to roads and other construction related impacts. ▪ Ongoing communication with land owners and road users during construction period. This should be outlined in the SEP. ▪ The proponent should implement a Grievance Mechanism that provides local farmers and other road users with an effective and efficient mechanism to address issues related to construction related impacts, including damage to local gravel farm roads. ▪ Implementation of a road maintenance programme throughout the construction phase to ensure that the affected roads maintained in a good condition and repaired once the construction phase is completed. ▪ Repair of all affected road portions at the end of construction period where required. ▪ Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport building materials are fitted with tarpaulins or covers. ▪ All vehicles must be roadworthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Medium term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

Impact	***Impact Criteria***		***Significance / Ranking (Pre-Mitigation and Pre-Enhancement)***	***Potential mitigation measures***	***Significance / Ranking (Post-Mitigation and Post-Enhancement)***	***Confidence Level***
Impact 7: Impacts associated with loss of farmland	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ The loss of high-quality agricultural land should be avoided and or minimised by careful planning of the final layout of the proposed SEF facilities and associated infrastructure. The recommendations of the agricultural / soil assessment should be implemented. ▪ Affected landowners should be consulted about the timing of construction related activities in advance. ▪ The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised. ▪ An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase. ▪ All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. ▪ The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up by the Environmental Consultants appointed to manage the EIA. ▪ The implementation of the Rehabilitation Programme should be monitored by the ECO.	**Moderate risk (Level 3)**	Medium
	Spatial Extent	**Site Specific**				
	Duration	**Medium Term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**High**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation and Pre-Enhancement)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation and Post-Enhancement)*	*Confidence Level*
	Irreplaceability	**N/A**				
DIRECT IMPACTS – OPERATIONAL PHASE						
Impact 1: 4.4.1 Improve energy security and support the renewable energy sector	*Status*	**Positive**	**Moderate risk (Level 3)**	▪ Maximise the number of employment opportunities for local community members. ▪ Implement training and skills development programs for members from the local community. ▪ Maximise opportunities for local content and procurement.	**Moderate risk (Level 3)**	High
	Spatial Extent	**National**				
	Duration	**Long Term**				
	Consequence	**Substantial**				
	Probability	**Very Likely**				
	Reversibility	**N/A**				
	Irreplaceability	**N/A**				
Impact 2: Creation of employment and business opportunities associated with the operational phase	*Status*	**Positive**	**Low risk (Level 4)**	▪ See business opportunities during the construction phase enhancement measures ▪ the proponent should investigate providing training and skills development to enable locally based service providers to provide the required services for the operational phase.	**Moderate (Level 3)**	High
	Spatial Extent	**Regional**				
	Duration	**Long term**				
	Consequence	**Slight**				
	Probability	**Very unlikely**				
	Reversibility	**N/A**				
	Irreplaceability	**N/A**				
Impact 3: The	*Status*	**Positive**	**Low risk**	▪ Implement agreements with affected landowners.	**Moderate**	High

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation and Pre-Enhancement)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation and Post-Enhancement)*	*Confidence Level*
generation of additional income represents a significant benefit for the local affected farmer(s) and reduces the risks to their livelihoods posed by droughts and fluctuating market prices for farm outputs and inputs, such as fuel, feed etc.	*Spatial Extent*	**Local**	**(Level 4)**	▪ The loss of high-quality agricultural land should be avoided and or minimised by careful planning in the final layout of the proposed SEF facilities. The recommendations of the agricultural / soil assessment should be implemented	**(Level 3)**	
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**N/A**				
	Irreplaceability	**N/A**				
Impact 4: Visual impact associated with the proposed SEF and associated infrastructure and the potential impact on the areas rural sense of place.	*Status*	**Negative**	**Moderate risk (Level 3)**	*The recommendations of the VIA should be implemented.*	**Moderate risk (Level 3)**	*High*
	Spatial Extent	**Regional**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation and Pre-Enhancement)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation and Post-Enhancement)*	*Confidence Level*
Impact 5: Potential impact of the SEF on property values. This is usually linked to the visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place	*Status*	**Negative**	**Moderate risk (Level 3)**		**Low risk (Level 4)**	*High*
	Spatial Extent	**Regional**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
Impact 6: Potential impact of SEF on local tourism. This is usually linked to the visual impact associated with the proposed facility and associated infrastructure and the potential impact on the areas rural sense of place.	*Status*	**Negative**	**Low risk (Level 4)**	The recommendations contained in the VIA should be implemented.	**Low risk (Level 4)**	*High*
	Spatial Extent	**Regional**				
	Duration	**Long Term**				
	Consequence	**Slight**				
	Probability	**Unlikely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation and Pre-Enhancement)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation and Post-Enhancement)*	*Confidence Level*
DIRECT IMPACTS – DECOMMISSIONING PHASE						
Impact 1: Social impacts associated with decommissioning	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ The proponent should ensure that retrenchment packages are provided for all staff retrenched when the plant is decommissioned. ▪ All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning	**Low risk (Level 4)**	High
	Spatial Extent	**Local**				
	Duration	**Short Term**				
	Consequence	**Slight**				
	Probability	**Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** ad EGI for the construction phase.

Impact	*Impact Criteria*		*Significance / Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance / Ranking (Post-Mitigation)*	*Confidence Level*
CUMULATIVE IMPACTS – CONSTRUCTION AND OPERATIONAL PHASE						
Impact 1: Visual impacts associated with the establishment of more than one REF and the potential impact on the area's rural sense of place and character of the landscape.	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ The recommendations contained in the VIA should be implemented	**Moderate risk (Level 3)**	High
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
Impact 2: The establishment of a number of renewable energy facilities and associated projects, such as the proposed SEF, in the TLM has the potential to place pressure on local services, specifically medical,	*Status*	**Negative**	**Moderate risk (Level 3)**	▪ The proponent should liaise with the other developers, the TLM, Mangaung Metro to investigate option of accommodating construction workers in Bloemfontein and Free State Provincial Government to investigate the option of providing accommodation for workers in Bloemfontein. ▪ The proponent should liaise with the TLM to address potential impacts on local services.	**Low risk (Level 4)**	High
	Spatial Extent	**Regional**				
	Duration	**Long Term**				
	Consequence	**Moderate-Substantial**				
	Probability	**Likely**	**High risk (Level 2)**			
	Reversibility	**High**				
	Irreplaceability	**Low**				

Impact	Impact Criteria		Significance / Ranking (Pre-Mitigation)	Potential mitigation measures	Significance / Ranking (Post-Mitigation)	Confidence Level
education and accommodation						
Impact 3: The establishment of renewable energy facilities and associated projects, such as the SEF, in the TLM will create employment, skills development and training opportunities, creation of downstream business opportunities.	*Status*	Positive	**Moderate (Level 3)**	▪ The proponent should liaise with the TLM to identify potential opportunities for the local economy and businesses	**Moderate (Level 3)**	*High*
	Spatial Extent	Regional				
	Duration	Long Term				
	Consequence	Moderate-High				
	Probability	Likely				
	Reversibility	N/A				
	Irreplaceability	N/A				
	Spatial Extent				**High risk (Level 2)**	
	Duration					
	Consequence					
	Probability					
	Reversibility					
	Irreplaceability					

D.2.8.5 Concluding Statement

The findings of the SIA indicate that the development of the proposed VOLTA PV Facility and associated infrastructure will create employment and business opportunities for the Tokologo Local Municipality during both the construction and operational phase of the project. However, due the small size of the towns of Dealesville and Boshof the employment opportunities for local community members are likely to be limited. The availability of accommodation for construction workers in Dealesville and Boshof is also limited. This will be exacerbated by the proposed construction of a number of PV SEFs in the area over the next 2-5 years. All of the potential negative impacts, with the exception of the visual impact on sense of place, can also be effectively mitigated.

The establishment of the proposed VOLTA PV Facility and associated infrastructure including a battery energy storage system (BESS) is therefore supported by the findings of the SIA.

D.2.9 Geohydrology Assessment

The Geohydrology Assessment was undertaken by Hardy Luttig and Shane Teek of GEOSS South Africa (PTY) Ltd to inform the outcome of this BA from a geohydrological perspective. The complete Geohydrology Assessment is included in Appendix C.16 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Geohydrology Assessment. The information below is extracted from Luttig and Teek (2023).

D.2.9.1 Approach and Methodology

The Geohydrology Assessment included a desktop review of groundwater characteristics and users in the area, with the aim of determining the potential for groundwater to be used during the construction and operational phases (including panel cleaning), as well as the risk to nearby groundwater users. The study also included an assessment of the impact on geohydrological resources as a result of the proposed development, as well as provision of recommendations to minimize or mitigate impacts, and to confirm what type of authorisation is required to make use of the groundwater. The specialist study was completed as follows:

- **Task 1**: To obtain all relevant data (i.e., obtain data from the National Groundwater Archive (NGA) and associated groundwater use databases, e.g. Water Authorisation and Registration Management System (WARMS), and GEOSS internal database). Obtain any data from local Department of Water and Sanitation (DWS) monitoring boreholes. Obtain relevant geological maps and geohydrological maps, as well as information on groundwater yield and groundwater chemistry of the area.
- **Task 2**: Analyse the data, using geohydrological methods and address the project objectives.
- **Task 3**: Document the results in a report.

D.2.9.2 Relevant Project Aspects relating to Geohydrology Impacts

As mentioned above, the Project Applicant does not intent on making use of borehole water but has commissioned an assessment should the need arise.

Generally, groundwater can be impacted negatively in two manners, namely:

- Over-abstraction (where groundwater abstraction exceeds recharge rates) which can result in the alteration of groundwater flow directions and gradients; and
- Quality deterioration (i.e., from anthropogenic activities negatively impacting groundwater quality).

D.2.9.3 Potential Impacts

The potential impacts identified in the Geohydrology Assessment are listed below:

Construction Phase:
- Ground water contamination by means of spillages with regards to oil, hydraulic fluids, fuels and dust control.

Operational Phase:
- Ground water contamination by means of electrolyte leakage and mismanaged solar panel maintenance.

Decommissioning Phase:
- Ground water contamination by means of spillages with regards to oil, hydraulic fluids, and fuels and by means of electrolyte leakage/spillage.

Cumulative Impacts

Construction Phase:
- Ground water contamination by means of spillages with regards to oil, hydraulic fluids, fuels and dust control.

Operation Phase:
- Contamination of ground water by means of electrolyte leakage and mismanaged solar panel maintenance.

Decommissioning Phase:
- Ground water contamination by means of spillages with regards to oil, hydraulic fluids, and fuels and by means of electrolyte leakage/spillage.

No indirect impacts have been identified; and no impacts were identified during the decommissioning phase.

D.2.9.4 Impact Assessment

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **construction phase**.

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACTS - CONSTRUCTION PHASE						
Ground water contamination by means of spillages with regards to oil, hydraulic fluids, fuels and dust control	Status	**Negative**	**Low(Level 4)**	• During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented, e.g. including ensuring that construction equipment is well maintained. • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilt material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. • Any construction vehicles/engines that stand in one place for an excessive length of time must have drip trays • It is advised that the water source to be used for dust control should be of such quality that it does not jeopardise the ground water quality upon possible infiltration. • Ground water quality monitoring to be done prior and	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**Low**				
	Irreplaceability	**Highly**				

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
				during construction in order to identify possible ground water contamination.		

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - OPERATIONAL PHASE						
Ground water contamination by means of electrolyte leakage and mismanaged solar panel maintenance	*Status*	**Negative**	**Low** **(Level 4)**	• Electrolyte spillage to be mitigated through leak detection, double containment and suitably designed bunding for the structure, approved by a qualified professional. • BESS should be buffered 50 m from existing boreholes, structures and public roads as this could potentially avoid mild impacts with regards to container fires and case explosions*. Adhering hereto, this might suppress ground water contamination in the case of an accident. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal should be obtained and retained on file for auditing purposes. • Maintenance of solar panels to be closely monitored and the use of hazardous chemical products to be avoided when solar panels are cleaned. • Recycled water for maintenance purposes should be of such a quality that it would not jeopardise underground resources. • Groundwater quality monitoring to be done during project operation in order to identify possible ground water contamination.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Unlikely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the VOLTA PV and BESS and associated infrastructure for the **Decommissioning phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Ground water contamination (1) by means of spillages with regards to oil, hydraulic fluids, and fuels. *And* *(2) by means of electrolyte leakage/spillage.*	*Status*	**Negative**	**Very low** **(Level 5)**	• During the execution of the decommissioning, appropriate measures to prevent pollution and contamination of the environment must be implemented e.g. including ensuring that equipment is well maintained; • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. • Chemical ground water monitoring to be done during project decommissions in order to identify possible ground water contamination.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short**				
	Consequence	**Slight**				
	Probability	**Likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **construction phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
CUMULATIVE IMPACT - CONSTRUCTION PHASE						
Ground water contamination by means of spillages with regards to oil, hydraulic fluids, fuels and dust control	*Status*	**Negative**	**Low** **(Level 4)**	• During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented, e.g. including ensuring that construction equipment is well maintained. • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilt material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. • Any construction vehicles/engines that stand in one place for an excessive length of time must have drip trays • It is advised that the water source to be used for dust control should be of such quality that it does not jeopardise the ground water quality upon possible infiltration. • Ground water quality monitoring to be done prior and during construction in order to identify possible ground water contamination.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Medium**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**Low**				
	Irreplaceability	**Highly**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACT - OPERATIONAL PHASE						
Ground water contamination by means of electrolyte leakage and mismanaged solar panel maintenance	*Status*	**Negative**	**Low** **(Level 4)**	• Electrolyte spillage to be mitigated through leak detection, double containment and suitably designed bunding for the structure, approved by a qualified professional. • BESS should be buffered 50 m from existing boreholes, structures and public roads as this could potentially avoid mild impacts with regards to container fires and case explosions*. Adhering hereto, this might suppress ground water contamination in the case of an accident. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal should be obtained and retained on file for auditing purposes. • Maintenance of solar panels to be closely monitored and the use of hazardous chemical products to be avoided when solar panels are cleaned. • Recycled water for maintenance purposes should be of such a quality that it would not jeopardise underground resources. • Groundwater quality monitoring to be done during project operation in order to identify possible ground water contamination.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Long term**				
	Consequence	**Moderate**				
	Probability	**Unlikely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLT PV and BESS** and associated infrastructure for the **Decommissioning phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS - DECOMMISSIONING PHASE						
Ground water contamination (1) by means of spillages with regards to oil, hydraulic fluids, and fuels. And (2) by means of electrolyte leakage/spillage.	*Status*	**Negative**	**Very low (Level 5)**	• During the execution of the decommissioning, appropriate measures to prevent pollution and contamination of the environment must be implemented e.g., including ensuring that equipment is well maintained; • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes. • Chemical ground water monitoring to be done during project decommissions in order to identify possible ground water contamination.	**Very Low (Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short**				
	Consequence	**Slight**				
	Probability	**Likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

D.2.9.5 Concluding Statement

As the project will only use municipal water for develop the development, a Water Use License will not be required; however, if the project requires the use of groundwater resources, a WULA will need to be submitted to the Department of Water and Sanitation under Section 40 of the National Water Act, 1998 (Act No. 36 of 1998).

From the impact assessment it is evident that the development will have a very low to low impact on the local geohydrology. Therefore, it is believed that the project can progress as is as long as the recommended mitigation measures are implemented.

D.2.10 Geotechnical impacts

This section is informed by the desktop technical Impact Assessment included in Appendix C.12 of the BA Report

The Geotechnical Assessment was undertaken by Hardy Luttig and Shane Teek of GEOSS South Africa (PTY) Ltd to inform the outcome of this BA from a geotechnical perspective. The complete Geohydrology Assessment is included in Appendix C.17 of this report. The following section provides a summary of the Approach, Key Findings, Impact Assessment and Concluding Statement undertaken for the Geotechnical Assessment. The information below is extracted from Luttig and Teek (2023).

