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Final EIA Report **14/12/16/3/3/2/2299**

PROPOSED QUAGGA SOLAR PARK ON THE FARMS QUAGGAFONTEIN 3 AND DELAPORTE 887, WINBURG RD, AND CONNECTING 132kV POWERLINE, MATJHABENG LOCAL MUNICIPALITY, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE

Short name: Quagga Solar Park

10 August 2023

Commissioned by: Indus Energy (Pty) Ltd
Document version 2.0 – Final
Compiled A von Well

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PROPOSED QUAGGA SOLAR PARK ON THE FARMS QUAGGAFONTEIN 3 AND DELAPORTE 887, WINBURG RD, AND CONNECTING 132kV POWERLINE, MATJHABENG LOCAL MUNICIPALITY, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE
Short name: Quagga Solar Park

10 August 2023

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	Department of Water and Sanitation (DWS)
	Department of Agriculture, Land Reform and Rural Development (DALRRD)
	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)
Municipal Manager	Lejweleputswa District Municipality
Municipal Manager	Matjhabeng Local Municipality
	South African Heritage Resources Agency (SAHRA)
	Eskom Land & Rights
	Registered Interested and Affected Parties (I&AP's)

DOCUMENT HISTORY

Report No	Date	Report	Version	Status
2022-12-0020	February 2023	Scoping Report	1.0	Draft
14/12/16/3/3/2/2299	March 2023	Scoping Report	2.0	Final
14/12/16/3/3/2/2299	June 2023	Environmental Impact Assessment Report	1.0	Draft
14/12/16/3/3/2/2299	August 2023	Environmental Impact Assessment Report	2.0	Final

EXECUTIVE SUMMARY

INDUS ENERGY (PTY) LTD is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure located approximately 21 km southeast of Virginia town. The Photovoltaic Power Plant with associated infrastructure and structures will be located on the **Farm QUAGGAFONTEIN 3, Winburg RD** and **Farm DELAPORTE 887, Winburg RD**, within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province.

The **Quagga 132kV power line**, according to the proposed powerline alignment, will cross the following properties, within the "Powerline Study Corridor":

- Farms Quaggafontein 3, Winburg RD (the project site);
- Farm Blomskraal 216, Ventersburg RD;
- Farm De Dam 27, Ventersburg RD;
- Farm Tevrede 361, Ventersburg RD;
- Farm Biddulph 329, Ventersburg RD;
- Remaining Extent of the Farm Le Roux 766, Ventersburg RD;
- Portion 1 of the Farm Florida 633, Ventersburg RD;
- Portion 4 of the Farm Florida 633, Ventersburg RD;

within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province.

Project short name: **QUAGGA SOLAR PARK**

The proposed development footprint will be approximately 494ha and the Photovoltaic (PV) Power Plant and its connection infrastructure will consist of the installation of the following equipment:

- Photovoltaic modules (mono-crystalline, poly-crystalline, mono or bi-facial modules)
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations
- Internal cabling and string boxes
- Medium voltage stations, hosting DC/AC inverters and LV/MV power transformers
- Medium voltage receiving station(s)
- Workshops & warehouses
- One **on-site high-voltage substation with high-voltage power transformers**, stepping up voltage, and one high-voltage busbar with metering and protection devices (switching station)
- A **new 132 kV powerline (double circuit)** approximately **15.6 km** long, for connection of the on-site substation to the new "Florida 132kV/400kV substation and 400kV switching station", planned to be located on Portion 1 of the Farm Florida 633, Ventersburg RD (this 132kV/400kV substation is not part of the current EIA process)
- **Battery Energy Storage Systems (BESS)**, with a Maximum Export Capacity up to 240 MW and up to 6-hour storage capacity up to 1 440 MWh, with a footprint up to 20 ha, next to the on-site high-voltage substation, within the PV plant footprint / fenced areas.

- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Access road, 5.1 km long, from the Regional Road R73
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point, water supply pipelines, water treatment facilities
- Patented Sewage system

Evaluation of the Quagga PV Solar facility

The following chapters of the Draft EIA Report together with the specialist studies contained in Annexures D – O provide a detailed assessment of possible impacts the proposed Quagga PV Solar facility and power line may have on the environment. This chapter contains the environmental assessment of the PV Solar facility and power line by providing a summary of the results and conclusions of the assessment of both the project site and development footprint. In so doing, it draws on the information gathered as part of the Environmental Impact Assessment (EIA) process, knowledge gained by environmental specialists and EAP and presents a combined and informed opinion of environmental impacts associated with the proposed development.

No environmental fatal flaws or unacceptable impacts were identified by environmental specialists, provided that recommended mitigation measures are implemented during construction and operational phases. Mitigation measures include, amongst others, the avoidance of sensitive areas within the development footprint.

The potential environmental impacts associated with the Quagga PV Solar facility identified and assessed through the EIA process include:

- Impacts on Terrestrial Biodiversity, vegetation and animals;
- Impacts on Wetlands, Drainage Channels and Aquatic Ecology;
- Impacts on Avifauna;
- Visual Impacts;
- Socio-economic Impacts;
- Impacts on Land Use, Soil and Agricultural Potential;
- Impacts on Heritage Resources and Palaeontological Resources
- Impacts of Civil Aviation aspects
- Radio Frequency Interference
- Impacts on Traffic.

Impacts on Ecology

A Terrestrial Biodiversity Impact Assessment was conducted to describe the ecology (fauna and flora) present in the site, to assess its ecological sensitivity and to indicate the most suitable areas for the proposed development.

A survey was conducted during November 2022 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid.

The sensitivity of the solar park footprint varies between High – Medium.

Most of the power line route is classified as Low - Medium except where the powerline will cross drainage channels and pans. The proposed development should avoid sensitive areas such as wetlands and riverine areas, while also allowing corridors of indigenous grassland on areas outside the development footprint to be preserved. Where sensitive areas of natural vegetation cannot be avoided, a few mitigation measures have been recommended to minimise and/or offset impacts (licence application for removal of protected species.). Negative impacts can be minimised by strict enforcement and compliance with an Environmental Management Programme (EMPr) which considers recommendations for managing impacts detailed above.

The preferred access road (option 2) is no longer feasible due to the proposed development of the Virginia 4 PV Solar Park. An alternative access (option 1) is considered suitable, although the rocky ridges of High sensitivity along this route will require mitigation measures to be implemented.

According to the Ecological Specialist, provided that the proposed development and layout plans is consistent with the sensitivity map and take all mitigation measures into consideration, the planned development can be supported.

Impacts on Aquatic Ecology

Vegetation associated with water courses and wetlands has a high sensitivity with a high conservation priority. These areas have been delineated and excluded from the development footprint. No major alteration of drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the habitat is high and therefore a sufficient buffer zone of 32m is applicable between the development site and the flood line zone.

All construction and maintenance activities should be conducted in such a way that minimal damage is caused to drainage features on site.

No development can be done within the flood line zone without a Water Use Licence, except if outside the 1:100-year flood line or 100 meters from the delineated riverine areas or 500 meters from wetlands.

Impacts on Avifauna

An Avifaunal Assessment was conducted to determine whether the proposed development would have any negative impact on avifauna.

One hundred and twenty-nine (129) bird species were recorded in and around the project area of influence, with 95 species recorded from point counts and an additional 34 species recorded as incidental sightings. The field survey was conducted on 12 -15 December 2022.

The assessment area consisted of four avifauna habitats; transformed areas, degraded grassland, grassland and bushclumps. These habitats were mainly in a natural state except for the regions disturbed by livestock grazing and transformed due to anthropogenic activities. Three species of conservation concern were confirmed in the assessment area (Blue Korhaan (*Eupodotis caerulenscens*), Lanner Falcon (*Falco*

biarmicus) and Secretarybird (*Sagittarius serpentarius*). Some high-risk avifauna species were recorded from the project area and surrounding, including raptors and water birds.

The project will result in habitat loss and degradation of avifaunal habitats. Based on the high receptor resilience and the medium biodiversity importance, the assessment area was given low site ecological importance, with transformed areas having a very low site ecological importance (SEI). Even though, the overall sensitivity is considered to be low, the specialist strongly suggests a follow-up survey to confirm the low sensitivity at the end of the wet season.

The development will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be effectively mitigated, the loss of habitat cannot be mitigated. Considering the number of applications and current solar plant developments in the area the cumulative impact is regarded as being high.

Mitigation measures are provided while very few sensitive features were identified for the project mainly along the proposed power line. The specialist concluded that the project may be considered for approval, but all prescribed mitigation measures and monitoring must be considered by the issuing authority.

Bird diverters, bird guards, and spirals must be placed along the entire proposed powerline to reduce fatalities, as these large terrestrial birds and raptors do occur across the entire proposed powerline. Any power lines that may be developed must be extensively mitigated.

Cumulative Impacts

Based on the number of known and planned PV sites and their associated powerlines in the area the cumulative impact is expected to be moderate. These would collectively result in a large area of habitat loss, and it increases the risk of collisions and electrocutions for avifauna. This risk is especially high as a few species expected and recorded is in a high-risk category for collisions and electrocutions.

According to Birdlife South Africa, the study area falls outside of any Important Bird Areas (IBA). The conservation status of many of the bird species dependent on wetlands reflects the critical status of wetlands nationally, while in the study area, man-made dams represent wetland areas.

Visual Impacts

A Visual Impact Assessment (Annexure J) was conducted by Mitha Cilliers an independent visual Specialist to determine visual impact of the proposed solar park.

In the light of the mixed agro-industrial sense of place and the other characteristics of the receiving environment, the proposed project components will exhibit a medium contrast with the receiving environment. No night-light impact is anticipated. Discussions with the aviation impact consultant revealed that it is very unlikely that glint and glare from the proposed project would interfere with the Approach / Departure flight paths for the three local airports that are located approximately 20km – 40km from the proposed project.

There were no visual receptors with extreme relevance ratings for Quagga PV Solar Park.

Socio-economic Impacts

The socio-economic impact of the proposed Quagga PV Solar Project is considered positive, and the application is supported, provided that all the mitigation measures proposed by specialist consultants are implemented.

The project is consistent with development policies at the national, provincial, and local government levels, although the institutional readiness for a project of this nature will have to be carefully managed at the municipal level.

Impacts on Land Use, Soil and Agricultural Potential

Based on Part 1 of the Regulation of the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the proposed development area, can be classified as having Moderate potential soils for dry land croplands. No active or old croplands are included in the PV Park footprint.

The grazing potential of the vegetation at the farm is also moderate for extensive livestock production.

Impacts on Heritage Resources

A few sensitive heritage receptors were identified and recommendations from the Heritage Specialist will be implemented prior to and during construction, to prevent resource:

- A possible Iron Age Farmer site (**QGS-IA01**) is situated in the Quagga Solar Park project area and impact might occur. It is recommended that a 50 m development no-go buffer be implemented prior to commencement of the construction phase. The site and the buffer should be monitored throughout all phases of the project to detect impact on the site and / or destruction of previously undetected heritage sites at the earliest opportunity. Should impact on the site be foreseen, a Phase 2 heritage assessment subject to necessary SAHRA permitting should be initiated and application should be made for a destruction permit during the preconstruction phase.

- The remains of a large Historical Period settlement (**QGS-HP01**) occur within the proposed powerline corridor area and impact on the site is likely. Since human burials occur in the vicinity of the site, it is recommended that a 20m development no-go buffer be implemented prior to commencement of the construction phase.
  The site and buffer should be monitored throughout all phases of the project to detect impact on the site and / or destruction of previously undetected heritage sites at the earliest opportunity. Should impact on the site be foreseen application should be made for a destruction permit during the preconstruction phase.
- Another small Historical Period settlement (**QGS-HP02**) occurs within the proposed powerline corridor area and impact on the site is likely but the little remains of the site in terms of features and material culture and it is rated as low significance. The site should be monitored throughout all phases of the project to avoid the potential destruction of undetected heritage sites.
- A cemetery (**QGS-BP01)** occurs within the proposed powerline corridor area and impact on the high heritage significance heritage resource is likely**.** It is primarily recommended that infrastructure such as the placement of monopoles, pylons and service roads be designed to avoid the burial site where a 50m no-go buffer should be demarcated prior to the construction phase. The site should be fenced, or a permanent construction barricade should be erected to clearly indicate the site and the margins of the no-go buffer. The cemetery must be monitored on a frequent basis during all phases of the project by an informed ECO to detect direct or indirect impact on these sites.

A Site Management Plan (SMP) should be implemented, detailing these conservation measures, and indicating responsible parties in this regard. Should impact on the resources prove inevitable, the graves should be relocated by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum 1).

As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.

Impacts on Palaeontological Resources

The proposed site lies on the moderately fossiliferous Quaternary sands and alluvium and the potentially highly fossiliferous Adelaide Subgroup that could preserve vertebrate fossils such as therapsids, fish, amphibians and parareptiles of the *Daptocephalus Assemblage Zone*. The site visit and walk through on 19 January 2023 by palaeontologists confirmed that the area has been or is being used for agriculture and the fields have been ploughed.

There were no rocky outcrops, and NO FOSSILS present on the land surface. Given the lack of surface outcrop, there is only a very small chance that there is outcrop in the soils below the surface.

A Fossil Chance Find Protocol should be added to the EMPr. Based on this information

it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, developer, environmental officer or other designated responsible person once excavations or drilling activities have commenced. Since the impact will be low to moderate, as far as the palaeontology is concerned, the project should be authorised.

It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Adelaide Subgroup so a Fossil Chance Find Protocol should be added to the EMPr.

If fossils are found by the contractor, environmental officer, or other responsible person, once excavations and drilling have commenced, then they should be rescued, and a palaeontologist called to assess and collect a representative sample.

Impacts on Civil Aviation

Evidence from the assessment and the technical drawings show clearly that the Quagga PV Solar Project will not interfere or impact the Obstacle Limit Surfaces and Approach/Departure Surfaces of Harmony Mine and Beatrix Mine airports.

Impacts on Traffic

Access to the proposed development will be via the existing access road - be re-built at a higher standard - from the regional road R73 that runs from the N1, North-East of Winburg, in the direction of Virginia. This access road is 5.1 km long and crosses the Remainder of the Farm PALMIET FONTEIN 229, Winburg RD, the Farm BLOMSKRAAL 216, Ventersburg RD and the Farm QUAGGAFONTEIN 3, Winburg RD, located north and west of the development area of Quagga.

Overall, the road surface of Road R73 is in good condition based on visual inspection. The road network-related impact from a road capacity perspective due to the Proposed Quagga Solar Park would have a low significance due to a low volume of vehicles along Road R73 as determined by the relevant 12-hour manual traffic counts and no road capacity-related mitigating measures would be required.

It is furthermore possible to conclude that owing to the type and nature of the Proposed Quagga Solar Park, it is expected that the activities as part of the construction and operational phases of the Proposed Quagga Solar Park will have a manageable impact on vehicle traffic during the construction and operational phases, as long as road infrastructure improvements such as loading and off-loading by public transport are implemented

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ABBREVIATIONS AND ACRONYMS

AGES	Africa Geo-Environmental and Engineering Services (Pty) Ltd
BID	Background Information Document
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSP	Concentrating Solar Power
DALRRD	Department of Agriculture, Land Reform and Rural Development
DFFE	National Department of Forestry, Fisheries and the Environment,
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environment Impact Assessment Report
EMPr	Environmental Management Programme
ESS	Environmental Scoping Study
GHG	Green House Gases
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
kV	kilovolt
MW	Mega Watt
MWp	Mega Watt peak
NEMA	National Environmental Management Act - Act no. 107 of 1998
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act - Act no. 25 of 1999
NWA	National Water Act - Act no. 36 of 1998
PoS	Plan of Study
PV Project site	Farms Quaggafontein 3 and Delaporte 887, Registration Division Winburg RD (Matjabeng Local Municipality, Lejweleputswa District Municipality, Free State Province)
PV	Photovoltaic
RFP Capacity	Request for Qualification and Proposals for New Generation under the IPP Procurement Programme
REIPPPP	Renewable Energy IPP Procurement Programme
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
UPS	Uninterruptible Power Supply
Indus Energy	Indus Energy (Pty) Ltd (applicant)

1 OBJECTIVE OF THE EIA PROCESS

According to the EIA Regulations 2017, Regulation No R 326 of 07 April 2017, Appendix 3, Section 2, the objective of the EIA process is to, through a consultative process —

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;

(c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report 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;

(d) determine the—

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) degree to which these impacts—

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;

(g) identify suitable measures to avoid, manage or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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Telephone number: 015 291 1577
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Expertise of EAP: The EAP is registered as an Environmental Assessment Practitioner at EAPASA and has 22 years of experience with management and conducting of EIA's. Curriculum Vitae of EAP is included in Annexure T.

3 LOCATION OF ACTIVITY

3.1 SURVEYOR GENERAL 21 DIGIT CODES OF PV DEVELOPMENT AREA

Table 1. Site location Quagga Solar Park - SG 21-digit site code:

F	**0**	**4**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**
F	**0**	**4**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**8**	**7**	**0**	**0**	**0**	**0**	**0**
1	**2**			**3**				**4**								**5**				

3.2 PHYSICAL ADDRESS AND FARM NAME

INDUS ENERGY (PTY) LTD is proposing the establishment of a **renewable energy generation facility (PV Power Plant)** with associated infrastructure and structures on:

- **Farm QUAGGAFONTEIN 3, Winburg RD** (467 ha)
- **Farm DELAPORTE 887, Winburg RD** (589 ha)

The name of the facility will be **QUAGGA PV SOLAR PARK.**

The **Quagga 132kV power line,** according to the proposed powerline alignment, will cross the following properties, within the "Powerline Study Corridor":

- Farms Quaggafontein 3, Winburg RD (the project site);
- Farm Blomskraal 216, Ventersburg RD;
- Farm De Dam 27, Ventersburg RD;
- Farm Tevrede 361, Ventersburg RD;
- Farm Biddulph 329, Ventersburg RD;
- Remaining Extent of the Farm Le Roux 766, Ventersburg RD;
- Portion 1 of the Farm Florida 633, Ventersburg RD.
- Portion 4 of the Farm Florida 633, Ventersburg RD;

located within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province.

Table 2. Properties crossed by Quagga 132kV Powerline - SG 21-digit site code:

F	0	4	2	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
F	0	3	5	0	0	0	0	0	0	0	0	0	2	1	6	0	0	0	0	0
F	0	3	5	0	0	0	0	0	0	0	0	0	3	6	1	0	0	0	0	0
F	0	3	5	0	0	0	0	0	0	0	0	0	3	2	9	0	0	0	0	0
F	0	3	5	0	0	0	0	0	0	0	0	0	0	2	7	0	0	0	0	0
F	0	3	5	0	0	0	0	0	0	0	0	0	7	6	6	0	0	0	0	0
F	0	3	5	0	0	0	0	0	0	0	0	0	6	3	3	0	0	0	0	4
F	0	3	5	0	0	0	0	0	0	0	0	0	6	3	3	0	0	0	0	1
1	**2**			**3**				**4**								**5**				

The **footprint (fenced area)** of the proposed PV development is approximately **494 ha in extent.**

Table 3. Geographical coordinates of Quagga Solar Park project area (footprint)

Quagga Solar Park Development Area (footprint)					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P1	28° 15' 11.71" S	26° 59' 05.89" E	P55	28° 15' 33.77" S	27° 00' 09.91" E
P2	28° 15' 22.71" S	26° 59' 06.00" E	P56	28° 15' 34.22" S	27° 00' 15.29" E
P3	28° 15' 22.05" S	26° 58' 58.79" E	P57	28° 15' 32.37" S	27° 00' 16.77" E
P4	28° 15' 23.66" S	26° 58' 56.63" E	P58	28° 15' 34.12" S	27° 00' 23.94" E
P5	28° 15' 27.46" S	26° 58' 58.61" E	P59	28° 15' 35.87" S	27° 00' 41.13" E
P6	28° 15' 31.73" S	26° 59' 00.28" E	P60	28° 15' 30.04" S	27° 00' 54.53" E
P7	28° 15' 35.61" S	26° 59' 01.25" E	P61	28° 15' 06.45" S	27° 01' 00.35" E
P8	28° 15' 37.61" S	26° 59' 01.17" E	P62	28° 15' 03.53" S	27° 00' 53.36" E
P9	28° 15' 40.86" S	26° 59' 00.33" E	P63	28° 15' 02.13" S	27° 00' 49.26" E
P10	28° 15' 47.59" S	26° 59' 00.09" E	P64	28° 15' 06.31" S	27° 00' 48.18" E
P11	28° 15' 50.25" S	26° 58' 57.65" E	P65	28° 15' 06.84" S	27° 00' 47.96" E
P12	28° 15' 55.97" S	26° 58' 54.21" E	P66	28° 15' 07.26" S	27° 00' 47.70" E
P13	28° 15' 58.59" S	26° 58' 56.57" E	P67	28° 15' 08.07" S	27° 00' 46.88" E
P14	28° 16' 04.16" S	26° 59' 31.94" E	P68	28° 15'08.43" S	27° 00' 46.20" E
P15	28° 16' 03.69" S	26° 59' 54.96" E	P69	28° 15' 08.63" S	27° 00' 45.58" E
P16	28° 16' 00.90" S	26° 59' 57.69" E	P70	28° 15' 08.72" S	27° 00' 44.98" E
P17	28° 15' 59.90" S	26° 59' 56.89" E	P71	28° 15' 08.67" S	27° 00' 44.15" E
P18	28° 15' 55.14" S	26° 59' 53.53" E	P72	28° 15' 08.37" S	27° 00' 43.23" E
P19	28° 15' 53.26" S	26° 59' 51.51" E	P73	28° 15' 07.57" S	27° 00' 42.25" E
P20	28° 15' 51.18" S	26° 59' 48.87" E	P74	28° 15' 06.89" S	27° 00' 41.70" E
P21	28° 15' 47.85" S	26° 59' 45.68" E	P75	28° 15' 06.37" S	27° 00' 40.61" E
P22	28° 15' 44.65" S	26° 59' 42.85" E	P76	28° 15' 06.1" S	27° 00' 40.23" E
P23	28° 15' 41.03" S	26° 59' 41.42" E	P77	28° 15' 05.78" S	27° 00' 39.90" E
P24	28° 15' 38.74" S	26° 59' 40.81" E	P78	28° 15' 05.46" S	27° 00' 39.67" E
P25	28° 15' 38.06" S	26° 59' 40.33" E	P79	28° 15' 04.97" S	27° 00' 39.42" E
P26	28° 15' 36.46" S	26° 59' 37.80" E	P80	28° 15' 04.37" S	27° 00' 39.24" E
P27	28° 15' 34.10" S	26° 59' 25.44" E	P81	28° 15' 03.90" S	27° 00' 39.21" E
P28	28° 15' 32.32" S	26° 59' 15.82" E	P82	28° 15' 03.06" S	27° 00' 39.35" E

Quagga Solar Park Development Area (footprint)					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P29	28° 15' 31.52" S	26° 59' 12.48" E	P83	28° 15' 02.68" S	27° 00' 39.53" E
P30	28° 15' 29.29" S	26° 59' 14.07" E	P84	28° 15' 02.24" S	27° 00' 39.87" E
P31	28° 15' 29.78" S	26° 59' 20.13" E	P85	28° 15' 01.88" S	27° 00' 40.26" E
P32	28° 15' 30.34" S	26° 59' 25.03" E	P86	28° 15' 01.59" S	27° 00' 40.67" E
P33	28° 15' 27.68" S	26° 59' 23.26" E	P87	28° 14' 59.69" S	27° 00' 42.24" E
P34	28° 15' 23.47" S	26° 59' 20.11" E	P88	28° 14' 58.75" S	27° 00' 39.54" E
P35	28° 15' 23.81" S	26° 59' 18.10" E	P89	28° 14' 59.04" S	27° 00' 38.25" E
P36	28° 15' 19.88" S	26° 59' 21.15" E	P90	28° 15' 10.10" S	27° 00' 33.30" E
P37	28° 15' 21.23" S	26° 59' 23.08" E	P91	28° 15' 05.73" S	27° 00' 24.61" E
P38	28° 15' 29.95" S	26° 59' 29.41" E	P92	28° 15' 12.48" S	27° 00' 14.44" E
P39	28° 15' 31.20" S	26° 59' 33.44" E	P93	28° 15' 19.79" S	27° 00' 08.15" E
P40	28° 15' 35.82" S	26° 59' 43.34" E	P94	28° 15' 20.22" S	27° 00' 06.63" E
P41	28° 15' 41.66" S	26° 59' 45.93" E	P95	28° 15' 20.22" S	27° 00' 04.54" E
P42	28° 15' 46.06" S	26° 59' 49.46" E	P96	28° 15' 17.91" S	27° 00' 04.73" E
P43	28° 15' 48.37" S	26° 59' 53.79" E	P97	28° 15' 16.37" S	27° 00' 06.27" E
P44	28° 15' 52.56" S	26° 59' 56.19" E	P98	28° 15' 10.79" S	27° 00' 10.11" E
P45	28° 15' 56.68" S	26° 59' 59.25" E	P99	28° 14' 55.25" S	27° 00' 36.68" E
P46	28° 15' 57.49" S	27° 00' 00.98" E	P100	28° 14' 55.18" S	27° 00' 40.59" E
P47	28° 15' 53.49" S	27° 00' 04.86" E	P101	28° 14' 51.15" S	27° 00' 49.87" E
P48	28° 15' 58.15" S	27° 00' 23.21" E	P102	28° 14' 45.66" S	27° 00' 51.73" E
P49	28° 15' 40.50" S	27° 00' 36.51" E	P103	28° 15' 03.05" S	26° 59' 30.35" E
P50	28° 15' 37.43" S	27° 00' 23.89" E	P104	28° 15' 05.18" S	26° 59' 30.35" E
P51	28° 15' 38.89" S	27° 00' 20.64" E	P105	28° 15' 09.82" S	26° 59' 23.67" E
P52	28° 15' 38.65" S	27° 00' 17.57" E	P106	28° 15' 07.50" S	26° 59' 22.74" E
P53	28° 15' 37.27" S	27° 00' 08.69" E	P107	28° 15' 04.25" S	26° 59' 24.65" E
P54	28° 15' 35.66" S	27° 00' 07.54" E	P108	28° 15' 09.85" S	26° 58' 58.47" E
			Overall footprint: 494 ha		

Table 4. Geographical coordinates of the Quagga SP BESS and construction camp

Quagga BESS & Temporary Construction Camp					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P1	28° 15' 10.23" S	26° 59' 02.06" E	P20	28° 15' 23.56" S	26° 59' 17.12" E
P2	28° 15' 11.33" S	26° 59' 06.46" E	P21	28° 15' 23.26" S	26° 59' 17.09" E
P3	28° 15' 22.30" S	26° 59' 06.48" E	P22	28° 15' 22.97" S	26° 59' 17.23" E
P4	28° 15' 22.30" S	26° 59' 10.51" E	P23	28° 15' 19.42" S	26° 59' 20.15" E
P5	28° 15' 28.69" S	26° 59' 10.50" E	P24	28° 15' 19.17" S	26° 59' 20.58" E
P6	28° 15' 28.69" S	26° 59' 12.75" E	P25	28° 15' 19.29" S	26° 59' 21.22" E
P7	28° 15' 29.28" S	26° 59' 20.19" E	P26	28° 15' 19.61" S	26° 59' 21.68" E
P8	28° 15' 29.43" S	26° 59' 22.36" E	P27	28° 15' 19.61" S	26° 59' 22.30" E
P9	28° 15' 29.26" S	26° 59' 22.82" E	P28	28° 15' 08.13" S	26° 59' 22.30" E
P10	28° 15' 28.89" S	26° 59' 23.08" E	P29	28° 15' 07.45" S	26° 59' 22.12" E

Quagga BESS & Temporary Construction Camp					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P11	28° 15' 28.44" S	26° 59' 23.06" E	P30	28° 15' 05.48" S	26° 59' 23.28" E
P12	28° 15' 27.94" S	26° 59' 22.77" E	P31	28° 15' 05.42" S	26° 59' 23.30" E
P13	28° 15' 26.87" S	26° 59' 21.90" E	P32	28° 15' 05.18" S	26° 59' 23.21" E
P14	28° 15' 24.43" S	26° 59' 20.15" E	P33	28° 15' 05.13" S	26° 59' 22.97" E
P15	28° 15' 24.12" S	26° 59' 19.31" E	P34	28° 15' 06.88" S	26° 59' 14.82" E
P16	28° 15' 24.32" S	26° 59' 18.09" E	P35	28° 15' 11.29" S	26° 59' 16.18" E
P17	28° 15' 24.33" S	26° 59' 18.01" E	P36	28° 15' 12.76" S	26° 59' 10.13" E
P18	28° 15' 24.22" S	26° 59' 17.54" E	P37	28° 15' 08.16" S	26° 59' 08.83" E
P19	28° 15' 23.86" S	26° 59' 17.23" E	P38	28° 15' 09.60" S	26° 59' 02.07" E
			Overall footprint: 20 ha		

Table 5. Geographical coordinates of the Quagga on-site substation

Quagga on-site substation and switching station		
Point	**Latitude**	**Longitude**
P1	28° 15' 11.77" S	26° 59' 12.53" E
P2	28° 15' 11.01" S	26° 59' 15.62" E
P3	28° 15' 07.08" S	26° 59' 14.41" E
P4	28° 15' 07.83" S	26° 59' 11.29" E
Overall footprint: 1.1 ha		

Table 6. Geographical coordinates of the Quagga 132kV powerline

Point	Longitude	Latitude
P1 (On-site substation)	26° 59' 13.19" E	28° 15' 07.53" S
P2 (bending point)	26° 58' 59.27" E	28° 14' 23.38" S
P3 (bending point)	26° 59' 08.56" E	28° 14' 04.35" S
P4 (bending point)	26° 59' 08.71" E	28° 13' 56.87" S
P5 (bending point)	26° 59' 02.86" E	28° 13' 50.50" S
P6 (bending point)	26° 58' 19.80" E	28° 13' 28.41" S
P7 (bending point)	26° 58' 23.26" E	28° 12' 59.89" S
P8 (bending point)	26° 58' 19.19" E	28° 12' 56.15" S
P9 (bending point)	26° 58' 20.33" E	28° 12' 47.51" S
P10 (bending point)	26° 56' 20.66" E	28° 11' 41.17" S
P11 (bending point)	26° 55' 37.33" E	28° 11' 32.80" S
P12 (bending point)	26° 54' 35.06" E	28° 11' 01.96" S
P13 (bending point)	26° 52' 48.89" E	28° 10' 48.70" S
P14 (bending point)	26° 52' 47.05" E	28° 10' 34.76" S
P15 (bending point)	26° 52' 47.09" E	28° 10' 33.46" S
P16 (Florida HV substation)	26° 52' 46.86" E	28° 10' 31.97" S
Overall length: 15.64 km		

Table 7. Geographical coordinates of the Quagga PV panels (solar field)

Quagga PV plant footprint					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P1	28° 15' 11.71" S	26° 59' 05.89" E	P55	28° 15' 33.77" S	27° 00' 09.91" E
P2	28° 15' 22.71" S	26° 59' 06.00" E	P56	28° 15' 34.22" S	27° 00' 15.29" E
P3	28° 15' 22.05" S	26° 58' 58.79" E	P57	28° 15' 32.37" S	27° 00' 16.77" E
P4	28° 15' 23.66" S	26° 58' 56.63" E	P58	28° 15' 34.12" S	27° 00' 23.94" E
P5	28° 15' 27.46" S	26° 58' 58.61" E	P59	28° 15' 35.87" S	27° 00' 41.13" E
P6	28° 15' 31.73" S	26° 59' 00.28" E	P60	28° 15' 30.04" S	27° 00' 54.53" E
P7	28° 15' 35.61" S	26° 59' 01.25" E	P61	28° 15' 06.45" S	27° 01' 00.35" E
P8	28° 15' 37.61" S	26° 59' 01.17" E	P62	28° 15' 03.53" S	27° 00' 53.36" E
P9	28° 15' 40.86" S	26° 59' 00.33" E	P63	28° 15' 02.13" S	27° 00' 49.26" E
P10	28° 15' 47.59" S	26° 59' 00.09" E	P64	28° 15' 06.31" S	27° 00' 48.18" E
P11	28° 15' 50.25" S	26° 58' 57.65" E	P65	28° 15' 06.84" S	27° 00' 47.96" E
P12	28° 15' 55.97" S	26° 58' 54.21" E	P66	28° 15' 07.26" S	27° 00' 47.70" E
P13	28° 15' 58.59" S	26° 58' 56.57" E	P67	28° 15' 08.07" S	27° 00' 46.88" E
P14	28° 16' 04.16" S	26° 59' 31.94" E	P68	28° 15'08.43" S	27° 00' 46.20" E
P15	28° 16' 03.69" S	26° 59' 54.96" E	P69	28° 15' 08.63" S	27° 00' 45.58" E
P16	28° 16' 00.90" S	26° 59' 57.69" E	P70	28° 15' 08.72" S	27° 00' 44.98" E
P17	28° 15' 59.90" S	26° 59' 56.89" E	P71	28° 15' 08.67" S	27° 00' 44.15" E
P18	28° 15' 55.14" S	26° 59' 53.53" E	P72	28° 15' 08.37" S	27° 00' 43.23" E
P19	28° 15' 53.26" S	26° 59' 51.51" E	P73	28° 15' 07.57" S	27° 00' 42.25" E
P20	28° 15' 51.18" S	26° 59' 48.87" E	P74	28° 15' 06.89" S	27° 00' 41.70" E
P21	28° 15' 47.85" S	26° 59' 45.68" E	P75	28° 15' 06.37" S	27° 00' 40.61" E
P22	28° 15' 44.65" S	26° 59' 42.85" E	P76	28° 15' 06.1" S	27° 00' 40.23" E
P23	28° 15' 41.03" S	26° 59' 41.42" E	P77	28° 15' 05.78" S	27° 00' 39.90" E
P24	28° 15' 38.74" S	26° 59' 40.81" E	P78	28° 15' 05.46" S	27° 00' 39.67" E
P25	28° 15' 38.06" S	26° 59' 40.33" E	P79	28° 15' 04.97" S	27° 00' 39.42" E
P26	28° 15' 36.46" S	26° 59' 37.80" E	P80	28° 15' 04.37" S	27° 00' 39.24" E
P27	28° 15' 34.10" S	26° 59' 25.44" E	P81	28° 15' 03.90" S	27° 00' 39.21" E
P28	28° 15' 32.32" S	26° 59' 15.82" E	P82	28° 15' 03.06" S	27° 00' 39.35" E
P29	28° 15' 31.52" S	26° 59' 12.48" E	P83	28° 15' 02.68" S	27° 00' 39.53" E
P30	28° 15' 29.29" S	26° 59' 14.07" E	P84	28° 15' 02.24" S	27° 00' 39.87" E
P31	28° 15' 29.78" S	26° 59' 20.13" E	P85	28° 15' 01.88" S	27° 00' 40.26" E
P32	28° 15' 30.34" S	26° 59' 25.03" E	P86	28° 15' 01.59" S	27° 00' 40.67" E
P33	28° 15' 27.68" S	26° 59' 23.26" E	P87	28° 14' 59.69" S	27° 00' 42.24" E
P34	28° 15' 23.47" S	26° 59' 20.11" E	P88	28° 14' 58.75" S	27° 00' 39.54" E
P35	28° 15' 23.81" S	26° 59' 18.10" E	P89	28° 14' 59.04" S	27° 00' 38.25" E
P36	28° 15' 19.88" S	26° 59' 21.15" E	P90	28° 15' 10.10" S	27° 00' 33.30" E
P37	28° 15' 21.23" S	26° 59' 23.08" E	P91	28° 15' 05.73" S	27° 00' 24.61" E
P38	28° 15' 29.95" S	26° 59' 29.41" E	P92	28° 15' 12.48" S	27° 00' 14.44" E
P39	28° 15' 31.20" S	26° 59' 33.44" E	P93	28° 15' 19.79" S	27° 00' 08.15" E
P40	28° 15' 35.82" S	26° 59' 43.34" E	P94	28° 15' 20.22" S	27° 00' 06.63" E
P41	28° 15' 41.66" S	26° 59' 45.93" E	P95	28° 15' 20.22" S	27° 00' 04.54" E
P42	28° 15' 46.06" S	26° 59' 49.46" E	P96	28° 15' 17.91" S	27° 00' 04.73" E

Quagga PV plant footprint					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P43	28° 15' 48.37" S	26° 59' 53.79" E	P97	28° 15' 16.37" S	27° 00' 06.27" E
P44	28° 15' 52.56" S	26° 59' 56.19" E	P98	28° 15' 10.79" S	27° 00' 10.11" E
P45	28° 15' 56.68" S	26° 59' 59.25" E	P99	28° 14' 55.25" S	27° 00' 36.68" E
P46	28° 15' 57.49" S	27° 00' 00.98" E	P100	28° 14' 55.18" S	27° 00' 40.59" E
P47	28° 15' 53.49" S	27° 00' 04.86" E	P101	28° 14' 51.15" S	27° 00' 49.87" E
P48	28° 15' 58.15" S	27° 00' 23.21" E	P102	28° 14' 45.66" S	27° 00' 51.73" E
P49	28° 15' 40.50" S	27° 00' 36.51" E	P103	28° 15' 03.05" S	26° 59' 30.35" E
P50	28° 15' 37.43" S	27° 00' 23.89" E	P104	28° 15' 05.18" S	26° 59' 30.35" E
P51	28° 15' 38.89" S	27° 00' 20.64" E	P105	28° 15' 09.82" S	26° 59' 23.67" E
P52	28° 15' 38.65" S	27° 00' 17.57" E	P106	28° 15' 07.50" S	26° 59' 22.74" E
P53	28° 15' 37.27" S	27° 00' 08.69" E	P107	28° 15' 04.25" S	26° 59' 24.65" E
P54	28° 15' 35.66" S	27° 00' 07.54" E	P108	28° 15' 09.85" S	26° 58' 58.47" E
			Overall footprint: 494 ha		

Preferred access (**Option 1**) to the site will be via an existing internal gravel road across farmland, connecting from the regional road R73 that runs from the N1, Northeast of Winburg, in the direction of Virginia, crossing the **Remainder of the Farm PALMIET FONTEIN 229, Winburg RD**, the **Farm BLOMSKRAAL 216, Ventersburg RD** and the **Farm QUAGGAFONTEIN 3, Winburg RD**, located north and west of the development area of Quagga. Along this road, a new portion of road at 500m will be constructed to bypass the homestead and then reconnect with the existing road to the Quagga SP site. The preferred route (Option 1) is indicated in Figures 9 and 19.