D.2.10.1 Potential Impacts

The potential impacts identified in the desktop Geotechnical Assessment are listed below:

Construction Phase:
- Impact 1: Displacement of geologic materials.
- Impact 2: Contamination of geologic materials

Operational Phase:
- Impact 1: Displacement of geologic materials
- Impact 2: Contamination of geologic materials

Decommissioning Phase:
- Impact 1: Displacement of geologic materials.
- Impact 2: Contamination of geologic materials

Cumulative Impacts

Construction Phase:
- Impact 1: Displacement of geologic materials.
- Impact 2: Contamination of geologic materials

Operational Phase:
- Impact 1: Displacement of geologic materials
- Impact 2: Contamination of geologic materials

Decommissioning Phase:

- Impact 1: Displacement of geologic materials.
- Impact 2: Contamination of geologic materials

No indirect impacts have been identified; and no impacts were identified during the decommissioning phase.

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the VOLTA PV and BESS and associated infrastructure for the **construction phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 1 *Displacement of geologic materials*	*Status*	**Negative**	**Low** **(Level 4)**	Favour dolerite as an aggregate (as opposed to Karoo sandstones and mudstones). Subject to investigation. • Any road cuttings should be designed by an appropriately qualified professional. • Drainage in the region should be designed and managed appropriately. • Investigate and confirm the geotechnical suitability of each structure (or other appropriate level of investigation) prior to construction (i.e. determine that soil with an adequate bearing capacity is obtained beneath each footing). Such investigations would not be required to fulfil the requirements of the EIA process. However, it would be necessary prior to construction. • Only strip vegetation necessary for the next phase of construction. • Install temporary drainage to divert stormwater away from active construction activities, where required. • Stormwater Management Plan must be developed in the preconstruction phase. It should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flow directly into any natural systems (in consultation with suitably qualified professionals). Effective stormwater management must include effective stabilisation (e.g., gabions and Reno mattresses) of exposed soil. • Suitable stormwater management systems must be installed along roads and other areas and be monitored	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

				during the first few months of use. Any erosion/sedimentation must be resolved through any additional interventions that may be necessary (e.g., extension, energy dissipaters, spreaders, etc.). • Where impacted through construction-related activities, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled. • Sloped areas stabilised using designed structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly. • Any rehabilitation should be scheduled to ensure rehabilitation can take place at the optimal time for vegetation establishment. • Where earthwork is being undertaken near any watercourses, slopes must be stabilised using suitable materials, e.g., sandbags or geotextile fabric, to prevent sand and rock from entering the channel. • Appropriate rehabilitation and re-vegetation measures for any disturbed watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.		

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **construction phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - CONSTRUCTION PHASE						
Impact 2 *Contamination of geologic materials*	*Status*	**Negative**	**Low** **(Level 4)**	• During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented, e.g. including ensuring that construction equipment is well maintained. • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilt material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **operational phase**.

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DIRECT IMPACTS - OPERATIONAL PHASE						
Impact 1 *Displacement of geologic materials*	*Status*	**Negative**	**Low** **(Level 4)**	• Install drainage to divert stormwater away from activities, roads/tracks, structures, where required. • Generic management for typical infrastructure of the proposed development, including: 1. Stormwater Management Plan must be developed in the preconstruction phase and should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems, where possible and lawful. Effective stormwater management must include effective stabilisation (e.g. gabions and Reno mattresses) of exposed soil etc. 2. 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 any additional interventions that may be necessary (e.g., extension, energy dissipaters, spreaders, etc.). 3. Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. 4. No regular maintenance activities to take place outside of the authorised footprint and all vehicles to remain on authorised roads and tracks.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Long**				
	Consequence	**Moderate**				
	Probability	**Likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - OPERATIONAL PHASE						
Impact 2 *Contamination of geologic materials*	*Status*	**Negative**	**Low** **(Level 4)**	• During the execution of the operations, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover/bunding. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short term**				
	Consequence	**Moderate**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **decommissioning phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
DIRECT IMPACTS - DECOMMISSIONING PHASE						
Impact 1 *Displacement of geologic materials*	*Status*	**Negative**	**Very low** **(Level 5)**	• Only drive and park vehicles where necessary. • Land rehabilitation to near natural state, i.e. removal of foundations and backfilling of any resultant voids within the soil, as well as removal of hard surfaced areas. Replacement soil should be sourced locally to ensure homogeneity. • Reinstate natural topography where cut-to-fill embankments have been constructed. • Implement generic environmental management procedures for infrastructure.	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short**				
	Consequence	**Slight**				
	Probability	**Likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				
Impact 2 *Contamination of geologic materials*	*Status*	**Negative**	**Very low** **(Level 5)**	• During the execution of the decommissioning, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that equipment is well maintained; • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste disposal slips or waybills) should be	**Very Low** **(Level 5)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short**				
	Consequence	**Slight**				
	Probability	**Likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

				obtained and retained on file for auditing purposes.		

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **Construction phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACT - CONSTRUCTION PHASE						
Impact 1 *Displacement of geologic materials*	*Status*	**Negative**	**Moderate** **(Level 3)**	• Only strip vegetation necessary for the next phase of construction. • Install temporary drainage to divert stormwater away from active construction activities, where required. • Stormwater Management Plan must be developed in the preconstruction phase. It should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems (in consultation with suitably qualified professionals). Effective stormwater management must include effective stabilisation (e.g. gabions and Reno mattresses) of exposed soil. • Suitable stormwater management systems must be installed along roads and other areas and be monitored during the first few months of use. Any erosion/sedimentation must be resolved through any additional interventions that may be necessary (e.g., extension, energy dissipaters, spreaders, etc.). • Where impacted through construction-related activities, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled. • Sloped areas stabilised using designed structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly. • Any rehabilitation should be scheduled to ensure rehabilitation can take place at the optimal time for vegetation establishment. • Where earthwork is being undertaken in near any	**Low** **(Level 4)**	Medium
	Spatial Extent	**Regional**				
	Duration	**Medium-term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

				watercourses, slopes must be stabilised using suitable materials, e.g. sandbags or geotextile fabric, to prevent sand and rock from entering the channel. • Appropriate rehabilitation and re-vegetation measures for any disturbed watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.		

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **Construction phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS - CONSTRUCTION PHASE						
Impact 2 *Contamination of geologic materials*	*Status*	**Negative**	**Moderate** **(Level 3)**	• During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented, e.g., including ensuring that construction equipment is well maintained. • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	**Low** **(Level 4)**	Medium
	Spatial Extent	**Regional**				
	Duration	**Medium-term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **Operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACT - OPERATIONAL PHASE						
Impact 1 *Displacement of geologic materials*	*Status*	**Negative**	**Moderate** **(Level 3)**	• Install drainage to divert stormwater away from activities, roads/tracks, structures, where required. • Generic management for typical infrastructure of the proposed development, including: 1. Stormwater Management Plan must be developed in the preconstruction phase and should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems, where possible and lawful. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil etc. 2. 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 any additional interventions that may be necessary (e.g., extension, energy dissipaters, spreaders, etc.). 3. Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. 4. No regular maintenance activities to take place outside of the authorised footprint and all vehicles to remain on authorised roads and tracks.	**Low** **(Level 4)**	Medium
	Spatial Extent	**Regional**				
	Duration	**Medium-term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **Operational phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
			OPERATIONAL PHASE			
Impact 2 *Contamination of geologic materials*	*Status*	**Negative**	**Moderate** **(Level 3)**	• During the execution of the operations, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g., including ensuring that construction equipment is well maintained. • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover/bunding. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.	**Low** **(Level 4)**	Medium
	Spatial Extent	**Regional**				
	Duration	**Medium-term**				
	Consequence	**Substantial**				
	Probability	**Very likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				

The impact assessments for both projects are the same. The table below includes an assessment of the potential **cumulative impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **Decommissioning phase**.

Impact	***Impact Criteria***		***Significance and Ranking (Pre-Mitigation)***	***Potential mitigation measures***	***Significance and Ranking (Post-Mitigation)***	***Confidence Level***
CUMULATIVE IMPACTS- DECOMMISSIONING PHASE						
Impact 1 *Displacement of geologic materials*	*Status*	**Negative**	**Moderate** **(Level 3)**	• Only drive and park vehicles where necessary. • Land rehabilitation to near natural state, i.e. removal of foundations and backfilling of any resultant voids within the soil, as well as removal of hard surfaced areas. Replacement soil should be sourced locally to ensure homogeneity. • Reinstate natural topography where cut-to-fill embankments have been constructed. • Implement generic environmental management procedures for infrastructure.	**Low** **(Level 4)**	Medium
	Spatial Extent	**Local**				
	Duration	**Short**				
	Consequence	**Substantial**				
	Probability	**Likely**				
	Reversibility	**Moderate**				
	Irreplaceability	**Moderate**				
Impact 2 *Contamination of geologic materials*	*Status*	**Negative**	**Moderate** **(Level 3)**	• During the execution of the decommissioning, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that equipment is well maintained; • Provision must be made for refuelling at the storage area by protecting the soil with an impermeable ground cover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. • Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. • If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, as reported. Proof of disposal (waste	**Low** **(Level 4)**	Medium

				disposal slips or waybills) should be obtained and retained on file for auditing purposes.		

D.2.10.2 Concluding Statement

Based on the findings of this study, development should proceed provided the mitigation measures are implemented. The following conclusions can be drawn from the investigation:

- The impact of the proposed development is expected to be very low and is anticipated to have little effect on the site from a geotechnical point of view. Cumulatively the intensities of the impacts may increase as the project progress, however with effective mitigations the significance of impacts is regarded as low.
- Increased soil erosion may transpire as an impact of development, this may persist for the life of the project. However, the impact of this is expected to be very low and is anticipated to have little effect on the site from a geotechnical point of view.
- Variable soil and rock conditions will exist across the site, broadly these have been divided as follows:
    a. Zone A – Karoo sandstones, siltstones and mudstones
    b. Zone B – Karoo dolerite
    c. Zone C – Quaternary sediments
- The presence of potential foundation related movement resulting from potentially collapsible soils and/or expansive clays must be confirmed during intrusive investigations. Each proposed structural footprint would have to be investigated prior to compilation of final design.
- Owing to the variable geologic and soil conditions across the proposed development area, the subgrade conditions will vary across the site. Dolerite has been proven to perform well as an aggregate for wearing courses. Dolerite has also been incorporated as an aggregate in concrete mixes. Karoo mudrock and sandstone should be avoided when selecting aggregates for concrete mixes.
- The excavatability of the stratum on site are anticipated to variable, based on material composition and texture, the degree of weathering, and the nature of discontinuities within the rock and/or soil mass.
- The seismicity in the region is considered to have a NPGA that exceeds a 0.1 g once every 475 years. The design phase should therefore make allowances for potential regional seismicity.
- Intrusive investigations will be required to confirm the anticipated conditions at each of the PV cluster positions and all other associated structures.
- Any road cuttings should be designed by an appropriately qualified professional.
- GEOSS has endeavoured to highlight and characterise all potential geotechnical risks that are presented by the site that has been proposed for development. However, due to the anisotropic (variable) nature of earth materials, each point on the site will present results that differ. For this reason, it is considered of the utmost importance that the foundation excavations be inspected prior to casting to ensure that soil with an adequate bearing capacity is obtained beneath each footing. These works should be carried out by an appropriately qualified individual.

D.2.11 Traffic Impacts

This section is informed by the **technical** Transportation Assessment Statement included in Appendix C.18 of the BA Report. The assessment was carried out by Merchandt Le Maitre.

D.2.11.1 Approach and Methodology

The Traffic Impact Statement investigates the transportation implications associated with the abnormal load vehicles transporting components to the site and the transportation of construction materials, equipment and workers to the site during the construction, operational and decommissioning phases. The broad methodology adopted for the Transport Study included a literature review, traffic data collection (such as Annual Average Daily Traffic from the Road Network Information System), data analysis, and evaluation of proposed access configurations.

D.2.11.2 Relevant Project Aspects relating to Traffic Impacts

The relevant project aspects relating to traffic impacts are linked to the vehicles that need to access the project sites for various reasons. As noted in Section A of this report, it is understood that traffic will be generated as a result of building materials and being transported to and from site. Solar panels, frames and inverters are also to be transported via double axle trucks; and transformers will be transported by abnormal load trucks for which a permit will need to be applied for in terms of Section 81 of the National Road Traffic Act.

D.2.11.3 Potential Impacts

The potential impacts identified in the Transport Assessment include the following for the construction, operation and decommissioning phases:

Construction phase:

- Increase in Traffic;
- Increase of Incidents with pedestrians and livestock;
- Increase in dust from gravel roads;
- Increase in Road Maintenance;
- Additional Abnormal Loads
- Increase in dust from gravel roads
- New / Larger Access points

Operational Phase:

- Increase in Traffic;
- Increase of Incidents with pedestrians and livestock;
- Increase in dust from gravel roads;
- Increase in Road Maintenance;
- Additional Abnormal Loads
- Increase in dust from gravel roads
- New / Larger Access points

Decommissioning Phase

- Increase in Traffic;
- Increase of Incidents with pedestrians and livestock;
- Increase in dust from gravel roads;
- Increase in Road Maintenance;
- Additional Abnormal Loads
- Increase in dust from gravel roads
- New / Larger Access points

The traffic generated during the operational phase will not have a significant impact on the surrounding road network; and indirect impacts have not been identified.

D.2.11.4 Impact Assessment

The impact assessments for both projects are the same. The table below includes an assessment of the potential **direct impacts** identified for the **VOLTA PV and BESS** and associated infrastructure for the **construction, operation and decommissioning phases and cumulative impact**.

Impact		Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
DIRECT IMPACT - CONSTRUCTION PHASE							
Additional Traffic Generation	***Increase in Traffic***	*Status*	**Negative**	**Low (Level 4)**	• Ensure staff transport is done in the 'off peak' periods and by bus, if possible. • Stagger material, component, and abnormal load delivery. • The PV Construction phase could be reduced by phasing the construction phase into smaller packages, thereby reducing the number of trips in the morning / afternoon peak periods.	**Very Low (Level 5)**	*Medium*
		Spatial Extent	**Regional**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase of Incidents with pedestrians and livestock	*Status*	**Negative**	**Low (Level 4)**	• Upgrade of existing / new access points. • Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives. • Regular maintenance of farm fences & access cattle grids.	**Low (Level 4)**	*Medium*
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in dust from gravel roads	*Status*	**Negative**	**Low (Level 4)**	• Upgrade of existing / new access point.	**Low (Level 4)**	*Low*
		Spatial Extent	**Site specific**				

		Duration	**Short Term**		• Reduction in the speed of the vehicles. • Construction of gravel roads in terms of TRH20. • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of approved dust suppressant techniques.		
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
	Increase in Road Maintenance	*Status*	**Negative**	**Low (Level 4)**	• Implement a road maintenance program under the auspices of the respective transport department.	**Low (Level 4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
Abnormal Loads	**Additional Abnormal Loads**	*Status*	**Negative**	**Low (Level 4)**	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
Internal Access Roads	**Increase in dust from gravel roads**	*Status*	**Negative**	**Low (Level 4)**	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				

		Irreplaceability	**Moderate**				
	New / Larger Access points	*Status*	**Neutral**	**Very Low (Level 5)**	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	**Very Low (Level 5)**	Medium
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**Moderate**				
DIRECT IMPACTS - OPERATIONAL PHASE							
Additional Traffic Generation	**Increase in Traffic**	*Status*	**Negative**	**Low (Level 4)**	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	**Very Low (Level 5)**	Medium
		Spatial Extent	**Regional**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in Incidents with pedestrians and livestock	*Status*	**Negative**	**Low (Level 4)**	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	**Low (Level 4)**	Medium
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in dust from gravel roads	*Status*	**Negative**	**Low (Level 4)**	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	**Low (Level 4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				

		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
	Increase in Road Maintenance	*Status*	**Negative**	**Low (Level 4)**	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	**Low (4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
Abnormal Loads	**Additional Abnormal Loads**	*Status*	**Negative**	**Low (Level 4)**	• The increase in traffic for this phase of the development is negligible and will not have a significant impact.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
Internal Access Roads	**Increase in dust from gravel roads**	*Status*	**Negative**	**Low (Level 4)**	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
	New / Larger	*Status*	**Neutral**	**Very Low**	• Adequate road signage according to	**Very Low**	Medium

	Access points	*Spatial Extent*	**Site specific**	**(Level 5)**	the SARTSM. • Approval from the respective roads department.	**(Level 5)**	
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**Moderate**				
DIRECT IMPACTS - DECOMMISSIONING PHASE							
Additional Traffic Generation	**Increase in Traffic**	*Status*	**Negative**	**Low (Level 4)**	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component, and abnormal load delivery.	**Very Low (Level 5)**	Medium
		Spatial Extent	**Regional**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in Incidents with pedestrians and livestock	*Status*	**Negative**	**Low (Level 4)**	• Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives. • Regular maintenance of farm fences and access cattle grids. • Coordination between all developers in the area and the local authority.	**Low (Level 4)**	Medium
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in dust from gravel roads	*Status*	**Negative**	**Low (Level 4)**	• Reduction in the speed of the vehicles. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	**Low (Level 4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				

		Reversibility	**Low-reversibility**		• Implement a road maintenance program under the auspices of the respective transport department.		
		Irreplaceability	**Moderate**				
	Increase in Road Maintenance	*Status*	**Negative**	**Low (Level 4)**	• Implement a road maintenance program under the auspices of the respective transport department.	**Low (Level 4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
Abnormal Loads	**Additional Abnormal Loads**	*Status*	**Negative**	**Low (Level 4)**	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
Internal Access Roads	**Increase in dust from gravel roads**	*Status*	**Negative**	**Low (Level 4)**	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
	New / Larger Access points	*Status*	**Neutral**	**Very Low (Level 5)**	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				

		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**Moderate**				
CUMULATIVE IMPACTS							
Additional Traffic Generation	**Increase in Traffic**	*Status*	**Negative**	**Low (Level 4)**	• Ensure a large portion of vehicles travelling to and from the proposed development travels in the 'off peak' periods or by bus. • Coordination between all developers in the area and the local authority.	**Very Low (Level 5)**	Medium
		Spatial Extent	**Regional**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in Incidents with pedestrians and livestock	*Status*	**Negative**	**Low (Level 4)**	• Reduction in the speed of vehicles. • Adequate enforcement of the law. • Implementation of pedestrian safety initiatives. • Regular maintenance of farm fences and access cattle grids. • Coordination between all developers in the area and the local authority.	**Low (Level 4)**	Medium
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
	Increase in dust from gravel roads	*Status*	**Negative**	**Low (Level 4)**	• Reduction in the speed of the vehicles. • Construction of gravel roads in terms of TRH20. • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of approved dust suppressant techniques. • Coordination between all developers in the area and the local authority.	**Low (Level 4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				

	Increase in Road Maintenance	*Status*	**Negative**	**Low (Level 4)**	• Implement a road maintenance program under the auspices of the respective transport department.	**Low (Level 4)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
Abnormal Loads	**Additional Abnormal Loads**	*Status*	**Negative**	**Low (Level 4)**	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger collections. • Adequate enforcement of the law.	**Very Low (Level 5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Non-reversible**				
		Irreplaceability	**High**				
Internal Access Roads	**Increase in dust from gravel roads**	*Status*	**Negative**	**Low (Level 4)**	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	**Very Low (5)**	Low
		Spatial Extent	**Site specific**				
		Duration	**Short Term**				
		Consequence	**Moderate**				
		Probability	**Very likely**				
		Reversibility	**Low-reversibility**				
		Irreplaceability	**Moderate**				
	New / Larger Access points	*Status*	**Neutral**	**Very Low (Level 5)**	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	**Very Low (Level 5)**	Medium
		Spatial Extent	**Site specific**				
		Duration	**Permanent**				
		Consequence	**Moderate**				
		Probability	**Very likely**				

		Reversibility	**Non-reversible**				
		Irreplaceability	**Moderate**				

D.2.11.5 Concluding Statement

With reference to this report, associated assessment, and the findings made within SKERP Consulting Engineers' opinion, the VOLTA Solar PV Project will have a negligible impact on the surrounding environment. Therefore, the project is deemed acceptable from a Transportations perspective, provided this report's recommendations, and mitigation measures are implemented and maintained.

D.2.12 Impacts relating to the BESS

The VOLTA Solar PV facility will have Battery Energy Storage Systems (BESS) of up to 2200 MWh located adjacent the VOLTA substation as option 1. A further 1800 MWh BESS is planned as an option 2 on the farm Oxford, and this will feed directly into the Artemis substation. The preferred battery technology is solid state Lithium-ion such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or sodium-ion systems. Alternative technologies being considered include Redox flow (typically vanadium) as well as Liquid Metal (Ambri technology). The specific technology will only be determined following Engineering, Procurement and Construction (EPC) procurement.

D.2.12.1 Potential Impacts and Recommended Mitigation Measures

The BESS risk assessment had the below recommendations for each of the considered technologies:

GENERAL

- This Risk Assessment has found that with suitable preventative and mitigative measures in place, none of the identified potential risks are excessively high, i.e., from a Safety, Health and Environment (SHE) perspective no fatal flaws were found with either type of technology (solid state - lithium-ion, redox flow - vanadium or molten liquid metal - Ambri) for the BESS installations at the proposed VOLTA Solar PVs near Dealesville.

- At a large facility, without installation of the state-of-the art battery technology that includes protective features, there can be significant risks to employees and first responders. The latest battery designs include many preventative and mitigative measures to reduce these risks to tolerable levels. (Refer to tables in section 4 under preventative and mitigative measures). State-of-the-art technology should be used, i.e., not old technology, such as liquid phase lithium-ion batteries, that may have been prone to fire and explosion risks.

- The design should be subject to a full Hazard and Operability Study (HAZOP) prior to commencement of procurement. A HAZOP is a detailed technical systematic study that looks at the intricacies of the design, the control system, the emergency system etc. and how these may fail under abnormal operating conditions. Additional safeguards may be suggested by the team doing the study.

LITHIUM SOLID STATE CONTAINERISED BATTERIES

- With lithium solid-state batteries, the most significant hazard with battery units is the possibility of thermal runaway and the generation of toxic and flammable gases. There have been numerous such incidents around the world with lithium-ion batteries at all scales and modern technology providers include many preventative and mitigative features in their designs, e.g. solid state electrolytes being one of these improvements. This type of event also generates heat which may possibly propagate the thermal runaway event to neighbouring batteries if suitable state of the art technology is not employed.

- The flammable gases generated may ignite leading to a fire which accelerates the runaway process and may spread the fire to other parts of the BESS or other equipment located near-by.

- If the flammable gases accumulate within the container before they ignite, they may eventually ignite with explosive force. This type of event is unusual with solid state batteries, but has happened with an older technology container installed at McMicken in the USA in 2019.

- Due to a variety of causes, thermal runaway could happen at any point during transport to the facility, during construction or operation / maintenance at the facility or during decommissioning and safe making for disposal.

- Due to the containerized approach as well as the usual good practice of separation between containers, which should be applied on this project, and therefore the likely restriction of events to one container at a time, the main risks are close to the containers i.e., to transport drivers, employees at the facilities and first responders to incidents.

- In terms of a worst conceivable case container fires, the significant impact zone is likely to be limited to within 10m of the container and mild impacts to 20m. Based on the current proposed layouts, impacts at the closest isolated farmhouses or other facilities are not expected.

- In terms of a worst conceivable case explosion, the significant impact zone is likely to be limited to with 10m of the container and minor impacts such as debris within 50m. Based on the current proposed layouts, impacts at the closest isolated farmhouses or other independent facilities are not expected.

- In terms of a worst reasonably conceivable toxic smoke scenario, provided the units are placed suitably far apart to prevent propagation from one unit to another and large external fires are prevented, the amount of material burning should be limited to one container at any one time. In this case, beyond the immediate vicinity of the fire, the concentrations of harmful gases within the smoke should be low.

- For the VOLTA Solar PV, the BESS locations are over 100m from public roads and 500m from any occupied farmhouse and in this context the location is therefore considered suitable in terms of toxic gas risks. This does not mean that as a precaution persons should not be advised to shelter-in-place if there is a fire with toxic smoke nor that the R64 should not be closed, it only means that severe impacts are highly unlikely and the risks is sufficiently low.

VANADIUM REDOX FLOW BATTERY INSTALLATIONS

- The most significant hazard with VRF battery units is the possibility of spills of corrosive and environmentally toxic electrolyte. Many preventative and mitigative features will be included in the design and operation, e.g., full secondary containment, level control on tanks, leak detection on equipment etc. (Refer to tables in section 4 under preventative and mitigative measures).

- For the VOLTA Solar PV, the BESS location is over 100m from any water source / course and is therefore considered suitable in terms of spill management.

- VRF batteries do not present significant fire and electrical arcing hazards provided they are correctly designed, operated, maintained and managed. Suitable Battery Management System (BMS), safety procedures, operating instructions, maintenance procedures, trips, alarms and interlocks should be in place. (Refer to tables in section 4 under preventative and mitigative measures).

LIQUID METAL BATTERY INSTALLATIONS

- The most significant hazard with liquid metal battery units is the possibility of injury to personnel mishandling hot items. Suitable on-site procedures and PPE for operations and maintenance need to be in place.

- Fires in the event of battery leaks are not impossible, but these should be limited to the combustible materials in a container, e.g., cable coatings etc. and is not likely to be the result of thermal runaway of the battery. The fire is not inherently electrical and normal fire suppression could be used. Note water on hot surfaces would not be advised.

- For the VOLTA Solar PV, the BESS locations are suitable for molten metal batteries.

TECHNOLOGY AND LOCATION OF BESS FACILITIES

- From a safety and health point of view, the above Risk Assessment shows that risks posed by VRFB systems may be slightly lower than those of SSL facilities, particularly with respect to fire and explosion risks. From an environmental spill and pollution point of view the VRFB systems present higher short-term risks than the SSL systems. Liquid metal batteries present lower risks than both the SSL and VRF battery systems as both the risks of fire and spills are significantly lower. However, the above conclusions may be due to the fact that the VRFB and Liquid Metal technology is not as mature as SSL technology and there is not as much operating experience and accident information available. Overall, from a SHE RA points of view, there is no specific preference for a type of technology.

- From a SHE risk assessment point of view, where there is a choice of location that is further from public roads, water courses, isolated farmhouses or other occupied facilities, this would be preferred. VRFB hazards are mostly related to possible loss of containment of electrolyte, SSL batteries to fires producing toxic smoke and fire fighting which may result in contaminated of firewater runoff and liquid metal hazards are mostly limited to on site operational issues. The current chosen locations are suitably far from the above with a very low risk of any significant impacts.

RECOMMENDATIONS

The following recommendations have been made:

- There are numerous different battery technologies, but using one consistent battery technology system for the BESS installations associated with all the PV developments in the complex would allow for ease of training, maintenance, emergency response and could significantly reduce risks.

- Where reasonably practicable, state-of-the-art battery technology should be used with all the necessary protective features e.g., draining of cells during shutdown and standby-mode, full BMS with deviation monitoring and trips, leak detection systems.

- **There are no fatal flaws associated with the proposed VOLTA battery installation for either of the three technology types**.

- The overall design should be subject to a full Hazop prior to finalization of the design.

- For the VRFB systems there should be an environmentally friendly method of filling the systems with electrolyte upon startup and an end of life (and for possible periodic purging requirements) solution for the large quantities of hazardous electrolyte should be investigated, e.g., can it be returned to the supplier for re-conditioning.

- Prior to bringing any solid-state battery containers into the country, the contractor should ensure that:

  - An Emergency Response Plan is in place that would be applicable for the full route from the ship to the site. This plan would include details of the most appropriate emergency response to fires both while the units are in transit and once they are installed and operating.

  - An End-of-Life plan is in place for the handling, repurposing or disposal of dysfunctional, severely damaged batteries, modules and containers.

- The site layout and spacing between lithium solid-state containers should be such that it mitigates the risk of a fire or explosion event spreading from one container to another.

- Under certain weather conditions, the noxious smoke from a fire in a lithium battery container could travel some distance from the unit. The smoke will most likely be acrid and could cause irritation, coughing, distress etc. Close to the source of the smoke, the concentration of toxic gases may be high enough to cause irreversible harmful effects. Location of the facilities needs to ensure a suitable separation distance from public facilities/residences etc. The current proposed BESS location is over 500m from isolated farmhouses / other occupied facilities and 100m from the R64 is therefore suitable. The risks of significant impacts is very low.

- Where there is a choice of alternative locations for the BESS, those that are further from water courses would be preferred. VRFB hazards are mostly related to possible loss of containment of electrolyte and solid-state systems may experience fires that may result in loss of containment of liquids or the use of large amounts of fire water which could be contaminated. One would not want these run-offs to enter water courses directly. The buffer distance between water bodies and the facilities containing chemicals should be set in consultation with a water specialist and is therefore not specified in this SHE RA. It should be noted that the locations are well over 100m from the closest water source and will likely be suitable.

- For molten metal batteries the most significant hazards are to persons working with the facilities, e.g., operation and maintenance personnel. Suitable procedures will need to be in place and PPE to be specified.

- Finally, it is suggested once the technology has been chosen and more details of the actual design are available, the necessary updated Risk Assessments should be in place.

D.2.13 Civil Aviation

The Site Sensitivity Verification for Civil Aviation is detailed in this section (Appendix C.20).

On 20 March 2020, in Government Gazette 43110, Government Notice (GN) R320, the Department of Environment, Forestry and Fisheries (DEFF) [now operating as the Department of Forestry, Fisheries and the Environment (DFFE)] published procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) when applying for an Environmental Authorisation (EA). GN R320 prescribes general requirements for undertaking Site Sensitivity Verification, as well as protocols for assessment and minimum report content requirements of environmental impacts associated with specified environmental themes for relevant activities requiring EA. GN R320 was enforced within 50 days of publication of the notice i.e., on 9 May 2020.

GN R320 specifically includes a protocol that provides the criteria for the specialist assessment and minimum report content requirements for impacts on civil aviation installations for relevant activities requiring EA. This protocol replaces the requirements of Appendix 6 of the 2014 NEMA EIA Regulations (as amended).

This specific protocol states that proposed developments (where relevant) that occur on sites identified as Very High, High or Medium sensitivity, as depicted on the National Web-Based Environmental Screening Tool (Screening Tool), must include a Civil Aviation Compliance Statement. It further states that there are no requirements if the proposed developments occur on sites identified as Low sensitivity on the Screening Tool. However, a Site Sensitivity Verification is required for the Civil Aviation Protocol for all sensitivity levels.

Therefore, since the proposed projects require an EA in terms of the 2014 NEMA EIA Regulations (as amended), and Civil Aviation was identified as a relevant theme in the Screening Tool Report, GN R320 must be complied with.

Screening Tool Reports and/or maps were generated for the proposed projects using the following classifications:

- **SEF Footprint**: Utilities Infrastructure → Electricity → Generation → Renewable → Solar → Solar PV;
- **Substation**: Utilities Infrastructure → Electricity → Distribution and Transmission → Substation; and

- **EGI:** Utilities Infrastructure → Electricity → Distribution and Transmission → Powerline.

The Solar PV classification results in the use of the Solar PV methodology, whilst the substations and EGI classification results in the use of the general methodology on the Screening Tool.

The civil aviation theme (for Solar PV developments) on the Screening Tool depicted that the entire study area is located in **a low sensitivity area from a civil aviation perspective** i.e., there are no major or other types of civil aviation aerodromes or buffers that intersect with the proposed project site. Figure 1 illustrates the civil aviation sensitivity in relation to the proposed PV development.