As alternative, access to the Quagga Solar Park may be from a new access road (to be constructed, at 5.8 km long), crossing the Farm SIBERIASFONTEIN 605, Portion 1 of the Farm ZOUTFONTEIN 841, Remainder of the Farm PALMIET FONTEIN 229 and Farm QUAGGAFONTEIN 3, Winburg RD, located south and west of the development area of Quagga. This alternative route is not preferred, due to the high environmental sensitivity of most of the area crossed by the proposed route (Option 3).

A third alternative access road was considered (Option 2), however is no longer feasible due to the proposed Virginia 4 Solar Park development footprint (north) and associated access routes (east) of the site.

Access point from the R73 road is **28°14'37.98"S** and **26°56'48.60"E.**

Table 8. Properties crossed by the proposed access road (Option 1, preferred) - Surveyor-general 21-digit site code

F	**0**		**4**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**9**	**0**	**0**	**0**	**0**	**0**
F	**0**		**3**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**6**	**0**	**0**	**0**	**0**	**0**
F	**0**		**4**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**
1		**2**			**3**				**4**									**5**				

To develop the facility, Indus Energy must undertake an Environmental Impact Assessment (EIA) process and acquire environmental authorization from the *National Department of Forestry, Fisheries and the Environment (DFFE)*, in consultation with the *Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)*, in terms of the EIA Regulations, 2017 published on 07 April 2017, as amended under section 24(5) and 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998).

Indus Energy is the applicant for Quagga Solar Park (the proposed project) which will be connected to a **new 132kV/400kV substation and 400kV switching station** (the "**Florida 132kV/400kV Substation**"), through a new 132 kV powerline **15.6 km long** (the "**Quagga 132 kV Powerline**").

The Florida 132kV/400kV Substation is planned to be located on Portion 1 of the Farm Florida 633 and will be connected to **Eskom Theseus Main Transmission Substation (MTS)** through a new 400 kV powerline 6.0 km long (the "**Florida 400 kV Powerline**").

Quagga 132 kV Powerline forms part of this EIA process, but **Florida 132kV/400kV Substation** and **Florida 400 kV Powerline** will form part of an EIA process of Florida Solar Park, proposed by **Piscis Energy (Pty) Ltd** (DFFE Ref No.: 14/12/16/3/3/2/2322).

This Florida 132kV/400kV Substation and the Florida 400 kV Powerline will be shared by several projects (*i.e.* Quagga, Virginia 4, Corona and Florida Solar Parks), but the applicant in terms of the environmental process is **Piscis Energy (Pty) Ltd.** Once built, this shared 400kV connection infrastructure will be owned and operated by **Eskom.**

The **Eskom Theseus Main Transmission Substation (MTS)** is located 18.2 km North-West of the north-western corner of project site.

The independent Environmental Assessment Practitioners (EAPs) which have been appointed for the undertaking of the detailed environmental studies in compliance with the 2017 EIA Regulations, as amended, is AGES Limpopo (Pty) Ltd (AGES)**.**

With the aim of identifying and assessing all potential environmental impacts related to the development as well as suggesting possible mitigation measures and alternatives, AGES has appointed specialist sub-consultants to compile detailed reports and to study the activities necessary for the assessment of the specific impacts related to their field of expertise. AGES and the other specialist consultants are in a position of independency from Indus Energy and not subsidiaries or affiliated to the latter. AGES and the specialist consultants have no secondary interest connected with the development of this project or of other projects which may originate from the authorization of the project.

The characteristics, the technology and the extent of the Quagga Solar Park is defined and evaluated in this EIA Report and its Annexures.

4 LOCALITY OF THE PROPOSED ACTIVITY

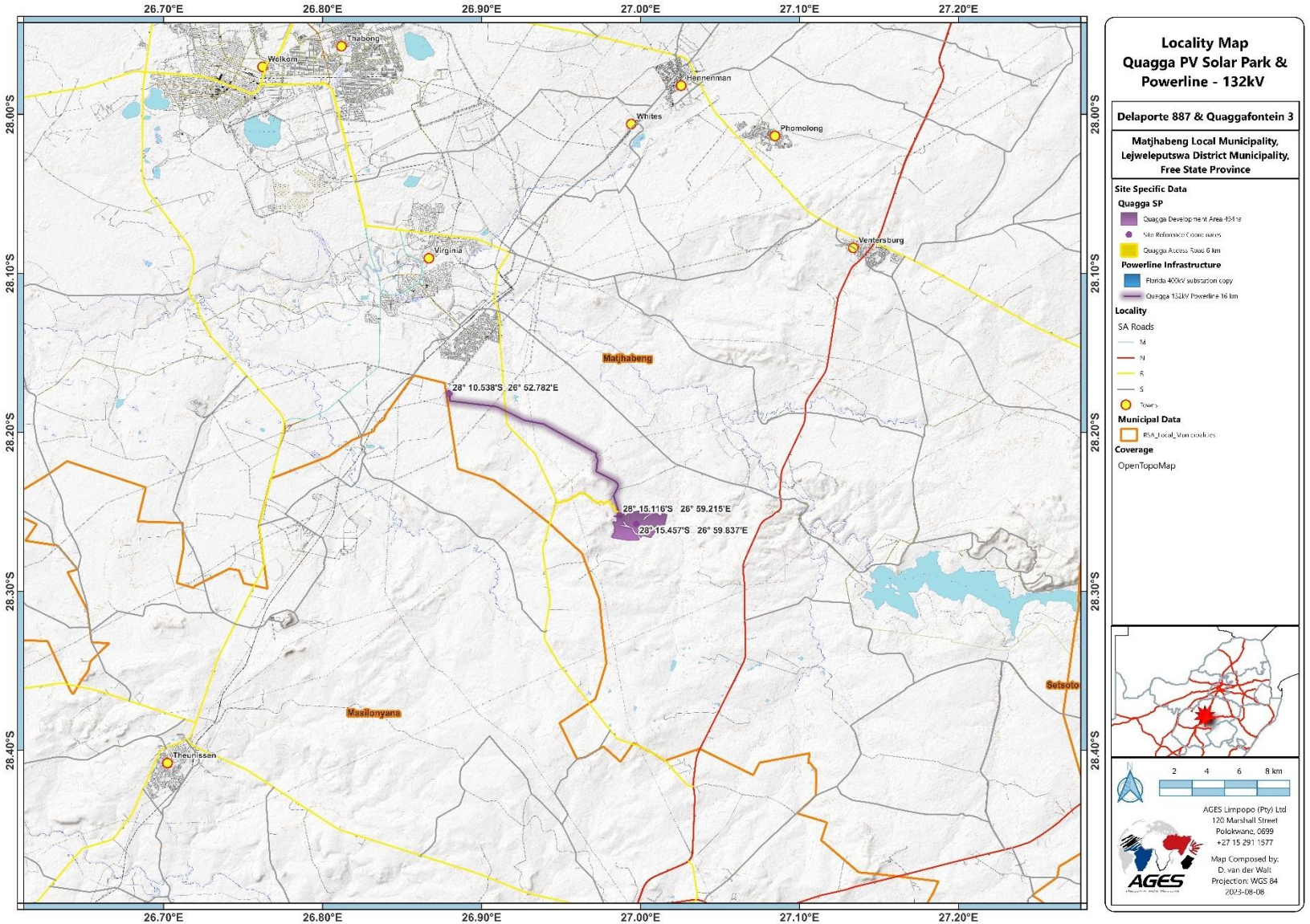


Figure 1. Locality map (Cadastral map)

5 SCOPE OF THE PROPOSED ACTIVITY

5.1 LISTED ACTIVITIES TRIGGERED IN TERMS OF NEMA

The "listed activities" in terms of sections 24 and 24D of NEMA, included in **Listing Notices 1 (GN R.327), 2 (GN R.325) & 3 (GN R.324) of the EIA Regulations, 2017,** involved (or *potentially* involved) in the proposed development, are detailed in the table below.

Table 9. Listed activities in terms of EIA Regulations dated 07 April 2017 triggered by the proposed development

Listing Notice 1 of 07 April 2017	Description of the activity
GN R.327 Item 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.**	Connection of Quagga Solar Park to Eskom grid will be according to Eskom connection solution and will require: (i) One on-site high-voltage substation with high-voltage power transformers, stepping up voltage from 22 kV (or 33 kV) to 132 kV, and one 132 kV busbar with metering and protection devices. On-site high-voltage substation will be equipped with control buildings and one 132 kV busbar with metering and protection devices ("switching station"). (ii) One 132kV powerline (double circuit), approximately 15.6km long, for connection of on-site substation to the 132kV busbar of new Florida 132kV/400kV Substation, planned on Portion 1 of the Farm Florida 633. Connection infrastructure is located outside urban areas or industrial complexes.
GN R.327, Item 12 (ii)(c) **The development of –** **(ii) infrastructure or structures with a physical footprint of 100sq.m. or more** **(c) within 32m of a watercourse, measured from the edge of a watercourse**	The proposed Quagga 132kV Powerline and access road will intercept wetlands and drainage channels that have been identified as per the delineation of the appointed wetland specialist. Some of the pylons of the proposed powerline may be constructed within 32m from these features.
GN R.327, Item 19 **The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse**	The proposed Quagga 132kV Powerline and access road will cross wetlands and drainage channels that have been identified as per the delineation of the appointed wetland specialist. The interception of these wetlands and drainage channels will entail, during the construction phase, the movement of soil of a volume of more than 10 m^3.
GN R.327, Item 24 (ii) **The development of a road -** **(ii) with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m**	Access to the Quagga Solar Park will be via the existing regional R73 road north-west of the site. During the construction phase, the access road will have a reserve wider than 13.5 m to allow the transportation of abnormal goods (e.g., power transformers).
GN R.327, Item 28 (ii) **Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture on or after 01 April 1998 and where such development:**	The Quagga Solar Park can be regarded as an industrial development, where the total area to be transformed (footprint) will be bigger than 1 ha (up to 494 ha). The project site is currently being used for livestock grazing and agriculture.

(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 ha	
Listing Notice 2 of 07 April 2017	**Description of the activity**
GN R.325, Item 1 **The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 MW or more.**	The proposed Quagga PV Solar facility will comprise the construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a maximum generation capacity up to 240 MW at the point of connection (Maximum Export Capacity). The proposed solar photovoltaic facility, as well as the associated on-site high-voltage substation and Battery Energy Storage System (BESS), will be located on the Farms Quaggafontein 3 and Delaporte 887, Winburg RD.
GN R.325, Item 15 **The clearance of an area of 20 ha or more of indigenous vegetation**	The construction of the Quagga PV Solar facility will require clearance of indigenous vegetation, where the total area to be transformed (footprint of the PV plant) will be up to 494 ha.
Listing Notice 3 of 07 April 2017	**Description of the activity**
GN R.324, Item 12 (b) (i) (ii) (iv) **The clearance of an area of 300m² or more of indigenous vegetation:** **(b) In Free State province;** **(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;** **(ii) Within critical biodiversity areas identified in bioregional plans;** **(iv) Areas within a watercourse or wetland; or within 100m from the edge of a watercourse or wetland.**	Quagga Solar Park and/or powerline will affect an area of 300 square metres or more of indigenous vegetation, as endangered ecosystem (Vaal-Vet Sandy Grasslands) in terms of section 52 of the NEMBA; and Critical Biodiversity areas identified in the Free State Biodiversity Conservation Plan (CBA2 and ESA1 areas); and will be developed in some areas within 100m from the edge of a watercourse or wetland.

5.2 DESCRIPTION OF ASSOCIATED STRUCTURES AND INFRASTRUCTURE RELATED TO THE DEVELOPMENT

The project envisages the establishment of a solar power plant with a maximum generation capacity at the delivery point (Maximum Export Capacity) of up to 240MW.

The construction timeframe is estimated to be approximately 18 to 24 months.

The preferred technical solutions envisage:

- **mono/polycrystalline PV modules, mono or bi-facial.**
- **fixed mounting systems** or **horizontal 1-axis trackers.**

The estimated annual energy production is calculated in approximately:

- **2,100 kWh/kWp/year** (load factor = 0.240), in the case of PV modules mounted on fixed mounting systems; or
- **2,450 kWh/kWp/year** (load factor = 0.280) in the case of bi-facial PV modules mounted on trackers.

Therefore, the Quagga PV Solar Park will generate:

- **787.5 GWh per year** with PV modules mounted on fixed mounting systems; or
- **918.7 GWh per year** in the case of PV modules mounted on trackers.

The Global Horizontal Irradiation of the site is 2,099 kWh/m^2/year (source: **https://solargis.info/imaps/**).

The energy generated by the Quagga PV Solar Park will reduce the quantity of pollutants and greenhouse gases emitted into the atmosphere. The reduced amount of CO_2 will be the emissions that would have been generated by a thermal power plant using fossil fuels for producing the same quantity of energy that it is produced by the Quagga PV Solar Park.

The quantity of the avoided CO_2 is calculated as follows: the energy produced by the Quagga Solar Park (up to 787.5 GWh/y or 918.7 GWh/y) is multiplied by Eskom's average emission factor which is 1.015 t CO_2/MWh (source: Energy Research Centre, University of Cape Town. (2009 Carbon accounting for South Africa).

The avoided CO_2 emissions are approximately 775,862 tons of CO_2 per year in the case of PV modules mounted on fixed mounting systems, or 905,172 tons of CO_2 per year in the case of PV modules mounted on trackers.

Considering that 1 kg of coal generates approximately 3.7 kWh (supposing a caloric value of 8000 kcal/kg and a coal plant efficiency of 40%), the coal saved by the Quagga Solar Park will be approximately 212,838 tons of coal / year in the case of PV modules mounted on fixed mounting systems, or 248,311 tons of coal / year in the case of PV modules mounted on trackers.

The detailed description of the characteristic and functioning of the PV plant and its connection is summarised in Table 10 and detailed in paragraphs 5.4 to 5.5.5 below.

Table 10. Technical details of the proposed PV facility and connecting powerline

Technical details of the proposed facility	
Component	**Description/Dimensions**
Technology	Solar Photovoltaic
Capacity of the facility	Maximum Export Capacity (@ the point of connection): up to **240 MW** Installed power capacity - DC side (PV modules): up to 375.0 MWp Installed power capacity - AC side (inverters): up to 300.0 MW
Height of PV structures	1.0 - 4.5 m above ground
Surface area to be covered (including associated infrastructure like roads)	Project footprint / fenced area is up to **494 ha**. Surface area (within the project footprint) covered by PV modules, internal roads, MV stations, HV substation and BESS is up to 247 ha (cover ratio up to 0.5)
Area occupied by both permanent and construction laydown areas	Project footprint / fenced area is up to **494 ha**. Surface area (within the project footprint) covered by PV modules, internal roads, MV stations, HV substation and BESS is up to 247 ha (cover ratio up to 0.5) The construction camp (temporary) will be up to 20 ha in extent, within the project footprint, and will correspond to the area used for the BESS.

Technical details of the proposed facility	
Component	**Description/Dimensions**
Number of inverters required	Each Medium voltage station will be equipped with DC/AC inverters that convert Direct Current (DC) into Alternate Current (AC) at a low voltage (typically 600 V). There will be 100 medium voltage stations of 3.0 MW each throughout the proposed development. PV technology is in constant and rapid evolution, which means the final choice of type (e.g. central inverters or string inverters) and model of inverter can be taken at commission date, based on the availability of inverters of the worldwide market and of the cost-efficiency curve. In any case, the total installed capacity of the inverters (AC side) will be up to 300 MWac.
Area occupied by inverter/transformer stations/substations	There will be 100 medium voltage stations throughout the proposed development. Each will have an area of approximately 30 m^2. Therefore, the combined area of the medium voltage stations will be 3000 m^2.
Control rooms	The substation and switching station will be equipped with 2 control rooms. The control rooms will have a length of 30 m and a width of 11 m. Therefore, each of the control room will have an area of 330 m^2: 660 m^2 in total.
Workshops/Warehouses	Three warehouses / workshops will be constructed within close proximity to the on-site substation and switching station. The three warehouses will have an area of approximately 300 m^2 each: 900 m^2 in total.
On-site substation	The on-site 22kV (or 33kV)/132kV step-up substation and 132kV switching station will host two 300 MVA 22kV (or 33kV)/132kV transformers (one as spare). On-site substation and switching station occupy a footprint of approx. 11,250 m^2. This area includes the control buildings.
Areas occupied by buildings	Medium-voltage stations occupy a footprint of to 3,000 m^2. On-site substation and switching station occupy a footprint of approx. 11,250 m^2. This area includes the control buildings. Workshops & Warehouses occupy a footprint of approx. 300 m^2 each. In total, 3 warehouses are foreseen: 900 m^2 in total. Therefore, the total area occupied by buildings (MV stations, HV substation, Workshop & Warehouse) amounts to approx. **15,150 m2 (1.5 ha).** The Battery Energy Storage Systems (BESS) will be located in the area where the camp site will be for the purpose of the construction phase. This area will be approximately **20 ha** in size.
Number of 132kV powerlines	1 (one) overhead 132kV powerline (double circuit) (the "**Quagga 132 kV Powerline**") approximately **15.6 km long**, connecting the on-site HV substation and switching station of the Solar Park to a new 132kV/400kV substation and 400kV switching station (the "Florida 132kV/400kV Substation"). The Quagga 132 kV Powerline forms part of this EIA process, while the Florida 132kV/400kV Substation will form part of the EIA process of the Florida Solar Park, proposed by Piscis Energy (Pty) Ltd (DFFE Ref No.: 14/12/16/3/3/2/2322).
Voltage of overhead power line	132 kV
Servitude of overhead powerline	36 m (18 m from each side of the centre line)

Technical details of the proposed facility	
Component	**Description/Dimensions**
Height of the overhead powerline	Up to 25 m above the ground level
Type of structures of powerline	Steel monopole (double circuit)
Battery Energy Storage System (BESS)	Battery Energy Storage System (BESS) of **240 MW / 1440 MWh** (6-hour storage), with a footprint up to **20 ha** within the Project footprint / fenced area
Access road	The project footprint / development area will have direct access from the **existing access road - be re-built at a higher standard - from the regional road R73** that runs from the N1, North-East of Winburg, in the direction of Virginia. This access road is 5.1 km long and crosses the **Remainder of the Farm PALMIET FONTEIN 229, Winburg RD**, the **Farm BLOMSKRAAL 216, Ventersburg RD** and the **Farm QUAGGAFONTEIN 3, Winburg RD**, located north and west of the development area of Quagga.
Length of internal roads	Approximately 40,000 m
Width of internal roads	Up to 8.0 m, with a road reserve up to 13.5 m
Height of fencing	3.0 m
Type of fencing	Wire mesh fencing with video-surveillance system

5.3 LAYOUT OF INFRASTRUCTURE AND STRUCTURES ON SITE

The layout of the proposed development is the result of a comparative study of various layout alternatives and was defined in consideration of the results of some specialist studies conducted during this EIA phase.

The PV plant is designed and conceived to minimize visual and noise impacts, as well as to operate safely whilst assuring a high level of reliability, with low water consumption and the need for easy and quick maintenance and repair for approximately 35 years.

The footprint (fenced area) of the Quagga PV Solar Park will be up to 494ha.

The main drivers of the proposed layout are:

- To maximize the energy production and the reliability of the PV plant, by choosing proven solar technologies; mono or bi-facial mono/polycrystalline solar modules mounted on single-axis horizontal trackers (SAT) or on fixed mounting systems.
- To develop the PV power plant on an area to avoid high potential agricultural land and ecologically sensitive natural areas.
- Although the plant will be on a CBA 2 area, the conservation priority of the *Themeda triandra – Setaria incrassatae* clay grassland is medium.
- To avoid drainage channels.

Approximately one third of the connecting powerline will traverse vegetation classified as endangered ecosystem (Vaal-Vet Sandy Grasslands) in terms of section 52 of NEMBA, although most of these areas have been transformed into agricultural land.
The footprint of Quagga Solar Park and portions of the Quagga 132kV Powerline will be developed within 100m from the edge of wetlands.

The proposed layout plan (attached as Annexure A and also shown in Figure 2 below) was drawn using PV modules mounted on trackers. In the case of PV modules mounted on fixed mounting systems, the layout plans will not change, except for the orientation of the PV arrays: East-West instead of North-South.

The required footprint - corresponding to the fenced area - will be the same: up to 494 ha, and the maximum height of the structures (PV modules and support frames) will be approximately 4.5 m above ground level.

The project layout and the other plant components are detailed in the following drawings attached as Annexures A.1 and A.2:

Table 11. List of maps and drawings included as Annexure A

Code	Title
QGGSP_01	Locality map_Provincial context
QGGSP_02	Locality map_District municipality context
QGGSP_03	Locality map_Local municipality context
QGGSP_04	Locality map_PV Solar Park_Cadastral
QGGSP_05	Locality map_Powerline_Cadastral
QGGSP_06	Development area and Sensitiv_Satellite
QGGSP_06	Layout plan_PV Power plant_240MW
QGGSP_06	Solar PV_Development area and Sensitivity map
QGGSP_07	Sensitivity map_Powerline and Access road
QGGSP_08	Powerline Sensitivity map 1_4
QGGSP_08	Powerline Sensitivity map 2_4
QGGSP_08	Powerline Sensitivity map 3_4
QGGSP_08	Powerline Sensitivity map 4_4
QGGSP_09	Powerline_Pylon positions map
QGGSP_09	Powerline_Pylon positions map_Satellite
QGGSP_10	Development area and CBAs map
QGGSP_11	Cumulative map
QGGSP_12	Mounting system Option 1_fixed
QGGSP_13	Development area_HCM Units map
QGGSP_13	Mounting system Option 2_trackers
QGGSP_14	MV Stations
QGGSP_15	Control building and MV receiving station
QGGSP_16	On-site 132kV substation
QGGSP_17	132kV Steel monopole structure
QGGSP_18	Warehouse 1_2
QGGSP_19	Warehouse 2_2
QGGSP_20	Florida 400kV substation
QGGSP_21	400kV Tower – Eskom specs
QGGSP_22	Buffer delineation map_PV Solar Park
QGGSP_23	Buffer delineation map_Powerline
QGGSP_24	Vegetation types

(*) The **Florida 132kV/400kV Substation** and the **Florida 400 kV Powerline** will form part of the EIA process of the Florida Solar Park, proposed by Piscis Energy (Pty) Ltd (DFFE Ref No.: 14/12/16/3/3/2/2322).

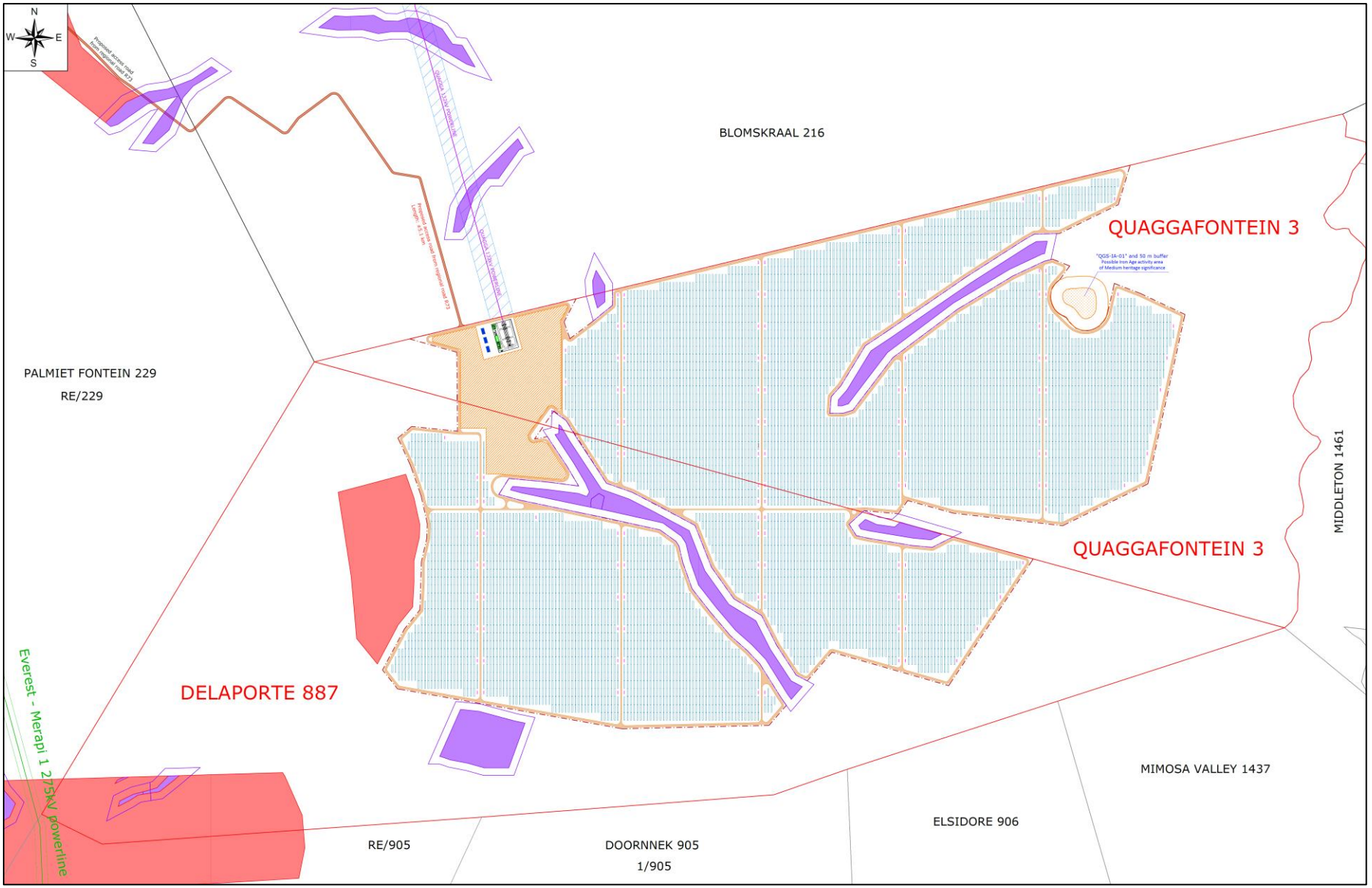


Figure 2. Proposed Layout Plan of the Quagga Solar Park

5.4 PRIMARY COMPONENTS

The proposed development (the Photovoltaic (PV) Power Plant and its connection infrastructure) consists of the installation of the following equipment:

- Photovoltaic modules (mono-crystalline, poly-crystalline, mono or bi-facial modules)
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations
- Internal cabling and string boxes
- Medium voltage stations, hosting DC/AC inverters and LV/MV power transformers
- Medium voltage receiving station(s)
- Workshops & warehouses
- One **on-site high-voltage substation with high-voltage power transformers**, stepping up voltage, and one high-voltage busbar with metering and protection devices (switching station)
- A **new 132 kV powerline (double circuit)** approximately **15.6 km** long, for connection of the on-site substation to the new “Florida 132kV/400kV substation and 400kV switching station”, planned to be located on Portion 1 of the Farm Florida 633, Ventersburg RD (this 132kV/400kV substation is not part of the current EIA process)
- **Battery Energy Storage Systems (BESS)**, with a Maximum Export Capacity up to 240 MW and up to 6-hour storage capacity up to 1 440 MWh, with a footprint up to 20 ha, next to the on-site high-voltage substation, within the PV plant footprint / fenced areas.
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Access road, 5.1 km long, from the Regional Road R73
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point, water supply pipelines, water treatment facilities
- Patented Sewage system

5.4.1 PROJECT FUNCTIONING

Solar energy facilities using PV technology convert sun energy to generate electricity through a process known as the Photovoltaic Effect, which consists of the generation of electrons by photons of sunlight to create electrical energy. The preferred technical solutions are mono/bi-facial; mono/polycrystalline modules, mounted on horizontal 1-axis trackers, which at present represent the best performing options in terms of reliability and costs/efficiency.

The PV technology is in constant and rapid evolution, this means that the final choice of the type of solar modules (mono-crystalline or polycrystalline, mono or bi-facial) and mounting system (fixed or tracker) can be taken at commission, on the basis of the availability of PV modules and mounting systems, of the worldwide market and of the cost-efficiency curve. The required footprint - corresponding on the fenced area - will not exceed 494 ha, and maximum height of the structures (PV modules and support frames) will be approximately 4.5m above the ground level. Impacts and mitigation measures will not change, regardless of technology to be applied as described above.

PV modules will be assembled on zinced steel or aluminium frames, to form PV arrays. The metal frames that sustain PV arrays are set to the ground by fixed support poles.

A) In the case of PV modules mounted on fixed mounting systems:

Each mounting frame will host several PV modules along two or more parallel rows consisting of PV modules placed side by side, with the position of the PV arrays northwards and at an optimized tilt. The rows are mounted one on top of the other, with an overall mounting structure height up to 4.5 meters above ground level.

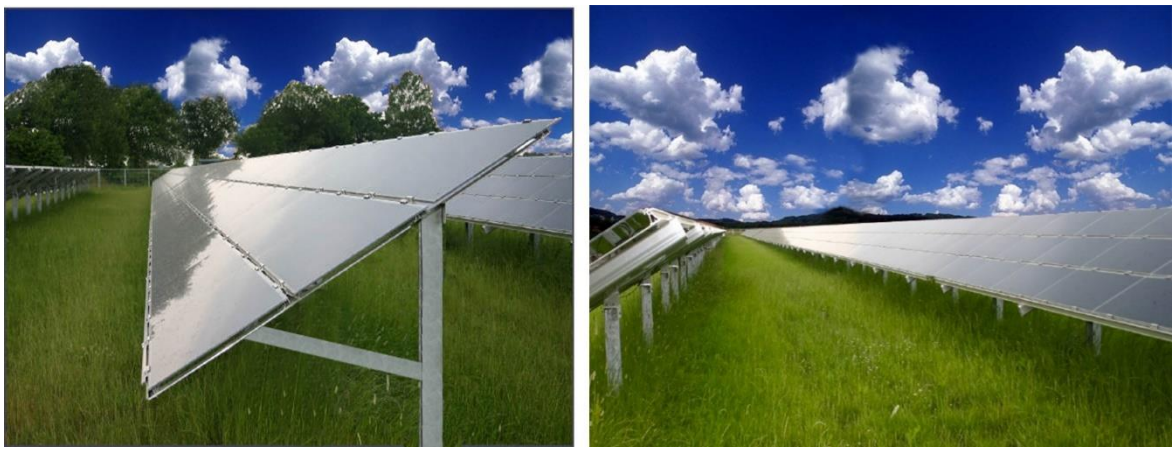


Figure 3. Lateral views of PV arrays mounted on fixed mounting systems

Figure 4. Frontal view of PV arrays mounted on fixed mounting systems

For further details, please refer to figure 3 and 4 above and to a drawing in Annexure A.

B) In the case of PV modules mounted on trackers:

Each PV array is composed of several PV modules disposed along one or more parallel rows consisting of PV modules placed side by side. Each tracker is composed by several PV arrays North-South oriented and linked by a horizontal axis, driven by a motor. The horizontal axis allows the rotation of the PV arrays toward the West and East direction, to follow the daily sun path.
The maximum mounting structure height will be up to 4.5 meters above ground level.

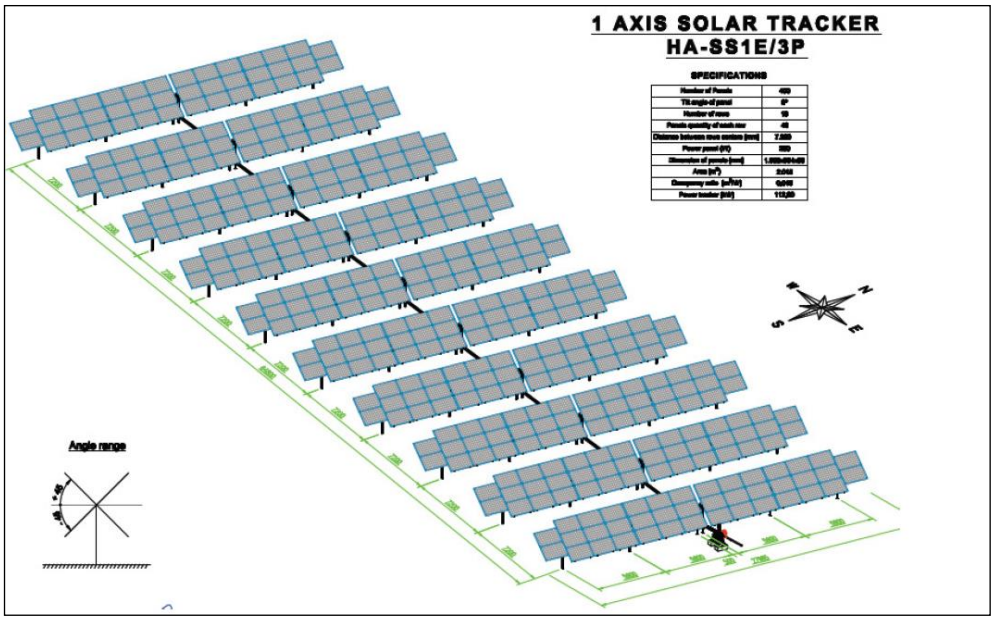


Figure 5. Simulation views of the PV arrays mounted on 1-axis horizontal tracker

Figure 6. Front views of the PV arrays mounted on horizontal 1-axis tracker

For further details, see also the drawing in Annexure A:

C) In both cases:

PV modules are series-connected outlining PV strings made of several modules, so that the PV string voltage fits into the voltage range of the inverters. PV strings are set up in order to be connected to DC-connection boxes. Each String Box allows the parallel connection of several PV strings (also called “PV sub-field”). String Boxes monitor the currents in photovoltaic modules and can promptly diagnose faults. String boxes are also designed with a circuit breaker in order to disconnect the photovoltaic sub-fields from the inverters.

The PV sub-fields are thought to be linked to central inverters, located in medium voltage stations. Each station comprises prefabricate buildings designed to host DC/AC inverters and a medium voltage power transformer. The DC/AC inverters are deemed to convert direct current (DC) into alternate current (AC) at low voltage (600 V); subsequently the AC will pass through a medium-voltage transformer in order to increase the voltage up to 22kV (or 33 kV).

The medium-voltage stations are detailed in the drawing in Annexure A.

The energy delivered from the medium voltage stations will be collected into one (or more) medium voltage receiving station(s), parallel connecting all the PV fields of the PV generator. From the medium voltage receiving station, the energy will be delivered to two high-voltage power transformers (300 MVA each, plus one as spare), which will step up the electric energy from the medium voltage level (22kV or 33kV) to the required connecting voltage (*i.e*., 132kV).

The power transformers will be connected to an on-site 132kV busbar (the so-called "switching station"), to be equipped with protection and metering devices.

The new on-site HV substation will be equipped with circuit breakers upstream and downstream, to disconnect the PV power plant and/or the power line in case of failure or grid problems. The layout of the on-site high-voltage substation and switching station as well as of the control building are detailed in the drawings included in Annexure A.

5.4.2 QUAGGA 132KV POWERLINE

Quagga PV Solar Park will be connected to a **new 132kV/400kV substation and 400kV switching station** (**Florida 132kV/400kV Substation**), through a new 132 kV powerline **15.6 km long** (**Quagga 132 kV Powerline**). The new 132 kV powerline (double circuit) will consist of a series of steel or aluminium monopole structures to be installed approximately 200–260 m apart, with supporting electrical cables. The proposed structures will be **between 18 m and 25 m** high, and the basement of each pole will have a footprint of approximately 0.6 m^2.

The construction phase of the powerline will last ± 9 months and will involve a team of 10-15 people. Monopole structures installation will not require the establishment of a permanent construction site, but will be done step-by-step, to affect small stretches of corridor for a short time.

An access road (dirt road), ± 4.0 m wide, may be constructed in the power line servitude, for construction and maintenance activities. At the turning points, the road reserve will be up to 14 m to allow the transportation of abnormal loads (steel monopoles).

Site preparation will consist of the clearing of a powerline servitude and vegetation removal will be done within the servitude, for the minimum width required by installation activities and by the Eskom security rules. Vegetation should not interfere with the high-voltage cables.

The proposed 132 kV powerline (double circuit) may be built by Indus Energy (Pty) Ltd and/or Eskom but will be owned and operated by Eskom Distribution. This will depend on a Eskom grid code in relation to IPP's (Independent Power Producers) and Connection Agreement to be finalized prior to or simultaneously with the conclusion of a PPA (Power Purchase Agreement) regarding options for retaining ownership of the connection once built.

The Quagga 132kV Powerline will traverse the following properties, according to the proposed powerline alignment, within the Powerline Study Corridor:

- Farm Quaggafontein 3, Winburg RD (the project site);
- Farm Blomskraal 216, Ventersburg RD
- Farm De Dam 27, Ventersburg RD;
- Farm Tevrede 361, Ventersburg RD;
- Farm Biddulph 329, Ventersburg RD;
- Remainder of the Farm Le Roux 766, Ventersburg RD;
- Portions 1 and 4 of the Farm Florida 633, Ventersburg RD;

located within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province.