In line with the above, the civil aviation theme (for substation developments and EGI) on the Screening Tool depicted that the entire proposed project site is located in a low sensitivity area from a civil aviation perspective. However, the civil aviation theme for substation developments and EGI also depicted the following high sensitivity features, which are beyond the boundaries of the proposed developments:

- A dangerous airspace, i.e., the Bloemfontein/ New Tempe Flying Area (FAD106) is located approximately 5 km (at its closest point) of the proposed projects. The Screening Tool has identified the entire Dangerous Aera (FAD) as high sensitivity;
- A restricted airspace, i.e., De Brug Range (FAR29) is located approximately 35 km south-east (at its closest point) of the proposed projects. The Screening Tool has identified the entire Restricted Aera (FAR) as high sensitivity;
- An unknown civil aviation aerodrome (near Bordeaux) located approximately 50 km north-west (at its closest point) of the proposed projects. High and medium sensitivity are respectively allocated to the area that extends 8 km from the aerodrome; and between 8 and 15 km of the aerodrome. The Screening Tool identified the feature as a civil aviation aerodrome using a dataset from 2013, however, the feature is not included in the 2022 ATNS dataset;
- The Bultfontein Aerodrome (FABU) (-28° 16' 28.4232" S; 26° 8' 12.4404" E) is located approximately 58 km north-east (at its closest point) of the proposed projects. It is unclear whether FABU is an unlicensed airfield or registered with the South African Civil Aviation Authority (SACAA). High and medium sensitivity are respectively allocated to the area that extends 8 km from the Bultfontein Aerodrome; and between 8 and 15 km of the Bultfontein Aerodrome;
- An Aeronautical Information Circular (AIC) licensed aerodrome, i.e., the New Tempe Aerodrome (FATP) (-29° 1' 12.5004" S; 26° 9' 15.2532" E) is located approximately 58 km south-east (at its closest point) of the proposed projects. High and medium sensitivity are respectively allocated to the area that extends 8 km from the FATP Aerodrome; and between 8 and 15 km of the aerodrome;
- An unknown civil aviation aerodrome (near Brandfort) located approximately 70 km east (at its closest point) of the proposed projects. High and medium sensitivity are respectively allocated to the area that extends 8 km from the aerodrome; and between 8 and 15 km of the aerodrome. The Screening Tool identified the feature as a civil aviation aerodrome using a dataset from 2013, however, the feature is not included in the 2022 ATNS dataset;
- An unknown civil aviation radar is located approximately 70 km south-east (at its closest point) of the proposed projects. High and medium sensitivity is allocated to the area that extends 15 km of the civil aviation radar; and between 15 and 35 km from the civil aviation radar;
- The Bram Fischer International Airport (FABL) (- 29° 5' 34.0944" S; 26° 18' 13.8456" E) is located approximately 72 km south-east (at its closest point) of the proposed projects. High and medium sensitivity are respectively allocated to the area that extends 8 km from the FABL Aerodrome; and between 8 and 15 km of the aerodrome;

- A Very High Frequency Omni-Directional Range (VOR) beacon/ Distance Measuring Equipment (DME) (BLV) and waypoints (BL1MP and BL2MP) are located within the FABL. Medium sensitivities are allocated to the area within 5 km of the air traffic control or navigation sites. The Screening Tol has also identified additional unknown air traffic control or navigation sites within the vicinity using a data set from 2013, however, these features are not included in the 2022 ATNS dataset. Moreover, some of the facilities re highlighted under the RFI theme (using the Solar PV methodology) as a telecommunication facilities; and
- Two dangerous airspaces, i.e., Bloemfontein Military Flying Area North (FAD107 A) and Bloemfontein Military Flying Area South (FAD107 B), are located 73 and 86 km (at their closest points) south-east of the proposed projects, respectively. The Screening Tool has identified both Danger Areas (FADs) as high sensitivity.

The proposed project study area was determined and verified to be of low sensitivity (as it relates to civil aviation). This was determined through a site visit and based on existing databases, and confirms the sensitivity allocated on the Screening Tool. Based on the above, in terms of GN R320, no further requirements are applicable i.e. a Compliance Statement is not required.

D.2.14 Defence

The Site Sensitivity Verification for Defence is detailed in this section (Appendix C.11)

On 20 March 2020, in Government Gazette 43110, Government Notice (GN) R320, the Department of Environment, Forestry and Fisheries (DEFF) [now operating as the Department of Forestry, Fisheries and the Environment (DFFE)] published procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) when applying for an Environmental Authorisation (EA). GN R320 prescribes general requirements for undertaking Site Sensitivity Verification, as well as protocols for assessment and minimum report content requirements of environmental impacts associated with specified environmental themes for relevant activities requiring EA. GN R320 was enforced within 50 days of publication of the notice i.e. on 9 May 2020.

GN R320 specifically includes a protocol that provides the criteria for the specialist assessment and minimum report content requirements for impacts on defence installations for relevant activities requiring EA. This protocol replaces the requirements of Appendix 6 of the 2014 NEMA EIA Regulations (as amended).

This specific protocol states that proposed developments (where relevant) that occur on sites identified as Very High, High or Medium sensitivity, as depicted on the National Web-Based Environmental Screening Tool (Screening Tool), must include a Defence Compliance Statement. It further states that there are no requirements if the proposed developments occur on sites identified as Low sensitivity on the Screening Tool. However, a Site Sensitivity Verification is required for the Defence Protocol for all sensitivity levels.

Therefore, since the proposed projects require an EA in terms of the 2014 NEMA EIA Regulations (as amended), and Defence was identified as a relevant theme in the Screening Tool Report, GN R320 must be complied with.

In terms of GN R320, this means that no further requirements are applicable i.e., a Compliance Statement is not required, if the site is indeed found to be of low sensitivity during the site visit.

Screening Tool Reports and/or maps were generated for the proposed projects using the following classifications:

- **SEF Footprint**: Utilities Infrastructure → Electricity → Generation → Renewable → Solar → Solar PV;
- **Substation**: Utilities Infrastructure → Electricity → Distribution and Transmission → Substation; and
- **EGI:** Utilities Infrastructure → Electricity → Distribution and Transmission → Powerline.

The Solar PV classification results in the use of the Solar PV methodology, whilst the substations and EGI classification results in the use of the general methodology on the Screening Tool.

The defence theme (for Solar PV developments) on the Screening Tool depicted that the entire study area is located in a **low sensitivity area from a defence perspective** i.e., there are no major or other types of defence installations or buffers that intersect with the proposed project site. Figure 1 illustrates the defence sensitivity in relation to the proposed PV development.

In line with the above, the defence theme (for substation developments and EGI) on the Screening Tool depicted that the entire study area is located in a low sensitivity area from a defence perspective. However, the defence theme for substation developments and EGI also depicted the following features, which are beyond the boundaries of the proposed developments, and located a significant distance away:

- The De Brug Military Base, which includes the De Brug shooting range and Training Centre, near Bloemfontein is located approximately 43 km south-east (at its closest point) of the proposed projects. Very High sensitivity has been allocated to the entire military base;
- An unknown military and defence site along the N8 near Petrusburg is located approximately 56 km south-west (at its closest point) of the proposed projects. Very High sensitivity has been allocated to the site;
- The Tempe Military Base in Bloemfontein is located approximately 65 km south-east (at its closest point) of the proposed projects. Very High and medium sensitivities have been allocated to the entire military base, as well as its associated military units and formations, however, the Screening Tool does not specify the distance of the sensitivities;
- The Bloemspruit Air Force Base (AFB) is located in Bloemfontein and shares a runway with the Bram Fischer International Airport (International Civil Aviation Organisation Code (ICAO): FABL). The AFB is located 72 km is south-east (at its closest point) of the proposed projects and is responsible for the management of the Northern Cape Vastrap Weapons Range – a remote airfield around 500 km to the north-west of Bloemspruit in the Kalahari Desert, used by the SAAF 16 Squadron attack helicopter squadron to practice tactical bombing operations[5]. Very High sensitivity has been allocated to the AFB;
- A military and defence site is located approximately 75 km south-east (at its closest point) of the proposed projects. The site is demarcated with a Very High sensitivity and is potentially

[5] Husseini, T. (2019) 'Exploring the air bases of the South African Air Force', *Airforce Technology*. Available at: https://www.airforce-technology.com/features/air-force-bases-in-south-africa/ (Accessed: 8 March 2023).

linked to a dangerous airspace, i.e., the Bloemfontein Military Flying Area (North) (FAD107 A), or military units and formations associated with the Tempe Military Base.

- An unknown military and defence site near Kimberly is located approximately 77 km south-west (at its closest point) of the proposed projects. The site is demarcated with a high sensitivity. This same facility is highlighted under the RFI theme as a Sentech High Power Terrestrial Broadcasting Facility or telecommunication facility. It must be noted that this feature is only identified by the defence theme using the Solar PV methodology.

In terms of GN R320, this means that no further requirements are applicable i.e. a Compliance Statement is not required, if the site is indeed found to be of low sensitivity during the site visit.

The proposed project study area was determined and verified to be of low sensitivity (as it relates to defence installations). This was determined through a site visit and based on existing databases, and confirms the sensitivity allocated on the Screening Tool. Based on the above, in terms of GN R320, no further requirements are applicable i.e., a Compliance Statement is not required.

D.2.15 Environmental Sensitivity Mapping for VOLTA PV and BESS and EGI

Based on the impact assessment undertaken and the relevant environmental sensitivities identified, the site layout of the solar PV facility has been identified and shown in Figure D.9 and Appendix B of this BA Report. Based on the specialist studies, the key environmental features that have been avoided in terms of the layout of the facilities are listed below.

- **Agriculture**
  - The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. However, the agricultural uniformity and low agricultural potential of the environment, means that the exact positions of all infrastructure will make no material difference to agricultural impacts and there are no sensitivities related to this theme to be mapped.

- **Visual**
  - There are currently no areas within the PV and EGI layouts that require avoidance.
  - Overall, the significance of the visual impacts is expected to range from moderate to low as a result of the numerous existing power lines within close proximity to the proposed site and its location within the Kimberley REDZ. There are a fair number of potential sensitive visual receptors within a 3 km radius of the proposed structures, although the possibility does exist for visitors to the region to venture into closer proximity to the facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive. It should be noted that of these receptors located within a 3km radius of the proposed sites, a number of the homesteads are located on farms that already have authorization to construct renewable energy developments (Figure D4.1 and D4.2).

- **Heritage (Archaeology and Cultural Landscape)**
  - There are currently the following areas rated as moderate -high sensitivity:
    - VT002, Med;
    - VT012 High;
    - VT101 High; and
    - J Orton 881 High

  - These have been avoided in the layout of the PV and The EGI for the VOLTA project.
  - Based on the current lay out the low-density background Stone Age scatters at VT014, VT015 and VT016 will be directly affected by the EGI development. These isolated Stone Age scatters are out of context and scattered too sparsely to be of significance apart from mentioning them in this report. Furthermore, based on the work done by Sampson (1986) the impacts by powerlines on Stone Age artefacts is limited and the impact on these occurrences is therefore low.
  - Refer to Figure D.5.1 – Figure 5.5 for the heritage sensitivity map.

- **Palaeontology**
  - There are no No-go palaeontological sensitivity areas designated by the specialists. The entire site is designated as low sensitivity.

- **Terrestrial Biodiversity and Species**
  - The development area for the VOLTA PV and EGI intersects with important grassland area. The specialist assessment has concluded that development should be focussed in already disturbed areas. The PV solar arrays and associated infrastructure should be focused in areas identified as medium sensitivity and lower, should the appropriate mitigation measures be implemented as development activities will have medium impacts overall which are acceptable, and which should be followed by appropriate restoration activities. **Only the Watercourse habitat must be avoided by the development, and an effort must be made to avoid the Grassland, where possible.** Appropriate mitigation measures and rehabilitation can reduce the impact to the Grassland to moderate.
  - The underground powerline route should ideally avoid the Grassland habitat as far as possible; where this is not possible an effective rehabilitation plan must be drafted.
  - Refer to Figure D.6. and Figure D6.2 for the ecology sensitivity maps.

- **Aquatic Biodiversity and Species**
  - The Ecological Importance and Sensitivity (EIS) of the delineated wetlands were derived to be high. Buffer zone calculations of the project indicated a requirement of 20m for all wetland types. All wetlands have been avoided in the site layout.
  - Refer to Figure D.7 for the ecology sensitivity map.

- **Avifauna**

The following no-go areas have been avoided by the proposed layout of the PV Facilities:
  - Very High sensitivity (No-go): Surface water: This includes all wetlands and pans in the area
  - There are no major negative impacts to avifauna SCC expected from the proposed VOLTA EGI development, provided that the proposed mitigation measures are applied appropriately and that continued adaptive management take place throughout the lifespan of the facility. Without long-term data to present the flight paths of large-bodied SCC prone to collision, it is not possible to develop strict no-go areas for OHPLs based on likely collisions (other than significantly buffering major attractions like large freshwater pans).
  - Refer to Figure D.8 for the avifauna sensitivity map.

- **Socio-Economic**

- Sensitivity maps in terms of areas to avoid are not applicable for the Socio-Economic Assessment.

- **Geohydrology**
  - Sensitivity maps in terms of areas to avoid are not applicable for the Geohydrology Assessment.

- **Traffic**
  - Sensitivity maps in terms of areas to avoid are not applicable for the Traffic Impact Statement.

Key sensitivity features have been annotated in Figure D.9 (i.e., sensitivity and feature map). For detailed feature maps, refer to the Specialist Assessments (Appendix C of this Final BA Report).