The Florida 132kV/400kV Substation, where the Quagga Powerline will be connected to, is planned to be located on Portion 1 of the Farm Florida 633, Ventersburg RD and will be connected to the **Eskom Theseus Main Transmission Substation (MTS)** via a new 400 kV powerline 6.0 km long (the "**Florida 400 kV Powerline**").

Quagga 132 kV Powerline forms part of this EIA process, while the Florida 132kV/400kV Substation and the Florida 400 kV Powerline will form part of the EIA process of the Florida Solar Park, applied for by Piscis Energy (Pty) Ltd (DFFE Ref No. 14/12/16/3/3/2/2232). This Florida 132kV/400kV Substation and the Florida 400 kV Powerline will be shared by several projects (*i.e.* the Virginia 4, Corona, Quagga and Florida Solar Parks), but the applicant in terms of the environmental process is **Piscis Energy (Pty) Ltd.** Once built, this shared 400kV connection infrastructure will be owned and operated by **Eskom.**

The **Eskom Theseus Main Transmission Substation (MTS)** is located 18.2km North-West of the north-western corner of project site.

The power generation capacity at the delivery point (Maximum Export Capacity) will be up to 240MW.

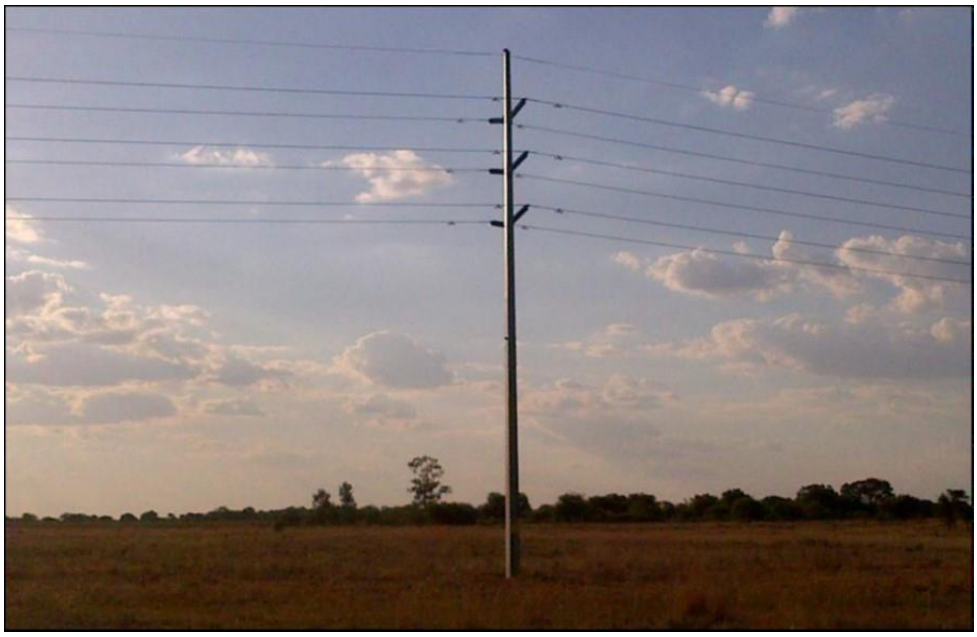


Figure 7. Steel monopole structure for a 132 kV powerline (double-circuit)

5.4.3 BATTERY ENERGY STORAGE SYSTEM (BESS)

A Battery Energy Storage System (BEES) with an output capacity up to 240 MW and a storage capacity up to 1 440 MWh (6-hour storage) will be installed next to an on-site step-up substation and switching station, in footprint and fenced area of Quagga PV Solar Park.

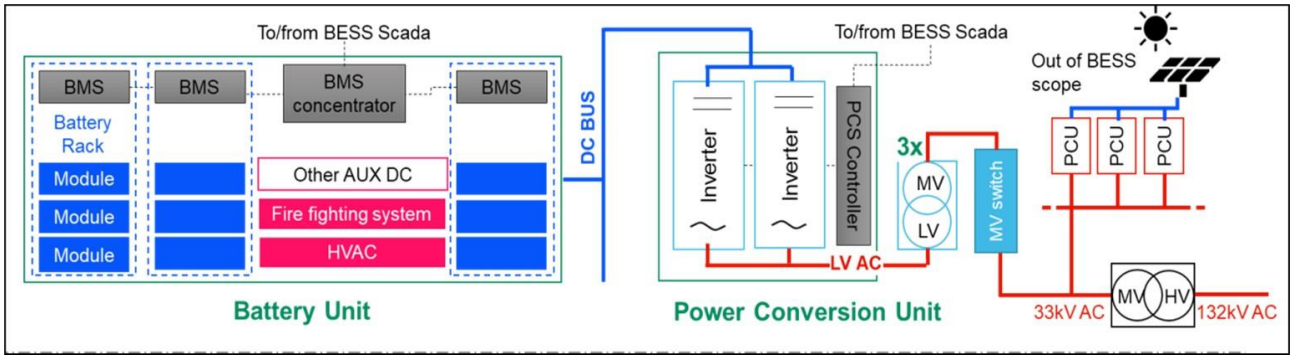
The lithium-ion batteries will store energy at times of low energy demand and release the energy to the grid at times of peak demand. The battery energy storage system can also provide other grid services (if required by Eskom) aimed to improve grid stability and power quality, by turning on and off in fractions of a second, such as “Fast Frequency Response” (FFR).

The Battery Storage Facility will have a footprint of **up to 20 hectares** and will comprise of the following equipment:

- Up to 252 containers (each up to 40 m^2), each with a storage capacity of up to 5 MWh and on a concrete platform. These will house the batteries, management system and auxiliaries.
- Up to 126 transformer stations (up to 35 m^2 each).
- Up to an additional 10 m^2 per container for cooling units.
- Internal access roads up to 8.0 m wide between rows of containers.
- BESS will be connected:
  - to the PV plant by means of DC/DC inverters, and
  - to the 33kV bus-bay of the on-site step-up substation by means of kiosk transformers, medium-voltage overhead lines and/or underground cables;

The batteries to be installed in the containers will be of the Lithium-ion type and the battery cells will be pre-assembled at the supplier factory prior to delivery to the site. NO electrolytes will be transported to and handled on site.

The Battery System will be able to store electrical energy and charge and discharge electrical energy when connected to a Power Conversion Unit (PCU), which performs the current conversion from LV DC to MV AC (and *vice versa*). The battery is commonly connected at AC MV level to a Renewable Power Plant for HV conversion and grid interconnection.



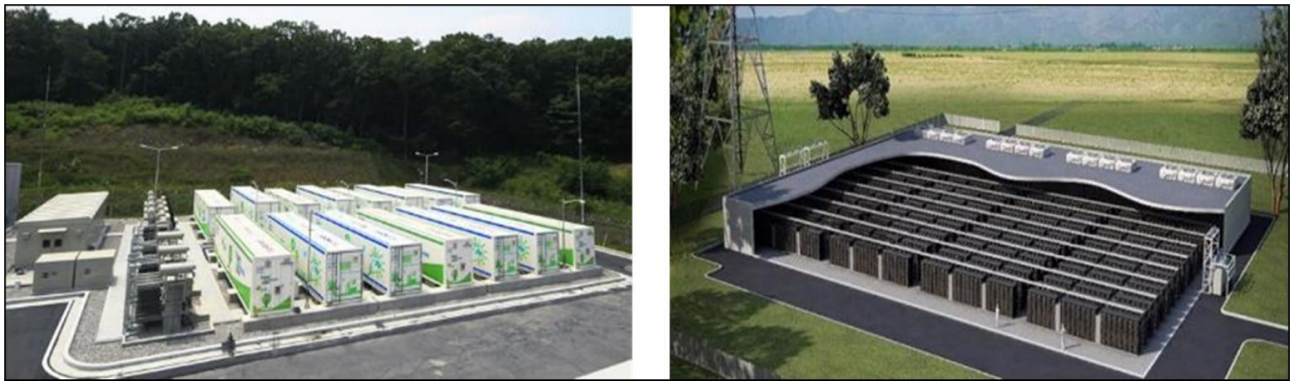


Figure 8. Battery Energy Storage System (BESS)

Battery Storage in combination with solar power plants is capable to provide multiple services to the plant and to the power transmission network adding flexibility to the system. Possible applications include amongst others: renewable generation time shifting, unbalancing reduction, curtailment avoidance, frequency regulation, voltage support and spinning reserve.

A Fire Management Plan has been compiled for the BESS and PV Park and is attached to the EMPr.

5.4.4 ACCESS ROAD AND INTERNAL ROADS

The **preferred access route** (Option 1/Figures 9 and 19) to the Quagga PV Solar Park will be from the existing access road from the regional road R73 that runs from the N1, North-East of Winburg, in the direction of Virginia. This access road is **5.1 km long** and crosses the **Remainder of the Farm PALMIET FONTEIN 229, Winburg RD, the Farm BLOMSKRAAL 216, Ventersburg RD and the Farm QUAGGAFONTEIN 3, Winburg RD**, located north and west of the development area.

Access point from the R73 road is at: **28°14'37.98"S and 26°56'48.60"E**

As alternative, access to Quagga Solar Park may be from a new access road, 5.8 km long, crossing SIBERIASFONTEIN 605, Portion 1 of the Farm ZOUTFONTEIN 841, Remainder of PALMIET FONTEIN 229 and Farm QUAGGAFONTEIN 3, Winburg RD, located south and west of the development area of Quagga. This alternative route is not preferred, due to the high environmental sensitivity of most of the area crossed by the proposed route.

During the construction phase, the access road will have a road reserve wider than 13.5 m (up to 16.0 m) to allow the transportation of abnormal goods (power transformers, etc.). During operation, the access road will be up to 8 m wide with a road reserve up to 13.5 m.

Internal roads will consist of gravel roads designed in accordance with engineering standards. The roads will have a width of 4.0 m allowing for the slow-moving heavy vehicles.

Once the solar park is operational, internal roads will mainly be used for maintenance and inspections. The vertical alignment of the roads will not present significant challenges due to the flatness of the terrain. The entire development will be contained inside a fenced area and the roads are not intended for public use.

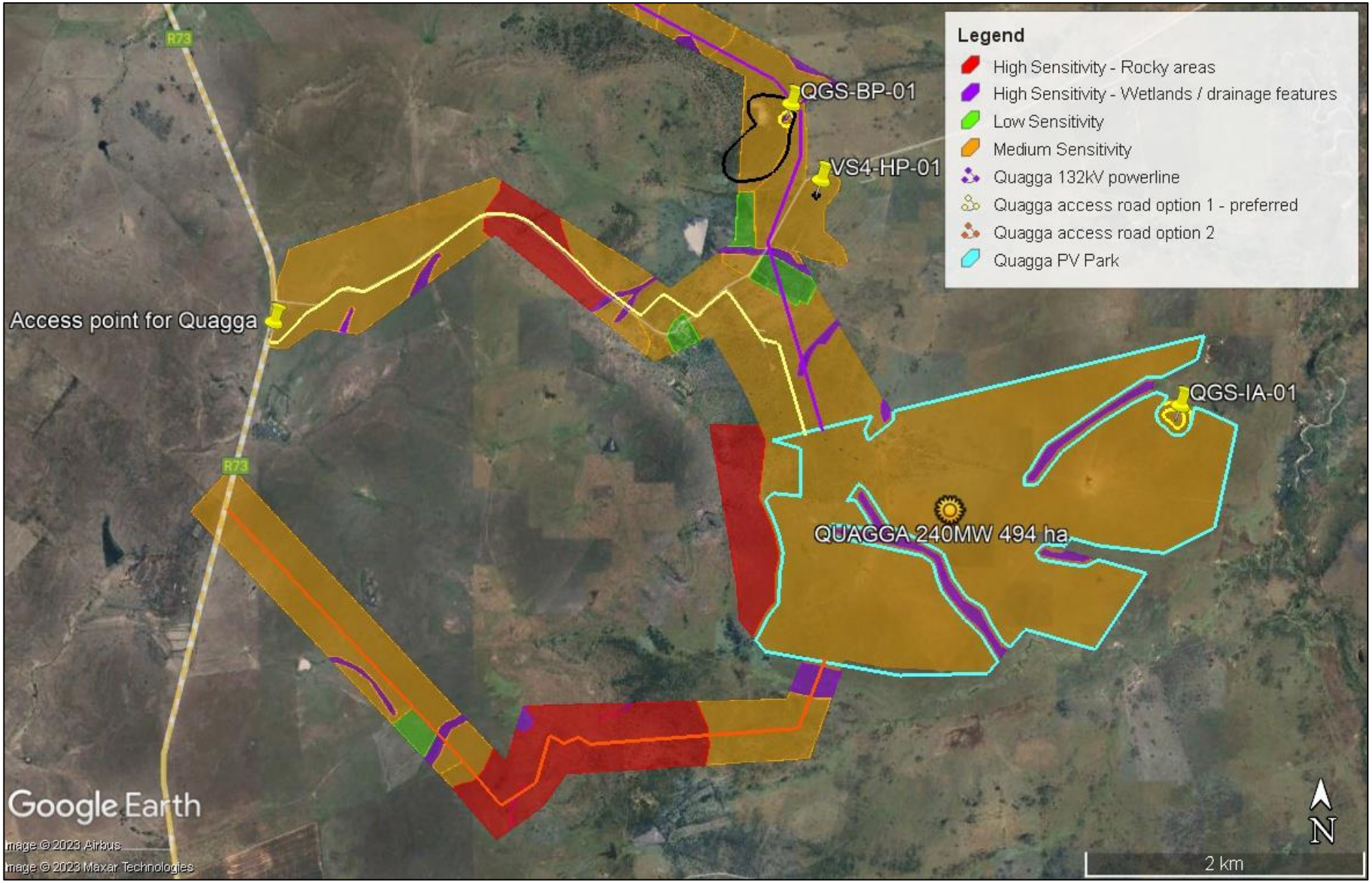


Figure 9. Quagga SP access from the regional R73 road (Option 1 is the preferred option)

5.4.5 TRAFFIC IMPACT OF THE PROPOSED DEVELOPMENT

5.4.5.1 Traffic impact – construction phase

Approximately 150 people are expected to be employed during the construction period, although this number can increase to 300 for short spaces of time during peak periods. This number can be higher in the case the Project Company - once being selected as Preferred Bidder by the Department of Mineral Resources and Energy and having finalized the Connection Agreement with Eskom, where in particular it is agreed the envisaged connection timeline - evaluates to build the proposed Solar Park in a timeframe shorter than 24 months (i.e. 528 working days). For example, in the case the construction works are planned to last only 18 months (i.e. 396 working days), the average number of workers required on site during construction is 200.

As indicated in Tables 2.6 and 2.7 of the Traffic Impact Assessment, the expected number of vehicle trips to and from the site during working days peak hour will be a maximum of 33 during the construction period and 25 during operation.

Medium and heavy trucks will access / leave the site only during the working days (Monday to Friday), during daytime. The provision of a fuelling area on the work site could reduce the load of heavy vehicles on public roads. The installation of one steel fuel tanks (capacity of <30 000 litres) is recommended.

5.4.5.2 Traffic impact – operation phase

The traffic impact during the operational phase will be insignificant, considering that about 40 people will work on the PV facility, in the following manner:

- During the daytime approximately 17 people.
- During the night-time 8 people.

As indicated in Table 2.7 of the Traffic Impact Assessment, the expected number of vehicle trips to and from the site during peak hour will be 25 during the operational phase.

5.4.6 LIGHTING SYSTEM

The lighting system will consist of the following equipment:

- Floodlight-towers: maximum 10 meters high, with directional lamps (LED type) of 120 W, installed around the HV loop-in loop-out substation. Normal lighting: 15 lux; up to 40 lux in case of emergency.
- Street lighting along internal roads, for the stretch from the access point up to the HV substation inside the property: 1 streetlamp, maximum 5.5 meters high, every 20 meters, having a LED lamp of 120 W.
- 2x120 W spotlights (LED type) mounted on the top of medium-voltage stations.

The lighting of the MV stations and of the on-site HV substation will be on only in case of intrusion/emergency or necessity to reach the MV stations / HV substation during the night. At night, the video-surveillance system will use infra-red (or micro-wave) video-cameras, which do not need a lighting system (which could reduce functioning).

5.4.7 STORMWATER COLLECTION SYSTEM

Given the low rainfall, flat topography and low flow speed of run-off, no formal storm water structures are required as the proposed gravel roads will be developed at ground level so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated while existing drainage patterns will be left undisturbed.

5.4.8 WATER REQUIREMENTS

5.4.7.1 Water requirements during the construction phase

The construction phase will last approximately 18 - 24 months.

a) Construction of internal gravel roads

- Water is necessary for the construction of internal gravel roads, to compact gravel to optimum moisture content (OMC).
- The surface of internal gravel roads will be approximately 180 000 m^2.
- 50 liters of water / m^2 of internal of roads will be required.
- Water consumption for internal roads will be: 180 000 m^2 x 50 l/m2 = 9,000 m^3.

b) Workers

- Approximately 150 people are expected to be employed during construction, although this number can increase to 300 during peak periods. This number can be higher in case the Project Company - if selected as Preferred Bidder by the DMRE and having finalized the Connection Agreement with Eskom, where in particular it is agreed the envisaged connection timeline - evaluates to build Quagga PV Solar Park in a timeframe shorter than 24 months (*i.e*. 528 working days). For example, in the case construction works are planned to last only 18 months (*i.e.* 396 working days), average number of workers required on site during construction is 200.
- Each worker needs 50 liters / 8 working hours for sanitary use.
- Water consumption will be:
    - 150 people x 50 l/person x 528 working days = 3 960 m^3 over 24 months, or:
    - 200 people x 50 l/person x 396 working days = 3 960 m^3 over 6 months.

c) Concrete production

- Concrete is necessary for basements of medium-voltage stations, high-voltage loop-in loop-out substation, control building, warehouse and workshop, basement of Battery Energy Storage System (BESS) and for foundations of the mounting systems. The overall amount of concrete to be produced will be *approximately* 30 000 m^3.
- 200 litres of water are needed for 1 cubic meter of concrete.
- Water consumption will be: 30 000 m^3 x 200 liters / m^3 = **6 000 m^3.**

d) Vehicle cleaning

As mitigation measure, the cleaning of vehicles like excavators, mechanical diggers and pile rammers will be done once or twice per month and not during working days, also in order to not increase the water requirement during construction activities. In order not to waste a large amount of water, high pressure cleaners will be used. Overall, the water requirement for cleaning activity is very low.

Overall and average water consumption during construction is detailed in the following table.

Table 12. Water consumption during the construction phase of the project

WATER REQUIREMENT DURING THE CONSTRUCTION PHASE OF THE PROJECT		
DESCRIPTION	UNIT	TOTAL
Timeframe of the construction activities	*months*	24
Timeframe of the construction activities - calendar days	*days*	760
Overall water consumption for internal roads	m^3	9 000
Overall water consumption for sanitary use	m^3	3 960
Overall water consumption for concrete production	m^3	6 000
OVERALL WATER CONSUMPTION	m^3	18 960
Daily water consumption (average over 760 calendar days)	m^3/day	26.3

Storage tanks will be sized to provide a reserve of water of approximately **200 m³**.

5.4.7.2 Water requirements during the operational phase

During operation, water is only required for the operational team on site (sanitary use), as well as for the cleaning of the solar panels. Further water consumption must be only for routine washing of vehicles and other similar uses.

a) Water for sanitary use

Approximately 40 people will be employed during the operation phase of the PV power plant, which will have a lifetime of approximately 35-40 years.

Quagga PV Solar Park will be in operation 7 days per week; therefore, personnel will operate in shifts. The surveillance team will be present during daytime, night-time, and weekends. The average number of people working on site will be of 17 people daytime and 8 people at night. The average daily water consumption for sanitary use is estimated to be 150 litres/day/person for 25 people (17 people daytime and 8 people at night). Daily water consumption will be approximately 3 750 litres/day or 1 370 m3 per year.

b) Water consumption to clean the PV modules

Cleaning activities of the solar panels will be limited to only twice per year. It is assumed that up to 1.0 liters per m^2 of PV panel surface will be needed. Therefore, the amount of water for cleaning is up to **1 750 m^3 per cleaning cycle and 3 500 m^3 per year**.

PV modules cleaning activity can last less than 1 month. If the cleaning activity lasts approximately 4 weeks (24 working days), the daily water consumption will be approximately **72 917 liters/day, over 24 days.**

5.4.7.3 CONCLUSION

Daily water requirement will be approximately **3 750 liters/day** over 12 months for sanitary use (i.e. **112 500 l/month** and **1 370 m3/year**).

Water consumption will increase up to **76 667 liters/day** during the cleaning of the solar modules **(72 917 liters/day** for cleaning activity and **3 750** for sanitary use), which will last less than a month and will occur twice per year during the dry period. PV modules are conceived as self-cleaning with the rain.

It is further proposed that **90 000 l** of water will be stored in **storage tanks** for fire, emergency and washing of panels twice a year.

The overall and average water consumption during operation is detailed in the table below.

Table 13. Water consumption during the operational phase of the project

WATER REQUIREMENT DURING THE OPERATIONAL PHASE		
DESCRIPTION	UNIT	TOTAL
Average daily water consumption for sanitary use	*l/day*	3 750
Average daily water consumption during cleaning activity (*)	*l/day*	76 667
Average monthly water consumption for sanitary use (over 30 days)	*l/month*	112 500
Annual water consumption for sanitary use	*m^3/year*	1 370
Annual water consumption for PV modules cleaning activities (twice/year)	*m^3/year*	3 500
ANNUAL WATER CONSUMPTION DURING OPERATION	*m^3/year*	4 870
DAILY WATER CONSUMPTION DURING OPERATION (average over 365 day)	*m^3/day*	13.34

(*) over 12 working days, twice per year

5.4.7.4 Water provision during construction and operation

Water needs for the construction phase (18 960 m^3 over approximately 24 months) and the operational phase (4 870 m^3/year) will be obtained from on-site boreholes. A Water Use License Application will be submitted to DWS, once the project has been awarded Preferred Bidder Status.

5.4.9 SEWERAGE

Considering that the proposed development will not include formal residential properties there is no need to connect to the municipal sewer reticulation system. Sewer reticulation will be handled by a suitable patented and commercially available wastewater treatment system.

The sewer system will consist of an installation to serve the offices of the control building. The system will be installed in line with the requirements of the manufacturer. Typical systems consist of a conservancy tank (built underground on site), and a patented digester. Most systems require electricity to power the pumps and fans used in aeration process, although some systems use wind power (whirlybird). The system could require chlorine tablets available commercially.

Effluent from wastewater treatment system will be suitable for irrigation of lawns, or re-use in buildings as water for the flushing of toilets, or for fire-fighting purposes. This could reduce overall water requirement of the development substantially. During construction, chemical toilets will be positioned across construction area at a ratio of 1 toilet for every 15 workers.

Sanitary conveniences (toilets) which causes or is likely to cause pollution of a water resource will not be located within the 1:50 year flood line or within 100 meters of any watercourse or borehole.

Once the project has been awarded Preferred Bidder Status and it is confirmed that the project is going to proceed, a Water Use License Application will be submitted to Department

of Water and Sanitation. An application for a license for all water uses triggered according to Section 21 of the National Water Act, 1998 (Act No. 36 of 1998), will be submitted.

5.4.10 REFUSE REMOVAL

During the construction phase, solid waste will mainly consist of vegetation material as a result of the clearance of vegetation. Other type of solid waste will include, amongst others, wood from packaging, boxboards, expanded polystyrene and household waste. Vegetation material from clearing activity can be recycled to be re-used as organic fertilizer. Other solid wastes will be recycled as much as possible. Non-recyclable waste will be delivered to the closest legal landfill site. The proposed development site is relatively close to Virginia town and household waste can be taken to the municipal landfill site, regularly.

During the operational phase (±35 years), solid waste will mainly consist of household waste from the operational team. Other type of solid waste will come from the maintenance activity in case of failure of some components. At the end of the project lifetime, the PV plant will be decommissioned. Silicon of the PV modules and cables (copper and/or aluminium conductor) will be recycled, as well as the aluminium (or zinced steel) frames and piles of the mounting systems. Indus Energy will enter into an agreement with the Matjhabeng Local Municipality for the PV plant's refuse at the nearby municipal refuse site. No refuse will be buried or incinerated on site. Measures to manage waste will be included in the Draft EMPr.

5.5 TEMPORARY CONSTRUCTION CAMP

The construction camp (± 20ha) will be located on the area planned for the BESS. The BESS is installed right at the end of the development period and is acquired as a complete unit with components. Once the construction camp area has been cleared and cleaned up, the BESS will be established on the exact same site as the size of the construction camp.

Table 14. Geographical coordinates of the Quagga PV construction camp & laydown areas

Quagga BESS & Temporary Construction Camp					
Point	**Latitude**	**Longitude**	**Point**	**Latitude**	**Longitude**
P1	28° 15' 10.23" S	26° 59' 02.06" E	P20	28° 15' 23.56" S	26° 59' 17.12" E
P2	28° 15' 11.33" S	26° 59' 06.46" E	P21	28° 15' 23.26" S	26° 59' 17.09" E
P3	28° 15' 22.30" S	26° 59' 06.48" E	P22	28° 15' 22.97" S	26° 59' 17.23" E
P4	28° 15' 22.30" S	26° 59' 10.51" E	P23	28° 15' 19.42" S	26° 59' 20.15" E
P5	28° 15' 28.69" S	26° 59' 10.50" E	P24	28° 15' 19.17" S	26° 59' 20.58" E
P6	28° 15' 28.69" S	26° 59' 12.75" E	P25	28° 15' 19.29" S	26° 59' 21.22" E
P7	28° 15' 29.28" S	26° 59' 20.19" E	P26	28° 15' 19.61" S	26° 59' 21.68" E
P8	28° 15' 29.43" S	26° 59' 22.36" E	P27	28° 15' 19.61" S	26° 59' 22.30" E
P9	28° 15' 29.26" S	26° 59' 22.82" E	P28	28° 15' 08.13" S	26° 59' 22.30" E
P10	28° 15' 28.89" S	26° 59' 23.08" E	P29	28° 15' 07.45" S	26° 59' 22.12" E
P11	28° 15' 28.44" S	26° 59' 23.06" E	P30	28° 15' 05.48" S	26° 59' 23.28" E
P12	28° 15' 27.94" S	26° 59' 22.77" E	P31	28° 15' 05.42" S	26° 59' 23.30" E
P13	28° 15' 26.87" S	26° 59' 21.90" E	P32	28° 15' 05.18" S	26° 59' 23.21" E
P14	28° 15' 24.43" S	26° 59' 20.15" E	P33	28° 15' 05.13" S	26° 59' 22.97" E
P15	28° 15' 24.12" S	26° 59' 19.31" E	P34	28° 15' 06.88" S	26° 59' 14.82" E
P16	28° 15' 24.32" S	26° 59' 18.09" E	P35	28° 15' 11.29" S	26° 59' 16.18" E

P17	28° 15' 24.33" S	26° 59' 18.01" E	P36	28° 15' 12.76" S	26° 59' 10.13" E
P18	28° 15' 24.22" S	26° 59' 17.54" E	P37	28° 15' 08.16" S	26° 59' 08.83" E
P19	28° 15' 23.86" S	26° 59' 17.23" E	P38	28° 15' 09.60" S	26° 59' 02.07" E
			Overall footprint: 20 ha		

The site's location has been dictated by the nature of the works to be undertaken, specialist studies, site restrictions, town planning intended uses and access. The area identified for the construction site had to meet the following requirements:

- sufficient size;
- proximity to existing roads;
- availability of water and energy;
- low environmental and landscape value;
- sufficient distance from residential areas; and
- proximity to the worksite.

To ensure environmental compatibility, the following factors have been considered:

- restrictions on land use (landscape, archaeological, natural, hydrological, etc.);
- terrain morphology;
- presence of high environmental value areas (*e.g*. wetlands); and
- sand & stone supply.

Establishment of a construction site will be divided into four phases. Steps included here do not follow a time sequence but should be considered overlapping and simultaneous events.

5.5.1 PHASE I

The area will be fenced to prevent intrusion of animals and to protect against materials theft within the site. A video surveillance system will be provided.

5.5.2 PHASE II

During the fencing operation as described in Phase I, tree species will be cut down and transferred to facilities for wood processing or compost.

5.5.3 PHASE III

At completion of the works defined in Phases I and II, the following step will be the site clearing and the construction of internal roads. The internal road network should ensure a two-way traffic of heavy goods vehicles to minimize trips. The road system is planned for a width of 8 meters for access roads and 4 meters for internal roads. Roads will comprise of dry and compacted materials.

The facility will require constant access control, a weigh-house for heavy trucks, removable structures for the storage of yard tools and temporary storage areas. During Phase III, the installation of MV/LV transformers connected to the Eskom grid is also planned, as well as the laying of underground electrical cables.

5.5.4 PHASE IV

Temporary storage areas of materials and workshops will be constructed and used for:

- temporary storage of photovoltaic modules;

- temporary storage for frames and piles of the mounting systems of the PV arrays;
- storage and processing of building material for construction (sand, gravel, concrete batching and mixing plant, steel, etc.);
- drinking water storage for human consumption;
- worker care facilities and site management buildings,
- prefabricated housing modules for workers who will require accommodation inside the site (only key personnel will be allowed to stay overnight);
- technical cabins and management offices;
- medical care unit in a prefabricated module, in order to allow immediate first aid and minor surgical emergency;
- recreation area and canteen (prefabricated modules);
- parking lots for employees (located close to the staff housing), for visiting staff (located close to the offices area), and for trucks and work vehicles during inactivity;
- workshop and storage facilities on the site for contractors;
- electrical network for living units, offices and service structures;
- water supply for living units through polyethylene pipes connected to storage;
- wastewater treatment system. The treated water will be used to moisten dusty areas and reduce dust pollution during windy conditions;
- temporary chemical toilets; and
- solid waste collection point.

5.5.5 EARTHWORKS

Clearing activity is required to remove shrubs and trees from the planned footprint (±494 ha). Due to the flatness of the development area, limited earthworks are envisaged for the installation of the PV module mounting systems. The mounting systems will consist of metallic frames to be assembled on-site, supported by pre-bored cast-in-situ concrete piles. Concrete ballasted footing foundations are also considered.

Earthworks will be required during the construction of internal roads and access road. The vertical alignment of the roads will not present any significant challenges due to the flatness of the terrain so that no deep cuts or fills will be required.

Given the low rainfall, flat topography and low flow speed of run-off - no formal storm water structures are required as the proposed gravel roads will be developed at ground level, so as not to disturb the natural flow of storm water. This means that run-off will not be concentrated, and existing drainage patterns will be left undisturbed.

Minor earthworks will be required for the installation of the medium-voltage stations. None of these activities should require earthworks in excess of 500 mm cut or fill. Only the foundation plate for the small high-voltage substation may require earthworks in excess of 500 mm cut or fill (the footprint will be up to 11 000 m2). The topsoil stripping will result in temporary spoils heaps which must be spread over the site upon completion of the project.

Underground cables will be laid down along the internal roads.

Concrete necessary for basements of medium-voltage stations, high-voltage substation, control building and warehouse will be provided from commercial sources in the vicinity of the development.

Gravel needed for construction of internal roads will be obtained from commercial sources in the area.

6 LEGAL AND POLICY REQUIREMENTS

The legislative and regulatory framework of reference for the solar power plant project includes statutory and non-statutory instruments by which National, Provincial and Local authorities exercise control throughout the development of the same project.

The development and the environmental assessment process of a solar power plant project involve various authorities dealing with the different issues related to the project (economic, social, cultural, biophysical etc.).

6.1 REGULATORY AUTHORITIES

6.1.1 NATIONAL AUTHORITIES

At national level, the main regulatory authorities and agencies are:

- *Department of Mineral Resources and Energy* (DMRE): the Department is competent and responsible for all policies related to energy, including renewable energy. Solar energy is contemplated and disciplined under the White Paper for Renewable Energy and the Department constantly conducts research activities in this respect.
- *National Department of Forestry, Fisheries and the Environment,* (DFFE): the Department is competent and responsible for all environmental policies and is the controlling authority under the terms of NEMA and EIA Regulations. The DFFE is also the competent authority for the proposed project and is entrusted with granting the relevant environmental authorization.
- *National Energy Regulator of South Africa* (NERSA): the Regulator is competent and responsible for regulating all aspects dealing with the electricity sector and issues the license for independent power producers.
- *South African National Roads Agency Limited* (SANRAL): the Agency is responsible for all National Road routes.

6.1.2 PROVINCIAL AUTHORITIES

At provincial level, the main regulatory authority is the Free State Department of Economic, Small Business Development, Environment and Tourism (DESTEA); this Department is responsible for environmental policies and is the Provincial authority in terms of NEMA and the EIA Regulations and is also the commenting authority for the proposed project.

6.1.3 LOCAL AUTHORITIES

At a local level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Free State Province, Municipalities and District Municipalities are involved in various aspects of planning and the environment related to solar energy facilities development. The local municipality is the Matjhabeng Municipality which is part of the Lejweleputswa Municipality.

Subject to the Municipal Systems Act (Act no. 32 of 2000), all municipalities are deemed to undergo an Integrated Development Planning (IDP) process to devise a five-year strategic development plan for the area of reference.

The identification of priority areas for conservation and their positioning within a planning framework of core, buffer, and transition areas is the subject of bioregional planning. Priority areas are individuated and defined with reference to visual and scenic resources and their identification and protection is granted through visual guidelines drafted for the area included in bioregional plans.

Local authorities also provide specific by-laws and policies to protect visual and aesthetic resources with reference to urban edge lines, scenic drives, special areas, signage, communication masts etc.

Finally, there are also various non-statutory bodies and environmental groups, who are involved in the definition of various aspects of planning and the protection of the environment, which may influence in the development of the proposed project.

6.2 LEGISLATION, REGULATIONS AND GUIDELINES

A review of the relevant legislation involved in the proposed development is detailed in table 15 below.

Table 15. Review of relevant legislation

National Legislation	Sections applicable to the proposed project
Constitution of the Republic of South Africa (Act no. 108 of 1996)	• Bill of Rights (S2) • Rights to freedom of movement and residence (S22) • Environmental Rights (S24) • Property Rights (S25) • Access to information (S32) • Right to just administrative action (S33)
Fencing Act (Act no. 31 of 1963)	• Notice in respect of a boundary fence (S7) • Clearing bush for boundary fencing (S17) • Access to land for boundary fencing (S18)
Conservation of Agricultural Resources Act (Act no. 43 of 1983)	• Prohibition of the spreading of weeds (S5) • Classification of categories of weeds & invader plants and restrictions in terms of where these species may occur (Regulation 15 of GN R0148) • Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R0148)
Environment Conservation Act (Act no. 73 of 1989)	• National Noise Control Regulations (GN R154 dated 10 January 1992)
National Water Act (Act no. 36 of 1998)	• Entrustment of the National Government to the protection of water resources (S3)

	• Entitlement to use water (S4) - Schedule 1 provides the purposes which entitle a person to use water (reasonable domestic use, domestic gardening, animal watering, fire-fighting and recreational use) • Duty of Care to prevent and remedy the effects of water pollution (S19) • Procedures to be followed in the event of an emergency incident which may impact on water resources (S20) • Definition of water use (S21) • Requirements for registration of water use (S26 and S34) • Definition of offences in terms of the Act (S151)
National Forests Act (Act no. 84 of 1998)	• Protected trees
National Environmental Management Act (Act no. 107 of 1998)	• Definition of National environmental principles (S2): strategic environmental management goals and objectives of the government applicable within the entire RSA to the actions of all organs of state, which may significantly affect the environment • **NEMA EIA Regulations 2017 (GN R. 326, 327, 325, 324 of 07 April 2017)** • Requirement for potential impact on the environment of listed activities to be considered, investigated, assessed and reported on to the competent authority (S24 - Environmental Authorisations) • Duty of Care (S28): requirement that all reasonable measures are taken in order to prevent pollution or degradation from occurring, continuing and recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment • Procedures to be followed in the event of an emergency incident which may impact on the environment (S30)
National Heritage Resources Act (Act no. 25 of 1999)	• SAHRA, in consultation with the Minister and the MEC of every province must establish a system of grading places and objects which form part of the national estate (S7) • Provision for the protection of all archaeological objects, paleontological sites and material and meteorites entrusted to the provincial heritage resources authority (S35) • Provision for the conservation and care of cemeteries and graves by SAHRA, where this is not responsibility of any other authority (S36) • List of activities which require notification from the developer to the responsible heritage resources authority, with details regarding location, nature, extent of the proposed development (S38)

	• Requirement for the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites for promotion of tourism (S44)
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	• Provision for the MEC for Environmental Affairs/Minister to publish a list of threatened ecosystems and in need of protection (S52) • Provision for the MEC for Environmental Affairs/Minister to identify any process or activity which may threaten a listed ecosystem (S53) Provision for the Member of the Executive Council for Environmental Affairs/Minister to publish a list of: critical endangered species, endangered species, vulnerable species and protected species (S56(1) - see Government Gazette 29657 • Three government notices have been published up to date: GN R150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R151 (Lists of critically endangered, vulnerable and protected species) and GN R152 (Threatened Protected Species Regulations)
National Environmental Management: Air Quality Act (Act no. 39 of 2004)	• Provision for measures in respect of dust control (S32) • Provision for measures to control noise (S34)
National Environmental Management: Waste Management Act (Act no. 59 of 2008)	• Waste management measures • Regulations and schedules • Listed activities which require a waste licence
Occupational Health and Safety Act (Act No. 85 of 1993)	• Health and safety of all involved before and after construction must be protected.

Guideline Documents	**Sections applicable to the proposed project**
South African National Standard (SANS) 10328, Methods for environmental noise impact assessments in terms of NEMA no. 107 of 1998	• Impact of noise emanating from a proposed development may have on occupants of surrounding land by determining the rating level • Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	• The Guidelines outline rules and conditions related to transport of abnormal loads and vehicles on public roads and detailed procedures to be followed for the grant of exemption permits

Policies and White Papers	**Sections applicable to the proposed project**
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	• The White Paper supports investment in renewable energy initiatives, such as the proposed solar power plant project
The White Paper on Renewable Energy (November 2003)	• The White Paper outlines the Government's vision, policy, principles, strategic goals and

	objectives for the promotion and the implementation of renewable energy in SA
Integrated Resource Plan (IRP1) Integrated Resources Plan 2010-2030 (IRP 2010). Update of the Integrated Resources Plan 2010-2030 (IRP 2019).	• The first Integrated Resource Plan (IRP1) was released late 2009. Subsequently the DoE decided to undertake a detailed process to determine South Africa's 20-year electricity plan, the Integrated Resources Plan 2010-2030 (IRP 2010). • The IRP1. IRP 2010 and IRP 2019 outline the Government's vision, policy and strategy in matter of the use of energy resources and the current status of energy policies in South Africa. • In the **IRP 2019**, published in October 2019, provision has been made to procure an additional **6 000 MW** of PV Solar and 14 400 MW of wind between **2022** and **2030**.
Renewable Energy IPP Procurement Programme (REIPPPP)	• The IPP Procurement Programme, issued on 3rd August 2011 by the DoE.
Equator Principles (July 2006)	• The Equator Principles provide that future developments with total project capital costs of US$10 million or more shall be financed only if socially and environmentally sustainable

7 NEED/DESIRABILITY OF THE PROJECT

South Africa's electricity supply remains heavily reliant upon coal powered plants, whereas the current number of renewable energy power plants is still limited while the demand for electricity in South Africa is steadily and rapidly growing.

These factors, if coupled with rapid advancement in community development, have determined the growing consciousness of the significance of environmental impacts, climate change and the need for sustainable development. The use of renewable energy technologies is a sustainable way in which to meet future energy requirements.

In the **IRP 2019**, issued by the Department of Energy (now **Department of Mineral Resources and Energy (DMRE)**) under Notice No. 1360 dated 18 October 2019 in *Government Gazette* 42784, pursuant to the Electricity Regulation Act, provision has been made to procure an additional **6 000 MW** of PV Solar and 14 400 MW of wind between **2022** and **2030**.

The purpose of the proposed Quagga Solar Park is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the Renewable Energy IPP Procurement Programme (REIPPPP) and to meet the "sustainable growth" of the Free State Province.

The use of solar radiation for power generation is considered a non-consumptive use and a renewable natural resource which does not produce greenhouse gas emissions. The generation of renewable energy will contribute to the growth of South Africa's electricity market, which has been primarily dominated up to this date by coal-based power generation. With specific reference to photovoltaic energy, and the proposed project, it is important to consider that South Africa has one of the highest levels of solar radiation in the world.

The proposed solar park will assist the Eskom grid to meet high energy demand related to the farming and hospitality activities conducted outside of Virginia town. The purpose of the proposed **Quagga Solar Park** is to add new capacity for the generation of electrical energy to the national electricity supply, in compliance with the Minister of Energy's Determinations and to meet the "electricity consumptions' growth" of the Free State Province.

The use of solar radiation for power generation is considered as a non-consumptive use and a renewable natural resource which does not produce greenhouse gas emissions. The generation of renewable energy will contribute to the growth of South Africa's electricity market, which has been primarily dominated up to this date by coal-based power generation. With specific reference to photovoltaic energy, and the proposed project, it is important to consider that South Africa has one of the highest levels of solar radiation in the world.

The reasons for the location of the project in the selected area are as follows:

- low requirement for municipal services;
- compliance with national and provincial energy policies and strategies;
- no impact on people's health and wellbeing;
- minimum waste and noise;
- no impact on air quality;
- compatibility with the ecosystem and the surrounding landscape; and
- likelihood of social and economic development of marginalized, rural communities.

7.1 FUTURE NEED AND DESIRABILITY

In 30-40 years' time certain of the infrastructure of the solar facility will probably be not be functioning with the same effectivity as when newly constructed. The energy requirements of the country will certainly not become less, but instead will become more dependent on renewable sources like solar and wind energy. It will be the same in this case. Quagga PV Solar Park will most probably never decommission completely as the country and area around it will be dependent on its energy generation. It will rather upgrade then or constantly go through a process of upgrading of technology so that the facility stays abreast of technology and energy needs and requirements in the area.

8 MOTIVATION FOR PREFERRED DEVELOPMENT FOOTPRINT ON THE PREFERRED SITE

8.1 THE CHOICE OF THE FREE STATE PROVINCE AND SITE LOCATION

The Quagga Solar Park will be located near the city of Virginia, in the Free State Province. During the previous Rounds of the REIPP Procurement Programme, very few projects were selected by the Department of Energy (now Department of Mineral Resources and Energy) in the Free State Province, if compared to the Northern and Eastern Cape. Therefore, the macro-area where the project is planned never received the benefits - in terms of socio-economic development and local content, arising from the previous Rounds of the REIPP Procurement Programme.

The Free State Province and in particular the Matjhabeng Local Municipality (Welkom & Virginia area) has been identified by Indus Energy (Pty) Ltd as an ideal area for establishing a PV Solar plant on the basis of several important considerations:

- there are few green projects currently operating in the Free State Province and it is clear that the “green energy quota” can be achieved mainly by means of solar projects, considering the high solar resources and the availability of lands with low ecological and agricultural value;
- the presence of several mines in the Welkom and Virginia area which require green energy;
- available Eskom grid capacity; and
- other infrastructure nearby to develop a renewable energy project.

In addition to these favourable conditions in terms of desirability of renewable solar energy projects in the Free State Province, the site of the Quagga PV Solar Park has been chosen based on several elements:

- The chosen site is suitable for the installation of a photovoltaic (PV) power plant due to its appropriate morphologically (flat terrain).
- The favourable radiation conditions allow for a high rate of electric energy production, as a combination of latitude-longitude and climatic conditions.
- The low to medium ecological sensitivity of the proposed project site (unused fields, degraded / modified land).
- Available Eskom grid connectivity.

- Furthermore, In the Generation Connection Capacity Assessment 2023 (GCCA 2023) published in June 2021, Eskom indicated that the current Transmission Network in the Welkom area and the Theseus MTS is available for the connection of new renewable projects for up to 1260 MW at 132 kV. Since, during the last Round 6, 240 MW has been already allocated to the Virginia 1 and 2 Solar Parks, 1020 MW are still available for connection at Distribution Level (132kV).

9 CONSIDERATION OF ALTERNATIVES

9.1 DETAILS OF ALTERNATIVES CONSIDERED

The EIA Regulations, 2017, Section 28(1)(c) and NEMA, Section 24(4), require investigation and consideration of feasible and reasonable alternatives for any proposed development as part of the environmental impact assessment process. Therefore, a number of possible alternatives for accomplishing the same objectives must be identified and investigated. In particular:

- the property on which, or location where, it is proposed to undertake the activity;
- the location within the current identified site;
- the type of activity to be undertaken;
- the design or layout of the activity;
- the technology to be used in the activity;
- the operational aspects of the activity (schedule, process);
- the sustainability of other alternatives, and
- the option of not implementing the activity (No-Go Alternative).

9.1.1 SITE ALTERNATIVES

Several layout locations have been considered to determine the preferred location for the PV power plant. The following selection criteria were applied:

- Connection availability and proximity
- Land availability
- Sufficient land surface area (±494 ha)
- Current land use
- Environmental impact (biodiversity)
- Agricultural potential
- Solar radiance
- Socio-economic issues (land cost and local community unemployment)
- Occurrence of Heritage resources

9.1.1.1 Site Alternative 1

- The landowners agreed that the farms Quaggafontein 3 and Delaporte 887 can be used for a PV Park – an area of 1 100 ha.
- The Terrestrial Biodiversity Specialist, following a site visit, determined that:
  - The Remainder of Palmietfontein has several drainage lines, valleybottom wetlands and hills which are too sensitive to develop.
  - The western part of Delaporte was excluded for the same reasons.
  - The eastern part of Quaggafontein borders a large drainage channel with paleontological sites and must be excluded as well.
  - Drainage channels in the area suitable for development must be excluded, resulting in the preferred layout – Figure 2.
  - The vegetation unit is classified as having a medium sensitivity due to the due to the widespread status through the larger project area.

- The Agricultural Specialist determined after a site visit that the site should be considered as moderate potential grazing land with Moderate potential for arable agriculture considering climatic conditions, soil physical characteristics and size of land potentially available (Table 3 of Agricultural Impact Assessment – Annexure G).
- No active or old croplands will be included in the PV Park footprint.
- No other fatal flaws were identified for the proposed footprint area.

There are no palaeontological sensitive sites on the proposed footprint, but a few sensitive heritage receptors were identified. The recommendations from the Heritage Specialist will be implemented prior to and during construction, to prevent damage to these resources:

- A possible Iron Age Farmer site (**QGS-IA01**) is situated in the Quagga Solar Park project area and impact might occur.
- It is recommended that a 50 m development no-go buffer be implemented prior to commencement of the construction phase. The site and the buffer should be monitored throughout all phases of the project to detect impact on the site and / or destruction of previously undetected heritage sites at the earliest opportunity.
- Should impact on the site be foreseen, a Phase 2 heritage assessment subject to necessary SAHRA permitting should be initiated and application should be made for a destruction permit during the preconstruction phase.
- The remains of a large Historical Period settlement (**QGS-HP01**) occur within the proposed powerline corridor area and impact on the site is likely. Since human burials occur in the vicinity of the site, it is recommended that a 20 m development no-go buffer be implemented prior to commencement of the construction phase. The site and the buffer should be monitored throughout all phases of the project to detect impact on the site and / or destruction of previously undetected heritage sites at the earliest opportunity. Should impact on the site be foreseen application should be made for a destruction permit during the preconstruction phase.
- Another small Historical Period settlement (**QGS-HP02**) occurs within the proposed powerline corridor area and impact on the site is likely but the little remains of the site in terms of features and material culture and it is rated as low significance. The site should be monitored throughout all phases of the project to avoid the potential destruction of undetected heritage sites.
- A cemetery (**QGS-BP01)** occurs in the proposed powerline corridor area and impact on high heritage significance heritage resource is likely**.** It is primarily recommended that infrastructure such as the placement of monopoles, pylons and service roads be designed to avoid the burial site and a 50 m no-go buffer should be demarcated prior to construction. The site should be fenced, or a permanent construction barricade should be erected to clearly indicate site and margins of the no-go buffer. Cemetery must be monitored frequently during all phases of the project by an informed ECO to detect direct or indirect impact on the sites. A Site Management Plan (SMP) should be implemented, detailing these conservation measures, and indicating responsible parties. Should impact on resources prove inevitable, the graves should be relocated by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum 1).

- As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.

The biodiversity specialist (Annexure D) identified various vegetation types and faunal habitat types in the proposed development footprint:

- Rocky ridges of **High sensitivity.** The development of the option 1 access road is considered more suitable.
- Open water habitats / wetlands of **High sensitivity.** These areas (including valley bottoms and pans) and riparian zones have been excluded together with buffer zones from the development footprint.
- Natural grassland and woodland of **Medium sensitivity** where development can be supported, provided certain mitigation measures are implemented.
- Clay and secondary grassland of **Medium-low sensitivity** due to the state of succession and degradation in the area, where development of the solar park is considered suitable.
- Exotic bush clumps, old slimes dams and croplands of **Low sensitivity** where unlimited development can be supported in these areas.

As no fatal flaws were identified, a decision was taken that only this site will be investigated.

In the Generation Connection Capacity Assessment 2023 (GCCA 2023) published in June 2021, Eskom indicated that the current Transmission Network in the Welkom area and the Theseus MTS is available for the connection of new renewable projects for up to 1260 MW at 132 kV. Since, during the last Round 6, 240 MW has been already allocated to the Virginia 1 and 2 Solar Parks, 1020 MW are still available for connection at Distribution Level (132kV).

9.1.2 TECHNOLOGY ALTERNATIVES

PV Plant and Solar Thermal Power Plant

The alternative to PV for producing energy from the sun is the thermal solution. There are different forms of this technology: linear Fresnel, parabolic trough, or tower. These technologies can also be with or without thermal storage and they can use diathermic oils or, the more sophisticated ones can use water and/or molten salts. The final choice is the PV option because these kinds of project result in:

- lower construction costs;
- lower operating and maintenance costs (O&M);
- it is a simpler, quicker and more experienced technology; and
- lower environmental impact, considering that, a PV solution requires a minor quantity of water.

Wind Power Plant

Another alternative to PV for producing energy from the sun is electrical energy form wind. A wind energy facility has a significant visual impact especially where it is located in a relative flat topographical area. Most important, the project site is not windy enough to be considered suitable for a wind farm. The PV option is thus still a better choice than wind energy based on the same reasons given above.

Alternatives for the Mounting System of the PV Modules

Preferred technical solutions for the proposed solar park entail PV modules mounted on **fixed mounting systems (alternative option 1)** or **horizontal single-axis trackers (alternative option 2)**. The tracking solution is the best performing in terms of efficiency because its energy production is approximately 20% more if compared with fixed systems. This type of technology is characterized by higher technical complexity and higher installing and maintenance costs, if compared with the fixed mounting solution. The selected tracking system is the horizontal single-axis tracker (SAT), which doesn't differ from the fixed system, except for the presence of the tracking devices and the orientation of the rows of the PV arrays (north - south instead of west – east direction).

The technology of mounting systems is under continuous evolution. The selection of fixed mounting system or horizontal single-axis trackers does not affect the layout of the PV power plant or imply any additional visual or environmental impacts that will necessitate specific or different mitigation measures. The development will not exceed the currently planned footprint (494 ha) and the height of the structures (PV modules and support frames) will be maximum 4.5 m above ground level.

Both fixed and horizontal single-axis tracking solutions grant the reversibility of the development in respect of the terrain's morphology, geology and hydrogeology. This means that at the end of the PV plant's lifetime, the site can easily be returned to its status prior to the establishment of the PV plant.

Considering the current PV market and that horizontal single-axis trackers grant a higher energy production compared to fixed mounting systems, **alternative option 2 (horizontal single-axis trackers) is the preferred option.**

BESS Technology alternatives and the Risk/Benefit of using Lithium-ion Batteries

Batteries store electrical energy in chemical form. The range of electrochemical technologies include:

a) batteries with solid electrolyte, as Lithium-ion battery;

b) batteries with liquid electrolyte, as Na–S battery, Lead–Acid (PbA) battery, nickel - cadmium (Ni–Cd) battery or other types of liquid metal battery

The preferred technology for the Battery Energy Storage System ("BESS") is **Lithium-ion battery cells**, which will be pre-assembled at the supplier factory and installed in the containers prior to delivery to the site. Lithium-ion cells technology offers the highest energy density (compared to the other cell technologies), does not suffer from memory effect and is low maintenance. Typical lithium-ion cells used for BESS hold a solid rechargeable electrolyte (the energy accumulator), therefore they do not hold any liquid or gas.

The main benefit of solid ceramic electrolytes is that there is no risk of leaks, which is a serious safety issue for batteries with liquid electrolytes.

A BESS does not emit any gas to the atmosphere during construction and/or normal operation. The containers of the batteries are equipped with a firefighting system conceived to effectively detect smoke and high temperatures and automatically activate the extinguishers to prevent fire. Furthermore, the external metallic surface of the cells is conceived to resist to fire.

The preferred technology is therefore Lithium-ion battery cells with solid rechargeable electrolyte.

Batteries with liquid electrolytes are not preferred due to risk of leakage and consequent potential impacts on environment.

9.1.3 NO-GO ALTERNATIVE / "DO-NOTHING" ALTERNATIVE

9.1.3.1 No-go alternative – negative impacts

The no-go alternative is the option of **not** establishing a Photovoltaic Power Plant on the site, or any of its alternatives. The environment will remain in its current state (status quo). This will have a negative effect of not creating any new employment opportunities, and therefore the anticipated economic benefits of the project will accrue to the study area (see the paragraph 6.4 *Socio-Economic Environment*).
Should this alternative be selected the socio-economic and environmental benefits related to the use of renewable energy resources will not be realised with prejudice to the development of the area.

The main negative impact of the project not proceeding is the potential for renewable energy not being utilized. The electrical infrastructure in South Africa is under extreme pressure and the demand for energy and electricity is increasing. If the project is not developed, there will be no contribution to the development of the renewable energy sector in South Africa.

The benefits related to the establishment of a renewable energy power plant (which will not realise should the project not go ahead) are for example analysed in detail in the REFIT Regulatory Guideline published by NERSA (March 2009):

- Enhanced and increased energy security:
- Resource economy and saving:
- Support of new technologies and new industrial sectors:
- Exploitation and capitalization of South Africa's renewable resources:
- Employment creation and career opportunities:
- Pollution reduction:
- Contrast to Global warming and climate mitigation:
- Protection of natural foundations of life for future generations:
- Acceptability to society and community:
- Commitment to and respect of international agreements:

9.1.3.2 No-go alternative – positive impacts

Should the No-go alternative be selected then the natural area will not be transformed or cleared form natural vegetation or crops and will still be available for agriculture should it be needed. The positive impact will relate mainly to the terrestrial biodiversity that will not be disturbed and agricultural sector which could be further developed in this area if the "Do-Nothing" alternative is applied.

9.2 DETAILS OF PUBLIC PARTICIPATION PROCESS UNDERTAKEN

All relevant I&AP's have been identified and involved in the public participation process from the beginning of the project as per sections 54, 55, 56 and 57 of the EIA regulations 2017, as amended. The public participation process offers the opportunity to become actively involved through constant sharing of information. The main purposes of the public participation process are to ensure that:

- all relevant information in respect of the application is made available to I&APs for their evaluation and review;
- reasonable opportunity is given to I&AP's to comment and to submit queries related to the proposed project;
- comments and queries by the I&APs to the Draft Scoping and to the EIA Reports are submitted and evaluated in a reasonable timeframe and in predetermined terms.

The initial stage of the public participation was conducted from 17 November 2022 until 17 January 2023.

Annexure C contains a list of all components of the public participation process. The public was informed of the project by means of:

- Site notices, which were fixed to and displayed at the proposed development site;
- Background Information Documents (BID), sent to all adjacent landowners;
- A Notice, published in a local newspaper, which is distributed locally;
- Sending of BIDs to other possible interested and affected parties/stakeholders.

An I&AP Register was created and is maintained and added to as required.

Site notices were fixed to boundary fences at 5 positions along the proposed development areas on 18 November 2022.

After a Deed Search was done on the surrounding properties a Background Information Document was sent to the adjacent landowners. Proof of this is attached in Annexure C.

A number of these documents were distributed to relevant governmental departments including *inter alia* Department of Water and Sanitation, Department of Agriculture, Land Reform & Rural Development, *etc*.

Other identified interested and/or affected parties/stakeholders include Eskom, the Local municipalities, the district municipality etc. Proof of all correspondence is included in Annexure C.

A newspaper advertisement was published in the 17 November 2022 edition of the *Vista* Newspaper, which is a local newspaper, distributed locally.

Several people registered as I&APs but no comments were received from adjacent landowners and/or I&APs during the initial public participation process.

- The Draft Scoping Report was made available for a 30-day commenting period and was also provided as hard copy on request. The commenting period on the Draft Scoping Report was from 06 February 2023 until 09 March 2023.
- The Final Scoping Report and the Plan of Study for EIA was submitted to the DFFE for review and approval on 17 March 2023. It was accepted by the competent authority on 04 May 2023.
- The Draft EIA Report (in electronic format) was made available to I&APs and organs of state for comment from 19 June 2023 until 18 July 2023.
- Notifications were sent out to inform registered I&APs and governmental organizations that the Draft EIA Report was submitted and is available for comments.

9.2.1 FURTHER STEPS IN THE PUBLIC PARTICIPATION PROCESS

To ensure a transparent and complete public participation process the following steps are still to be taken during the remainder of the EIA process:

- Comments received on the Draft EIA Report are included in Annexure C to this Final EIA Report.
- This Final EIA Report will be submitted to the DFFE for review and Authorisation.
- Registered I&APs and governmental organizations will be notified about the submission of the Final EIA Report to DFFE.
- Registered I&APs and governmental organizations will be notified about the final decision of the DFFE (Environmental Authorisation granted or not).

9.3 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES AND RESPONSES SUPPLIED

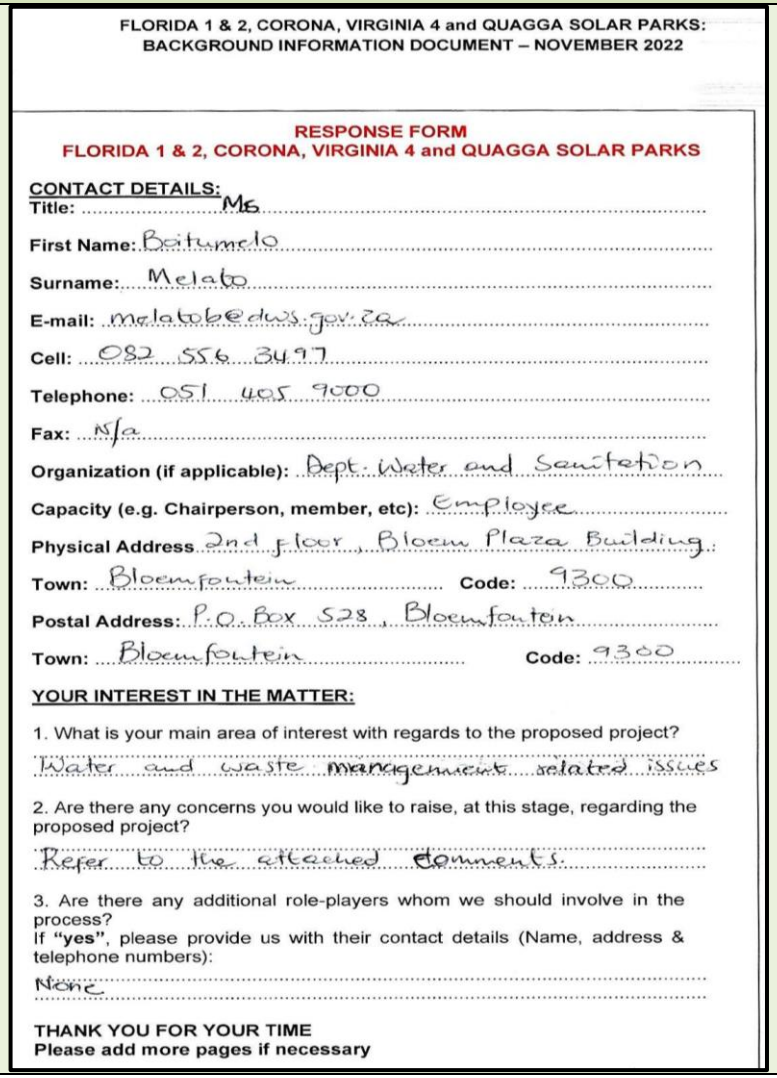
DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
18/11/2022 **CONRAD VAN BILJON** **EMAIL** **ABERDARE**	To Whom it may concern Aberdare Cables is a local level 1 BEE manufacturer of electrical cables and a market leader in the renewable sector. We can provide all the necessary cables needs for this proposed solar facility and will appreciate it if we can obtain more information regarding the proposed plant in order for us to assist were possible. Below are all my contact details should you have any enquiries. Thanking You Conrad Van Biljon	18/11/2022 EMAIL-AGES Thank you for your email. Unfortunately, AGES are only appointed to conduct an environmental Impact assessment for the solar parks. They have not been approved yet, and we are not involved in any construction. Kind regards
18/11/2022 **EMAIL** **KATHRYN WINSTANLEY** **G7ENERGIES**	Dear Hiadee, I trust you are well. Could you please confirm that Caryn Clarke with e-mail address eia@g7energies.com is registered as an I&AP for these 5 proposed solar projects: Virginia 4 SP, Quagga SP, Corona SP, Florida 1 & 2 SP. Thank you very much. With kind regards,	10/01/2023 EMAIL- AGES Dear Kathryn Confirmed. eia@g7energies.com is also receiving emails. The Draft Reports will be forwarded as soon as they are available. Kind regards
23/11/2022 **EMAIL** **BOITUMELO MELATO** **DEPARTMENT OF WATER AND SANITATION**	Good day Hiadee, Hope this mail finds you well. Kindly send the below notification as per the details below so that it can be allocated to the relevant case officer. ntilit@dws.gov.za lenongp@dws.gov.za kumaloz@dws.gov .za and copy musekenen2@dws.gov.za	17/01/2023 EMAIL- AGES Dear Melato, Thank you for your email. I did send the emails to the relevant officers, but to date no-one has responded with a case officer details. The Draft Scoping Report will go out for comments shortly, so I will forward the link to all of the above.
28/11/2022	Good day	28/11/2022

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
EMAIL **MELANIE MILES** **DEPUTY HOD** **PROJECTS** **LEADS 2 BUSINESS**	Please could you forward me a BID document and register me as an interested and affected party for the following 5 projects: Virginia 4 Solar Park Quagga Solar Park Florida 1 & 2 Solar Parks Corona Solar Park I look forward to your response. Kind Regards	EMAIL AGES Dear Melanie Thank you for your registration. I have added you to the I&AP register. Attached please find the BID for your information. Kind regards
	Thank you so much :) Kind Regards	
30/11/2022 **EMAIL** **NOKUKHANYA GASA** **ARC.** **AGRICULTURAL** **RESEARCH COUNCIL**	Good Morning Please see attached. Kind Regards Nokukhanya	30/11/2022 EMAIL AGES Dear Nokukhanya Thank you for your registration. You have been added to the I&AP list and we will keep you informed as the process proceeds. Kind regards

	FLORIDA 1 & 2, CORONA, VIRGINIA 4 and QUAGGA SOLAR PARKS: BACKGROUND INFORMATION DOCUMENT – NOVEMBER 2022 **RESPONSE FORM** **FLORIDA 1 & 2, CORONA, VIRGINIA 4 and QUAGGA SOLAR PARKS** **CONTACT DETAILS:** **Title:** Miss **First Name:** NOMKHANYA **Surname:** GASA **E-mail:** GasaN@arc.agric.za **Cell:** 073 984 3806 **Telephone:** 012 427 9864 **Fax:** – **Organization (if applicable):** Agricultural Research Council **Capacity (e.g. Chairperson, member, etc):** Environmental Compliance **Physical Address** 1134 Park Street **Town:** Hatfield **Code:** 0083 **Postal Address:** P.O. Box 8783 **Town:** Pretoria **Code:** 0001 **YOUR INTEREST IN THE MATTER:** 1. What is your main area of interest with regards to the proposed project? To know the progress on the application as it proceeds. 2. Are there any concerns you would like to raise, at this stage, regarding the proposed project? None at this stage. 3. Are there any additional role-players whom we should involve in the process? If **"yes"**, please provide us with their contact details (Name, address & telephone numbers): NO **THANK YOU FOR YOUR TIME** **Please add more pages if necessary**	
02/12/2022 **EMAIL**	Dear Hiadee,	14/12/2022 EMAIL- AGES

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
THOMAS WILSON SENIOR ENVIRONMENTAL MANAGER SUSTAINABLE DEVELOPMENT DEPARTMENT HARMONY GOLD MINING COMPANY LIMITED	I trust you are well. Please provide us with a plan that we can understand where this site is located, to determine where this is relative to our operations. @ Harmony Team – please take note. Regards.	Dear Thomas I have attached the kmz files so that you can see how this will affect Harmony. It would seem as if it will only be the powerlines that will be adjacent to Harmony's property (along with the existing powerlines). Please confirm that the properties in question are Millo 639 remainder and portion 1 that belong to Harmony? Kind regards 11/01/2023 EMAIL- AGES Hi Thomas As per my email below, please confirm that the properties in question are Millo 639 remainder and portion 1 that belong to Harmony? Kind regards
14/12/2022 EMAIL DEBBIE WESSELS CONTENT REGULATOR LEADS2BUSINESS	Hi Haidee Hope you are well I was looking at the background document for the 5 solar parks in the Free State and was curious.....what does the RD stand for that is listed behind the town's name? • Portions 1 and 4 of Farm FLORIDA 633 and Remaining Extent of the Farm LE ROUX 766, VENTERSBURG RD; • Farms BIDDULPH 329, DE DAM 27 and TEVREDE 361, VENTERSBURG RD; • Farm BLOMSKRAAL 216, VENTERSBURG RD;	17/12/2022 EMAIL AGES Hi Debbie I think it's just for REGISTRATION DIVISION. A map reference. Kind regards

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	• Farm DELAPORTE 887 and Farm QUAGGAFONTEIN 3, WINBURG RD; Never seen that before and wondered what it meant? Kind Regards	
09/02/2023 **EMAIL**	Hi Haidee Thanks so much and compliments of the season. Kind Regards	
18/01/2023 **EMAIL** **BOITUMELO MELATO** **DWS**	Good day Hiadee, Kindly take note that I am the case officer for this project. Attached is the completed form to register the Department as an interested and affected Party. I will await the submission of the Draft Scoping Report	19/01/2023 EMAIL – AGES Limpopo Dear Boitumelo Melato Thank you so much for your registration. The draft Scoping report will be sent to you shortly. Kind regards

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
		

FLORIDA 1 & 2, CORONA, VIRGINIA 4 and QUAGGA SOLAR PARKS:
BACKGROUND INFORMATION DOCUMENT – NOVEMBER 2022

RESPONSE FORM
FLORIDA 1 & 2, CORONA, VIRGINIA 4 and QUAGGA SOLAR PARKS

CONTACT DETAILS:
Title: Ms
First Name: Boitumelo
Surname: Melato
E-mail: melatobe@dws.gov.za
Cell: 082 556 3497
Telephone: 051 405 9000
Fax: N/a
Organization (if applicable): Dept. Water and Sanitation
Capacity (e.g. Chairperson, member, etc): Employee
Physical Address 2nd floor, Bloem Plaza Building
Town: Bloemfontein **Code:** 9300
Postal Address: P.O. Box 528, Bloemfontein
Town: Bloemfontein **Code:** 9300

YOUR INTEREST IN THE MATTER:

1. What is your main area of interest with regards to the proposed project?
Water and waste management related issues

2. Are there any concerns you would like to raise, at this stage, regarding the proposed project?
Refer to the attached comments.

3. Are there any additional role-players whom we should involve in the process?
If **"yes"**, please provide us with their contact details (Name, address & telephone numbers):
None

THANK YOU FOR YOUR TIME
Please add more pages if necessary

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	ɔmments for the Virginia 4 SP, Quagga SP Corona SP , Florida 1 & 2 SP BIDS • The applicant must take note that any development within 500m from the boundary of any wetland requires to be authorised according to the Department's regulation. The authorisation must be obtained prior commencement of the project. • Any activity which is located within 100m of the water resource needs to be authorised by the Department. The authorisation must be obtained prior commencement of the project. • Erosion and stormwater management must be put in place through all stages of the project • All sections of the National Environmental Act: Waste Act (Act 59 of 2008) pertaining to the disposal of waste must be adhered to. • All fuel and lubricants must be stored in sealed containers at least 100m from the nearest water course and all reasonable precautions must be taken to prevent any possible pollution. • Sanitary conveniences which causes or is likely to cause pollution of a water resource should not be located within the 1:50 year flood line or 100m of any watercourse or borehole. • The applicant shall further note that in terms of Section 19(1) of the National Water Act: Act 36 of 1998 it is stated that: *An owner of land, a person in control of land or a person who occupies or uses the land on which – (a) any activity or process is or was performed or undertaken, or (b) any other situation exists, which causes, has caused or likely to cause pollution to a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring".* Therefore, any pollution incident(s) originating from this project shall be reported to Department of Water Sanitation: Free State Operations within 24 hours.	
(24/01/2023) 10/03/2023	Good day Tobie,	**24/01/2023 EMAIL**

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
EMAIL **VUSI NKOSI** **OBSTACLE ADMINISTRATOR | COO - AIR TRAFFIC SERVICES** **BRUMA**	**RE: Proposed Solar PV Facility** This is to acknowledge that ATNS has received your query. Below is the criteria for obstacle evaluation according to the regulations: • If the Solar PV installation is equal to or bigger than 5000 square meters; • If the Solar PV installation falls within a 8km radius around any aerodrome/airstrip or helipad; • If the Solar PV installation falls within the Approach and Departure area of any aerodrome/airstrip or helipad and • If the Solar PV installation **falls within 3km** radius of any aerodrome/airstrip or helipad **a glint and glare assessment is required** from the applicant. ***Please Note the above is requirements for aviation purposes but if your development does fall outside of the above and you still need approval or letter based on other departments within the EIA process, you will still need to apply for assessments before we or the CAA can issue this approval or letter.** Kindly note that ATNS charge for the assessment, and before the process start our Business Development department will forward a proposal to the client. The proposal and payment process are as follows if applicable: • You will receive the proposal from our Business Development department, it will contain the work that will be done as well as what it will cost. • They will provide you with all the information needed to make payment. **For this reason, please provide a billing address and the details of the person to whom the proposal should be addressed.**	Tobie Du Toit Dear Winnie, QUAGGA ENERGY (PTY) LTD (PTY) LTD, is proposing the establishment of a renewable energy generation facilities (Photovoltaic Power Plants) with associated infrastructure and structures, and a power line which will connect the proposed facilities with the existing Eskom Theseus Main Transmission Substation (MTS) which is located within the Matjabeng Local Municipality, Lejweleputswa District Municipality, in the Free State Province. The proposed location of the Quagga Photovoltaic Power Plant is on the Farms DELAPORTE 887 and Farm QUAGGAFONTEIN 3, VENTERSBURG RD, located within the Masilonyana Local Municipality, Lejweleputswa District Municipality, Free State Province. AGES (Africa Geo-Environmental Engineering and Science) is contracted to do the Environmental Impact Assessment (EIA) and myself, TCA (Tappas Aviation Consultant), is subcontracted to do the Aviation Impact Assessment and all other requirements and influences regarding aviation on this project. I therefore apply for approval from ATNS through the obstacle committee for approval to continue with the Quagga Solar Park and Powerline project. Attached find a drawing showing the points and numbers of the pylons as well as the corner points and numbers of the solar park. Attached find the amended form received from you with all the coordinates and elevations of the solar park corners and the powerline pylons. An as-built application will be sent to you by the contractors with the actual positions of the pylons and corner points of the solar park after the project is completed. Thank you for your assistance. Kind regards, Tobie du Toit

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	• We will start with the assessments when our Business Development department received an accepted and signed proposal back from the client. We will conduct an assessment to evaluate whether the proposed structures will affect the safety of flight for aerodromes in close vicinity as well as communication, navigation and surveillance (CNS) equipment. Please see required information below before we can proceed with our assessment: • A KMZ file with the positions of the proposed structures. • A Glint and Glare assessment report (if it is within the 3km radius of any aerodrome/airstrip or helipad). **This whole process can take up to 120 working days' minimum that will commence after the proposal is accepted, signed and received by our Business Development department**. Please note that ATNS also liaise with the South Africa Civil Aviation Authority (SACAA) and will provide the client with the conditional/final approval from the SACAA. The client will have to liaise with SACAA to finalise the "**As build"** and for any queries with the lighting.	
13/02/2023 **EMAIL** **KAMOGELO MATHETJA** **DFFE DIRECTORATE: BIODIVERSITY CONSERVATION**	Dear Sir/Madam DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and comment on the project mentioned on the subject line. Kindly note that the project has been allocated to Mrs M Rabothata and Mr K Mathetja (Both copied on this email). In addition, kindly share the shapefiles of the development footprints/application site with the Case Officers. Please note: All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the	

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	Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr Seoka Lekota Regards,	
14/02/2023 **EMAIL** **MPILO MASONDO** **ESKOM**	Good day, Please could you kindly send through the kmz file(s) of your development in order for us to know the proximity to our current and/or future projects. Regards,	15/02/2023 EMAIL AGES LIMPOPO Dear Mpilo Attached is the KMZ for 3 of the PV plants envisioned in the Virginia area. : VIRGINIA 4, CORONA AND QUAGGA PVs, WITH ASSOCIATED POWERLINE APPLICATIONS. We do not have details of exactly where the Solar plant will be at this stage, only on the farm level. As soon as there is more detailed information, we will forward it to you. Kind regards
28/02/2023 **EMAIL** **LYDIA KUTU** **INTEGRATED ENVIRONMENTAL AUTHORISATIONS: PRIORITY INFRASTRUCTURE DEVELOPMENTS** **LETTER FROM:** **MS MILICENT SOLOMONS** **ACTING CHIEF DIRECTOR:**	Good day. Please find herein the attached letter for the above mentioned. Please do not respond to this mailbox with any queries related to the decision been issued. All queries on the attached decision must be directed to official whose contact details is listed as enquiries. I hope you find all in order. Thank you. Kind Regards	**17/03/2023** **Response to be submitted with final scoping report submission.**
INTEGRATED ENVIRONMENTAL AUTHORISATIONS **DEPARTMENT OF FORESTRY, FISHERIES**	**COMMENTS ON THE DRAFT SCOPING REPORT FOR THE PROPOSED 240MW QUAGGA SOLAR PARK NEAR THE TOWN OF VIRGINIA WITHIN THE MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES IN THE FREE STATE PROVINCE**	**FINAL SCOPING REPORT FOR THE PROPOSED PHOTOVOLTAIC QUAGGA SOLAR PARK AND CONNECTING POWER LINE NEAR THE TOWN OF VIRGINIA WITHIN THE MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE**

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AND THE ENVIRONMENT SIGNED BY: MR COENRAD AGENBACH DESIGNATION: DEPUTY DIRECTOR: PRIORITY INFRASTRUCTURE PROJECTS	The Application for Environmental Authorisation and the draft Scoping Report (SR) dated February 2023 and received by the Department on 03 February 2023, refer. This letter serves to inform you that the following information must be included to the final SR: **(a) <u>Specific Comments</u>** (i) Kindly clarify the reason this Department is the Competent Authority in terms of Section 24(c) of NEMA. State clearly if the applicant intends to bid the project in terms of the IRP or whether the project would be for private off-take	Your letter dated 28 February 2023 refers. **(a) <u>Specific Comments</u>** *(i)* The project is going to participate in the next applicable BID window as per the REIPPPP in terms of the IRP.
	(ii) Kindly ensure all contact details included in the application form are correct and valid. You are requested to provide the email address of the Provincial contact person for this application.	*(ii)* All contact details are correct and valid. The email address of the Provincial contact person for this application have been provided on page 5 of the application form.
	(iii) The co-ordinates in the SR must be specific to each activity and infrastructure that is proposed on the site. The co-ordinates for each corner of the solar field, substation, and battery energy storage system (BESS) must be included in the report, i.e., we require that you provide us with the specific development footprints for each development parameter, and not an area outlining the entire site.	*(iii)* Development footprints are indicated in the FSR in Sections, 1.3, 3.2.2 - 3.2.7 and 3.3.
	(iv) Please provide a concise, but complete, summary and bullet list of the project description and associated infrastructure (or project scope). This must include a list of all development components and associated infrastructure.	*(iv)* The summary required is included in Section 1.3 of the FSR. *(v)* Development footprints are indicated in the FSR in Sections, 1.3, 3.2.2 - 3.2.7 and 3.3.