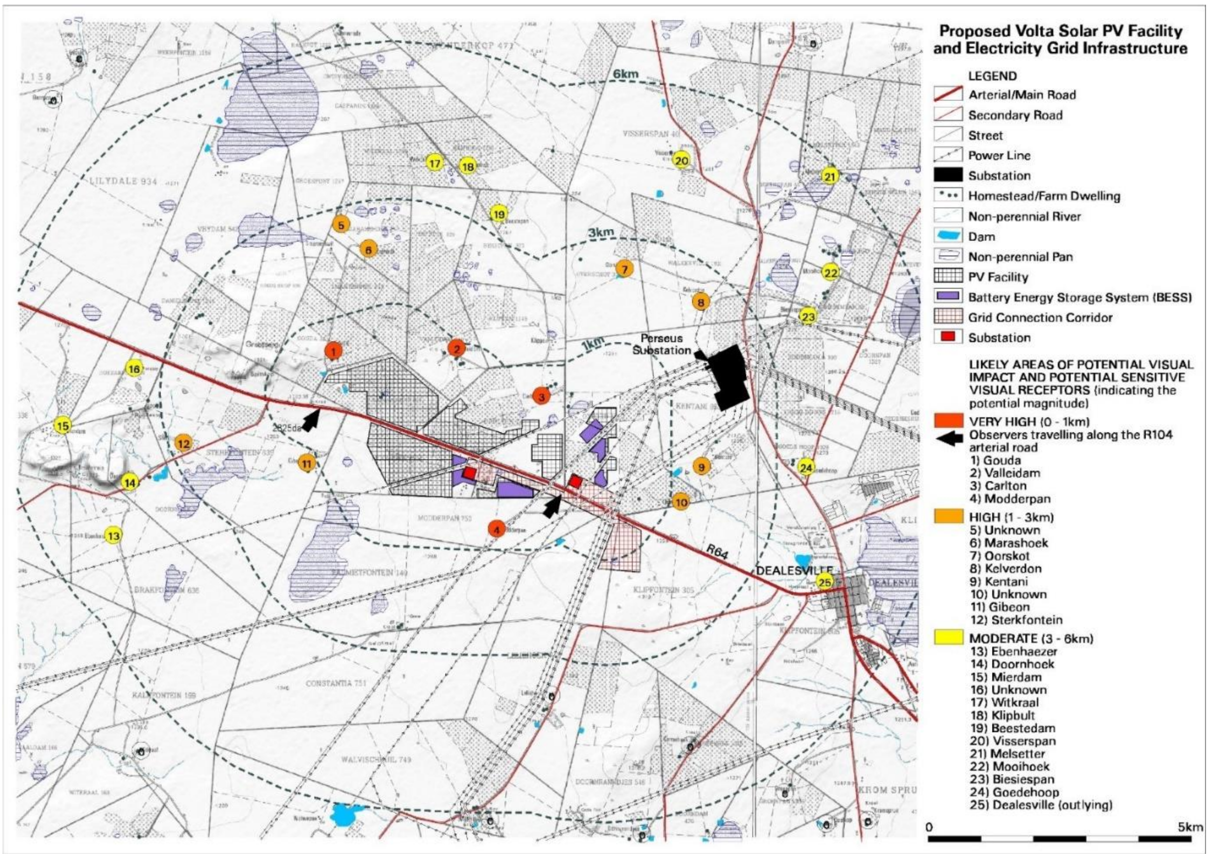

Figure D.4.1. Sensitivity Map for Visual Aspects for VOLTA PV and EGI

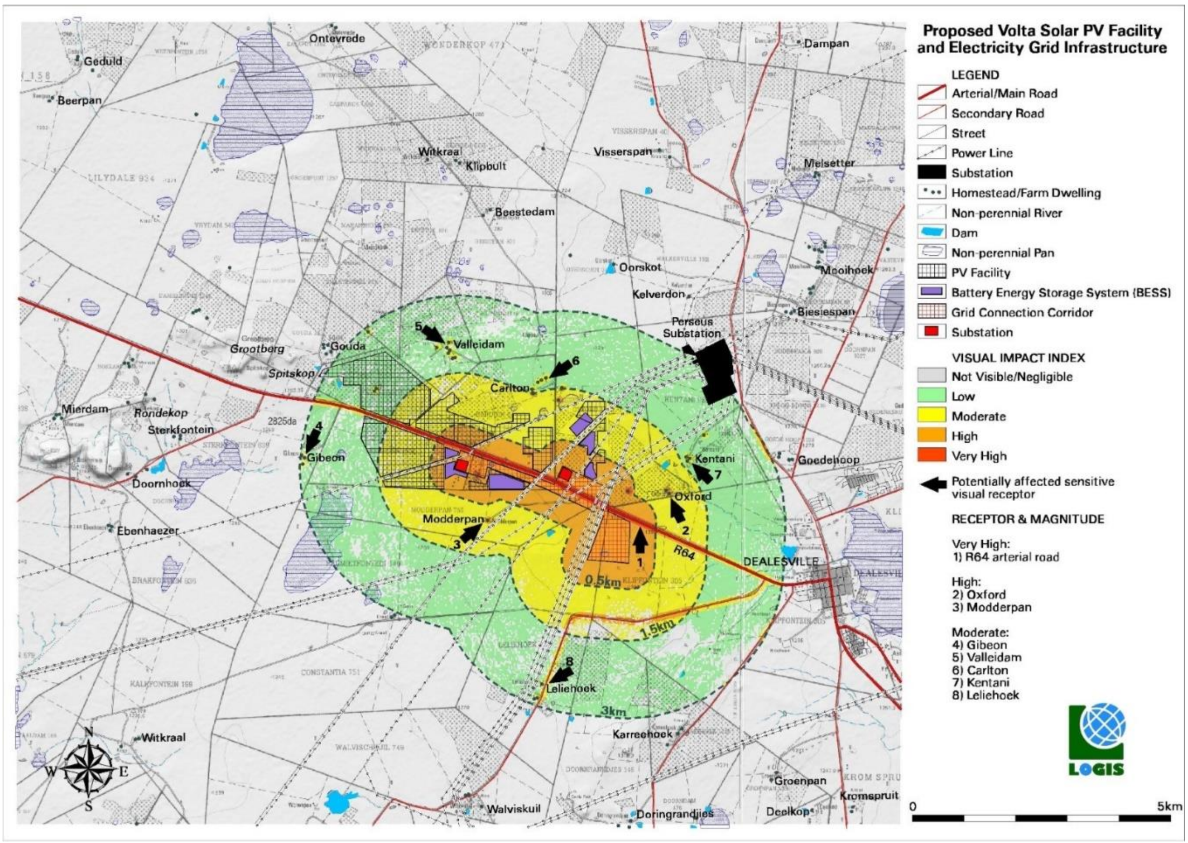

Figure D.4.2. Sensitivity Map for Visual Aspects for VOLTA PV and EGI

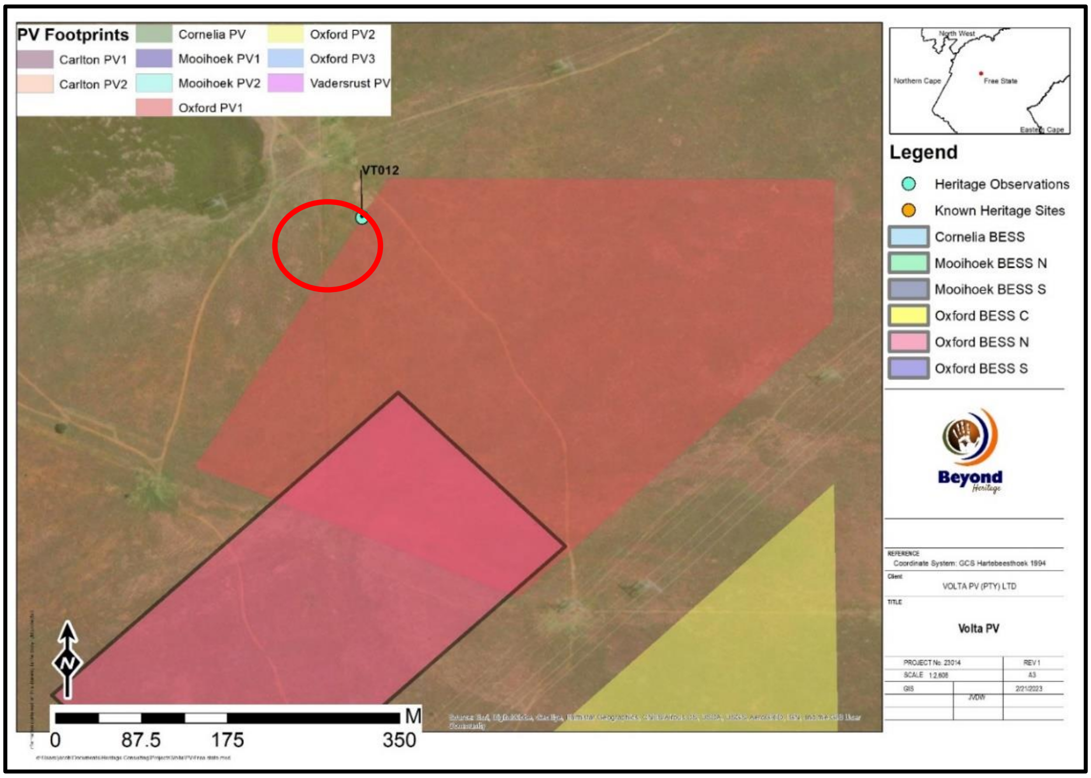

Figure D.5.1 Sensitivity Maps for Heritage for VOLTA PV and EGI

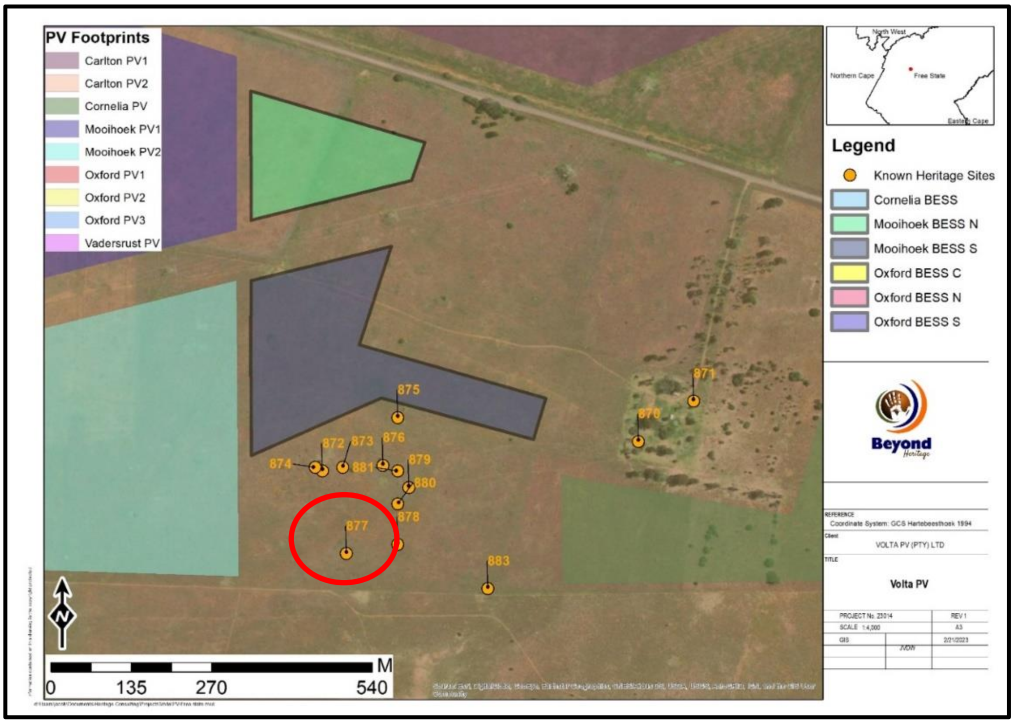

Figure D.5.2. Sensitivity Maps for Heritage for VOLTA PV and EGI

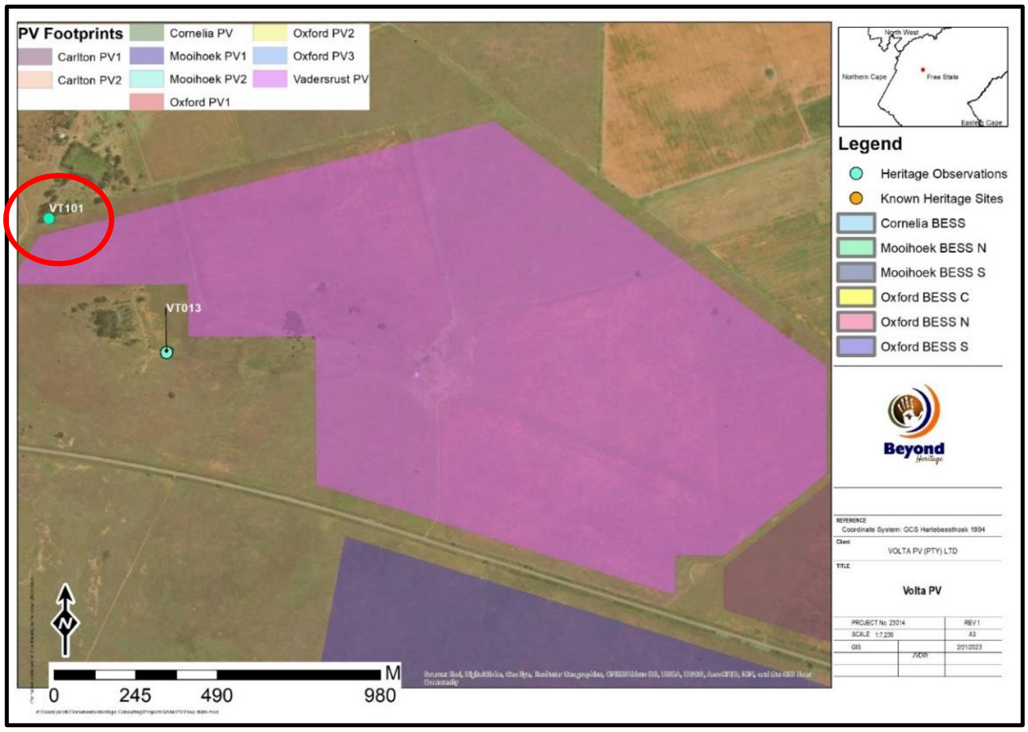

Figure D.5.3. Sensitivity Maps for Heritage for VOLTA PV and EGI

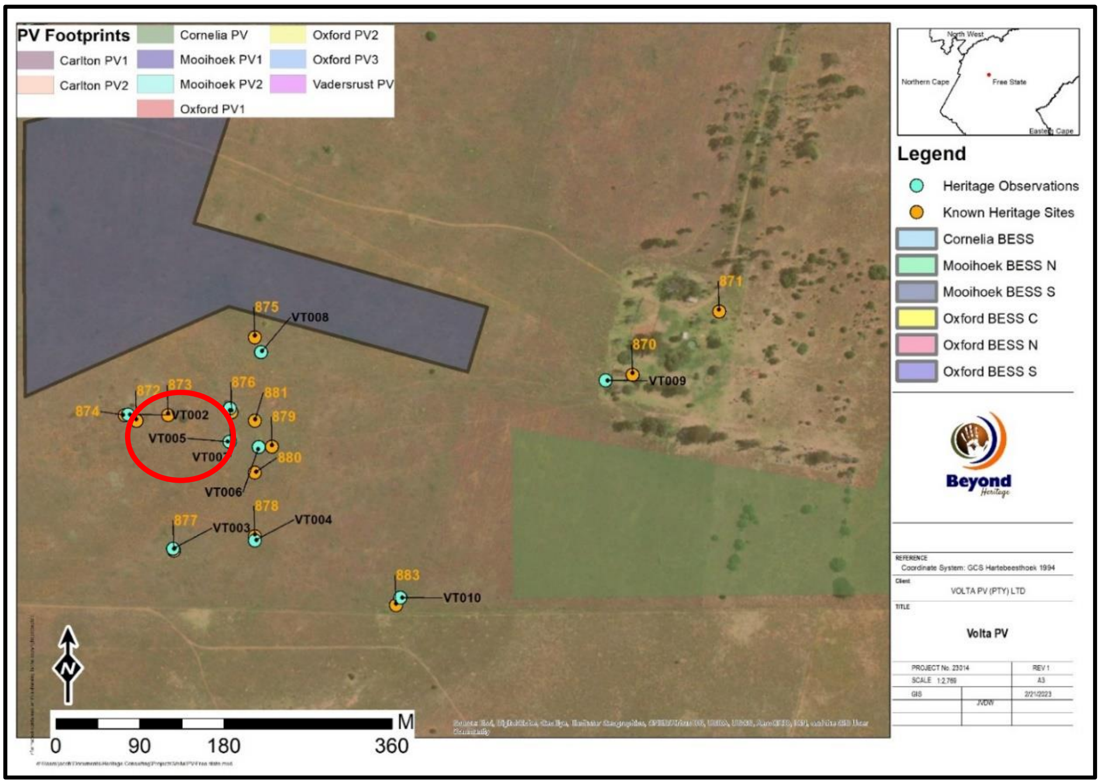

Figure D.5.4. Sensitivity Maps for Heritage for VOLTA PV and EGI

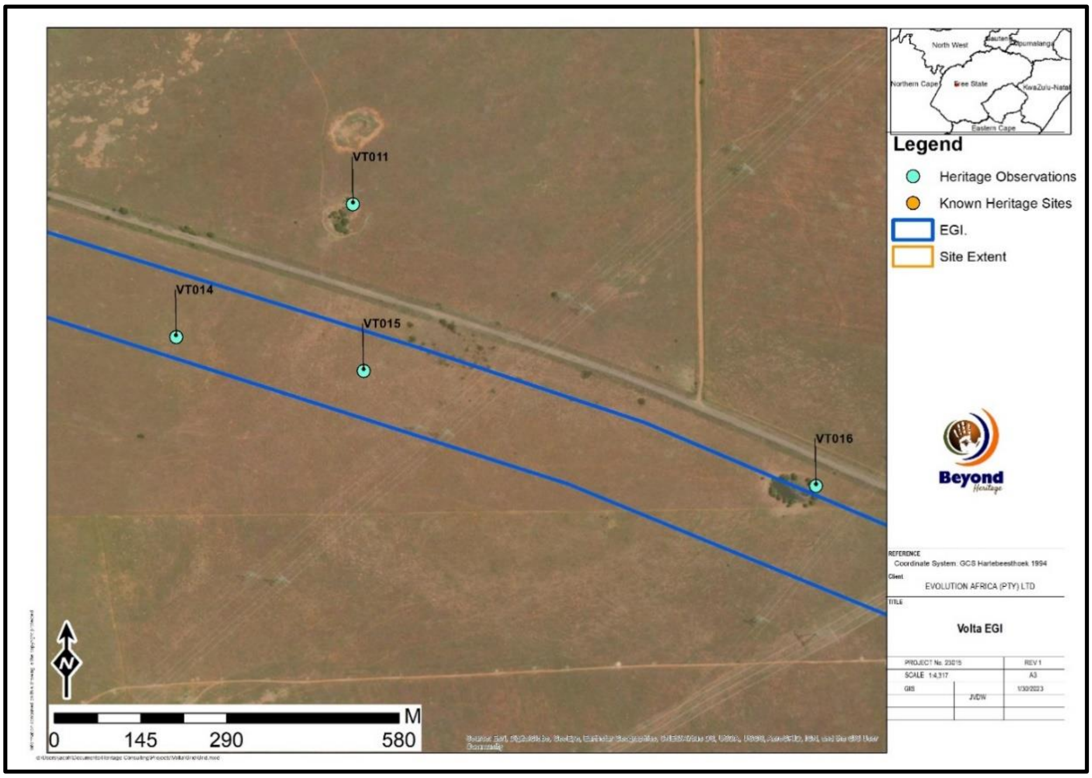

Figure D.5.5. Sensitivity Maps for Heritage for VOLTA PV and EGI

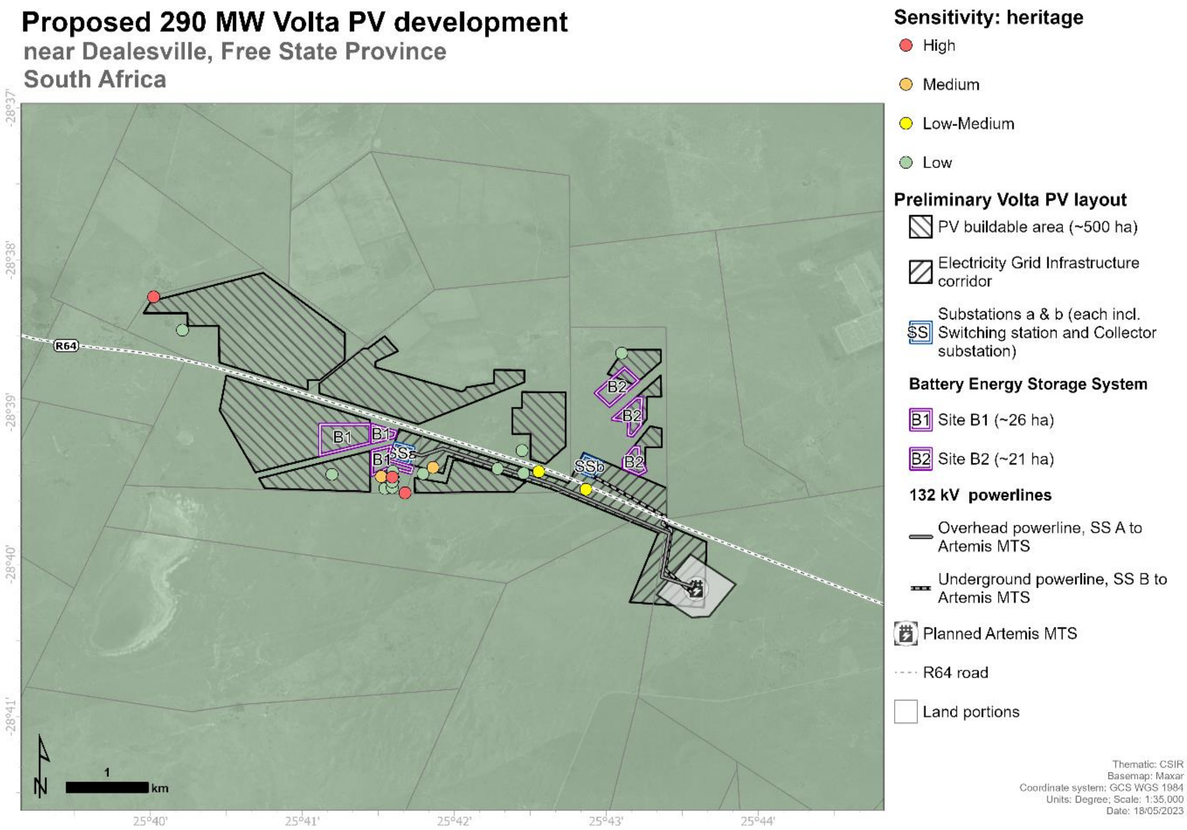

Figure D.5.6. Sensitivity Maps for Heritage for VOLTA PV and EGI

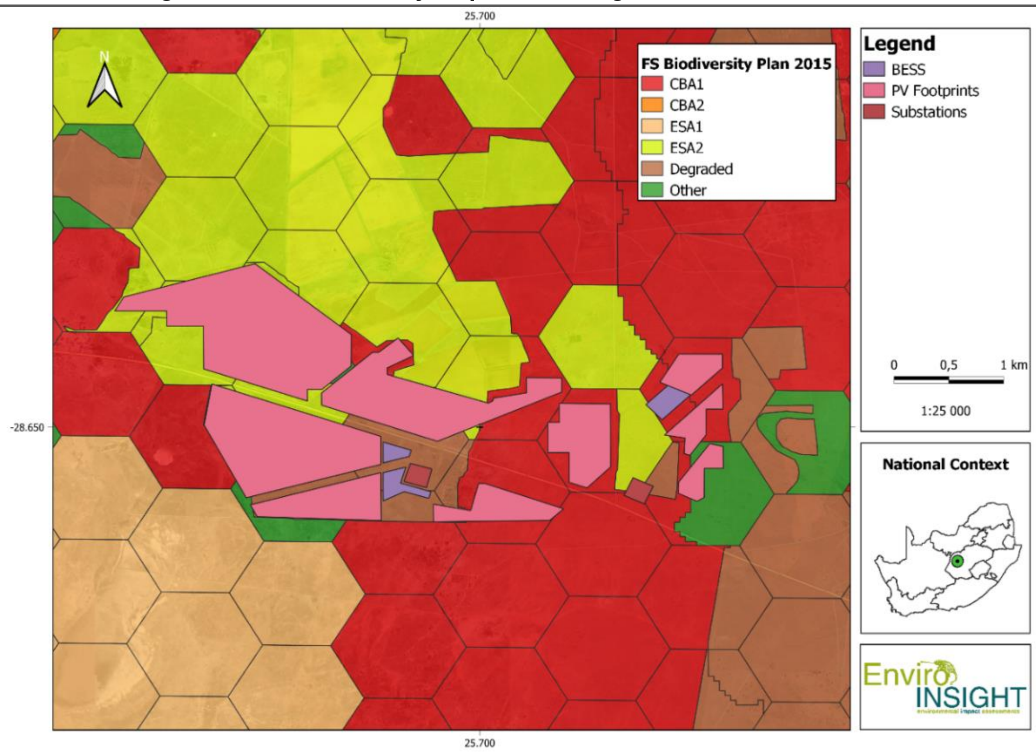

Figure D.6.1. Sensitivity Map for Terrestrial Ecology for VOLTA PV and EGI

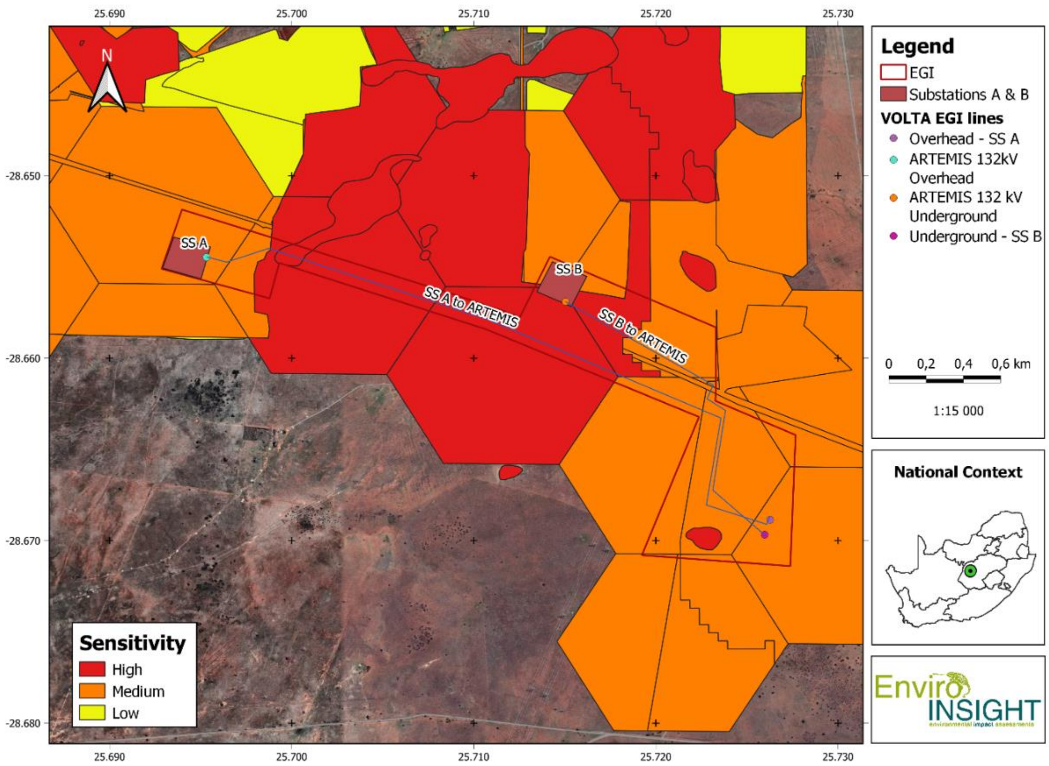

Figure D.6.2 Sensitivity Map for Terrestrial Ecology for VOLTA PV and EGI

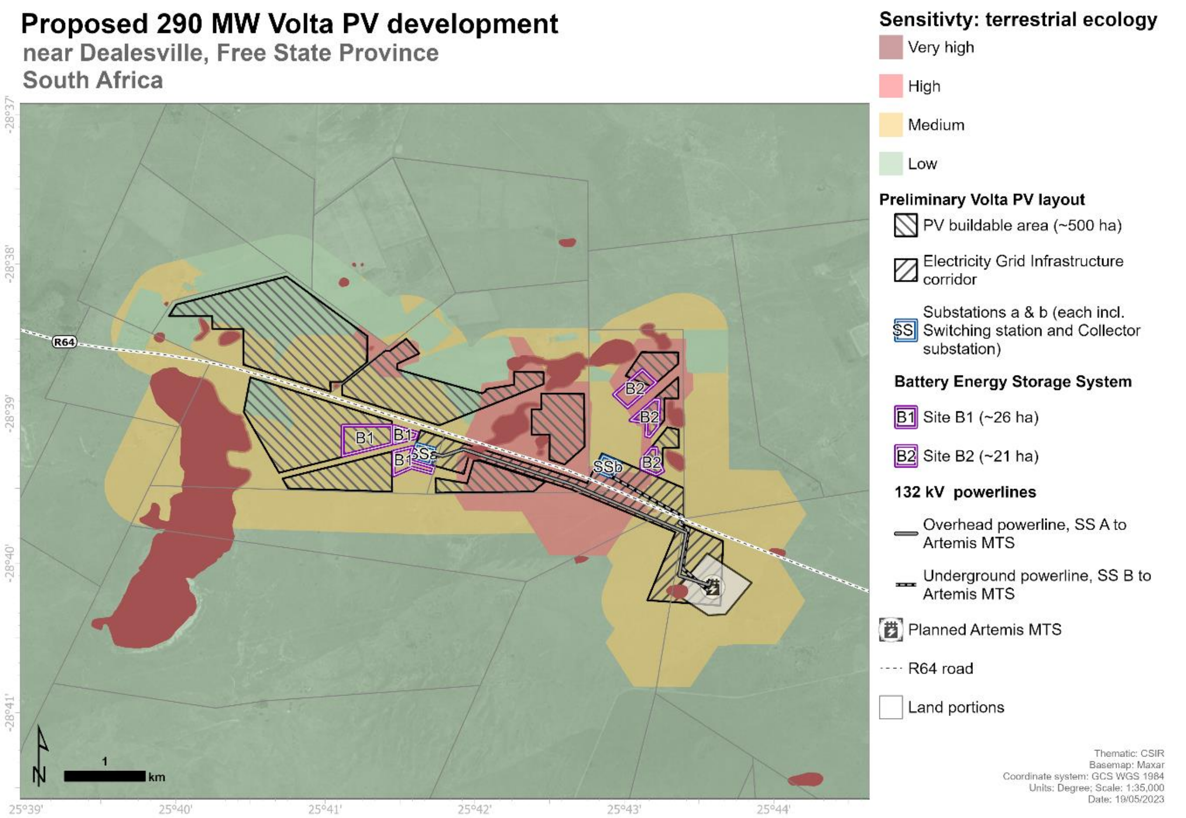

Figure D.6.3 Sensitivity Map for Terrestrial Ecology for VOLTA PV and EGI

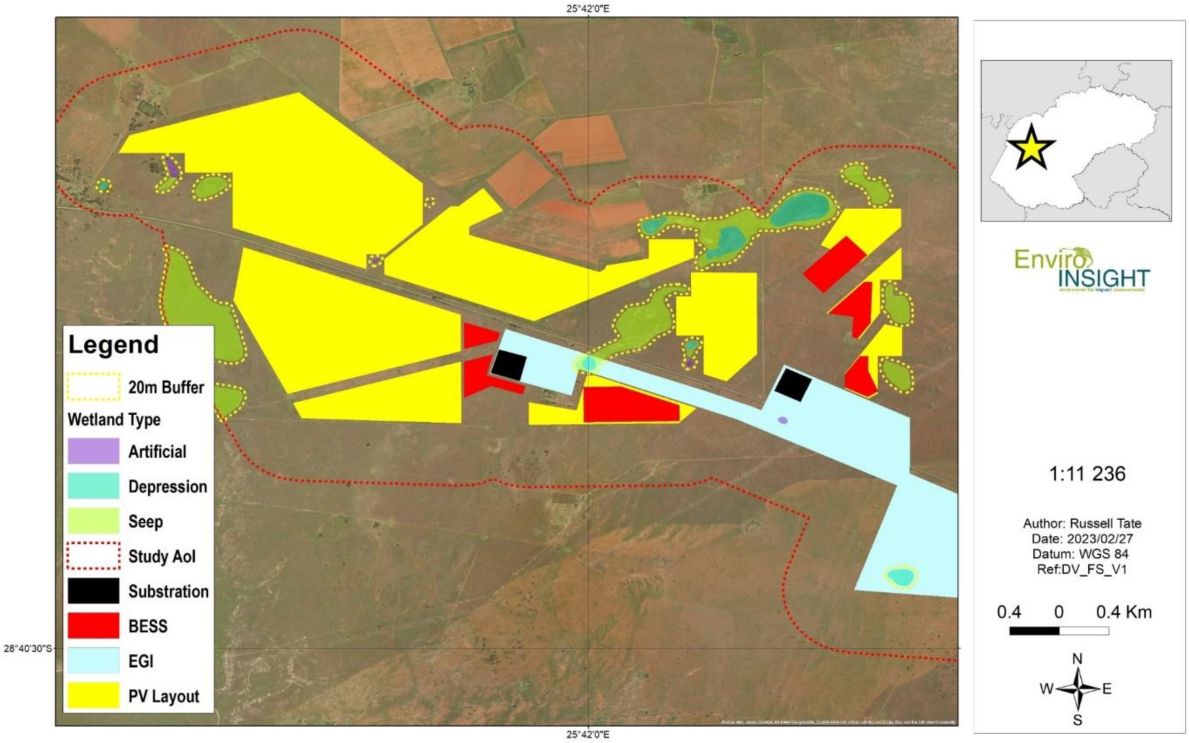

Figure D.7 Sensitivity Map for Aquatic Ecology for VOLTA PV and EGI

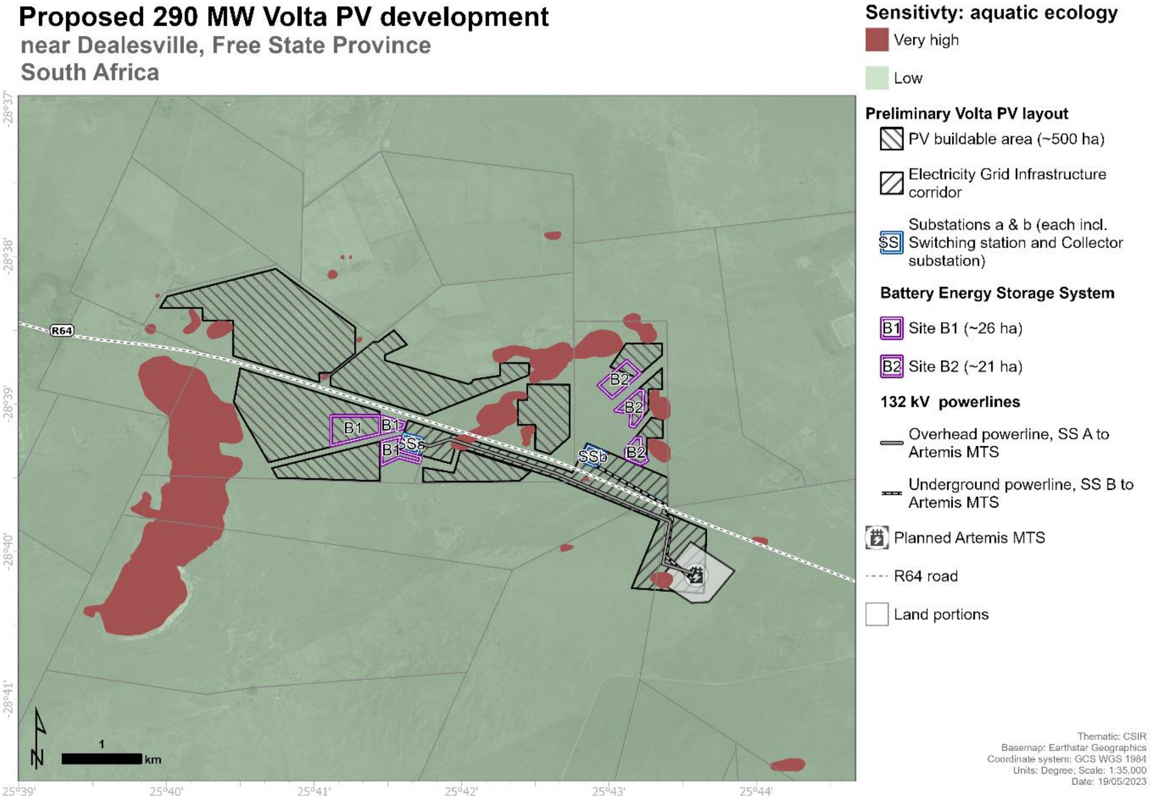

Figure D.7.1 Sensitivity Map for Aquatic Ecology for VOLTA PV and EGI

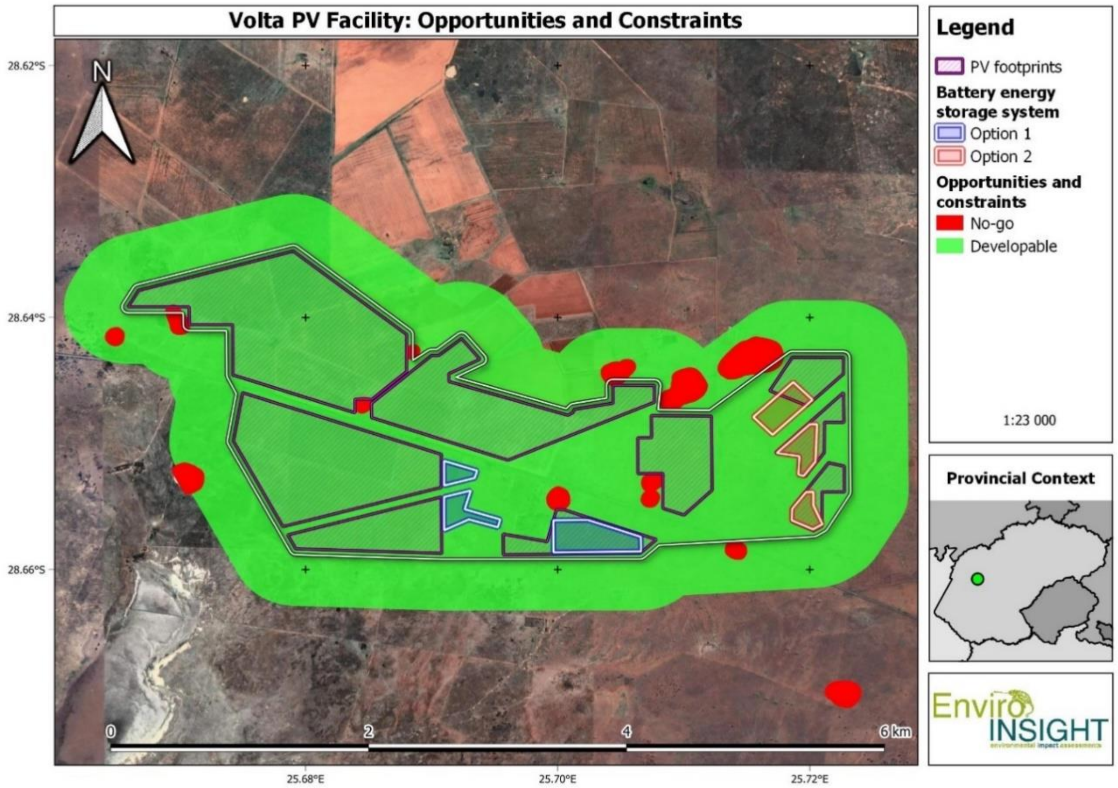

Figure D.8 Sensitivity Map for Avifauna for VOLTA PV

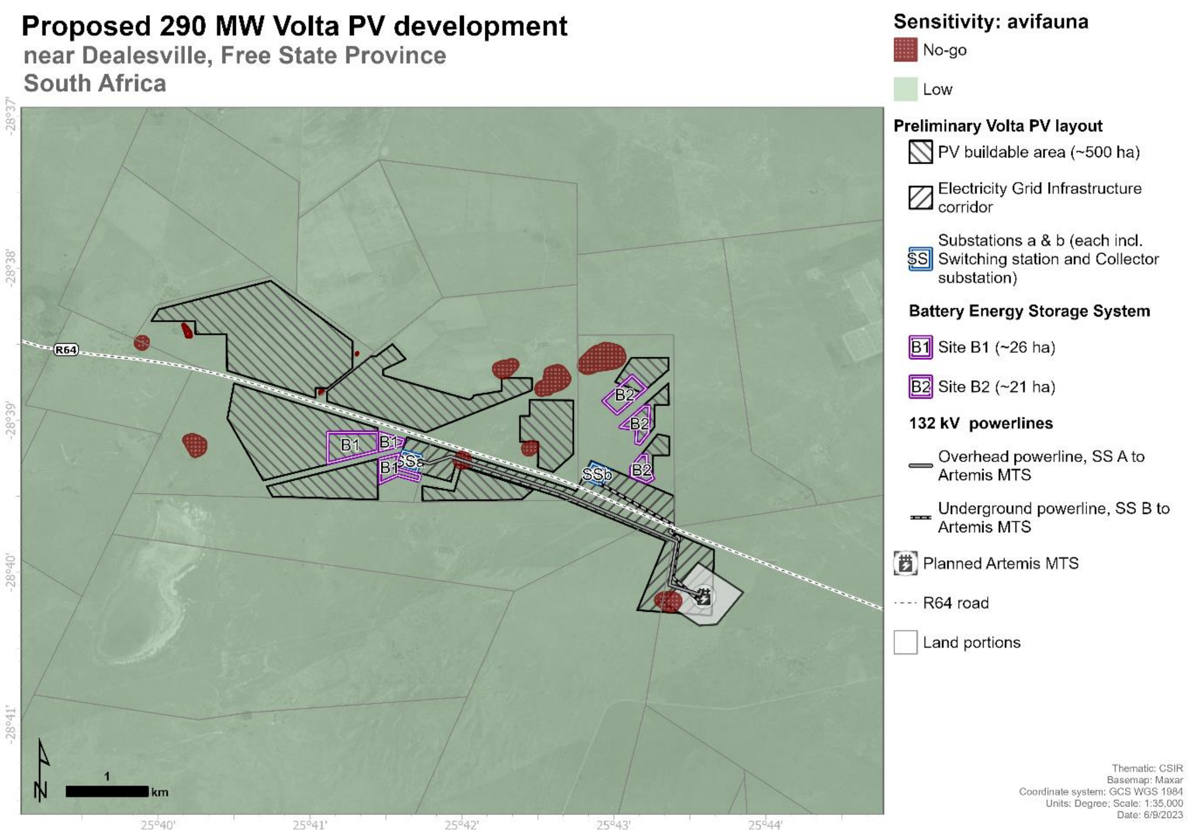

Figure D.8.1 Sensitivity Map for Avifauna for VOLTA PV

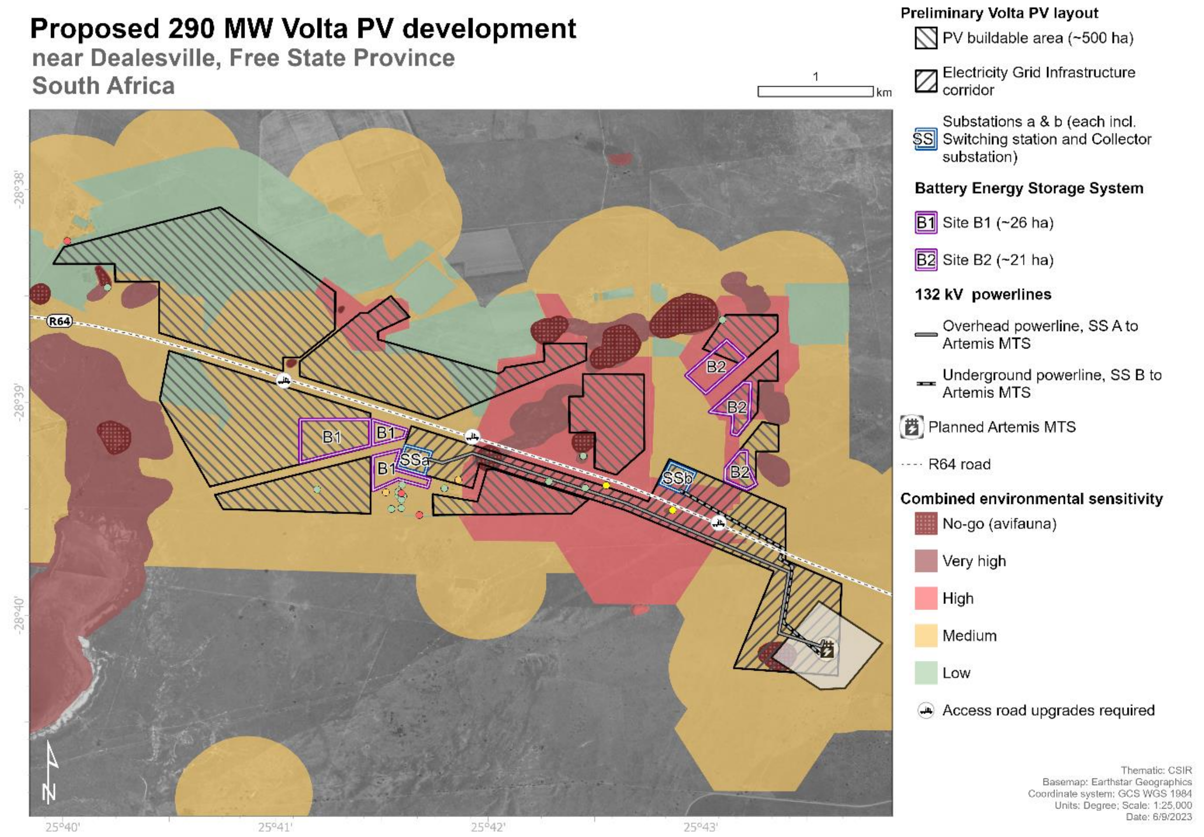

Figure D.9. Combined Sensitivity and Key Features Map for the proposed projects

SECTION E: RECOMMENDATION OF PRACTITIONER & ENVIRONMENTAL IMPACT STATEMENT

This BA Report has investigated and assessed the significance of potential positive and negative direct, indirect and cumulative impacts associated with the proposed **VOLTA PV and BESS and VOLTA EGI projects**. No negative impacts have been identified within this BA that, in the opinion of the EAP who has conducted this BA Process, should be considered "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Section 24 of the Constitutional Act states that "everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that prevents pollution and ecological degradation; promotes conservation; and secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development". Based on this, this BA was undertaken to ensure that these principles are met through the inclusion of appropriate management and mitigation measures, and monitoring requirements. These measures will be undertaken to promote conservation by avoiding the sensitive environmental features present on site and through appropriate monitoring and management plans (refer to the EMPr in Appendix G - K of this BA Report).

It is understood that the information contained in this BA Report and appendices is sufficient to make a decision in respect of the activity applied for. It is recommended that each EA be valid for a period of 10 years.

Alternatives

As noted above, in Section A of this report, the preferred activity was determined to be the development of a renewable energy facility on site using solar PV as the preferred technology. In terms of the preferred location of the site, even though location alternatives were not assessed the layout was designed after provision of sensitivity data by the specialists to ensure that it would have the least possible overall impact. The Specialists considered desktop data, field work, existing literature and the National Web-based Environmental Screening Tool to inform the identification of sensitivities. Based on this, a preferred layout for the solar PV facilities was determined. This layout avoids the features on site that have been identified as no-go areas, as explained in Section B and Section D.

There are no alternatives for the EGI component of the project.

Need and Desirability of the Proposed Projects

This BA considered the nature, scale and location of the proposed development as well as the wise use of land (i.e., is this the right time and place for the development of these proposed projects). These projects are located in REDZ 5 (Kimberley) which is a geographical area that has been identified on a strategic planning level to have reduced negative environmental impacts but high commercial attractiveness (due to its proximity to, inter alia, the national grid) and socio-economic benefit to the country. The development of solar energy is therefore important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability. On a municipal planning level, the proposed projects support the objectives of the Tokologo Local Municipality's IDP. The IDP promotes the creation of an enabling environment to attract investment and support local economy.

The proposed **VOLTA PV and BESS and EGI projects** are therefore aligned with the vision and goals of the District and Local Municipality. It will also stimulate the creation of employment which is much needed in the municipal areas. It will therefore be supportive of the IDP's objective of creating more job opportunities.