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	(v) Kindly ensure the development footprints (hectares/square metres) and specifications of all proposed infrastructure and associated infrastructure during all phases are included in the final SR.	*(vi)* The proposed layout plans in Figures 1 – 8 and Annexure A indicates the requested infrastructure.
	(vi) Kindly take note that when finalising the layout plan the position of all proposed infrastructure and linear activities, which includes but not limited to the following must be illustrated: ➢ Solar field; ➢ Construction camp laydown areas; ➢ Substations; ➢ Internal roads; ➢ Battery energy storage systems (BESS); ➢ Operation and maintenance buildings; and ➢ Power line.	*(vii)* All identified SSV and specialist studies identified by the screening tool report were conducted and this is indicated in Table 14 in the FSR.
	(vii) The final SR must clearly provide a detailed section which addresses the site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed, as well as the site sensitivity verification and minimum report content requirements for all specialist assessments undertaken, which were included in the screening tool report.	*(viii)* The initial indication that the project will be a SIP was an error. Confirmation was requested from the relevant sector representatives and once this confirmation has been received, it will be forwarded to the Department. In the meantime, please consider the application as a normal EIA Application.
	(viii) Under Section 10: List of Appendices the applicant has selected "Yes" that the proposed development is a Strategic Infrastructure Project. However, under Appendix 5 none of the SIPs were selected. Kindly take note that, if the project is a SIP, then it is mandatory to provide proof of confirmation for SIP applications from the relevant sector representative. Should no proof be provided, the application will be considered as a normal EIA Application. A letter of confirmation for SIP applications can be obtained from the following relevant sector representatives:	**(b) <u>Listed Activities</u>** (i) All relevant listed activities are applied for and linked to development activities in Table 4, in the FSR.

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	➢ Alvino Wild Schutt-Prins: AlvinoW@idc.co.za/ Alvino@presidency.gov.za; or ➢ Tshepo Chuene: TshepoCh@idc.co.za.	(ii) Listed activities are correct as reflected in the EIA Application form (amended) and submitted with this FSR. If there are any changes, this will reflect in the EIA Report. An amended application form is submitted with this FSR.
	(b) <u>Listed Activities</u> (i) Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description.	(iii) Should any activities applied for in the application form differ from those mentioned in the FSR, an amended application form will be submitted.
	(ii) The listed activities represented in the SR, and the application form must be the same and correct.	(iv) The latest template on the website was used, dated April 2021.
	(iii) If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be submitted.	**c) <u>Layout & Sensitivity Maps</u>** *(i)* Coordinates are provided in Tables 1, 6, 7, 8, 9, 10 and 13 of the FSR.
	(iv) Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.dffe.gov.za/documents/forms.	*(ii)* A layout map is provided in Annexure A and Figures 1 - 8 of the FSR.
	(c) <u>Layout & Sensitivity Maps</u> (i) The final SR must provide coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	
	(ii) Please provide a layout map which indicates the following: a) A clear indication of the envisioned area for the proposed solar field; b) Position of the solar panels; c) Power line; d) Internal roads;	*(iii)* Sensitivity maps for specific sensitivities are included in the respective

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	e) All supporting onsite infrastructure such as laydown area, guard house and control room etc. (existing and proposed); f) Substations, transformers, switching stations and inverters; g) Battery Energy Storage System; h) Connection routes (including pylon positions) to the distribution/transmission network; i) All existing infrastructure on the site, especially railway lines and roads; and j) Buildings, including accommodation.	specialists' reports. *(iv)* Layout maps overlain with sensitivity maps indicating buffer areas are provided in Annexure A and in Figures 4 – 8 of the FSR for the solar park and power line.
	(iii) Please provide an environmental sensitivity map which indicates the following: a) The location of sensitive environmental features identified on site, e.g. CBAs, protected areas, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; b) Buffer areas; and c) All "no-go" areas.	*(v)* Noted. **(a) <u>Alternatives</u>** (i) The reasons for selection of the preferred alternative are explained in section 4.1 and 4.2 of the FSR.
	(iv) The above layout map must be superimposed (overlain) with the sensitivity map and a cumulative map which shows neighbouring and existing infrastructure.	(ii) The reasons for selection of the preferred alternative are explained in section 4.1 and 4.2 of the FSR.
	(v) Google ~~maps will not be accepted.~~	**(b) <u>Public Participation Process</u>**
	(d) <u>Alternatives</u> (i) Please provide a description of any identified alternatives for the proposed activity that are ~~feasible and reasonable, including the advantages and~~ disadvantages that the proposed activity or alternatives will have on the	(i) The DSR was submitted to the Biodiversity Conservation Directorate and comments received from this Directorate are included in the FSR/Comments and Responses Report. (ii) All issues raised, and comments received from registered I&APs and organs of state following distribution of the DSR are included

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	environment and on the community that may be affected by the activity as per Appendix 2 of GN R.982 of 2014 (as amended). (ii) Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2. **(e) Public Participation Process** (i) Comments must be obtained from this Department's Biodiversity Conservation Directorate at BCAdmin@dffe.gov.za. (ii) Please ensure that all issues raised, and comments received during the circulation of the SR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final SR, including comments from this Department, and must be incorporated into a Comments and Response Report (CRR). (iii) Proof of correspondence with the various stakeholders must be included in the final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. (iv) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations 2014, as amended. (v) A comments and response trail report (C&R) must be submitted with the final SR. The C&R report must incorporate all historical comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Annexure 1 of this comments letter. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied	in the CRR. (iii) Proof of all correspondence with stakeholders is included in the CRR. (iv) The Public Participation Process was conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations 2014, as amended. (v) All comments and responses are included in the CRR in the format required. (vi) Proof that all relevant and competent authorities have been given an opportunity to comment on the BID and DSR is included in the CRR as appended to the FSR. (c) **Specialist Assessments** *(i)* a) As all of the specialist studies have already been conducted, these details are included in section 8.6 of the FSR and the specialist reports.

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	verbatim and responded to clearly. Please note that a response such as "Noted" is not regarded as an adequate response to I&AP's comments.	b) Limitations to the studies and time of season are addressed in the various specialist studies and all specialist studies were conducted in the right season.
	(vi) The final SR must provide evidence that all identified and relevant competent authorities have been given an opportunity to comment on the proposed development.	c) No-go areas were identified in the area and the footprint of the solar plant has been designed outside any no-go areas. Buffers around environmental and heritage sensitivities have been indicated and these areas will be excluded from the development.
	(f) <u>Specialist Assessments</u> (i) The EAP must ensure that the terms of reference for all the identified specialist studies include the following: a) A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint (solar arrays) and all other associated infrastructures that they have assessed and are recommending for authorisation.	d) This is not applicable as none of the specialists' definition of a 'no-go' area differs from the Departments' definition.
	b) Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed.	e) The project was completed in consideration of the BirdLife SA (BLSA) best practice guidelines for solar energy. Information provided by BLSA is included in the report, with reference to threatened species, Important Bird Areas and Eskom's Red Data book on birds. Information from the South African Bird Atlas Project 2 (SABAP2) database has also been included in the report. The report states that information from the monitoring plan must be provided to the BirdLife Renewable Energy Programme. There is continuous liaising with BLSA during the EIA process.
	c) Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	f) All specialist studies attached to this FSR are final and provide detailed mitigation measures.
	d) Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.	g) Mitigation measures recommended by specialists will be included in the EIA report.
	e) Bird specialist studies must have support from Birdlife South Africa.	*(ii)* No contradicting recommendations were specified by any specialists.

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		(iii) This will be considered during the EIA phase while the EIA report is compiled.
	f) **All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.**	(iv) The aforementioned protocols have been and will be implemented throughout the EIA process.
	g) Should a specialist recommend specific mitigation measures, these must be clearly indicated.	
	(ii) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons: and were necessary, include further expertise advice.	(v) The requisite information is included in Specialist Declaration forms, attached to the specialist studies.
	(iii) Please ensure that all mitigation recommendations are in line with applicable and most recent guidelines.	(vi) All specialist studies were conducted for the relevant environmental themes and assessments as recommended by the environmental screening tool report.
	(iv) It is further brought to your attention that 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, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species), have come into effect. Please note that specialist assessments must be conducted in accordance with these protocols.	(vii) All SACNASP registrations, where required, are included in Specialist Declarations, attached to the respective specialist studies.
	(v) As such, the Specialist Declaration of Interest forms must also indicate the scientific organisation registration/member number and status of registration/membership for each specialist.	**g) <u>Cumulative Assessment</u>** (i) a) Cumulative assessments are defined in the respective specialist reports. This will be further addressed in the EIA report.
	(vi) Please also ensure that the final SR includes the Site Verification Report as required by the relevant environmental themes and assessments.	

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	(vii) Please note further that the protocols, if applicable, require certain specialists' to be SACNASP registered. Please ensure that the relevant specialist certificates are attached to the relevant reports.	
	(g) <u>Cumulative Assessment</u> (i) Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: a) Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land.	b) Cumulative impacts will be assessed in the EIA Report. c) This will be further addressed in the EIA Report.
	b) Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.	d) No fatal flaws were raised by any specialist regarding the possible cumulative impacts of the proposed solar park and power line on the development footprint as specified.
	c) The cumulative impacts significance rating must also inform the need and desirability of the proposed development.	**e) <u>General</u>** All timeframes will be adhered to as prescribed in the EIA Regulations, 2014, as amended. The scoping report was compiled according to Appendix 2 of the EIA Regulations, 2014, as amended. If a timeframe cannot to complied to, the applicant will apply for an extension of the timeframe in terms of Regulation 3(7) of the EIA Regulations, 2014, as amended. The applicant has been informed that no activity may commence prior to an Environmental Authorisation being granted by the Department. Please note that in the initial EIA application form (February 2023): o Activity 12 of Listing Notice 3 has been incorrectly referenced. The reference has been amended. o Under Section 10: List of Appendices the applicant has selected "YES" that the proposed development is a Strategic Infrastructure Project. The selection has been amended.
	d) A cumulative impact environmental statement on whether the proposed development must proceed.	
	(h) <u>General</u> You are further reminded to comply with Regulation 21(1) of the NEMA EIA Regulations 2014, as amended, which states that: *"If S&EIR must be applied to an application, the applicant must, within 44 days of receipt of the application by the competent authority, submit to the*	

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competent authority a scoping report which has been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority".

You are further reminded that the final SR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of Scoping reports in accordance with Appendix 2 and Regulation 21(1) of the EIA Regulations 2014, as amended.

Further note that in terms of Regulation 45 of the EIA Regulations 2014, as amended, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of these Regulations, unless an extension has been granted in terms of Regulation 3(7).

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Yours sincerely

<table>
<tr><th>Format for Comments and Response Report: Date of comment, format of comment name of organisation/I&AP,</th><th>Comment</th><th>Response from EAP/Applicant/Specialist</th></tr>
<tr><td>27/03/2021
Email
Department of Forestry, Fisheries and the Environment: Priority Infrastructure Projects (Joe Soap)</td><td>Please record C&R trail report in this format
Please update the contact details of the provincial environmental authority</td><td>EAP: (Noted)The C&R trail report has been updated into the desired format, see Appendix K
EAP: Details of provincial authority have been updated, see page 16 of the Application form</td></tr>
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</td><td>
o A new EIA application form (March 2023) is therefore attached.

I trust you find the above in order.

Yours sincerely
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<tr><td>01/03/2023</td><td>Dear Hiadee,</td><td>02/03/2023</td></tr>
</table>

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EMAIL **MS M RABOTHATA** **DFFE**	Kindly note that your link has Expired on 14 February 2023 and I couldn't manage to download the report before the expiry date . Please send me the new link or an alternative way to access the report for the above mentioned project. Regards,	LINK SENT VIA WETRANSFER
06/03/2023 **BOITUMELO MELATO** **DWS** **LETTER SIGNED BY DR T NTILI** **PROVINCIAL HEAD: FREE STATE**	Good day, Kindly find the attached for your further attention.	06/03/2023 EMAIL AGES LIMPOPO Dear Melato Boitumelo Thank you very much, comments will be incorporated in the Draft EIA report. Kind regards
		16/03/2023 EMAIL AGES LIMPOPO **COMMENTS ON THE DRAFT SCOPING REPORT FOR THE PROPOSED PHOTOVOLTAIC QUAGGA SOLAR PARK AND CONNECTING POWER LINE NEAR THE TOWN OF VIRGINIA WITHIN THE MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE** Your letter dated 06 March 2023 with comments on the Draft Scoping Report refers. Kindly note that, once the project has been awarded Preferred Bidder Status and it is confirmed that the project is going to proceed, a Water Use License Application will be submitted to the Department of Water and Sanitation, for all

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	Regards, **APPLICATION FOR ENVIRONMENTAL AUTHORISATION FOR THE PROPOSED RENEWABLE ENERGY GENERATION PROJECT (PV) ON THE FARMS QUAGGAFONTEIN 3 AND DELAPORTE 887, AND CONNECTING POWERLINE, MATJHABENG & MASILONYANA LOCAL MUNICIPALITY, LEJWELEPUTSW DISTRICT, FREE STATE PROVINCE: QUAGGA SOLAR PV FACILITY** **AGES REF: L 22 106 E** Reference is hereby made to the document submitted to this Department dated February 2023 for the above-mentioned project as presented to this Department by AGES Limpopo (Pty) Ltd. This office has evaluated the Draft Scoping Report and the comments are as follows. • In Page 62 of The Wetland/Riparian Impact Assessment Report attached as Appendix F it is indicated that two wetland types were identified on the project area. The applicant must take note that any development within 500m from the boundary of any wetland requires to be authorised according to the Department's regulation. The authorisation must be obtained prior commencement of the project. • It is noted that in Page ix: Executive Summary the applicant has taken note that no development can be done within the flood line zone without a Water Use Licence except if outside the 1:100-year flood line or 100m from the delineated riverine areas or 500 meters from the wetlands. • In page 30 under 3.2.7.3: Water provision during construction and operation it is noted that water will be obtained from Matjhabeng Local Municipality and/or from on-site boreholes. An agreement letter between the water supplier and the applicant must be in place. • Sanitary conveniences which causes or is likely to cause pollution of a water resource should not be located within the 1:50 year flood line or 100m of any watercourse or borehole. • All sections of the National Environmental Act: Waste Act (Act 59 of 2008) pertaining to the disposal of waste must be adhered to.	water uses triggered according to Section 21 of the National Water Act, 1998 (Act No. 36 of 1998). I trust you find this in order. Yours sincerely

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	• All fuel and lubricants must be stored in sealed containers at least 100m from the nearest water course and all reasonable precautions must be taken to prevent any possible pollution. • Erosion and stormwater management must be put in place through all stages of the project. • The applicant shall further note that in terms of Section 19(1) of the National Water Act: Act 36 of 1998 it is stated that: *An owner of land, a person in control of land or a person who occupies or uses the land on which – (a) any activity or process is or was performed or undertaken, or (b) any other situation exists, which causes, has caused or likely to cause pollution to a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring*". Therefore, any pollution incident(s) originating from this project shall be reported to Department of Water Sanitation: Free State Operations within 24 hours. • All the commitments stipulated in the various parts of this report must be adhered to and any deviations must be reported to this Department. • Further comments, if any, will be provided during the Environmental Impact Assessment process. You are welcome to contact Ms B Melato at telephone: 051 405 9000 or on e-mail: melatob@dws.gov.za should you have any enquiries. Yours sincerely,	
08/03/2023 EMAIL	Dear Mr von Well,	

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
MS MMATLALA RABOTHATA LETTER SIGNED BY MR SEOKA LEKOTA CONTROL	Please receive the attached comments from Directorate :Biodiversity Conservation for your attention and implementation Regards	
BIODIVERSITY OFFICER GRADE B: BIODIVERSITY CONSERVATION DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT	Dear Mr. von Well **COMMENTS ON THE DRAFT SCOPING REPORT FOR THE PROPOSED PHOTOVOLTAIC QUAGGA SOLAR PARK ON THE REMAINDER OF FARMS QUAGGAFONTEIN 3 AND DELAPORTE 887, WINBURG RD, AND CONNECTING POWERLINE, MATJHABENG & MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT, FREE STATE PROVINCE** The Directorate: Biodiversity Conservation has reviewed and evaluated the reports and doesn't have any objection to the Scoping Report and the Plan of Study, however, final report must comply with the 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, 1998. It is recommended that the PV infrastructure be placed in such a way that they avoid any highly sensitive biodiversity areas. The layout Plan overlaid with biodiversity sensitivities must be included and submitted during the next phase of the EIA. All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of **Mr Seoka Lekota.** Yours faithfully	
02/05/2023 EMAIL MELANIE MILES LEADS2 BUSINESS	Dear Hiadee, I work for the Private Projects Department at Leads 2 Business.	04/05/2023 Email AGES response

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	Please could you advise if Environmental Authorisation has been received for the proposed of the 240MW Quagga Solar Park located in Delaporte 887, Quaggafontein 3, Winburg, Free State? I look forward to your response. Kind regards, --- Thank you so much	Dear Melanie Relating to ANY OF OUR EIA PROJECTS: As a registered I&AP, AGES will always inform you when the Environmental Authorisation has been issued. If you have not received notification, then the EA has NOT been issued yet. Kind regards
04/05/2023 **EMAIL** **Lydia Kutu** **Integrated Environmental Authorisations: Priority Infrastructure Developments** **Letter:** **MR SABELO MALAZA** **CHIEF DIRECTOR: INTEGRATED ENVIRONMENTAL AUTHORISATIONS** **DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT** **SIGNED BY: MR COENRAD AGENBACH** **DESIGNATION: DEPUTY DIRECTOR: PRIORITY INFRASTRUCTURE PROJECTS**	**ACCEPTANCE OF THE SCOPING REPORT FOR THE PROPOSED 240MW QUAGGA SOLAR PARK NEAR THE TOWN OF VIRGINIA WITHIN THE MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES IN THE FREE STATE PROVINCE** The final Scoping Report (SR) and the Plan of Study for Environmental Impact Assessment dated March 2023 and received by the Department on 17 March 2023, refer. The Department has evaluated the submitted final SR and the Plan of Study for Environmental Impact Assessment dated March 2023 and is satisfied that the documents comply with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. The final SR is hereby accepted by the Department in terms of Regulation 22(1)(a) of the EIA Regulations, 2014, as amended. You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the Plan of Study for Environmental Impact Assessment as required in terms of the EIA Regulations, 2014, as amended. In addition, the following amendments and additional information are required for the Environmental Impact Assessment Report (EIAr): (a) **<u>Specific Comments</u>**	**DRAFT EIA REPORT FOR THE PROPOSED 240MW QUAGGA SOLAR PARK NEAR THE TOWN OF VIRGINIA WITHIN THE MATJHABENG LOCAL MUNICIPALITY IN THE FREE STATE PROVINCE** Your Scoping approval letter dated 04 May 2023 refers. (a) **<u>Specific Comments</u>**

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	i The co-ordinates in the EIAr must be specific to each activity and infrastructure that is proposed on the site. The co-ordinates for each corner of the solar fields, the substation, BESS, power line route, and laydown areas must be included in the EIAr, i.e., we require that you provide us with the specific development footprints for each development parameter, and not an area outlining the entire site.	(i) The coordinates of the PV plant footprint, construction camp (laydown areas) that will become the BESS, on-site substation, solar field and connecting powerline are included in the DEIAr in Tables 3 – 7 and Table 13.
	ii Please provide a concise, but complete, summary and bullet list of the project description and associated infrastructure (or project scope) to be included in the decision (or as it should appear in the decision), should a positive Environmental Authorisation be granted. This must include a list of all development components and associated infrastructure.	(ii) The summary required is included in Section 5.4 of the EIAr. (iii) See Tables 3 - 7, 9 and 13 and Section 5.3 – 5.4.6 of the EIAr.
	iii Kindly ensure the development footprints (hectares/square metres) and specifications of all proposed infrastructure and associated infrastructure during all phases are included in the EIAr. **b) Listed Activities** i Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description.	(b) **Listed Activities** (i) The listed activities to be applied for are listed comprehensively in Table 8 of the EIAr, are specific and can be linked to the development activity and infrastructure as described in the project description. The Listing Notices as quoted have been amended to reference the 2017 Regulations and an amended application form is attached. (ii) Corrected in Table 8 of the EIAr and attached amended application form.
	ii Please ensure that all relevant listed activities and sub-activities are correctly numbered as per the relevant listing notices: ➢ Activity 12 of Listing Notice 3 of the EIA Regulations, 2014 as amended.	(iii) The EIAr has assessed each sub listed activity for each listed activity applied for. (iv) The listed activities to be applied for are listed comprehensively in Table 8 of the EIAr and correspond to the listed activities mentioned in the application form. The Listing Notices as quoted have been amended to reference the 2017 Regulations and an amended application form is attached.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	iii The EIAr must assess the correct sub listed activity for each listed activity applied for.	(v) An assessment of the impacts of the listed activities applied for and mitigation measures thereto are provided in Section 10.2 of the draft EIAr and the EMPr.
	iv The listed activities represented in the EIAr and the application form must be the same and correct. If the activities applied for in the application form differ from those mentioned in the draft EIAr, an amended application form must be submitted.	(c) **Public Participation Process** (i) Since legislation do not stipulate the language/s to be used when placing an advertisement, the EAP exercised insight and discretion in selecting English as the only language for advertising and the site notice, while ensuring that the language used allows for facilitation of a PPP where all potential and RI&APs are provided with a reasonable opportunity to comment on the application and participate without difficulty. The initial selection of English only, was based on the following:
	v The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	
	(c) Public Participation i Please ensure the language used to inform potential I&APs in the newspaper advertisement is not only communicated in the language English but should also utilise other dominant languages spoken in the study area. The EAP must ensure that the newspaper medium adequately caters for all potential I&APs in the study area. This should also apply to any site notification boards as well.	• The same EAP practice conducted a public participation process (PPP) for similar developments (Virginia PV Solar Parks 1, 2 and 3 during 2021/2022. The PPP for this application commenced in English as only language, while during the entire EIA process, and to date, no I&APs responded (either telephonically or via email or other medium) with any comments or concerns regarding the choice of language used, nor did any RI&AP seemed to be limited in their use of English as written/spoken language. • An assessment of the geographic location and socio-economics character of the area pertaining to this application indicated no rural settlements, Communal Property Associations or Tribal Authorities (who may prefer a language other than English) in close proximity to the proposed development, which is situated on privately owned land. All directly adjacent property owners were contacted, and none indicated any challenges in corresponding in English. • If at any time, any I&AP seemed to have difficulty in expressing their comments (assessing the fluency and type of language used in the comments expressed), the EAP would request the I&AP to indicate if they wished to converse in another language and would have complied with any such requests insofar possible.

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		(ii) All comments and responses received, are included in Section 9.3 of the DEIAr and Annexure C. Please take note that due to the shorter powerline, none of the components of this application falls within the jurisdiction of Masilonyana Local Municipality.
	ii Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs, the Matjhabeng and Masilonyana Local Municipalities, the Department of Water and Sanitation (DWS), the provincial Department of Agriculture, the South African Heritage Resources Agency (SAHRA), the Endangered Wildlife Trust (EWT), BirdLife SA, the Department of Mineral Resources, the Department of Rural Development and Land Reform, the Department of Forestry, Fisheries and the Environment: Directorate Biodiversity and Conservation, and the Directorate Protected Areas.	(iii) Noted and will be actioned. (iv) All issues raised, and comments received during the circulation of the DSR from registered I&APs and organs of state are included in the CRR (Annexure C). Proof that all relevant and competent authorities have been given an opportunity to comment on the BID and DSR is included in the CRR as appended to the EIAr.
	iii Please ensure that all issues raised, and comments received during the circulation of the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAr.	(v) All comments and responses are included in the CRR in the format required.
	iv Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	(vii) Responses to comments were made individually as indicated in Section 9.3 of the DEIAr and Annexure C.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
		(vii) The Public Participation Process was conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations 2014, as amended.
	v A Comments and Response trail report (C&R) must be submitted with the final EIAr. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Appendix 1 of this comments letter. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	(d) **Layout & Sensitivity Maps** (i) Coordinate points are provided in tables 3 – 7 and table 13 the DEIAr.
	vi Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	(ii) Layout maps are provided in Annexure A.
	vii The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations, 2014, as amended.	
	(d) Layout & Sensitivity Maps i The EIAr must provide coordinate points for the proposed development site and all proposed infrastructure (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	(iii) Sensitivity maps are included in the respective specialists' reports.
	ii The EIAr must provide a copy of the final preferred layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following: a) A clear indication of the envisioned area for the proposed solar fields; b) Internal roads;	(iv) Layout maps overlain with sensitivity maps for solar park and power line, indicating buffer areas are provided in Annexure A.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	c) All supporting onsite infrastructure such as laydown area, guard house and control room etc.; d) Substations, transformers, switching stations and inverters; e) Battery Energy Storage System; f) Powerline route (including pylon positions) to the distribution/transmission network; and g) All existing infrastructure on the site, especially railway lines and roads.	(v) Noted (e) **Specialist Assessments** (i) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: (a) All these details are included in the specialist reports attached as Annexures.
	iii Please provide an environmental sensitivity map which indicates the following: a) The location of sensitive environmental features identified on site, e.g. CBAs, protected areas, heritage sites, wetlands, drainage lines, nests and roosting sites, etc. that will be affected by the facility and its associated infrastructure; b) Buffer areas; and c) All "no-go" areas.	(b) All specialist studies were conducted in the right season and limitations are listed where applicable. (c) 'No-go' areas were identified, and the footprint of the solar plant has been designed outside any 'no-go' areas. Buffer areas have been drawn around the heritage areas and drainage channels which have been excluded from the development. These buffer areas are indicated on the maps in Annexure A.
	(iv) The above layout map must be superimposed (overlain) with the sensitivity map and a cumulative map which shows neighbouring and existing infrastructure.	(d) This is not applicable as none of the specialists' definition of a 'no-go' area differs from the Departments' definition.
	(v) Google maps will not be accepted.	
	(e) Specialist assessments i. The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: a) A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisation.	(e) The project was completed in consideration of the BirdLife SA (BLSA) best practice guidelines for solar energy. Information provided by BLSA is included in the report, with reference to threatened species, Important Bird Areas and Eskom's Red Data book on birds. Information from the South African Bird Atlas Project 2 (SABAP2) database has also been included in the report. The report states that information from the monitoring plan must be provided to the BirdLife Renewable Energy Programme. There is continuous liaising with BLSA during the EIA process. The Avifauna Specialist Assessment was submitted to BirdLifeSA via wetransfer link on 07 February 2023 with the Consultation Scoping Report,

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	b) Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed.	however no comments were received on the report to date. The Avifauna Specialist Assessment will again be submitted to BirdlifeSA for comment, with the draft EIAr.
	c) Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas.	(f) All specialist studies attached to this draft EIAr are final and provide detailed mitigation measures. (h) Mitigation measures recommended by specialists are included in Section 10.2 of the draft EIAr and the EMPr. (ii) No contradicting recommendations were specified by any specialists.
	d) Should the specialist definition of 'no-go' area differ from the Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.	(iii) The protocols have been implemented throughout the EIA process.
	e) **Avifaunal specialist studies must have comments from Birdlife South Africa**.	(iv) A Site Verification Report is attached as Appendix Q, while specialist assessments were conducted for the relevant environmental themes as identified in the environmental screening tool report.
	f) **All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.**	(vi) All SACNASP registrations, where required, are included in the Specialist Declarations – please refer to Annexure U.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	g) Should a specialist recommend specific mitigation measures, these must be clearly indicated.	(vi) The required information is included in the Specialist Declaration forms.
	(ii) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	(vii) All these studies, as well as a Traffic Impact Assessment and Geotechnical Impact Assessment are attached as Annexures D - O to the draft EIAr.
	(iii) It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting in identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species), have come into effect. **Please note that specialist assessments must be conducted in accordance with these protocols.**	
	(iv) Please also ensure that the EIAr includes the Site Verification Report and Compliance Statements (where applicable) as required by the relevant themes.	(viii) The project description and layout included in the specialist assessments were amended to correspond with the application and EIAr.
	(v) Please note further that the protocols, if applicable, require certain specialists' to be SACNASP registered in the field of expertise of the specialist study being undertaken e.g. An aquatic assessment must be prepared by a specialist registered with SACNASP, with expertise in the field of aquatics sciences. Please ensure that the relevant specialist certificates are attached to the relevant reports.	(ix) Table included under Section 11 of the draft EIAr.
	(vi) <u>As such, the Specialist Declaration of Interest forms must also indicate the scientific organisation registration/member number and status of registration/membership for each specialist</u>.	(f) **<u>Cumulative Assessments</u>** (i) a. Cumulative assessments are defined in the different specialist reports. The significance of cumulative impacts is assessed and rated in the tables in Section 10.2 of the draft EIAr.

<table>
<tr><th>DATE OF COMMENT, FORMAT, NAME OF I&AP</th><th>COMMENT</th><th>RESPONSE FROM EAP/ SPECIALIST / APPLICANT</th></tr>
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(vii) The following Specialist Assessments will form part of the EIAr:

<table>
<tr><th>Specialist Study</th><th>Company</th></tr>
<tr><td>Terrestrial Biodiversity, Plant & Animal Species Impact Assessment</td><td>Ages Limpopo</td></tr>
<tr><td>Avifaunal Impact Assessment</td><td>The Biodiversity Company</td></tr>
<tr><td>Wetland & Riparian Impact Assessment</td><td>Ages Limpopo</td></tr>
</table>

</td><td>

b. The significance of cumulative impacts is assessed and rated in the tables in Section 10.2 of the draft EIAr.

c. All cumulative impacts were rated between low-medium and medium without mitigation measures.

d. No fatal flaws were raised by any specialist regarding the possible cumulative impacts of the proposed solar park and power line and all cumulative impacts can be mitigated to low, medium-low and medium impacts – section 10.2.

(g) **<u>General</u>**

(i) Technical details are listed in Table 9 of draft EIAr.

(ii) Landowner's consent is attached to the amended application form.

(iii) EMPr's are attached as Annexure R.1 – R.3.

iv) Noted and have been actioned.

</td></tr>
</table>

<table>
<tr><th>DATE OF COMMENT, FORMAT, NAME OF I&AP</th><th>COMMENT</th><th></th><th>RESPONSE FROM EAP/ SPECIALIST / APPLICANT</th></tr>
<tr><td></td><td></td><td></td><td>The timeframes are noted and will be complied with for this application.</td></tr>
<tr><td></td><td>Heritage Impact Assessment Report</td><td>CES Environmental and Social Advisory Services</td><td>The applicant has been informed that no activity may commence prior to an Environmental Authorisation being granted by the Department.

Please note that the Listed Activities have been amended and an amended EIA application form is therefore attached.

I trust you find this in order.

Yours sincerely</td></tr>
<tr><td></td><td>Palaeontological Impact Assessment</td><td>Prof Marion Bamford</td><td></td></tr>
<tr><td></td><td>Visual Impact Assessment</td><td>M Cilliers (PrLArch.)</td><td></td></tr>
<tr><td></td><td>Agricultural Agro-Ecosystem Impact Assessment</td><td>Ages Limpopo</td><td></td></tr>
</table>

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	Aviation Assessment — Tappas Aviation Consultant (Pty) Ltd RFI Assessment — PF Smuts Social-Economic Assessment — GLEN STEYN AND ASSOCIATES	
	(viii) Please ensure that each specialist study has the correct and same project description and layout to assess, as there seems to be conflicting descriptions presented in the SR and studies attached.	
	(ix) Please include a table that shows the proposed studies and the relevant specialists carrying out the study. In addition, a summary should be included of the specialist's recommendations in terms of the alternatives that are preferred based on the findings of their study.	
	(f) <u>Cumulative Assessment</u> i If there are other similar facilities proposed within a 30km radius of the proposed development site, a cumulative impact assessment must be	

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	conducted for all identified and assessed impacts which must be refined to indicate the following: a) Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land.	
	b) Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.	
	c) The cumulative impacts significance rating must also inform the need and desirability of the proposed development.	
	d) A cumulative impact environmental statement on whether the proposed development must proceed.	
	(g) **General** (i) The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under Annexure 2 below.	
	(ii) The EAP must provide landowner consent for all farm portions affected by the proposed project i.e., all farm portions where the solar field and associated infrastructure are to be located.	

<table>
<tr><th>DATE OF COMMENT, FORMAT, NAME OF I&AP</th><th>COMMENT</th><th>RESPONSE FROM EAP/ SPECIALIST / APPLICANT</th></tr>
<tr><td></td><td>(iii) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr, including the Generic EMPr for substations and powerlines.</td><td rowspan="4"></td></tr>
<tr><td></td><td>(iv) When submitting the EIAr and future documents kindly name each of the documents and attachments according to the information it contains. E.g., instead of only naming it Appendix A, it must be Appendix A: Maps, Appendix B: EAP Declaration etc.</td></tr>
<tr><td></td><td>The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amendment, with regard to the time period allowed for complying with the requirements of the Regulations.</td></tr>
<tr><td></td><td>You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.

Yours faithfully

Annexure 1: Format for Comments and Response Trail Report:

<table>
<tr><th>Date of comment, format of comment name of organisation/I&AP</th><th>Comment</th><th>Response from EAP / Applicant/Specialist</th></tr>
</table>
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<table>
<tr><th>DATE OF COMMENT, FORMAT, NAME OF I&AP</th><th>COMMENT</th><th>RESPONSE FROM EAP/ SPECIALIST / APPLICANT</th></tr>
<tr><td></td><td>
<table>
<tr><td>27/01/2016

Email

Department of Forestry, Fisheries and the Environment: Priority Infrastructure Projects (John Doe)</td><td>Please record C&R trail report in this format

Please update the contact details of the provincial environmental authority</td><td>EAP: (Noted)The C&R trail report has been updated into the desired format, see Appendix K

EAP: Details of provincial authority have been updated, see page 16 of the Application form</td></tr>
</table>
Annexure 2: Sample of technical details for the proposed facility
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<tr><th>DATE OF COMMENT, FORMAT, NAME OF I&AP</th><th>COMMENT</th><th>RESPONSE FROM EAP/ SPECIALIST / APPLICANT</th></tr>
<tr><td></td><td>
<table>
<tr><th>Component</th><th>Description / dimensions</th></tr>
<tr><td>Height of PV panels</td><td></td></tr>
<tr><td>Area of PV Array</td><td></td></tr>
<tr><td>Number of inverters required</td><td></td></tr>
<tr><td>Area occupied by inverter / transformer stations / substations</td><td></td></tr>
</table>
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DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT		RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	Capacity of on-site substation		
	Area occupied by both permanent and construction laydown areas		
	Area occupied by buildings		
	Length of internal roads		
	Width of internal roads		

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<tr><th>DATE OF COMMENT,
FORMAT,
NAME OF I&AP</th><th>COMMENT</th><th>RESPONSE FROM EAP/ SPECIALIST / APPLICANT</th></tr>
<tr><td></td><td><table>
<tr><td>Proximity to grid connection</td><td></td></tr>
<tr><td>Height of fencing</td><td></td></tr>
<tr><td>Type of fencing</td><td></td></tr>
</table></td><td></td></tr>
<tr><td>19/06/2023
EMAIL
NOSIFISO MAKHASI
RECEPTIONIST :
COGTA & HUMAN
SETTLEMENTS</td><td>Good Day

Email received and noted, thank you.