Summary of Key Impact Assessment Findings

Based on the findings of the specialist studies, the proposed projects are considered to have an <u>overall moderate to low negative environmental impact and an overall low to moderate positive socio-economic impact</u> (with the implementation of respective mitigation and enhancement measures). Table E.1 below provides a summary of the impact assessment for each phase of the proposed projects **post mitigation for direct impacts**. Table E.2 provides the same information for the **cumulative impacts**.

As indicated in Table E.1(VOLTA PV and BESS) it is clear that the majority of the **direct negative impacts** were rated with a <u>**low to very low**</u> **post mitigation impact significance** for the **construction phase**, with only the Terrestrial Biodiversity and Species and Visual impacts being rated as **moderate**. In terms of the operational and decommissioning phases, the majority of the **direct negative impacts** were rated with a <u>**low**</u> **post mitigation impact significance**, with only the Terrestrial and Species and Visual impacts being rated as **moderate**. In terms of **positive impacts**, the Socio-Economic impacts are rated as **low to moderate significance** for the construction phase; **very low to high** for the operational phase; and **low** for the decommissioning phase.

As indicated in Table E.2 (VOLTA EGI) it is clear that the majority of the **direct negative impacts** were rated with a <u>**low**</u> **post mitigation impact significance** for the **construction phase**, **operation** and **decommissioning phase** with only the Terrestrial Biodiversity and Species and Visual impacts being rated as **moderate**. In terms of the operational and decommissioning phases, the majority of the **direct negative impacts** were rated with a <u>**low**</u> **post mitigation impact significance**, with only the Terrestrial and Species and Visual impacts being rated as **moderate**. In terms of **positive impacts**, the Socio-Economic impacts are rated as **low to moderate significance** for the construction phase; **very low to high** for the operational phase; and **low** for the decommissioning phase.

Based on Table E.3 and E4, the majority of the **cumulative negative impacts** were rated with a <u>**low**</u> **post mitigation impact significance** for both the VOLTA PV and BESS and EGI projects.