Regards</td><td></td></tr>
<tr><td>21/06/2023
EMAIL
LUFUNO SITHOMOLA
LAND USE OFFICER:
AGRO ECOSYSTEM
LAND USE
MANAGEMENT</td><td>
Good day

Kindly provide the tittle deed and power of attorney if you are applying on behalf of the farm owner in order for the Department to comment on proposed Quagga Solar Park.</td><td>22/06/2023
Email
Daniele Ventura
On behalf of Indus Energy (Pty) Ltd

Dear Lufuno,</td></tr>
</table>

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
DIRECTORATE: LAND AND SOIL MANAGEMENT DEPARTMENT OF AGRICULTURE, LAND REFORM & RURAL DEVELOPMENT	Regards	Please find attached the title deed, deed info, landowner resolutions and resolutions by applicant about the Quagga Solar Park. Thank you very much, Kind Regards
21/06/2023 EMAIL KAMOGELO MATHETJA DFFE DIRECTORATE: BIODIVERSITY CONSERVATION	Dear Sir/Madam DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and comment on the project mentioned on the subject line. Kindly note that the project has been allocated to Mrs M Rabothata and Mr K Mathetja (Both copied on this email). In addition, kindly share the shapefiles of the development footprints/application site with the Case Officers. Please note: All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr Seoka Lekota Regards,	
05/07/2023 EMAIL MR KAMOGELO MATHETJA BIODIVERSITY & CONSERVATION DEPARTMENT OF FORESTRY FISHERIES AND THE ENVIRONMENT LETTER: MR. SEOKA LEKOTA	Good day, Kindly find the attached comments for your implementation. --- **COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORTS FOR THE PROPOSED PHOTOVOLTAIC VIRGINIA 4, CORONA AND QUAGGA SOLAR PARKS ON THE FARMS BLOMSKRAAL 216, TEVREDE 361, BIDDULPH 329, DE DAM 27, QUAGGAFONTEIN 3, AND DELAPORTE 887, WINBURG RD WITH RESPECTIVE CONNECTING 132 kV POWERLINES, MATJHABENG & MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT, FREE STATE PROVINCE**	13/07/2023 Email AGES LIMPOPO Dear Mr Kamogelo Mathetja Attached please find AGES response to the comments on the DEIAR for VIRGINIA 4, CORONA AND QUAGGA solar parks. Kind regards For attention: Ms M Rabothata/Mr K Mathetja

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CONTROL BIODIVERSITY OFFICER GRADE B: BIODIVERSITY CONSERVATION DEPARTMENT OF FORESTRY, FISHERIES & THE ENVIRONMENT LETTER SIGNED BY: MS. P MAKITLA DESIGNATION: CONTROL BIODIVERSITY OFFICER GRADE A	The Directorate: Biodiversity Conservation reviewed and evaluated the afore-mentioned report. Based on the information provided in the report, 129 bird species were recorded in and around the the Proposed Area of Interest (PAOI), with 95 species recorded from point counts and an additional 34 species recorded as incidental. These species include 3 avifaunal Species of Conservation Concern (SCC) namely, Secretary bird (*Sagittarius serpentarius*), Lanner Falcon (*Falco biarmicus*) and Blue Korhaan (*Eupodotis caerulenscens*). Two wetland types were identified on the site namely: Valley bottom wetland with channel, Depressions: Exorheic depressions (man-made dams) and Endorheic depressions(pans). The other drainage features on the proposed development footprint sites are classified as channels (rivers) with riparian woodland. The rivers are classified as Floodplain Rivers and Non-perennial drainage channels. Lastly, most of the proposed solar parks and portions of the connection line do overlap with the Priority Focus Areas, as per the National Protected Areas Expansion Strategy (NPAES) namely, Free State Highveld Grasslands. These are areas contributing towards meeting biodiversity thresholds for terrestrial or freshwater ecosystems, maintaining ecological processes or climate change resilience. Therefore, they are given highest priorities for protected area expansion to meet those targets. Furthermore, the Quagga Solar Park overlaps with Optimal Critical Biodiversity Area (CBA 2). Given the above, the Directorate Biodiversity Conservation supports the development provided that all the recommended measures are adhered to including the following: • Overhead cables/lines across water resource areas must be fitted with industry standard bird flight diverters to make the lines as visible as possible to collision-susceptible species.	**COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORTS FOR THE PROPOSED PHOTOVOLTAIC VIRGINIA 4, CORONA AND QUAGGA SOLAR PARKS ON THE FARMS BLOMSKRAAL 216, TEVREDE 361, BIDDULPH 329, DE DAM 27, QUAGGAFONTEIN 3, AND DELAPORTE 887, WINBURG RD WITH RESPECTIVE CONNECTING 132 kV POWERLINES, MATJHABENG & MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT, FREE STATE PROVINCE** Your comments dated 5 July 2023 are appreciated. Please see our response in italics below each recommendation. • Overhead cables/lines across water resource areas must be fitted with industry standard bird flight diverters to make the lines as visible as possible to collision-susceptible species. The bird specialist recommended that the design of the proposed transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2017). Bird

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		diverters or spirals must be added to the transmission line to reduce fatalities. These recommendations are included in the final EIAr and EMPr.
	• Monitoring by an avifauna specialist must be done throughout the development phases. Standard methods as per the species protocols must be followed.	• Monitoring by an avifauna specialist must be done throughout the development phases. Standard methods as per the species protocols must be followed. The bird specialist recommended that monitoring should be conducted between September and February so that mitigation measures can be adapted to ensure the development does not have a long-term impact on the SCCs in the area. A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on energy@birdlife.org.za.
	• Powerline pylons must be located outside the recommended buffer zones.	• Powerline pylons must be located outside the recommended buffer zones. It is recommended in the final EIAR and EMPr that the pylons must be located outside sensitive areas as far as possible.
	• The proposed solar park and connection line overlap with the Priority Focus Areas, as per the National Protected Areas Expansion Strategy (NPAES) (Free State Highveld Grasslands), Comments from the DFFE Directorate: Protected Areas Planning and Management Effectiveness must be obtained at email: TNethononda@environment.gov.za for attention of Mr. Thivhulawi Nethononda	• The proposed solar park and connection line overlap with the Priority Focus Areas, as per the National Protected Areas Expansion Strategy (NPAES) (Free State Highveld Grasslands), Comments from the DFFE Directorate: Protected Areas Planning and Management Effectiveness must be obtained at email: TNethononda@environment.gov.za for attention of Mr. Thivhulawi Nethononda. The Directorate: Protected Areas Planning and Management Effectiveness have been included in the I&AP distribution list since the start of the EIA studies. All reports have been sent via electronic links to Sydney Nkosi and Skumsa Mancotywa as per the contact details provided on the DFFE website, however no comments from this Directorate have been received to date. The reports have now been forwarded to Mr Nethononda for comment. Any comments received from Mr Nethononda herein will be forwarded to BCAdmin@environment.gov.za and yourself upon receipt thereof.

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	All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of **Mr Seoka Lekota.** Yours faithfully ---------- Well received and the correspondence has been noted,	All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr Seoka Lekota. All correspondence for these projects was sent to BCAdmin@environment.gov.za as well as to five other officials. Kind Regards,
11/07/2023 **13/07/2023** **EMAIL** **LINDOKUHLE VILAKATI** **PROTECTED AREAS PLANNING AND MANAGEMENT EFFECTIVENESS** **DFFE**	We transfer files uploaded. shnkosi@environment.gov.za lvilakati@dffe.gov.za smancotywa@environment.gov.za downloaded the links Good Day Hiadee, ---------- The Directorate: Protected Areas Planning and Management Effectiveness (PAPME), would like to thank you for the shared documents and invitation to review the proposed development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure located near Virginia town in the Free State Province. After conducting the review of the availed documents, we have noted that the proposed developments of solar power plants (Quagga and Virginia solar park) does not take place within any kind of protected area recognized in terms of Section 9 of the National Environmental Management: Protected Areas Act (NEMPAA), Act No. 57 of 2003. It has been noted that the Quagga and Virginia solar park proposed developments affect the National Protected Areas Expansion Strategy (NPAES), and encroach into the L.M Safaris Nature Reserve 5 Km buffer.	11/07/2023 Email AGES Limpopo Dear Mr Thivhulawi Nethononda, Mr Seoka Lekota from DFFE Biodiversity has requested that we obtain comments from Protected Areas Planning and Management Effectiveness, as the proposed solar parks and connection lines overlap with the Priority Focus Areas, as per the National Protected Areas Expansion Strategy (NPAES) (Free State Highveld Grasslands). We apologise for the late request, as we were only now informed of your involvement in the process. Our previous emails were sent to Sydney Nkosi and Skumsa Mancotywa as per DFFEs website. I have sent you a WETRANSFER link to the Draft EIA Report as the entire report and annexures are too large to email. I have only attached this DEIAR in this email. It would be greatly appreciated if you could provide us with comments. Kind regards ---------- 02/08/2023 Email AGES Limpopo Dear Lindokuhle Vilakati

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	The NPAES focus areas for land-based protected area expansion are large, intact, and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation of linkages, corridors as well the expansion of protected areas. Focus areas present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and ecosystem current protection levels as well as threat status indicated in the National Biodiversity Assessment Reports. The project does not affect any of the three (3) adjacent nature reserves however, the 5 Km buffer of the L.M Safaris Nature Reserve which is also an NPAES focus areas is affected. This area is strategically positioned as a future corridor or linkage in between the PAs. Therefore the EAP is encouraged to take note of such and also take note that the ecosystem affected is the Central Free State Grassland ecosystem type which is currently classified as (PP) poorly protected by the NPAES 2018. The Directorate does not have any objections to the development, however development within NPAES focus areas and protected area buffers is not supported. Kind Regards,	Apologies for the late response. I see that we responded on Virginia 4 SP comments, but not on Quagga SP. Here it is as attached. Kind regards From: Dr BJ Henning (Pr.Sci.Nat.) Director / Senior Environmental Scientist For attention: Mr Lindokuhle Vilakati **RESPONSE TO COMMENTS RECEIVED VIA THE DIRECTORATE: PROTECTED AREAS PLANNING AND MANAGEMENT EFFECTIVENESS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED PHOTOVOLTAIC QUAGGA SOLAR PARK ON THE FARMS QUAGGAFONTEIN 3 AND DELAPORTE 887, WINBURG RD, AND CONNECTING 132kV POWERLINE, MATJHABENG LOCAL MUNICIPALITY, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE** Your comments dated 13 July 2023 are appreciated and in response to these comments, the specialist would like to add additional information that needs to be reconsidered by the Directorate: Protected Areas Planning and Management Effectiveness. This is with specific reference to the following comment by the aforementioned directorate: "*The Directorate does not have any objections to the development, however encroachment into the NPAES focus areas is not supported."* The biodiversity specialist acknowledges the area for the proposed Quagga Solar Park lies within a NPAES and the buffer zone of the L.M Safaris Nature Reserve – see map below. The preferred position of Quagga Solar Park (QSP) was influenced by the cattle grazing camps in the footprint area and the fact that drainage lines and ridges must be avoided. The footprint of QSP was also positioned so that the Merriespruit, with a sufficient buffer area, will form a natural border of the 5 km buffer from LM Safari's Nature Reserve 4.3 km from the QSP.

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		The biodiversity study specifically identified corridors for the protection of biodiversity as emphasised in the Terrestrial Biodiversity Impact Assessment Report and include corridors for Merriespruit east of the QSP, the drainage channel with buffers within the study area of QSP and the hills west of the QSP. An approximate 1 km area will be left open as corridor between Virginia 4 SP and QSP. Corridors and linkages of areas with similar habitat are present in the local district where several solar power plants are planned. An important mitigation measure is to leave corridors with indigenous vegetation, natural wetlands/water course and sensitive habitats in between solar plants and their associated infrastructure. This was implemented during the Site Sensitivity Verification (SSV) Process to ensure the lowest potential impact on the terrestrial biodiversity of the area. **After the SSV, the layout plan of the Quagga Solar Park was specifically amended to avoid the network of linked corridors (Rocky ridges, watercourses and wetlands) to ensure that steppingstone corridors are conserved in the larger landscape, thereby ensuring the protection of local biodiversity. This was highlighted in the terrestrial biodiversity specialist report compiled for the Quagga Solar Park.** Because of the nature of solar plants allowing regrowth of the herbaceous component beneath the solar panels, and few or no emissions and pollutants into air when operational, cumulative impacts to the environment are limited, if compared for example to emissions from fossil fuel burning. Ultimately, solar power plants could reprieve the pressures to use fossil fuels that are associated with numerous cumulative impacts and habitat losses. It can therefore be concluded that the development of the Quagga Solar Park appears to be more ideal on a national scale because functional biodiversity corridors will remain. The Solar Park will contribute to power generation in South Africa, without having significant impacts on the terrestrial or aquatic biodiversity of the larger Virginia area. This was considered and implemented for the Quagga Solar Park and surrounding solar plants planned in the area.

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		Please do not hesitate to contact me if you have any comments or queries in this regard. Yours truly,
14/07/2033 **EMAIL** **BOITUMELO MELATO** **DWS** **LETTER** **DR T NTILI** **PROVINCIAL HEAD:** **FREE STATE**	Good day Hiadee, Hope this mail finds you well. Kindly find attached the comments for your further attention. Regards, Dear Sir/Madam **PROPOSED QUAGGA SOLAR PARK ON THE FARMS QUAGGAFONTEIN 3 AND THE DELAPORTE 887, WINBURG RD, AND CONNECTING 132kV POWERLINE, MATJHABENG LOCAL MUNICIPALITY, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE** **REFERENCE NUMBER: 14/12/16/3/3//2/2299** **Applicant: Indus Energy (Pty) Ltd** Reference is hereby made to the document submitted to this Department dated June 2023 for the above-mentioned project as presented to this Department by AGES Limpopo (Pty) Ltd. This office has evaluated the Draft Environmental Impact Assessment Report and the comments dated 06 March 2023 that were sent to your office still applies. It is also noted in your response dated 16 March 2023 that a Water Use Licence Application will be applied for in terms of Section 21 of the National Water Act once the project has been awarded the Preferred Bidder Status and confirmation has been received that the project will proceed. It must be emphasized that the identification of the water uses associated with the project is the responsibility of the applicant, and all the water uses must be applied for prior commencement of the project. All the commitments stipulated in the various parts of this report must be adhered to and any deviations must be reported to this Department.	

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	You are welcome to contact Ms B Melato at telephone: 051 405 9000 or on e-mail: melatob@dws.gov.za should you have any enquiries. Yours sincerely,	
17/07/2023 **EMAIL** **LETTER: MR SABELO MALAZA** **CHIEF DIRECTOR: INTEGRATED ENVIRONMENTAL AUTHORISATIONS DEPARTMENT OF FORESTRY, FISHERIES AND THE ENVIRONMENT** **SIGNED BY: MR COENRAD AGENBACH** **DESIGNATION: DEPUTY DIRECTOR: PRIORITISED INFRASTRUCTURE PROJECTS**	Dear Mr Von Well **COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED DEVELOPMENT OF THE 240MW QUAGGA SOLAR PARK NEAR THE TOWN OF VIRGINIA WITHIN THE MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES IN THE FREE STATE PROVINCE** The Application for Environmental Authorisation and the draft Environmental Impact Assessment Report (EIAr) received by the Department on 03 February 2023 and 15 June 2023, respectively, refer. This letter serves to inform you that the following information must be included in the final EIAr: **(a) Specific comments** (i) The co-ordinates in the EIAr must be specific to each activity and infrastructure that is proposed on the site. The co-ordinates for each corner of the solar field, the substation, BESS, power line route, and laydown areas must be included in the EIAr, i.e., we require that you provide us with the specific development footprints for each development parameter, and not an area outlining the entire site. (ii) Please provide a concise, but complete, summary and bullet list of the project description and associated infrastructure (or project scope) to be included in the decision (or as it should appear in the decision), should a positive Environmental Authorisation be granted. This must include a list of all development components and associated infrastructure.	08/08/2023 Email AGES Limpopo Mr Sabelo Malaza c/o Mr Coenrad Agenbach Your comments on the DEIAR dated 17 July 2023 refers. (a) Specific comments (i) The coordinates for each corner of the PV plant footprint, each corner of the solar field, the on-site substation, construction camp and laydown areas that will become the BESS and connecting power line route, are included in the final EIAr in tables 3 – 7 and 14. (ii) The summary required is included in Section 5.4 of the FEIAr.

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	(iii) Please provide a detailed description as well as any associated assessments related to the technology required for the Battery Energy Storage System (BESS).	(iii) See Section 5.4.3, 9.1.2 and 9.6 of the FEIAr.
	(iv) The EIAr must clearly provide a detailed section which addresses the site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed, as well as the site sensitivity verification and minimum report content requirements for all specialist assessments undertaken, which was included in the screening tool report. Kindly take note that this should be in the form of a report and should either confirm or dispute the sensitivity ratings for each theme identified by the screening tool report. Please refer to 1. Site sensitivity verification and minimum report content requirements of the Protocol document.	(iv) All assessments required by the screening tool report were conducted as indicated in Table 19 in the final EIAr. A Site Sensitivity Verification Report was compiled and is included as Annexure Q.
	(v) You are further reminded that the final EIAr to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of the EIAr in accordance with Appendix 3 of the EIA Regulations, 2014 as amended.	(v) The attached final EIAr complies with all requirements as listed in Appendix 3 of the EIA Regulations, 2017.
	(b) Listed Activities	(b) Listed Activities
	i Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development must be applied for and assessed.	(i) The activity description in Table 9 of the attached final EIAr link each activity applied for to the specific activity/ies that will be undertaken.

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	ii If the activities applied for in the application form differ from those mentioned in the final EIAr, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.dffe.gov.za/documents/forms.	(ii) Care have been taken that the activities in the final EIAr are the same as in the amended application form submitted with the draft EIAr.
	iii It is imperative that the relevant authorities are continuously involved throughout the environmental impact assessment process as the development property possibly falls within geographically designated areas in terms of numerous GN R. 985 Activities. Written comments must be obtained from the relevant authorities and submitted to this Department. In addition, a graphical representation of the proposed development within the respective geographical areas must be provided.	(iii) All relevant authorities have been involved since the beginning of the EIA process. Proof is included in the CRR report attached as Annexure C. Graphical representation of the proposed development within the respective geographical areas are attached in Annexure A.2 "Development Geographical Areas".
	(c) Public Participation Process	(c) Public Participation Process
	i The final EIAr must comply with all the conditions of the acceptance of the SR signed on 14 April 2023 and must address all comments contained in the final SR, the draft EIAr and this letter.	(i) The FEIAr complies with all the conditions of the acceptance of the SR and address all comments contained in the final SR, the draft EIAr and your comments letter dated 17 July 2023.
	ii The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations, 2014, as amended.	(ii) The Public Participation Process was conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations 2014, as amended. Proof of this is included in Annexure C of the final EIAr.
	iii Please ensure that comments from all relevant stakeholders are submitted to the Department with the final EIAr. This includes but is not limited to the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs, the Matjhabeng and Masilonyana Local Municipalities, the Department of Water and Sanitation (DWS), the provincial Department of Agriculture, the South African Heritage Resources Agency (SAHRA), the Endangered Wildlife Trust (EWT), BirdLife SA, the Department of Mineral Resources, the Department of Rural Development and Land	(iii) All comments and responses are included in Section 9.3 of the final EIAr and Annexure C.

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	Reform, the Department of Forestry, Fisheries and the Environment: Directorate Biodiversity and Conservation, and the Directorate Protected Areas.	
	iv Please ensure that all issues raised and comments received during the circulation of the draft SR and draft EIAr from registered Interested and Affected Parties (I&APs) and organs of state (including this Department's Biodiversity and Protected Area Sections), as listed in your I&APs Database, and others that have jurisdiction in respect of the proposed activity are adequately addressed and included in the final EIAr and are incorporated into a Comments and Response Report (CRR).	(iv) All issues raised, and comments received during the circulation of the DSR and DEIAr from registered I&APs and organs of state are included in the CRR (Annexure C). Proof that all relevant and competent authorities were provided opportunity to comment on the DSR and DEIAr is included in the CRR as appended to the FEIAr.
	v Copies of original comments received from I&APs and organs of state, which have jurisdiction in respect of the proposed activity are submitted to the Department with the final EIAr.	(v) Copies of original comments are included in the CRR (Annexure C).
	vi Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. In terms of Regulation 41(2)(b) of the EIA Regulations, 2014, as amended, please provide proof of written notice for the availability of the EIAr for comment.	(vi) Proof is included in the CRR report attached as Annexure C.
	vii The CRR report must be a separate document from the main report and the format must be in the table format as indicated in Annexure 1 of this comments letter.	(vii) The CRR is attached as Annexure C to the final EIAr and is in the table format of Annexure 1.
	viii Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	(viii) All comments have been copied verbatim and were responded to as indicated in the CRR.

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	ix Minutes and attendance registers (where applicable) of any physical/virtual meetings held by the Environmental Assessment Practitioner (EAP) with Interested and Affected Parties (I&APs) and other role players must be included in the final EIAr.	(ix) There was no need for physical/virtual meetings with I&Aps, hence no such meetings were held.
	(d) Layout & Sensitivity Maps	(d) Layout & Sensitivity Maps
	i. The final EIAr must provide coordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	(i) Coordinate points are provided in tables 3 – 7 and 14 of the final EIAr.
	ii. The EIAr must provide a copy of the final preferred layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following:	(ii) Layout maps and technical drawings are provided in Annexures A.1 and A.2.
	iii. Please provide an environmental sensitivity map which indicates the following:	(iii) Sensitivity maps are included in the different specialist reports as well as in Annexures A.1 and A.2.
	iv. The above layout map must be superimposed (overlain) with the sensitivity map and a cumulative map which shows neighbouring and existing infrastructure.	(iv) Layout maps overlain with sensitivity maps for the solar park and power line, indicating buffer areas are provided in Annexures A.1 and A.2.
	v. Google maps will not be accepted.	(v) Google maps are used as a base and when working on the maps but are not included in Annexures A.
	a) A clear indication of the envisioned area for the proposed solar field; b) Internal roads; c) All supporting onsite infrastructure such as laydown area, guard house and control room etc.;	

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	d) Battery Energy Storage System; e) Substations, transformers, switching stations and inverters; f) Power line route (including pylon positions) to the distribution/transmission network; g) All existing infrastructure on the site, especially railway lines and roads; and h) Buildings, including accommodation. a) The location of sensitive environmental features identified on site, e.g. CBAs, protected areas, heritage sites, wetlands, drainage lines, nesting and roosting sites etc. that will be affected by the facility and its associated infrastructure; b) Buffer areas; and c) All "no-go" areas. **(e) Cumulative Assessment** i Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: a) Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. b) Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. c) The cumulative impacts significance rating must also inform the need and desirability of the proposed development.	(e) Cumulative Assessment (i) (a) Cumulative assessments are defined in the different specialist reports. The significance of cumulative impacts is assessed and rated in the various tables in Section 10.2 of the final EIAr. b) The process followed to determine the cumulative impacts is described in Section 9.9 of the final EIAr. The cumulative impacts rating by the specialists are summarised in Section 9 under the various environmental themes. The significance of these ratings has been determined in the cumulative impacts row of the impact rating tables in Section 10.2 of the final EIAr. c) All the cumulative impacts have been rated between low-medium and medium without mitigation measures. As such, the envisioned impacts are within the limits of acceptable change and the proposed development in its preferred location is supported. It is the opinion of the EAP that the positive impact from this proposed development outweighs its negative impacts, provided all mitigation measures as stipulated by the respective specialists are implement and monitored for the lifespan of the proposed development.

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	d) A cumulative impact environmental statement on whether the proposed development must proceed.	d).No fatal flaws were identified by any specialist regarding the possible cumulative impacts of the proposed solar park and power line and all cumulative impacts can be mitigated to low, medium-low and medium impacts – section 10.2.
	(f) Specialist Declaration of Interest	(f) Specialist Declaration of Interest
	i Specialist Declaration of Interest forms must be attached to the final EIAr. You are therefore requested to submit original signed Specialist Declaration of Interest forms for each specialist study conducted. The forms are available on Department's website (please use the Department's template).	(i) Specialist declarations are attached as Annexure U to the final EIAr.
	ii It is further brought to your attention that 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, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species), have come into effect. **Please note that specialist assessments must be conducted in accordance with these protocols.**	(ii) All specialist assessments were conducted in accordance with "the Protocols".
	(g) Undertaking of an Oath	(g)
	i. Please note that the final EIAr must have an undertaking under oath/ affirmation by the EAP.	(i) Oath signed in Section 18 of the final EIAr.
	(ii) Based on the above, you are therefore required to include an undertaking under oath or affirmation by the EAP (administered by a Commissioner of Oaths) as per Appendix 3 of the NEMA EIA Regulations, 2014, as amended, which states that the EIAr must include:	(ii) The details of the EAP, declaration of interest and undertaking under oath is attached as Annexure V of the final EIAr.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	"an undertaking under oath or affirmation by the EAP in relation to: *a) the correctness of the information provided in the reports;* *b) the inclusion of comments and inputs from stakeholders and I&APs;* *c) the inclusion of inputs and recommendations from the specialist reports where relevant; and* *d) 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".* **(h) Details and Expertise of the EAP** i You are required to include the details and expertise of the EAP in the EIAr, including a curriculum vitae, in order to comply with the requirements of Appendix 3 of the NEMA EIA Regulations, 2014, as amended. **(i) Environmental Management Programme** i The EMPr must also include the following: a) All recommendations and mitigation measures recorded in the EIAr and the specialist studies conducted. b) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process. c) Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants. ii In addition to the above, the EMPr must comply with Appendix 4 of the EIA Regulations, 2014, as amended. iii It is drawn to your attention that for substation and overhead electricity transmission and distribution infrastructure, when such facilities trigger activity 11 or 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and any other listed and specified activities necessary for the realisation of such facilities, the generic	(h) Details and Expertise of the EAP (i) Expertise and qualifications are included in the condensed Curriculum Vitae attached as Annexure T to the final EIAr. (i) Environmental Management Programme (i) a) All recommendations and mitigation measures listed in the EIAr and specialist studies have been included in the tables in Section 7 of the EMPr. b) Maps are included in the figures of the EMPr. c) Measures are included in the tables of Section 7 under the Ground- and Surface Water Pollution and Ecology sections. (ii) The EMPr complies with Appendix 4 of the EIA Regulations, 2014, as amended. (iii) Generic EMPr's for the powerline and on-site substation are attached as Annexures R.2 and R.3 to the final EIAr.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	Environmental Management Programme, contemplated in the Regulations must be used and submitted with the final report over and above the EMPr for the facility. **(j) General** The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample of the minimum information required is listed under Annexure 2 of the EIA information required for solar energy facility as requested in the acceptance of the SR. Please also ensure that the final EIAr includes the period for which the Environmental Authorisation is required and the date on which the activity will be concluded as per Appendix 3 of the NEMA EIA Regulations, 2014, as amended. You are further reminded to comply with Regulation 23(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that: *"The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority -* *(a) an environmental impact assessment report inclusive of any specialist reports, an EMPr, a closure plan in the case of a closure activity and where the application is a mining application, the plans, report and calculations contemplated in the Financial Provisioning Regulations, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority."* Should there be significant changes or new information that has been added to the EIAr or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 23(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: *"The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority – (b) a*	(j) General Technical details are listed in Table 10 of final EIAr. Periods specified in Section 17 of the final EIAr.

DATE OF COMMENT, FORMAT, NAME OF I&AP	COMMENT	RESPONSE FROM EAP/ SPECIALIST / APPLICANT
	notification in writing that the documents contemplated in subregulation 1(a) will be submitted within 156 days of acceptance of the scoping report by the competent authority or where regulation 21(2) applies, within 156 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the documents, which changes or information was not contained in the original documents consulted on during the initial public participation process contemplated in subregulation (1)(a), and that the revised documents contemplated in subregulation 1(a) will be subjected to another public participation process of at least 30 days". Should you fail to meet any of the timeframes stipulated in Regulation 23 of the NEMA EIA Regulations, 2014, as amended, your application will lapse. You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department. Yours sincerely	The applicant has been informed that no activity may commence prior to an Environmental Authorisation being granted by the Department. I trust you find our response to the comments above in order.

9.4 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROPOSED PV SOLAR PARK

The receiving environment has been described using a combination of specialist inputs, on-site observations, a review of existing literature and utilizing Geographic Information Systems (GIS) planning tools.

9.4.1 PROPERTY DESCRIPTION AND CURRENT LAND USE

The project site is located ±20 km South-East of Virginia, ±22 km South-West of Ventersburg and 3.8 km east of the R73, within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province (Figure 1 & 2), on the Farms QUAGGAFONTEIN 3 and DELAPORTE 887, Winburg RD.

Table 16. Site location and Property details

Site location and Property details	
Farm	**Farm DELAPORTE 887, Winburg RD**
Portion	**Portion 0**
LPI code	F04200000000088700000
Overall Extent	589.508 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Diagram deed number	G00/1893
Title deed number	T624/2002
Registration date	20020118
Current land use	Grazing, game farming
Farm	**Farm QUAGGAFONTEIN 3, Winburg RD**
Portion	**Portion 0**
LPI code	F04200000000000300000
Overall Extent	467.6665 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Diagram deed number	T17413/1876
Title deed number	T624/2002
Registration date	20020118
Current land use	Grazing, game farming

The connecting power line will traverse the following farms located within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province:

Table 17. Properties crossed by the proposed powerline alignment

Quagga 132 kV Powerline: Properties crossed by the proposed powerline corridor	
Farm	**Quaggafontein 3, Winburg RD** (project site)
Portion	**Portion 0**
LPI code	F04200000000000300000
Overall Extent	467.6665 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Title deed number	T624/2002
Current land use	Grazing, game farming
Farm	**Blomskraal 216, Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000021600000
Overall Extent	4246.0575 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Title deed number	T622/2002
Current land use	Grazing, game farming
Farm	**De Dam 27, Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000002700000
Overall Extent	185.0980 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Title deed number	T624/2002
Current land use	Grazing, game farming
Farm	**Tevrede 361, Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000036100000
Overall Extent	417.4780 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Title deed number	T624/2002
Current land use	Grazing, game farming
Farm	**Biddulph 329, Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000032900000
Overall Extent	598.7216 hectares
Landowner	Forum SA Trading 124 (Pty) Ltd
Title deed number	T624/2002
Current land use	Grazing, game farming
Farm	**Le Roux 766, Ventersburg RD**
Portion	**Remaining Extent**
LPI code	F03500000000076600000
Overall Extent	451.3239 hectares
Landowner	PIENAAR ANDRIES BENJAMIN
Title deed number	T16446/2011
Current land use	Grazing, game farming
Farm	**Florida 633, Ventersburg RD**
Portion	**Portion 1**
LPI code	F03500000000063300001
Overall Extent	709.5842 hectares
Landowner	PIENAAR ANDRIES BENJAMIN
Title deed number	T11996/1979
Current land use	Grazing, game farming
Farm	**Florida 633, Ventersburg RD**
Portion	**Portion 4**
LPI code	F03500000000063300004
Overall Extent	579.3031 hectares
Landowner	PIENAAR GERTRUIDA THEODORA
Title deed number	T8154/2021
Current land use	Grazing, game farming

Table 18. Properties crossed by the proposed access road (5.1 km) from R73

Properties crossed by the proposed access road from the regional road R73	
Farm Portion LPI code Overall Extent Landowner Title deed number Current land use	**Palmiet Fontein 229, Winburg RD** **Remaining Extent** F04200000000022900000 1761.4393 hectares Forum SA Trading 124 (Pty) Ltd T622/2002 Grazing, game farming
Farm Portion LPI code Overall Extent Landowner Title deed number Current land use	**Blomskraal 216, Ventersburg RD** **Portion 0** F03500000000021600000 4246.0575 hectares Forum SA Trading 124 (Pty) Ltd T622/2002 Grazing, game farming
Farm Portion LPI code Overall Extent Landowner Title deed number Current land use	**Quaggafontein 3, Winburg RD** (project site) **Portion 0** F04200000000000300000 467.6665 hectares Forum SA Trading 124 (Pty) Ltd T624/2002 Grazing, game farming

9.4.2 ENVIRONMENTAL FEATURES

Environmental Screening Report

Table 19 Environmental Screening Tool Table for Solar Park and powerline

Theme	Very High	High	Medium	Low	Specialist Studies Conducted	Motivation for no Specialist Studies
	X – Solar Park		X – Power line			
Agriculture	X		X		X	
Animal species			X X		X	
Aquatic biodiversity	X X				X	
Archaeological and Cultural Heritage				X X	X	
Avian				X	X	
Civil Aviation		X		X	X	An application will be submitted to the CAA.
Defence				X X		SSV not required by NST
Landscape	X				X	
Palaeontology	X X				X	
Plant species				X X	X	
RFI				X	X	
Terrestrial Biodiversity	X X				X	

The following environmental sensitivities are identified for the project area:

- **Agriculture Theme**
  Sensitivity - High land capability
  Agricultural agro-ecosystem impact assessment (Annexure G) concluded that the site should be classified as marginally suitable for arable agriculture due to its physical characteristics. Although the soil texture and depth are suitable for arable agriculture, the climatic conditions (annual rainfall 560mm) render the soils marginal for arable agriculture. The site is moderate potential grazing land, but re-growth of grass under the panels will provide for grazing by small livestock such as game and sheep.
- **Animal species Theme**
  Sensitivity - Medium
  A sensitivity analyses was conducted, and no red data fauna were found. Suitable habitat of spotted necked otter will be excluded from the development - Annexure D.
- **Aquatic Biodiversity Theme**
  Sensitivity - Very High
  An impact assessment was conducted for the wetlands and riparian zones on site in addition to the mitigation measures recommended to ensure the protection of the riverine ecosystems close to the development area. Specific mitigation measures like buffer areas, etc. need to be implemented in the areas surrounding the riparian zones and water courses to prevent any negative impacts other than the impacts that will be caused during the development – Annexure F.
- **Avian Species Theme**
  Sensitivity - Low
  The avifaunal assessment conducted (Annexure E) concluded that very few sensitive features were identified for the project mainly along the proposed power line.
- **Civil Aviation Theme**
  Sensitivity - Low for Solar Park and High for Power Line (Between 8 and 15 km of other civil aviation aerodrome)
  Evidence from the assessment and the technical drawings show clearly that the Quagga SP Project will not interfere or impact the Obstacle Limit Surfaces and the Approach/Departure Surfaces of Harmony Mine and Beatrix Mine airports – Annexure N. An application for approval will be submitted to the Civil Aviation Authority.
- **Defence Theme**
  Sensitivity - Low
- **Paleontological Theme**
  Sensitivity - High
  According to the Palaeontological Report conducted in 2021 (Annexure I), there are no possible sites within the Solar Park footprint area.
- **Heritage Theme**
  Sensitivity – Low
  The findings from the Archaeological Impact Assessment indicate a possible Iron Age Farmers site, remains of a large Historical Period settlement and cemetery, however the proposed development will have little to negligible negative cumulative impact on the heritage value of the area, provided mitigation measures as proposed, are implemented.

- **Plant Species Theme**
  Sensitivity - Low
  The botanist concluded that the development can be supported provided that the mitigation measures and sensitivity map are implemented – Annexure D.
- **RFI Theme**
  Sensitivity - Low
  Radio Frequency Assessment minimum report attached as Annexure L.
- **Terrestrial Biodiversity Theme**
  Sensitivity - Very High
  Most of the proposed powerline development footprints represent Degraded Areas and Other natural Areas, while the access roads and part of the powerline represents ESA1 and ESA2. The solar plant footprint area represents CBA2. The management objective for this area is to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern (see Annexure D).

9.4.3 WIND AND SOLAR DEVELOPMENTS WITH ENVIRONMENTAL AUTHORISATION OR APPLICATIONS UNDER CONSIDERATION WITHIN 30 KM OF THE PROPOSED AREA

The following wind and solar projects, proposed within 30km from the project site, received and/or applied for Environmental Authorisation according to the DFFE database:

Table 20. List of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of Application	Distance from proposed area (km)
1	12/12/20/2666/A	Solar PV	Approved	18
2	12/12/20/2669	Solar PV	Approved	23
3	12/12/20/2668	Solar PV	Approved	19
4	14/12/16/3/3/1/1322	Solar PV	Approved	19
5	12/12/20/2669/A	Solar PV	Approved	23
6	12/12/20/2666	Solar PV	Approved	19
7	12/12/20/2667	Solar PV	Approved	19
8	14/12/16/3/3/2/2099	Solar PV Virginia 1 SP	Approved **AWARDED IN ROUND 6 OF REIPPPP**	3.3
9	14/12/16/3/3/2/2100	Solar PV Virginia 2 SP	Approved **AWARDED IN ROUND 6 OF REIPPPP**	2.5
10	14/12/16/3/3/2/2101	Solar PV Virginia 3 SP	Approved **AWARDED IN ROUND 6 OF REIPPPP**	4.2
11	14/12/16/3/3/2/2283	Solar PV Virginia 4 SP	In process	0.75
12	14/12/16/3/3/2/2297	Solar PV Corona SP	In process	3.7
13	14/12/16/3/3/2/2322	Solar PV Florida SP	In process	7.4

No	EIA Reference No	Project Name	Project Capacity [MW]	Date of application
1	12/12/20/2669	Proposed Construction of PV Solar Facility and Associated Infrastructure on Portion 225 of Farm Kalkoenkrans, Beatrix Mine Shaft 4, Oryx Mine in Virginia, Free-State Province	20	2012/08/14
2	12/12/20/2666/A	Construction of the 19.9MW PV Facility for the Generation of Electricity on Portion of Farm Palmietkuil 328, Beatrix Mine Shaft 4, Oryx Mine in Virginia, Free State Province.	19.9	2013/08/12
3	12/12/20/2668	Proposed development and implementation of solar panels (solar photovoltaic project 221) for electricity generation on portion of the farm Leeubult 52 Beatrix Mine Shaft 2, Virginia, Free State	19.9	2012/08/14
4	14/12/16/3/3/1/1322	Proposed construction of Hennenman 5 mw Solar Energy Facility, near Hennenman, Free State	5	2014/11/07
5	12/12/20/2666	Proposed development and implementation of solar panels (solar photovoltaic project 221) for electricity generation on portion of the farm Leeubult 52 Beatrix Mine Shaft 2, Virginia	19.9	2012/08/14
6	12/12/20/2667	Proposed development and implementation of solar panels (solar photovoltaic project 221) for electricity generation on portion of the farm Leeubult 52 Beatrix Mine Shaft 2, Virginia	19.9	2012/08/14
7	12/12/20/2668	Proposed development and implementation of solar panels (solar photovoltaic project 221) for electricity generation on portion of the farm Leeubult 52 Beatrix Mine Shaft 2, Virginia	19.9	2012/08/14
8	**14/12/16/3/3/2/2099**	**Renewable Energy Generation Project on the Farm Blomskraal 216, Ventersburg Rd, located in the Matjhabeng Local Municipality (Virginia 1 Solar Park) AWARDED IN ROUND 6 OF REIPPPP**	**100**	**2022/02/01**
9	**14/12/16/3/3/2/2100**	**Renewable Energy Generation Project on the Farm Blomskraal 216, Ventersburg Rd, located in the Matjhabeng Local Municipality (Virginia 2 Solar Park) AWARDED IN ROUND 6 OF REIPPPP**	**100**	**2022/02/01**
10	**14/12/16/3/3/2/2101**	**Renewable Energy Generation Project on the Farm Blomskraal 216, Ventersburg RD, located in the Matjhabeng Local Municipality (Virginia 3 Solar Park) AWARDED IN ROUND 6 OF REIPPPP**	**100**	**2022/02/01**
11	14/12/16/3/3/2/2283	Virginia 4 Solar Park on Farm Blomskraal 216, Ventersburg RD, located in the Matjhabeng Local Municipality	240	DEIA submitted
12	14/12/16/3/3/2/2297	Corona Solar Park on Farms Tevrede 361, Biddulph 329 and De Dam 27, Ventersburg RD, located in the Matjhabeng Local Municipality	210	DEIA submitted
13	14/12/16/3/3/2/2322	Florida Solar Park on Portions 1 and 4 of the Farm FLORIDA 633, Remainder of the Farm LE ROUX 766 and Remainder of the Farm KRIEGERS KRAAL 708, Ventersburg RD, located in the Matjhabeng Local Municipality	170	F. Scoping approved

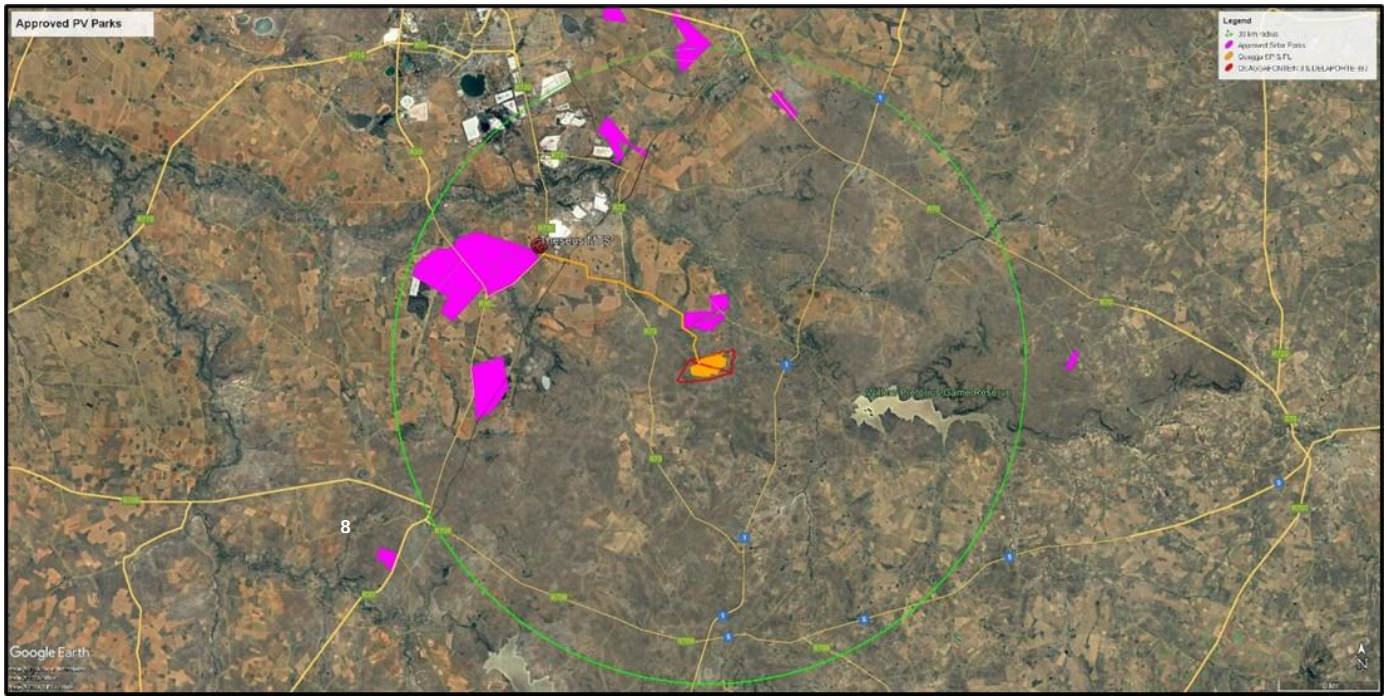

Figure 10. Map of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

During the last Round 6 of the REIPP Procurement Programme, **240 MW** was already allocated to the Virginia 1, 2 and 3 Solar Parks, **located on the same property** (Farm Blomskraal 216, Ventersburg RD of 4246.0575 ha) **of the Virginia 4 Solar Park.**

The construction phase of the Virginia 1, 2 and 3 projects, with a footprint of approximately **480 ha**, is planned to commence at the beginning of 2024.

With reference to the other projects listed in the tables above, it should be noted that **none of these applied for, have been constructed to date**. A number of these applications have lapsed or have been withdrawn. No additional information could be readily obtained regarding these solar projects.
With reference to the wind and solar projects currently under development in the proximity of the proposed Quagga Solar Park, the following solar PV projects / EIA processes are on-going:

Table 21. List of Solar developments with on-going EIA process under consideration within 30 km of proposed area

No	EIA Reference No	Project name (project capacity) and applicant	Status of Application	Distance from the proposed area
1	14/12/16/3/3/2/2283	Virginia 4 Solar Park (240 MW) Indus Energy (Pty) Ltd	Final EIA submitted	0.75 km
2	14/12/16/3/3/2/2297	Corona Solar Park (240 MW) Corona Energy (Pty) Ltd	Final EIA submitted	3.7 km
3	14/12/16/3/3/2/2322	Florida Solar Park (170 MW) Piscis Energy (Pty) Ltd	Draft EIA submitted	7.4 km

Please refer to **Locality Map** and **Cumulative Map**, in Annexure A, showing the location of the Quagga Solar Park with respect to **Virginia 1, 2 and 3 Solar Parks** (construction planned in 2024) and **Virginia 4, Corona and Florida Solar Parks** (EIA application process ongoing).

9.4.4 CLIMATE

The climate for the region can be described as warm-temperate. In terrestrial environments, limitations related to water availability are always important to plants and plant communities. The study area is situated within the summer and autumn rainfall region with very dry winters and frequent frost that occurs during the colder winter months.

Mean annual precipitation for the region is around 560mm. The mean annual temperature for the area is 15.2°C, and the mean annual frost days is 43 days. Mean Annual Potential Evaporation is 2 226mm, with Mean Annual Soil Moisture Stress of 78%.

9.4.5 TOPOGRAPHY AND DRAINAGE

The site is located within the C42K, C42G and C42H quaternary catchments and lies completely within the Middle Vaal Water Management Area (WMA) and entirely within the Highveld ecoregion (Kleynhans et al., 2005).

The topography is characterised by slightly undulating plains with wetlands and / or drainage channels bisecting the area. Drainage occurs as sheet-wash into the drainage channels on site which eventually drains into the major river namely the *Merriespruit* west of the site.

The topography of the site can be described as generally favourable, considering that most of the area consists of slopes of less than 1:5. The site is located at an altitude of between 900 and 940 meters above mean sea level (AMSL).

9.4.6 SOILS AND GEOLOGY

Geology is directly related to soil types and plant communities that may occur in a specific area (Van Rooyen & Theron, 1996). A Land type unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine potential agricultural value of soils in an area. Land type unit represented in the study area include Bd 20, Dc12 and Dc8 land types (Land Type Survey Staff, 1987) (ENPAT, 2001). Land type, geology and associated soil types is presented in Figure 11 and Table 22 below as classified by Environmental Potential Atlas, South Africa (ENPAT, 2000).

Table 22. Land types, geology, and dominant soil types of the proposed development site

Landtype	Soils	Geology
Bd20	Plinthic catena: eutrophic; red soils not widespread upland duplex and margalitic soils rare	Shale, mudstone and sandstone of the Ecca and Beaufort Group. Aeolian and possibly colluvial sand overlies the rocks.
Dc8	Prismacutanic and/or pedocutanic diagnostic horizons dominant. In addition, one or more of: vertic melanic red structured diagnostic horizons	Mudstone, shale, sandstone and grit of the Beaufort Group, Karoo Sequence with dolerite sills
Dc12	Prismacutanic and/or pedocutanic diagnostic horizons dominant. In addition,	Mudstone, shale, sandstone and grit of the Beaufort Group, Karoo Sequence, with dolerite sills in places.

Landtype	Soils	Geology
	one or more of: vertic, melanic, red structured diagnostic horizons	

Soils associated with the site vary between very sandy on the plateaus and higher lying areas, to dark clayey soils in the low-lying plains and bottomlands.

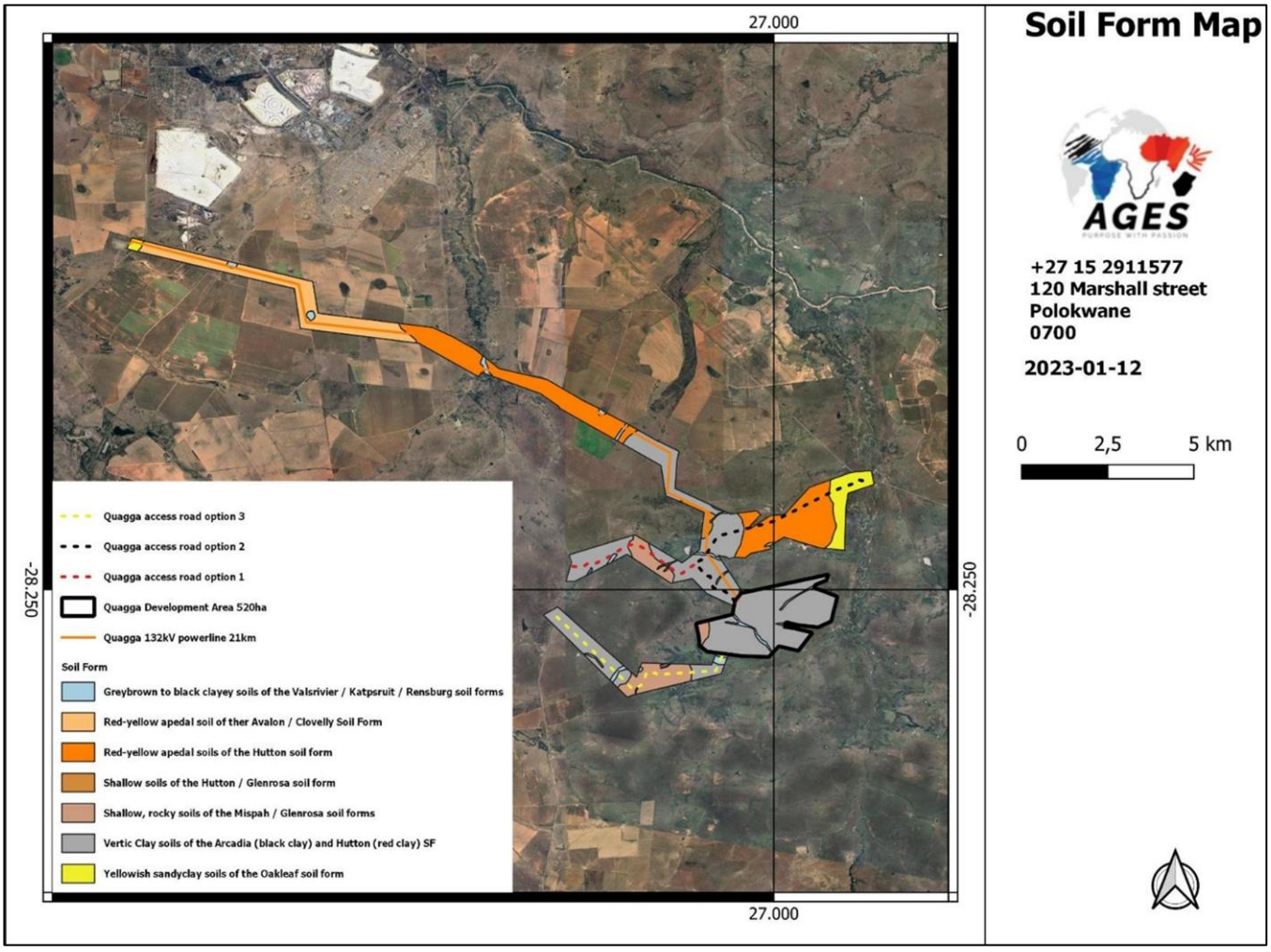

Figure 11. Soil Form Map

9.4.7 GEOTECHNICAL REPORT

A Geotechnical and Geohydrological Desktop Assessment Report is included in Annexure O. The area is defined as developable with minor precautions due to the relative thin soil profile and the use of specialized foundations for the single axis tracker system. Developable with minor risk with respect to the proposed solar park development. Transported soil has a low to moderate collapse potential and the excavatability is soft to 1,2m, below that depth it is expected to be intermediate to hard. Rammed and or pre-bored rammed mini piles can be considered as practical solutions for the solar arrays. Reinforced strip footings are recommended for the conventional structures.

The following conclusions were made by the specialist:

- The site is underlain by recent aeolian sand calcrete, and Karoo sandstone deposits.
- No geosites have been identified on the site.

- Due to the climate shallow bedrock conditions is expected.
- Three soil profile are expected on site:
    - Profile 1 - Transported aeolian sand overlying weathered sandstone
    - Profile 2 – Calcretized deposits close to the drainage features
    - Profile 3 – Weathered Karoo sandstone
- The potential for collapse of side walls of deep excavations is low.
- No shallow groundwater conditions are expected.
- The calcareous soils present on the site may be useful as road construction material.
- Normal strip footing foundations recommended for buildings.
- Pre-bored rammed piles or pre-bored cast in situ piles are recommended for the single axis tracker systems planned.
- The geotechnical risk classification for the project area is F2 due to the shallow bedrock and excavatability risk for profiles 2 and 3. Profile 1 is potentially collapsible.
- Localized soil degradation and erosion is the only environmental impacts identified for the property.
- Considering geotechnical aspects, the proposed development area is suitable for the proposed development of a PV solar facility if these recommendations are adhered to as a minimum requirement.
- The availability of groundwater for the construction and operational phases of the project is a potential risk to the project. A geohydrological study to confirm whether sufficient water for the construction and operational phases of the project must be undertaken, if the project is approved.
- Considering geotechnical aspects, the proposed development area is suitable for the proposed development of a PV solar facility if these recommendations are adhered to as a minimum requirement.

The following mitigation measures are included in the Environmental Management Program (EMPr):

- Construction activities should be kept to restricted areas and activities should be kept to a minimum where possible.
- Excavation activities should be monitored to prevent over excavation and to ensure the correct placement of soil in controlled stockpiles.
- Rehabilitation of disturbed areas should be undertaken as soon as possible.
- The wetting of soil and the discharge of construction greywater into unspoiled soil should be controlled.
- Erosion control barriers, such as silt traps, sandbags and geosynthetic barriers should be installed where necessary and properly maintained.
- Dedicated natural construction material handling and stockpile areas must be demarcated and adequate dust and erosion measures have to be taken.

LAND USE CLASSIFICATION

The land-use of the proposed development site is livestock, game and dryland maize cultivation. The surrounding areas are used for cattle, game and crop cultivation. The major

land use of the study area as classified by the Environmental Potential Atlas of South Africa (2000) is **vacant land**.

RECOMMENDATIONS

To follow on this desktop scoping study, it is recommended that the following be adopted for the construction phase, if the project is approved:

- A site visit is required to confirm the physical and geotechnical conditions on site. Trial pits should be excavated and profiled to bedrock on order to collect visual information and soil samples for testing to define the foundation conditions and the availability of construction materials.
- Dynamic cone penetrometer test is recommended to define the in-situ shear resistance of the soils and the depth to refusal.
- Geophysical surveys to define the soil resistivity at the proposed substation position and thermal resistivity along the cable routes are recommended.
- Assessment of the potential direct and indirect environmental impacts resulting from the geological and geotechnical conditions on site
- Prepare a specialist geotechnical report detailing the ground conditions possible foundation problems and solutions on site.
- A hydro census and target generation and drilling exercise should be conducted to determine whether sufficient groundwater is available on the property to support the proposed solar park development. Pump test will also be required to verify the yields of the boreholes identified for the construction and long-term water supply for the project.

9.4.8 ECOLOGY (FAUNA & FLORA)

A Terrestrial Biodiversity Impact Assessment (Annexure D) was conducted by AGES to describe the ecology (fauna and flora) present in the site, to assess its ecological sensitivity and to indicate the most suitable areas for the proposed development.

A pre-screening site visit was conducted to determine if the assessment was accurate and if the studies recommended should be conducted. After the site visit the following was concluded:

- The site has a HIGH Sensitivity from a terrestrial biodiversity perspective due to the presence of indigenous grassland with riparian floodplains and wetlands.
- The site has a Medium Sensitivity from an Animal Species Theme Perspective due to the presence of natural fauna habitats.
- The site has a Medium Sensitivity from a Plant Species Theme Perspective due to the presence of indigenous grassland.

After the assessment, it was concluded that a detailed terrestrial biodiversity, plant species theme and animal species theme assessment should be conducted.

For this purpose, detailed ecological (fauna habitat & flora) surveys were conducted during November 2022 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid.

9.4.8.1 Vegetation types

The most recent classification of the area by Mucina & Rutherford (2006) shows that the site is classified as Central Free State Grassland, Highveld Alluvial Vegetation and Vaal-Vet Sandy Grassland (Figure 13).

The landscape of Central Free State Grasslands is characterised by undulating plains supporting short grassland. Under natural conditions it is dominated by *Themeda triandra* but is dominated by *Eragrostis curvula* and *E. chloromelas* in disturbed habitats. Dwarf Karoo-shrubs establish in severely degraded clayey bottomlands and overgrazed and trampled low-lying areas are prone to *Vachellia karroo* encroachment. From a conservation point of view, this unit is described as Least Concern. Almost a quarter of the area of it being transformed for crop cultivation and building of large dams such as Allemanskraal, Erfenis, Groothoek, Koppies, Weltevrede and Kroonstad Dams. Small portions are conserved in Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves as well as in some private nature reserves.

The Vaal-Vet Sandy Grasslands vegetation unit is described as plains-dominated landscape with some scattered slightly irregular undulating plains and hills. Mainly low tussock grasslands with an abundant karroid element. Themeda triandra is dominant in this vegetation unit. This vegetation type is described as Endangered because approximately 63% of it has been transformed for commercial crop cultivation and grazing pressure from cattle and sheep. Only 0.3% of this vegetation type is statutorily conserved in Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves.

Highveld Alluvial Vegetation is distributed in Free State, Northwest, Mpumalanga and Gauteng Provinces, as well as in Lesotho and Swaziland where it occurs along alluvial drainage lines and floodplains along rivers embedded within the Grassland Biome. The vegetation within the Highveld Alluvial Vegetation is characterised by flat topography supporting riparian thickets mostly dominated by Vachellia karroo, accompanied by seasonally flooded grassland and disturbed herblands often dominated by alien plants. Highveld Alluvial Vegetation is classified as Least Threatened, with a conservation target of 31%. Only nearly 10% of the vegetation type is statutorily conserved in Barberspan (a Ramsar site), Faan Meintjie, Sandveld, Schoonspruit, Soetdoring and Wolwespruit Nature Reserves. More than a quarter has been transformed for cultivation and by building of dams (Bloemhof, Erfenis, Krugersdrif, Mockes and Vaalharts Dams). The Highveld alluvia are prone to invasion by a number of weeds, obviously encouraged by the high nutrient status of the soils and ample water supply. The undergrowth of the alluvial riparian thickets and the accompanying grasslands suffer from heavy overgrazing in many places (Mucina & Rutherford, 2006).

The proposed development site occurs on a landscape that varies from slightly undulating to flat plains bisected by drainage channels and wetlands. The importance to survey the area to have a better understanding of the ecosystem and the potential impact of the solar development on the natural environment was identified as a key factor, and subsequently the footprint areas was completely surveyed. The site forms part of larger farms used for livestock farming and maize cultivation. The vegetation units on the site vary according to soil characteristics, topography, and land-use. Vegetation units were identified on the footprint development sites and can be divided into 8 distinct vegetation units according to soil types and topography.

The vegetation communities identified on the proposed development site are classified as physiographic physiognomic units, where physiognomic refers to the outer appearance of the vegetation, and physiographic refers to the position of the plant communities in the landscape. The physiographic-physiognomic units will be referred to as vegetation units in the following sections. These vegetation units are divided in terms of the land-use, plant species composition, topographical and soil differences that had the most definitive influence on the vegetation units. Each unit is described in terms of its characteristics and detailed descriptions of vegetation units are included in the following section. A species list for the site is included in Appendix B, while a plant species list for the quarter degree grid square (QDS) is included in Appendix A. Photographs of each unit is included in the next section to illustrate the grass layer, woody structure, and substrate (soil, geology etc.). The following vegetation units were identified during the survey.

- *Themeda – triandra – Setaria incrassatae* clay grassland.
- *Themeda triandra – Aristida congesta* secondary grassland.
- Open *Vachellia karroo* woodland.
- *Vachellia karroo – Searsia lancea – Euclea crispa* footslopes.
- Rocky grassland and woodland associated with outcrops and ridges
- Degraded grassland.
- Cultivated land.
- Exotic bushclumps.
- Old slimes dams
- Drainage features:
    - Valleybottom wetlands
    - River channels:
        - Floodplains rivers.
        - Non-perennial channels.
    - Exorheic depressions (dams)
    - Endorheic depressions (pans)

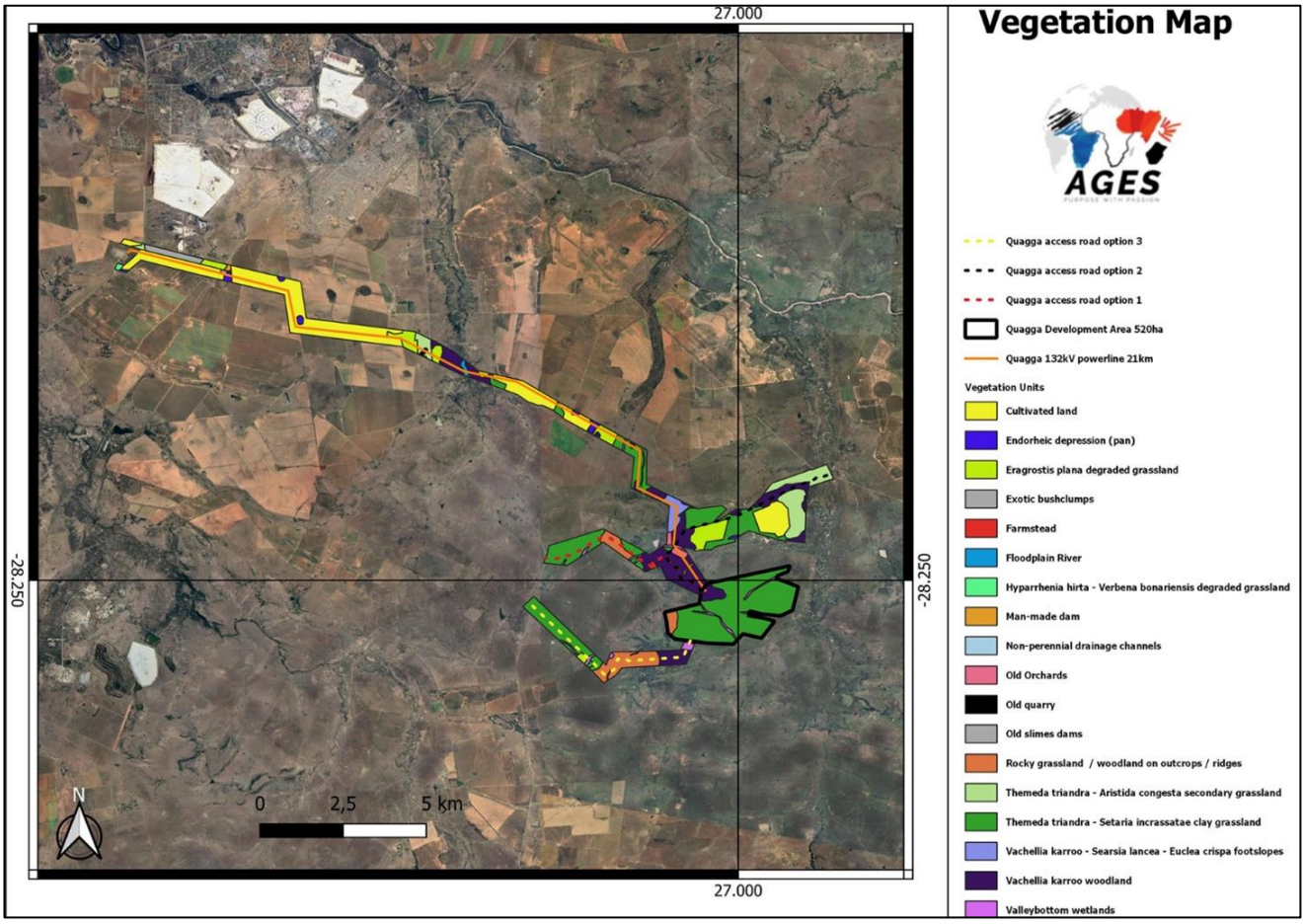

Figure 12. Vegetation Unit Map of the proposed development area (From Biodiversity report)

- ***Themeda triandra – Setaria incrassatae* clay grassland**

This grassland occurs throughout large sections of the project area. The grass layer is well developed and underlied by red apedal soils of the Hutton soil form and dark clayey soils of the Arcadia or Swartland Soil Forms. Grasses that dominate on the clayey soils are species such as *Setaria incrassatae* and *Themeda triandra*. The vegetation structure is tall, closed grassland. No red listed or protected species were documented in the area.

The following specific recommendations for the vegetation unit regarding the proposed development should be adhered to:

- The vegetation unit is classified as having a **medium sensitivity** due to the widespread status through the larger project area.
- The development of the solar development is considered suitable in this area.

- ***Themeda triandra – Aristida congesta* secondary grassland**

This vegetation unit occurs on red Hutton soils in the low-lying areas adjacent to the *Merriespruit*. The vegetation was probably overgrazed in the past that caused the soil to become eroded. The grass layer is in a secondary state of succession at present and dominated by species such as *Themeda triandra, Aristida congesta* and *Sporobolus africanus*. The following specific recommendations for the vegetation unit regarding the proposed development should be adhered to:

- The vegetation unit is classified as having a **medium-low sensitivity** due to the secondary state of succession and degradation evident in the area.
- The removal of protected plant species *Boophone* or *Helichrysum* species would need a permit from local authorities in the Free State.
- The development of the solar development is considered suitable in this area.

- **Open *Vachellia karroo* woodland**

The microphyllous woodland vegetation unit occurs on red apedal soils of the Hutton soil form. The woody layer is dominated by species such as *Vachellia karroo, Vachellia tortilis* and *Ziziphus mucronata*. The woody structure varies from open woodland to slightly denser woodland with bushclumps in some areas. The grass layer is in a slightly degraded state due to previous overgrazing and dominated by *Setaria incrassatae, Themeda triandra* and *Panicum maximum*.

The following specific recommendations for the vegetation unit regarding the proposed development should be adhered to:

- The vegetation unit is classified as having a **medium sensitivity** due its widespread occurrence in the Grassland Biome.
- The development of the solar development is considered suitable in this area.

- ***Vachellia karroo – Searsia lancea – Euclea crispa* footslopes**

This mixed woodland vegetation unit occurs along the proposed powerline route on the footslopes of the outcrops on shallowish clayey soils of the Hutton or Glenrosa soil form. The woody layer is dominated by species such as *Vachellia karroo, Pappea capensis, Searsia lancea, Euclea crispa* and *Ziziphus mucronata*. The woody structure varies from being open woodland to slightly denser woodland with bushclumps in some areas. The grass layer is in a slightly degraded state due to previous overgrazing and dominated by *Eragrostis lehmanniana, Heteropogon contortus, Themeda triandra* and *Panicum maximum*.

The following specific recommendations for the vegetation unit regarding the proposed development should be adhered to:

- The vegetation unit is classified as having a **medium sensitivity** due its widespread occurrence in the Grassland Biome.
- The development of the solar development is considered suitable in this area.

- **Rocky grassland / woodland associated with outcrops and ridges**

This vegetation unit associated with rocky outcrops and ridges in the project area can be divided into woodland and grassland variations. The vegetation of the woodland variation is dominated by woody species such as *Senegalia caffra, Tarchonanthus camphoratus, Searsia lancea, Euclea crispa, Combretum molle, Euclea crispa, Searsia zeyheri, Vachellia karroo, Vachellia robusta, Diospyros lycioides* and *Ziziphus mucronata*.

The grassland variation is characterised by species such as *Loudetia simplex, Schizachyrium sanguineum, Xerophyta retinervis* and *Brachiaria serrata*.

This vegetation unit that forms part of the rocky outcrops is characterised by slightly to moderately undulating slopes, although the area is not as steep as the typical ridges in the larger area. Rocky outcrops in Savanna and Grassland Biomes of South Africa are often habitats for red data and endemic species of an area, while also supporting a unique floral and faunal species composition. No red data species was documented during the surveys. The area could potentially support red data species though and plays an important role for smaller mammals and reptiles that utilize the area.

The main factors which contributed to the outcrop area being classified as a High sensitivity (ridge section) compared to the plains section that is classified as having a medium sensitivity, was the rockiness, plant species composition, pristine state of the vegetation, microhabitats and potential red data fauna that utilize this area as habitat. A unique diversity of plant species occurs within this unit.

The following specific recommendations for the vegetation unit regarding the proposed development should be adhered to:

- The vegetation unit is classified as having a High sensitivity due to the potential red listed species habitat, slopes and rockiness in the area.
- The development of the access road is considered suitable in this area, although the preferred access road (option 2) is still considered more suitable.

- **Degraded grassland**

A section of the proposed development footprint represents degraded grassland on red-yellow apedal soils of the Hutton soil form or Clovelly soil form. According to the soil types and previous land use, the vegetation represents degraded grassland (primary old fields) dominated by *Cynodon dactylon* and *Eragrostis plana.* The grass layer is well developed and dominated by species such as *Hyparrhenia hirta, Cynodon dactylon, Eragrostis plana, Eragrostis chloromelas* and various exotic weeds such as *Verbena bonariensis*.

The following specific recommendations for the vegetation unit regarding the proposed development should be adhered to:

- The vegetation unit is classified as having a **low sensitivity** due to degraded state of the herbaceous layer.
- The development of the solar development is considered suitable in this area.

- **Cultivated land**

The croplands in the project area form ploughed fields on sandy soils. Exotic weeds and pioneer grasses often colonize the areas surrounding the croplands.

- **Exotic bushclumps**

A small section of the project area is characterised by homogenous stands of exotic trees such as *Eucalyptus camaldulensis*. Exotic weeds and pioneer grasses often colonize the areas surrounding these bushclumps. This area has a **low sensitivity**.

- **Old slimes dams**

The western section of the power line is partially along completely degraded old slimes dams. This area is not active any longer and the area colonised by various alien invasive species such as Tamarisk chinensis and other exotic weeds. Due to the completely modified state of the vegetation the area has a **low sensitivity**.

- **Drainage features (valley bottom wetland with channel, river channels & floodplains, exorheic and endorheic depressions)**

All rivers and streams with their associated riparian vegetation in the project area are ecologically sensitive, forming important, limited, and specialised habitats for several plant and fauna species. The species composition is unique and relatively limited in distribution and coverage. These habitats also form linear corridors linking different open spaces. The drainage channels of the project area eventually flow into the Sand River that occurs to the North-east of the project area.

The riverine woodland would be important dry season refuge areas for many fauna species in their natural state. It is also a centre of floral diversity. Riparian areas have been identified as important dry season refuge areas for a variety of large mammal species. Impacts on sensitive riparian ecosystems, regardless of the source, need to be restricted. Impacts on this system include erosion, habitat loss and degradation and associated impacts on faunal and floral diversity, dewatering of marshes and wetlands, water abstraction and increased sedimentation. Continued impacts on riverine ecosystems may also ultimately reduce capacity of this system to absorb dramatic flooding events. Band of trees that occurs along the channel can be classified as riparian vegetation. This vegetation is very important for connectivity with adjacent vegetation as well as migratory route for riparian animals.

The following recommendations should be adhered to for all drainage features:

- Vegetation is mostly in a natural habitat, with all areas in the wetland zone or drainage channels classified as a high sensitivity area with high conservation priority, while natural vegetation outside the floodline is natural woodland with a Medium Sensitivity. No alteration of these important drainage areas is recommended.
- A 32-meter buffer should be implemented around the riparian zones of the smaller drainage channels and wetlands on site.
- A Water Use Licence application should be submitted to the Department of Water and Sanitation for the development of the solar plants within 500 meter of the wetland zones or the floodline zones of non-perennial drainage channels.
- Only existing roads should be used to cross drainage lines and mitigating measures should be implemented to prevent erosion of roads across drainage lines.

9.4.8.2 Red Data Species

No red data species was documented during the surveys in the study area. Ecological monitoring should however still be implemented during the construction phase and specific sensitive habitats (riparian) needs to be avoided to ensure that any potential red data species potentially missed during the field surveys are preserved and not potentially impacted on.

9.4.8.3 Protected Species (Free State Nature Conservation Ordinance)

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

After a detailed survey was conducted during November 2022, the presence of the listed species *Boophone disticha* and *Helichrysum nudifolium* was confirmed on site. The species can be relocated from its current locations if needed through a rescue and relocation programme should development activities impact on populations.

9.4.8.4 Protected Trees Species (NFA)

The National Forest Act,1998 (Act No. 84 of 1998) provides a list of tree species that are considered important in a South African perspective because of scarcity, high utilization, common value, etc. In terms of the National Forest Act of 1998, these tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under license granted by DAFF (or a delegated authority). Obtaining relevant permits are therefore required prior to any impact on these individuals. Taking cognizance of the data obtained from the field surveys, **no protected tree species** occur in the area.

9.4.8.5 Alien Invasive Species

The following alien invasive and exotic plant species were recorded on site during the surveys as stipulated in the Alien and Invasive Species Regulations (GNR 599 of 2014).

Table 23. Declared weeds and invader plants of the study area.

Species	Category
Argemone ochroleuca	1b
Cestrum laevigatum	1b
Datura stramonium	1b
Eucalyptus camaldulensis	1b
Morus alba	3
Opuntia ficus-indica	1b
Opuntia imbricata	1b
Tamarisk chinensis	1b
Verbena brasiliensis	1b
Xanthium strumarium	1b

According to the amended regulations (No. R280) of March 2001 of the Conservation of Agricultural Resources Act 1983 (Act no. 43 of 1983), it is the legal duty of the land user/landowner to control invasive alien plants occurring on the land under their control.