<u>**Table E.1. Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for the VOLTA PV and BESS**</u>

Specialist Assessment	Construction Phase	Operational Phase		Decommissioning Phase
DIRECT NEGATIVE IMPACTS				
Visual	**Moderate**	**Low**	**Moderate**	**Moderate**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Low**		**Low**

<table>
<tr><th>Specialist Assessment</th><th colspan="2">Construction Phase</th><th>Operational Phase</th><th colspan="2">Decommissioning Phase</th></tr>
<tr><td colspan="6">DIRECT NEGATIVE IMPACTS</td></tr>
<tr><td>Palaeontology</td><td colspan="2">Very Low</td><td>Insignificant and/or not identified and/or not applicable</td><td colspan="2">Insignificant and/or not identified and/or not applicable</td></tr>
<tr><td>Terrestrial Biodiversity and Species</td><td colspan="2">Moderate</td><td>Moderate</td><td colspan="2">Low</td></tr>
<tr><td>Aquatic Biodiversity and Species</td><td colspan="2">Low</td><td>Low</td><td colspan="2">Low</td></tr>
<tr><td>Avifauna</td><td colspan="2">Low</td><td>Low</td><td colspan="2">Low</td></tr>
<tr><td>Socio-Economic</td><td colspan="2">Low</td><td>Low</td><td colspan="2">Low</td></tr>
<tr><td>Geohydrology</td><td colspan="2">Very Low</td><td>Very Low</td><td colspan="2">Very Low</td></tr>
<tr><td>Geotechnical</td><td colspan="2">Very Low</td><td>Very Low</td><td colspan="2">Very Low</td></tr>
<tr><td>Transport</td><td>Low</td><td>Very Low</td><td>Insignificant and/or not identified and/or not applicable</td><td>Low</td><td>Very Low</td></tr>
<tr><td colspan="6">DIRECT POSITIVE IMPACTS</td></tr>
<tr><td>Socio-Economic</td><td colspan="2">Moderate</td><td>Moderate</td><td colspan="2">Low</td></tr>
</table>

Table E.2: Overall Impact Significance with the Implementation of Mitigation Measures for Direct Negative and Positive Impacts for the VOLTA EGI

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
DIRECT NEGATIVE IMPACTS			
Visual	Moderate	Low to moderate	Moderate
Heritage (Archaeology and Cultural Landscape)	Low	Low	Low
Palaeontology	Very Low	Insignificant and/or not identified and/or not applicable	Insignificant and/or not identified and/or not applicable
Terrestrial Biodiversity and Species	Moderate	Moderate	Low
Aquatic Biodiversity and Species	Low	Low	Low
Avifauna	Low	Low	Low

Table E.2. Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts for the VOLTA PV and BESS project

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Visual	**Insignificant and/or not identified and/or not applicable**	**Moderate**	**Insignificant and/or not identified and/or not applicable**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Insignificant and/or not identified and/or not applicable**	**Insignificant and/or not identified and/or not applicable**
Palaeontology	**Very Low**	**Insignificant and/or not identified and/or not applicable**	**Insignificant and/or not identified and/or not applicable**
Terrestrial Biodiversity and Species	**Moderate**	**Low**	**Low**
Aquatic Biodiversity and Species	**Low**	**Low**	**Low**
Avifauna	**Low**	**Low**	**Low**
Socio-Economic	**Low**	**Low**	**Low**
Geohydrology	**Very Low**	**Very Low**	**Very Low**
Geotechnical	**Low**	**Low**	**Low**
Transport	**Low** **Very Low**	**Insignificant and/or not identified and/or not applicable**	**Low** **Very Low**
CUMULATIVE POSITIVE IMPACTS			
Socio-Economic	**Moderate**	**Moderate**	**Moderate**

<u>Table E.2. Overall Impact Significance with the Implementation of Mitigation Measures for Cumulative Negative and Positive Impacts for the VOLTA EGI project</u>

Specialist Assessment	Construction Phase	Operational Phase	Decommissioning Phase
CUMULATIVE NEGATIVE IMPACTS			
Visual	**Insignificant and/or not identified and/or not applicable**	**Moderate**	**Insignificant and/or not identified and/or not applicable**
Heritage (Archaeology and Cultural Landscape)	**Low**	**Insignificant and/or not identified and/or not applicable**	**Insignificant and/or not identified and/or not applicable**
Palaeontology	**Very Low**	**Insignificant and/or**	**Insignificant and/or**

<table>
<tr><th>Specialist Assessment</th><th colspan="2">Construction Phase</th><th>Operational Phase</th><th>Decommissioning Phase</th></tr>
<tr><td colspan="5">CUMULATIVE NEGATIVE IMPACTS</td></tr>
<tr><td></td><td colspan="2"></td><td>not identified and/or not applicable</td><td>not identified and/or not applicable</td></tr>
<tr><td>Terrestrial Biodiversity and Species</td><td>Moderate</td><td>Low</td><td>Low</td><td>Low</td></tr>
<tr><td>Aquatic Biodiversity and Species</td><td colspan="2">Low</td><td>Low</td><td>Low</td></tr>
<tr><td>Avifauna</td><td colspan="2">Low</td><td>Low</td><td>Low</td></tr>
</table>

All of the specialists have recommended that the proposed projects receive EAs if the recommended mitigation measures are implemented.

Overall Environmental Impact Statement

Taking into consideration the findings of the BA Process, as well as the fact that the proposed **VOLTA PV and BESS and VOLTA EGI projects** will be located within Kimberley REDZ (REDZ 5), it is the opinion of the EAP, that the project benefits outweigh the costs and that the projects will make a positive contribution to sustainable infrastructure development in the Dealesville town and surrounding regions. Provided that the specified mitigation measures are applied effectively, it is recommended that the proposed projects receive EAs in terms of the EIA Regulations promulgated under the NEMA.

Cumulative Environmental Impact Statement

The cumulative impacts have been assessed by all the specialists on the project team. The cumulative assessment included approved renewable energy projects within a 30 km radius of the project sites, as well as existing and planned transmission lines, as well as the proposed VOLTA PV and BESS projects and proposed VOLTA power line project. No cumulative impacts have been identified that were considered to be fatal flaws. The specialists recommended that the projects receive EA in terms of the EIA Regulations promulgated under the NEMA, including consideration of cumulative impacts. It is also important to note that the proposed project sites are located within REDZ 5 (Kimberley REDZ), which supports the development of large-scale wind and solar energy developments. The proposed projects are therefore in line with the national planning vision for wind and solar development in South Africa.

Conditions to be included in the EA

In order to ensure the effective implementation of the mitigation and management actions, an EMPr has been compiled and is included in Appendix G - K of this BA Report. The mitigation measures necessary to ensure that the proposed projects are planned and carried out in an environmentally responsible manner are listed in this EMPr. The EMPr includes the mitigation measures noted in this report and the specialist studies. The EMPr is a dynamic document that should be updated as required and provides clear and implementable measures for the proposed project. The frequency of monitoring and auditing compliance with the conditions of the EA (should such an authorisation be granted) and EMPr, is recommended in the EMPr. The compliance monitoring ranges from weekly to bi-monthly to monthly. It is recommended that regular monitoring be undertaken, as specified in the EMPr. It is further recommended that the submission of compliance reports to the Competent Authority be undertaken quarterly.

Listed below are the **main** recommendations that should be considered for inclusion in the EAs (should such authorisations be granted by the DFFE). These main recommendations as well as additional recommendations are included in the EMPr and BA Report. These recommendations apply to both the proposed VOLTA PV and BESS and VOLTA EGI project, unless where specified.

In line with the approval of the combination and multiple EA request (as noted in Appendix H of the BA Report), it is proposed that for this VOLTA PV and BESS Project, one EA will be issued for the VOLTA PV and BESS and one EA be issued for the VOLTA EGI project.

- **Agriculture Impacts**

The conclusion of the Agricultural Compliance Statement is that the proposed projects are acceptable and the recommendation for its approval is not subject to any conditions.

- **Visual Impacts:**
  - All key mitigation measures are contained in the EMPr. No conditions were recommended by the specialist.

- **Heritage Impacts (Archaeology and Cultural Landscape):**

  - **VOLTA Solar PV and BESS:**
    - Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources in case heritage resources are uncovered during the course of construction;
    - Recorded heritage features should be indicated on development plans and construction crews should be made aware that these sites should be avoided with the applicable buffer zones;
    - Once construction commences all aspects of the Project should be carried out within the approved footprint so as to avoid impacts to heritage resources;
    - Any additional changes to the layout should be subjected to a heritage walkdown prior to development;
    - A qualified archaeologist must undertake the above-mentioned heritage walkdown and must submit a walkdown report to SAHRA for comments prior to the commencement of development;
    - A 30m buffer must be maintained around all the identified burial grounds (VT101, VT010 and site 881) along with the Stone Cairn (VT005);
    - If any evidence of archaeological sites or remains, fossils or other categories of heritage resources are found during the proposed development, SAHRA must be alerted;
    - If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit must be altered immediately; and
    - If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

  - **VOLTA EGI**

    - Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction;
    - Recorded heritage features should be indicated on development plans and construction crews should be made aware that these sites should be avoided with the applicable buffer zones;
    - Once construction commences all aspects of the Project should be carried out within the approved footprint so as to avoid impacts to heritage resources;
    - It is recommended that the EGI is micro-sited to avoid the Tree lined avenue (Feature 871 as recorded by Orton 2016);
    - The final pylon positions and underground powerline route should be subjected to a heritage walk down prior to development;
    - The heritage walk down report must be submitted to SAHRA for comments prior to the commencement of the development;
    - If any evidence of archaeological sites or remains, fossils or other categories of heritage resources are found during the proposed development, SAHRA must be alerted;
    - If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit must be altered immediately; and
    - If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

- **Palaeontological Impacts for both VOLTA PV and BESS and EGI**
  - If fossils are found by the environmental officer or other responsible person, once excavations for poles, foundations and amenities have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

- **Terrestrial Biodiversity and Species Impacts**

  - **VOLTA Solar PV and BESS:**
    - Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating pristine grassland sites to functional systems (not just biomass replacement).
    - Roads and underground cabling must avoid sensitive areas as far as possible by considering various layout alternatives. Accordingly, the Watercourse must be avoided, whereas the Grassland habitat will not be transformed completely (only PV related – this is not the case for roads and the BESS), accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact of the PV panels is considered medium for Grassland.
    - It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there.

    - Care should be taken not to unnecessarily clear or destroy natural vegetation.
    - Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible.

  - **VOLTA EGI**
    - Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating pristine grassland sites to functional systems. This is specifically relevant for the substations, roads and underground powerline.
    - Roads and the underground powerline must avoid sensitive areas such as the Watercourse as far as possible by considering various layout alternatives.
    - It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there.
    - Care should be taken not to unnecessarily clear or destroy natural vegetation.
    - Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible.

- **Aquatic Biodiversity and Species Impacts for both VOLTA PV and BESS and EGI**
    - It is recommended that the avoidance actions proposed in this study are implemented. Note from CSIR: Avoidance actions have been included in the EMPr.
    - It is recommended that floodlines are determined for the project.
    - Should there be a required crossing it is proposed that general authorisations for Section 21 (c) and (i) water uses are recommended for the proposed culvert/wetland crossings where required.

- **Avifauna Impacts**

  - **VOLTA PV and BESS**
    - All mitigation measures stipulated above must be adhered to and captured in an Environmental Management Plan (EMP), specifically noting that bird deterrents and visibility enhancements must be installed where the boundaries of the solar panel clusters are in close (200 m) proximity of the No-go areas;
    - The EMP must include the necessity for post-construction avifauna monitoring as stipulated in Jenkins et al (2017);
    - Adaptive management and review of the EMP must take place based on post-construction monitoring results.

  - **VOLTA EGI**
    - The alignment of the OHPL must be adjusted to avoid the 50 m buffer around the depression wetland;
    - All mitigation measures stipulated above must be adhered to and captured in an Environmental Management Programme (EMPr), specifically noting the strict requirements for bird flight diverters;
    - The EMPr must include the necessity for post-construction avifauna monitoring;

  - Adaptive management and review of the EMP must take place based on post-construction monitoring results.

- **Socio-Economic Impacts**
  - All proposed mitigation measures should be adhered to Construction Phase.

- **Geohydrology Impacts**
  - Groundwater quality monitoring systems to be implemented one year prior to construction until post decommissioning phase (at least 1 year after). This will allow for the potential detection of contamination.
  - Physical barriers between contaminant sources and the bare soil surface to be implemented to limit contamination by means of spillage.
  - Leak detection and double containment to be implemented at BESS in order to prevent potential electrolyte leakage.
  - Proper bunding structures for the BESS designed by a professional.
  - Buffering of BESS of at least 50 m from existing boreholes attempting to mitigate contamination in case of BESS failure.
  - Biodegradable cleaning agents must be used during the maintenance procedures of solar panels.

- **Geotechnical Impacts**
  - Foundation excavations be inspected prior to casting to ensure that soil with an adequate bearing capacity is obtained beneath each footing. These works should be carried out by an appropriately qualified individual.

- **Traffic Impacts**
  - As far as practically possible, ensure staff transport is done in the 'Off Peak' period and by bus to reduce impact in the peak periods.
  - Stagger material, component, and abnormal load deliveries.
  - Reduction in the speed of vehicles.
  - Adequate enforcement of the law.
  - Implementation of pedestrian safety initiatives.
  - Regular maintenance of farm fences & access cattle grids.
  - Construction of gravel roads in terms of Technical Recommendations for Highways (TRH20).
  - Implement a road maintenance program under the auspices of the respective transport department; and
  - Possible use of approved dust suppressant techniques.
  - A more comprehensive route analysis should be completed before construction to understand the required work and potential risks better.

- **General**
  - Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.
  - If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.

Paul Lochner

NAME OF EAP

09 June 2023

SIGNATURE OF EAP

DATE

References:

Refer to detailed reference lists included in each Specialist Assessment chapter in Appendix C of this Final BA Report. In addition to each of the Specialist Assessments chapters referred to in the text above, as well as various footnotes, below is a list of the key references used.

CSIR (Council for Scientific and Industrial Research). 2017. Protecting South Africa's strategic water source areas. https://www.csir.co.za/protecting-south-africa%E2%80%99s-strategic-water-source-areas. Date accessed: Feb. 2019

Department of Environmental Affairs, 2015. Strategic Environmental Assessment for wind and solar photoVOLTAic energy in South Africa. CSIR Report Number: CSIR/CAS/EMS/ER/2015/0001/B. Stellenbosch.

Department of Environment Forestry and Fisheries, 2019. Phase 2 Strategic Environmental Assessment for wind and solar PV energy in South Africa. CSIR Report Number: CSIR/SPLA/SECO/ER/2019/0085 Stellenbosch, Western Cape.

Department of Environment, Forestry and Fisheries, 2019. Strategic Environmental Assessment for the Expansion of Electricity Grid Infrastructure Corridors in South Africa. CSIR Report Number: CSIR/SPLA/EMS/ER/2019/0076/B. ISBN Number: ISBN 978-0-7988-5648-5. Stellenbosch and Durban.

Department of Environment, Forestry and Fisheries, 2019. Strategic Environmental Assessment for the Development of a Phased Gas Pipeline Network in South Africa. CSIR Report Number: CSIR/SPLA/EMS/ER/2019/0077/B. ISBN Number: ISBN 978-0-7988-5649-2. Stellenbosch and Durban.

Appendix A	Maps
Appendix B	Generic Facility Illustrations of a PV Project
Appendix C	Specialist Reports Appendix C.1 and C.2: Agriculture Compliance Statement Appendix C.3 and C.4: Visual Impact Assessment Appendix C.5 and C.6: Heritage Impact Assessment Appendix C.7 and C.8: Palaeontology Impact Assessment Appendix C.9 and C.10: Terrestrial Biodiversity and Species Assessment Appendix C.11 and C.12: Wetland Ecology Study Appendix C.13 and C.14: Avifauna Assessment Appendix C.15: Socio-Economic Impact Assessment Appendix C.16: Geohydrological Impact Assessment Appendix C.17: Geotechnical Assessment Appendix C.18: Traffic Impact Assessment Appendix C.19: High Level Safety, Health, and Environment Risk Assessment for the BESS Appendix C.20: Civil Aviation Site Sensitivity Verification Appendix C.21: Defence Site Sensitivity Verification
Appendix D	Part 1: Public Participation Part 2: Comments and Responses Report
Appendix E	EAP Details, Expertise and Declaration of Interest
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Appendix G	Environmental Management Programme (EMPr) - EMPr for the planned 132 kV overhead powerlines that will enable the proposed PV facility to connect from the Volta PV collector substation SS A to the planned Artemis Main Transmission Station (MTS).
Appendix H	EMPr for the high voltage infrastructure at the on-site substations extending from the Point of Connection (i.e., Eskom's section of the proposed on-site substations and/or a switching substations) to be located at the proposed PV facility.
Appendix I	EMPr for the high voltage infrastructure at the on-site substation leading up to the Point of Connection (i.e., the Project Applicant's section of the proposed on-site substations and/or a switching substations) to be located at the proposed PV facility.
Appendix J	EMPR for the PV facility, BESS, and associated infrastructure, including the 33 kV underground power lines that connects the PV array to the on-site substations.
Appendix K	EMPr for the planned 132 kV underground powerlines that will enable the proposed PV facility to connect from the Volta PV collector substation SS B to the planned Artemis Main Transmission Station (MTS).
Appendix L	Pre-Consultation with the Competent Authority
Appendix M	Additional Information
Appendix N	Specialist Confirmation Letters