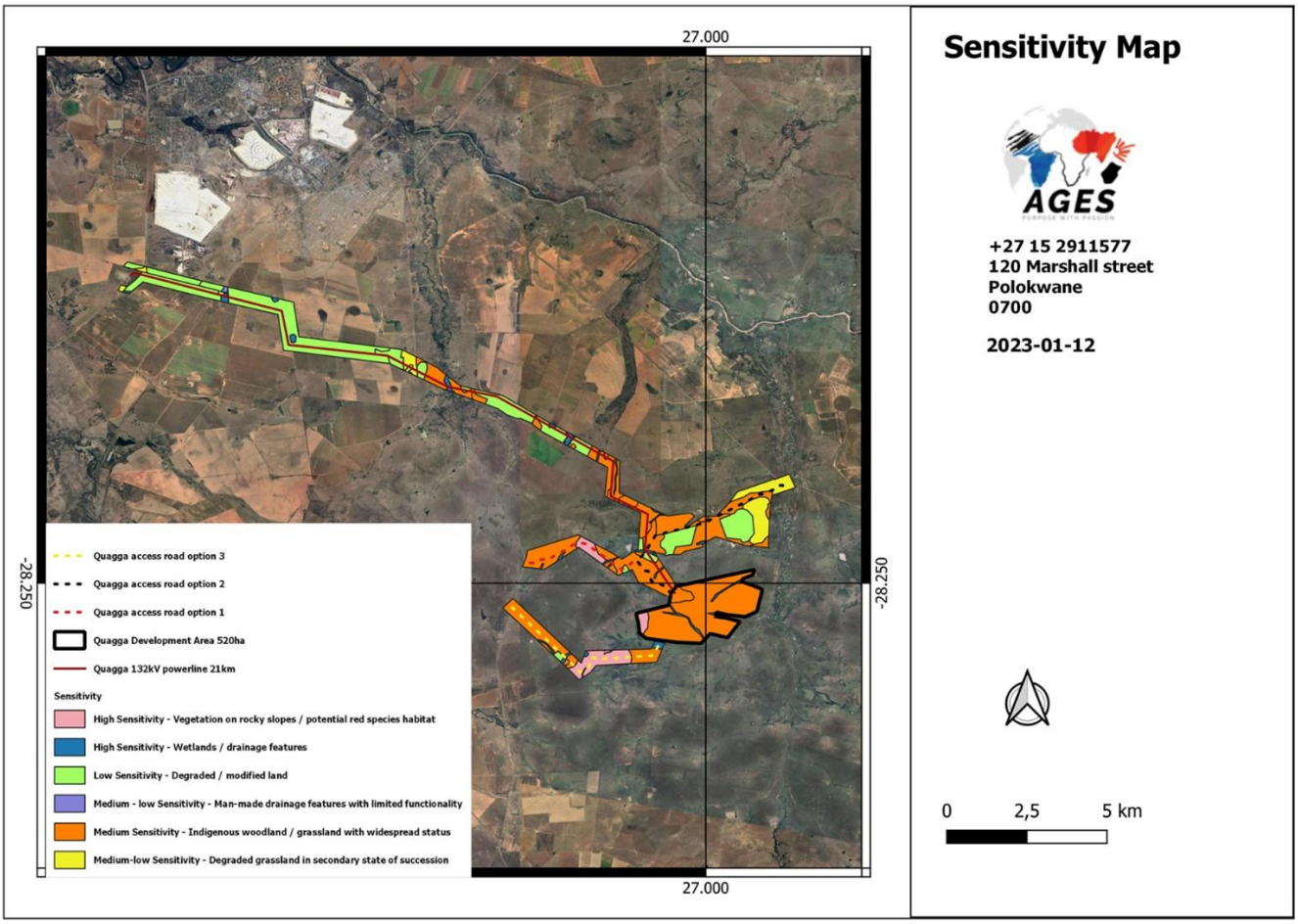

Figure 13. Ecological Sensitivity Map

9.4.8.6 Cumulative impacts

It is unclear whether other projects not related to renewable energy is or has been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite certain that future solar farm development may take place within the general area.

Regionally landscape fragmentation could create barriers to the movement of species and their genes (Saunders et al., 1991). The answer to the width and extent of corridors depends on the conservation goal and the focal species (Samways, 2005). Corridors for mammalian species are especially important for migratory species (Mwalyosi, 1991; Pullin 2002). Published information about cumulative effects, metapopulations and fragmentation of landscapes is in general scarce, especially for local and regional areas.

Corridors and linkages of areas with similar habitat are present in the area where several solar power plants are planned. Watercourses and wetlands are avoided by the proposed footprints so that steppingstone corridors (pans) and a network of linked corridors (active channels with riparian zones) remain. No habitats of threatened species that could easily be isolated (for

example beetles with flightless females) are known to be impacted locally in the larger study area.

Because most of the Virginia area appears to be ideal to avoid very sensitive habitats such as larger pristine wetlands and highly sensitive habitat pockets of threatened species, the development of a several solar plants appear to be more ideal on a national scale than at many other locations. Therefore, an important mitigation measure is to retain corridors with indigenous vegetation in between solar plants and their associated infrastructure.

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

9.4.8.7 Conclusions

The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the construction phase of the solar development should be considered a high priority. The proposed site for the development varies from being in a completely modified to slightly degraded state.

The protected plant species *Boophone disticha* and *Helichrysum nudifolium* occur on the site and specific mitigation measures (permit applications, avoidance, relocation) should be implemented to avoid negative impacts on the species.

9.4.8.8 Fauna

A survey was conducted during November 2022 to identify specific fauna habitats, and to compare these habitats with habitat preferences of the different fauna groups (birds, mammals, reptiles, amphibians) occurring in the quarter degree grid. During the site visits mammals, birds, reptiles, and amphibians were identified by visual sightings through random transect walks. In addition, mammals were also recognized as present by means of spoor, droppings, burrows or roosting sites.

9.4.8.8.1 Mammals

The Highveld Ecoregion contains a higher number of mammals, although only the orange mouse (*Mus orangiae*) is restricted to the ecoregion, and the rough-haired golden mole (*Chrysospalax villosa*) is near-endemic. The ecoregion also supports populations of several large mammal species, some of which are rare in southern Africa (Stuart and Stuart 1995). Among these are the brown hyena (*Hyaena brunnea*), African civet (*Civettictis civetta*), leopard (*Panthera pardus*), pangolin (*Manis temminckii*), honey badger (*Mellivora capensis*), striped weasel (*Poecilogale albinucha*), aardwolf (*Proteles cristatus*), oribi (*Ourebia ourebi*), and mountain zebra (*Equus zebra hartmannae*).

Predators that still roam freely in the area include larger predators such brown hyena, while smaller predators such as caracal, serval and honey badger are common throughout the larger area. Antelope species such as duiker and steenbok will roam freely through the area and are not restricted by game fences. Smaller mammal species such as honey badgers and serval

can become habituated to anthropogenic influences, while other species such as brown hyena will rather move away from the construction activities and will seldom use the area.
The wetland is an important habitat and dispersal corridor for moisture-reliant small mammals. The conservation of the wetland and buffer zone will conserve the moisture reliant African marsh rat (Near Threatened) on the study site and act as a movement corridor for small mammals.
The connectivity1 of the project site to the remainder of the larger area is Moderate due to other surrounding areas representing natural grassland and drainage channels. Of significance is the role of the channels and riparian zone as zoogeographical dispersal corridor.
Most mammal species are highly mobile and will move away during construction of the solar development. The most important corridors that need to be preserved for free-roaming mammal species in the area include the riparian zones, wetlands and indigenous grasslands.

Spotted-necked otters (listed by the EIA screening tool) are aquatic and require permanent and continuous waterways. They prefer clear water with rocks. They are found in lakes, swamps, rivers, and may be found in mountain streams at higher elevations. They are absent in turbid rivers and shallow alkaline lakes. They live in dens, which are found near these sources of water.

The otter's fur is highly prized, being used as a cure for eye and/or nose infections. The spotted-necked otters are in decline due to changes in their environment and human interference. One problem is the increased use of nylon fishing nets, in which the otters get tangled in and die. Erosion of soil near the source of the rivers is also a threat. Fish-farmers and fur-trappers are also playing a part in the decline of the spotted-necked otter.

Probability of occurrence on site: MODERATE due to the presence of suitable habitat on the proposed development footprint, although no population of the species occur on site.
Probability of impact during vegetation clearance: MODERATE, no populations documented although some habitat considered suitable at wetland crossings and dams.

The connectivity of the project site to the remainder of the larger area is Moderate due to other surrounding areas representing natural grassland and drainage channels. Of significance is the role of the channels and riparian zone as zoogeographical dispersal corridor.

Most mammal species are highly mobile and will move away during construction of the solar development. The most important corridors that need to be preserved for free-roaming mammal species in the area include the riparian zones, wetlands and indigenous grasslands.

9.4.8.8.2 Avifauna

An Avifaunal Assessment (Annexure E) was conducted by Ryno Kemp *(Pr.Sci.Nat.)* to determine whether the proposed development would have a negative impact on avifauna.

[1] C**onnectivity (habitat connectivity)** - Allowing for the conservation or maintenance of continuous or connected habitats, so as to preserve movements and exchanges associated with the habitat.

One hundred and twenty-nine (129) bird species were recorded in and around the project area of influence, with 95 species recorded from point counts and an additional 34 species recorded as incidental sightings. The field survey was conducted on 12 -15 December 2022.

The assessment area consisted of four avifauna habitats; transformed areas, degraded grassland, grassland and bush clumps. These habitats were mainly in a natural state except for the regions disturbed by livestock grazing and transformed due to anthropogenic activities. Three species of conservation concern were confirmed in the assessment area (Blue Korhaan (*Eupodotis caerulenscens*), Lanner Falcon (*Falco biarmicus*) and Secretarybird (*Sagittarius serpentarius*). Some high-risk avifauna species were recorded from the project area and surrounding, including raptors and water birds.

The project will result in habitat loss and degradation of avifaunal habitats. The development will lead to the clearing of vegetation and an alteration in the undeveloped nature of the area. Based on the high receptor resilience and the medium biodiversity importance, the assessment area was given low site ecological importance, with transformed areas having a very low site ecological importance (SEI). Even though, the overall sensitivity is considered to be low, the specialist strongly suggests a follow-up survey to confirm the low sensitivity at the end of the wet season.

The development will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be effectively mitigated, the loss of habitat cannot be mitigated. Considering the number of applications and current solar plant developments in the area the cumulative impact is regarded as being high.

The mitigation hierarchy implemented in this report is as per the information provided in section 2(4)(a)(i) of NEMA as well as the overall policy on Environmental offsetting (Biodiversity Offset Guidelines, section 24(J) of NEMA, Sept 2021). The mitigation hierarchy includes first avoiding the impact, then minimising it, then rehabilitation, and then offsetting. Where the residual impact, even after mitigation, is high, then offsetting should only be considered. In this case, no impacts are high post-mitigation and according to available data, offsets will not be required. Mitigation measures have reduced most impacts to a Moderate or Low, which is considered within the limits of acceptable change.

The significance of potential impacts on avifauna are assessed in Tables 7-1 to 7-4 of the Avifaunal Assessment.

Mitigation measures are included in Table 8-1 of the Avifaunal Assessment and the EMPr.

Considering the above-mentioned information, very few sensitive features were identified for the project mainly along the proposed power line. It is the opinion of the specialist that the project may be considered for approval, but all prescribed mitigation measures and monitoring must be considered by the issuing authority.

Bird diverters, bird guards, and spirals must be placed along the entire proposed powerline to reduce fatalities, as these large terrestrial birds and raptors do occur across the entire proposed powerline. Any power lines that may be developed must be extensively mitigated.

Cumulative Impacts

Cumulative impacts are assessed within the context of the extent of the proposed assessment area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a point in time may represent a significant change from the original state of the system. This section describes the potential impacts of the project that are cumulative for avifauna.

Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as nearby solar farm activities within the area). These include dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Based on the number of known and planned PV sites and their associated powerlines in the area the cumulative impact is expected to be moderate. These would collectively result in a large area of habitat loss, and it increases the risk of collisions and electrocutions for avifauna. This risk is especially high as a number of species expected and recorded is in a high-risk category for collisions and electrocutions.

A total area of 30 km surrounding the project area was used to assess the total habitat loss in the area and subsequently the cumulative impact. To determine the intact remnant habitat the NBA (2018) remnant spatial data was utilised. The future renewable energy projects were also considered by utilising the REEA Q3 (2022) spatial dataset. In order to remove any duplication, only the areas that overlap with the remnant areas were considered. The total cumulative loss was found to be 46.3%, a visual representation of this is shown in Table 15 of Annexure E.

Table 24. Total cumulative habitat loss

Total Area of 30 km buffer		Intact Remnant Habitat	REEA area that overlaps with undisturbed areas	Total Disturbed/Transformed habitat	Percentage area lost
282 265 ha		149 324 Ha	11 544 Ha	119 379 Ha	46.3 %

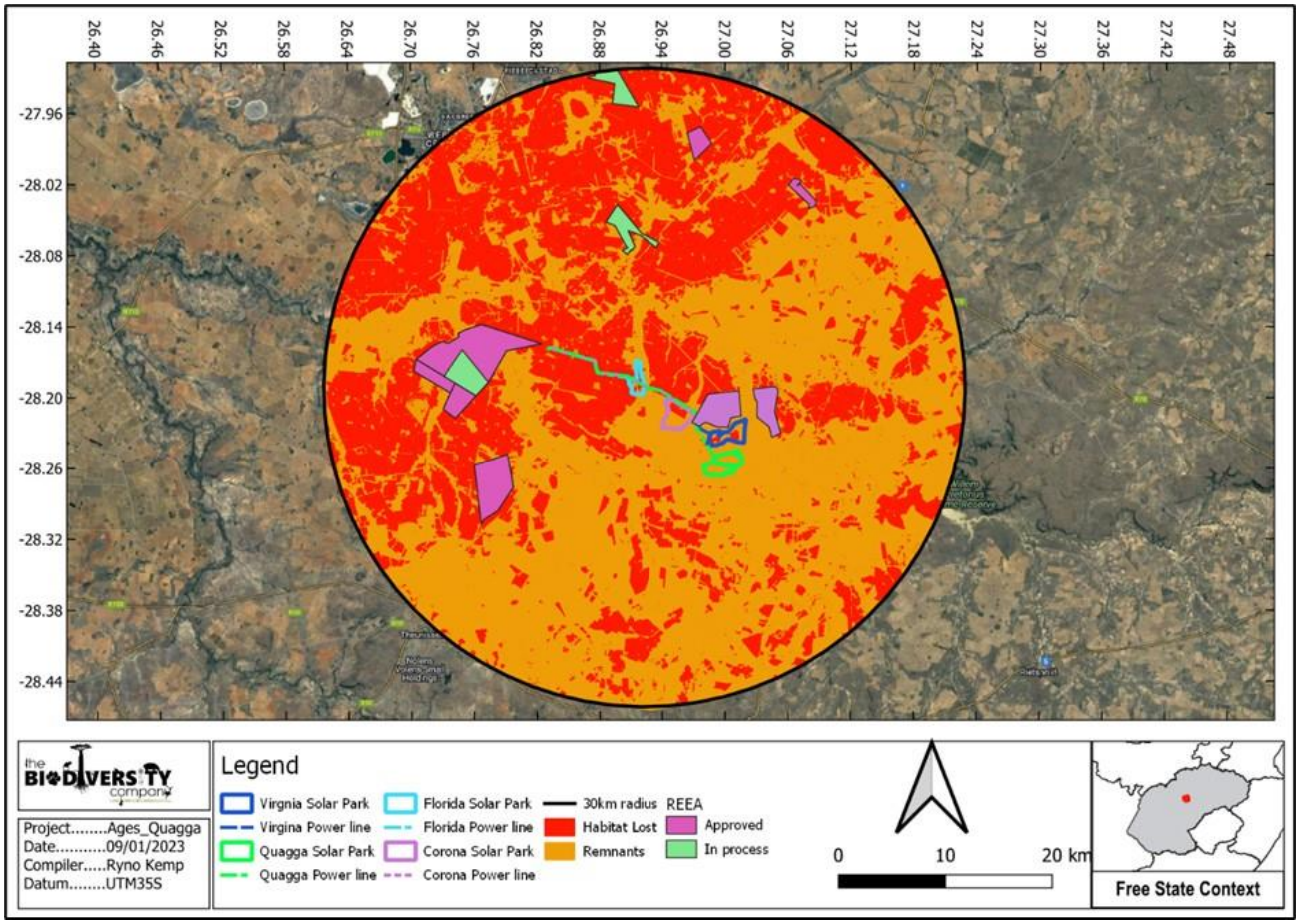

Figure 14. Cumulative habitat loss in the area

According to Birdlife South Africa, the study area falls outside of any Important Bird Areas (IBA), identified within South Africa (www.birdlife.org.za). The conservation status of many of the bird species that are dependent on wetlands reflects the critical status of wetlands nationally, with many having already been destroyed. In the study area, man-made dams represent wetland areas.

9.4.8.8.3 Herpetofauna

Twenty-nine amphibians occur within the ecoregion, but none are endemic (Passmore and Carruthers 1995). Breeding habitat of frogs and toads can be found mostly in the permanent wet zone of the wetlands and dams in the larger area. Amphibian species potentially occurring in the larger area include Common River Frog, Natal Sand Frog, Gutteral Toad, Raucous Toad and Bubbling Kassina. These species are non-threatened and widespread, and as such the development will not have any impact on amphibian conservation within the region.

The wetland could provide habitat for the red listed giant bullfrog, and therefore the 32-meter buffer zone surrounding the wetland should be adhered to.

Relatively few reptile species occur within the Highveld Ecoregion, mainly due to its cool climate. However, the ecoregion supports some of Africa's most characteristic reptile species, including Nile crocodile (*Crocodylus niloticus*), African rock-python (*Python sebae*), water monitor (*Varanus niloticus*) and veld monitor (*Varanus exanthematicus albigularis*).

There are also two strict endemic reptiles: giant girdled lizard (*Cordylus giganteus*), and *Agama distanti* (Branch 1998). Several additional reptile species are near endemics, including Drakensberg rock gecko (*Afroendura niravia*), giant spinytail lizard (*Cordylus giganteus*), and Breyer's whiptail (*Tetrodactylus breyeri)* (Branch 1998).

In the presence of dead termitaria, the small geckos listed are probably found on the site. A few terrestrial lizards (Yellow-throated Plated Lizard, Variegate Skink), typical for Highveld Grassveld, are expected to be present. A variety of smaller snake species characteristic for Highveld Grassveld will be present (Common Wolf Snake, Brown House Snake), although some might be dependent on the presence of dead termitaria. The only venomous snakes, which has been reported as being present and common, is as expected, the Rinkhals, Mozambique spitting cobra, snouted cobra and the Puffadder for this QDS. All the reptile species are common and widespread, and as such the development will not have any impact on reptile conservation within the region. The sungazer lizard occurs in some of the grassland areas, while the southern spiny agama and the striped harlequin snake may occur in small numbers in suitable habitat.

Table 25. Red data list of potential fauna for the study area

English Name	Conservation Status	Probability of occurrence on site
BIRDS		
Stork, Abdim's	Near Threatened	Moderate
Stork, Yellow-billed	Endangered	Moderate
MAMMALS		
Oribi	Endangered	Low
Roan Antelope	Endangered (2016)	Zero – restricted to game reserves
African wild dog	Endangered (2016)	Zero – restricted to game reserves
Vaal Rhebok	Near Threatened (2016)	Low
Southern African Hedgehog	Near Threatened (2016)	Moderate
Lechwe	Near Threatened (2017)	Zero – restricted to game reserves
(Southern African) Tsessebe	Vulnerable (2016)	Zero – restricted to game reserves
Sable antelope	Vulnerable (2016)	Zero – restricted to game reserves
Ground Pangolin	Vulnerable (2016)	Low
African White-tailed Rat	Vulnerable (2016)	Moderate
Hartmann's Mountain Zebra	Vulnerable A3bcd (IUCN, 2019)	Zero – restricted to game reserves
HERPETOFAUNA		
Giant Bull Frog	Near Threatened	Moderate
Giant Girdled Lizard	Vulnerable (SARCA 2014)	Low

Negative impacts of the proposed development will have a medium to low impact on fauna of the area. Recommendations and mitigating measures still need to be implemented to ensure the survival of these species, other fauna habitats and feeding grounds as stipulated below:

- The development would not have a significant impact on the above-mentioned red data fauna since adequate and natural habitat/vegetation would be available on the peripheral grassland and woodland habitats surrounding the development site. The most probable habitat to find any of the red data species in the study area would be in the more natural areas of the outcrops, grassland and wetlands where little or no disturbances form humans or livestock occur at a regular interval. Fauna will therefore rather move away from the area and utilize adjacent, more natural areas. The importance to preserve the riparian habitat should still be considered a high priority though.
- The removal of vegetation should be confined to the footprints of the proposed development site. This will be on small sections in relation to the total available surrounding habitat for fauna. Development also will not influence the natural feeding and movement patterns of the existing fauna in the area.
- If one considers the habitat descriptions of the red data species, most of them are not directly threatened by habitat loss. The impact of development on the red data species would therefore be less than predicted.
- The protection of different habitat types in the area will be important to ensure the survival of the different animals due to each species' individual needs and requirements. Sufficient natural corridor sections should be protected around the proposed development footprints to allow fauna to move freely between the different vegetation units on the property. The drainage channels and sections of natural vegetation will be preserved as corridors in the area and mitigation measures should be implemented to ensure that the habitats are protected.
- The taller (>3m) indigenous trees within this area also provide resting/perching sites for larger birds like birds of prey, arboreal reptiles and mammals that might occur/pass through the area and should preferably be preserved. These larger trees should be protected as far as possible and be incorporated into the proposed development. The removal of large dead trees is also not advised as these trees also provide smaller habitats for the mentioned bat species as well as rodents. The grass layer on the other hand also provides a valuable food source (insects, reptiles, small mammals that occur in/on the grass layer) for fauna.
- A monitoring programme needs to be implemented by a specialist if any rare species are confirmed on the property.

9.4.8.9 Summary and results of the Terrestrial Biodiversity Impact Assessment

Detailed ecological (fauna habitat & flora) surveys were conducted during November 2022 to verify the ecological sensitivity and ecological components of the site at ground level. The timing of the season was considered as adequate due to sufficient rains received in the area during the winter months and early spring. The survey was considered successful.

Most sensitive sections: It is evident from the distribution of biodiversity, presence of threatened species and sites of scientific interest, that the proposed development has the potential for negative impact on the flora and faunal of the study area. This is particularly true of the sensitive vegetation associated with the riverine and wetland ecosystems and the larger project area.

Most sensitive habitats: Many threatened species are grassland specialists, linked to these habitats either for breeding, feeding or shelter. Major impacts on riverine areas should be avoided wherever possible during construction. Where unavoidable impacts will occur on grassland and riparian zones, strict mitigation measures and legislation should be implemented (licence for eradication of protected plants, IWUL application etc.).

Monitoring of threatened species: Many endemic and protected species have been recorded in region. The EMP for the development should highlight the conservation status of these species and note that steps must be undertaken in conjunction with conservation authorities to protect or translocate any populations encountered during project actions. Ecological monitoring is recommended for the construction phase of the development considering the presence of protected trees and potential red data fauna on areas surrounding the site.

The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the construction phase of the solar development should be considered a high priority. The proposed site for the development varies from being in a completely modified to slightly degraded state.

A sensitivity analyses was conducted to identify the most suitable site for the development. From this investigation and ecological surveys, the following main observations were made:

- Most of the natural grassland and woodland have a Medium Sensitivity and development can be supported in the area provided certain mitigation measures are implemented. Where the clearance of the vegetation would cause protected plants or other fauna to be removed, permits should be obtained from the relevant authorities.
- The secondary grassland has a Medium-low Sensitivity due to the state of succession and degradation in the area.
- The degraded grasslands, croplands and exotic bushclumps have a low sensitivity and unlimited development can be supported in these areas.
- The wetlands have a high sensitivity and a WUL application should be submitted to the DWS for the wetland crossings. Where applicable a 32 meter should be implemented for construction activities.
- Other sensitive habitats in the mountainous section of the site (outcrops) have a High sensitivity and should preferably be avoided during development of access roads.

The protected plant species *Boophone disticha* and *Helichrysum nudifolium* occur on the site and specific mitigation measures (permit applications, avoidance, relocation) should be implemented to avoid negative impacts on the species.

Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low. Specific mitigation relating to red data fauna includes the following:

- Disturbances in close vicinity of the development (periphery) should be limited to the smallest possible area to protect species habitat.
- Corridors are important to allow fauna to move freely between the areas of disturbance.

Several ecological potential impacts were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:

- Destruction or disturbance to sensitive ecosystems leading to reduction in the overall extent of a particular habitat.
- Increased soil erosion.
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts.
- Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species.
- Soil and water pollution through spillages.
- Establishment and spread of declared weeds and alien invader plants.
- Impacts of human activities on fauna and flora of the area during construction.
- Air pollution through dusts and fumes from construction vehicles.

Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. A monitoring plan is recommended for the construction phase of the development should the proposed application be approved.

The proposed development should avoid sensitive areas such as outcrops, wetlands and riverine areas, while also allowing corridors of indigenous grassland on areas outside the development footprint to be preserved. Where sensitive areas of natural vegetation cannot be avoided, a few mitigation measures have been recommended to minimise and/or offset impacts (licence application for eradication of protected species, preferred route options through less sensitive areas). Negative impacts can be minimised by strict enforcement and compliance with an Environmental Management Plan which considers the recommendations for managing impacts detailed above.

According to the Ecological Specialist, provided that the proposed development and layout plans are consistent with the sensitivity map and take all the mitigation measures into consideration stipulated in the report, the planned development can be supported.

Cumulative impacts

It is unclear whether other projects not related to renewable energy is or has been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development may take place within the general area.

Regionally landscape fragmentation could create barriers to the movement of species and their genes (Saunders et al., 1991). The answer to the width and extent of corridors depends on the conservation goal and the focal species (Samways, 2005). Corridors for mammalian species are especially important for migratory species (Mwalyosi, 1991; Pullin 2002). For an African butterfly assemblage this is about 250m when the corridor is for movement as well as being a habitat source (Pryke and Samways 2003). Hill (1995) found a figure of 200m for dung beetles in tropical Australian forest. In the agricultural context, and at least for some common insects, even small corridors can play a valuable role (Samways, 2005). Published information about cumulative effects, metapopulations and fragmentation of landscapes is in general scarce, especially for local and regional areas.

Corridors and linkages of areas with similar habitat are present in the area where several solar power plants are planned. Watercourses and wetlands are avoided by the proposed footprints so that steppingstone corridors (pans) and a network of linked corridors (active channels with riparian zones) remain. No habitats of threatened species that could easily be isolated (for example beetles with flightless females) are known to be impacted locally in the larger study area.

Because most of the Virginia area appears to be ideal to avoid very sensitive habitats such as larger pristine wetlands and highly sensitive habitat pockets of threatened species, the development of a several solar plants appear to be more ideal on a national scale than at many other areas. Therefore, an important mitigation measure is to leave corridors with indigenous vegetation in between solar plants and their associated infrastructure.

Cumulative impacts on the ecology of the area can be significant. However, with the mitigation measures in place, the potential is low for significant negative impacts on the ecology of the area.

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

9.4.9 WETLAND AND RIPARIAN IMPACT ASSESSMENT

A Wetland and Riparian Impact Assessment was conducted and is included in this Report as Annexure F.

Two wetland types were identified on the site for the proposed solar and power line development namely:

- Valleybottom wetland with channel
- Depressions:
  - Exorheic depressions (man-made dams)
  - Endorheic depressions (pans)

The other drainage features on the proposed development footprint sites are classified as channels (rivers) with riparian woodland. The rivers are classified as Floodplain Rivers and Non-perennial drainage channels. The wetland and riparian map and regulated areas for the wetlands and rivers are presented in Figure 15.

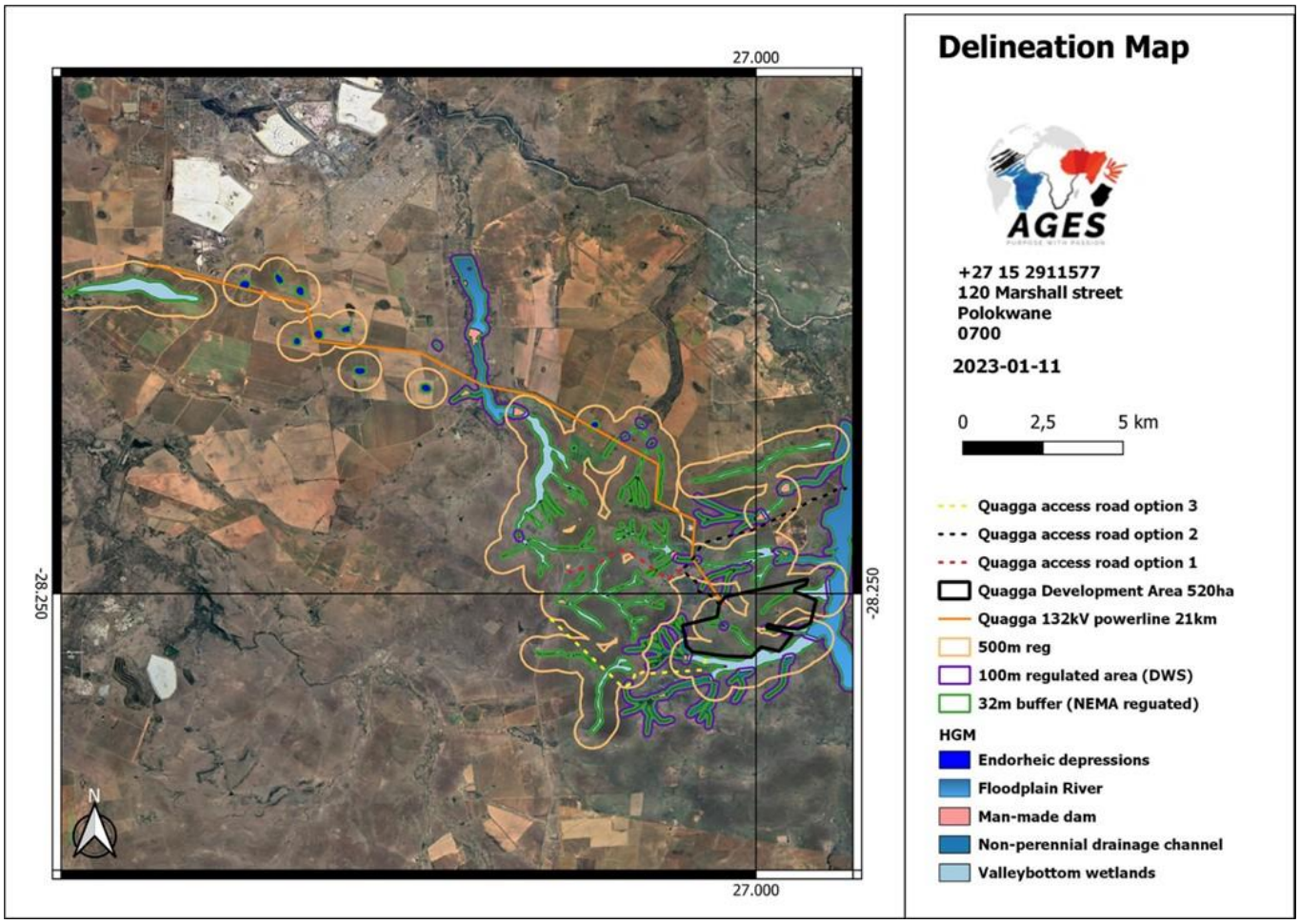

Figure 15. Riparian/wetland delineation map of the proposed development site

9.4.9.1 Valleybottom wetland with channel

The drainage features occur throughout the project area and along the powerline and are classified as channelled valley-bottom wetlands.

The vegetation structure of the valley bottom wetlands varies from the actual channels being closed grassland in certain areas, to a muddy riverbed with alluvial sand and reeds along the riverbanks. The drainage channels that from part of the channelled valley bottom wetlands are mostly perennial.

The most abundant and most conspicuous plant species is hygrophilous grasses such as *Andropogon eucomis, Hyparrhenia tamba, Eragrostis gummiflua* and *Setaria sphacelata*. Other plants associated with valley bottom channels are *Juncus effusus, Schoenoplectus corymbosus, Verbena bonariensis, Persicaria serrulata* and *Typha capensis*.

Unfortunately, the valley bottom wetlands provide a distribution route for weeds and invading trees. Many of the usual weeds were recorded together with *Xanthium strumarium* (Large

cocklebur) *Datura stramonium, Tagetes minuta* and *Bidens bipinnata*. Weeds and invaders should be removed, as well as destruction of such plants in a safe place and manner.

9.4.9.2 Depressions

The depressions in the project area can be classified into two variations namely man-made dams that form part of the valleybottom wetlands and are classified as exorheic depressions with channelled inflow or natural pans classified as endorheic depressions.

The vegetation associated with depressions is mostly sedges and bulrushes depending on the depth of the water and the substrate. Species such as *Persicaria serullata, Typha capensis, Schoenoplectus corymbosus, Ludwigia stolonifer* and *Leersia hexandra* mostly grow along the shallow edges of dam and pans s in the project area on a muddy substrate. The riparian woodland is characterised by *Vachellia karroo, Ziziphus mucronata* and *Grewia flava*.

9.4.9.3 River channels and floodplains

All rivers and streams with their associated riparian vegetation in the project area are ecologically sensitive, forming important, limited and specialised habitats for several plant and fauna species. The species composition is unique and relatively limited in distribution and coverage. These habitats also form linear corridors linking different open spaces. The drainage channels of the project area eventually flow into the *Sand River* that occurs to the North of the project area. The riverine woodland would be important dry season refuge areas for many fauna species in their natural state. It is also a centre of floral diversity. Riparian areas have been identified as important dry season refuge areas for a variety of large mammal species. The impacts on the sensitive riparian ecosystems, regardless of the source, need to be restricted. Impacts on this system include erosion, habitat loss and degradation and the associated impacts on faunal and floral diversity, dewatering of marshes and wetlands, water abstraction as well as increased sedimentation (SANParks 2003). Continued impacts on the riverine ecosystems may also ultimately reduce the capacity of this system to absorb dramatic flooding events. The band of trees that occurs along the channel can be classified as riparian vegetation. This vegetation is very important for connectivity with adjacent vegetation as well as a migratory route for riparian animals.

Most of the drainage channels on site are non-perennial. These riverine areas support low riparian woodland dominated by species such as *Vachellia karroo* and various grasses such as *Setaria sphacelata, Themeda triandra, Sporobolus africanus* and *Eragrostis rotifer*.

The *Merriespruit* can be described as a floodplain river or a lowland river. The floodplain is not classified as a floodplain wetland, but a river with some wetland characteristics in the channel and its banks.

The vegetation associated with the floodplain is mostly microphyllous woodland and hygrophilous grasses in the project area. Species such as *Vachellia karroo, Searsia pyroides, Ziziphus mucronata* and *Searsia lancea* mostly grow in the floodplain area (Photograph 4), together with grass species such as *Sporobolus africanus* and *Eragrostis rotifer*.

The following are recommendations for the wetlands and rivers in the area:

- The vegetation associated with the water courses and wetlands has a high sensitivity with

a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the habitat is high and therefore a sufficient buffer zone of 32 meters is applicable for the development site or the floodline zone.

- All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features on site. No development can be done within the floodline zone without a Water Use Licence, except if outside the 1:100 year floodline or 100 meters from the delineated riverine areas or 500 meters from the wetlands.

Evidence was observed on site of transformation of the floristic characteristics of the site at least to some extent. Impacting activities which have altered the expected floristic composition include alien infestation, impoundment and powerline crossings. The valleybottom wetlands and riverine areas were assessed.

Table 26. Present Ecological State and Ecological Importance & Sensitivity of the wetland and riparian systems on the proposed development site

Hydro-geomorphic Unit	PES	EIS
Valleybottom wetland with channel Pans Floodplain Rivers Non-perennial Channels	Class C: Moderately modified	Moderate

Anthropogenic disturbance of soil and primary vegetation have altered the natural hydrological functioning of the drainage systems (wetlands and riverine areas) associated with the proposed solar development project area. The reference state was probably Class B that changed to a Class C. However, the biotic and abiotic characteristics clearly indicated that the drainage system is functional in terms of flood attenuation, erosion control, sediment trapping and biodiversity. The limited presence of facultative wetland plant species such as sedges, and the absence of temporary pools limit the ability of this wetland system to contribute to streamflow regulation.

All the wetlands' components on site were found to be limiting in their ability to improve water quality by removing nitrates, phosphates, and other toxicants. The drainage system as an entity (dam, non-perennial and valleybottom wetlands) has a Class C PES (Moderately Modified). The riparian woodland plays an important role as corridor for fauna in the area and has only been impacted by upstream agricultural activities and road crossings. The state of the individual hydrologic component functions is as follows:

- **Hydrologic:** Class D – Largely Modified
- **Water quality**: Class C: Moderately Modified
- **Hydraulic / Geomorphic**: Class C: Moderately Modified
- **Biota**: Class C: Moderately Modified

Considering the importance as fauna corridor as well as the red data species associated with the riverine woodland and wetlands, the area has a MODERATE EIS. This HGM unit is

therefore considered to be ecologically sensitive and important. The biodiversity of this riparian zone may be sensitive to flow and habitat modification, while the channel plays a significant role in moderating the quantity and quality of water entering downstream areas.

The proposed development will have a potential direct or indirect impact on the instream and riparian habitat. Mitigation (including rehabilitation) of the impacts and should rather focus on the management of stormwater, erosion prevention and connection with the larger system. Indirect impacts could occur because of construction activities (dust, spillages etc.).

The impacts associated with the construction site is reflected in the results of the PES assessment which indicates that the riparian zones, wetlands and water courses are 'Moderately Modified'.

The EIS of the drainage systems on site are MODERATE and are ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.

An impact assessment was conducted for the wetlands and riparian zones on site in addition to the mitigation measures recommended to ensure the protection of the riverine ecosystems. Impacts relating to the proposed development on the water courses / riparian zones are as follows:

- Impact on the characteristics of the watercourse i.e., flow regime, habitat, biota, water quality and geomorphology due to construction within floodline zone.
- Soil erosion and sedimentation.
- Water pollution from spillages, vehicle emissions and dust.
- Spread and establishment of alien invasive species in wetlands.

Specific mitigation measures as provided in Section 5 of Annexure F need to be implemented in the areas surrounding the riparian zones and water courses to prevent any negative impacts other than the impacts that will be caused during the development. Provided that all the mitigation measures and recommendations surrounding the water courses and riparian zones are strictly adhered to the development of the solar development can be supported.

9.4.10 VISUAL

A Visual Impact Assessment (Annexure J) was conducted by Mitha Cilliers Landscape Architect to determine the visual impact of the proposed solar park and power line.

The main characteristics of the study area includes mining, crop and livestock farming. Tourist attractions mostly occur on the outer edges of the study area, 20km radius, with the closest being the Allemanskraal Dam, approximately 16km southeast of the nearest solar park site, on the outer edge of the visual analysis. The residential component of the study area includes farmstead with associated workers housing as well as the towns of Virginia and Ventersurg and the townships of Meloding and Mmamahabane.

The study area has agro-industrial sense of place. The area where the solar parks are located is dominated by agriculture and in the north is buffered by the township of Meloding and the town of Virginia from the mining activities. This is similar the powerline corridor as well which become less dense towards the southeast of the study area.

Night-time character would consist mostly of lights associated by the farmsteads and a larger glow in the northern section associated with the township of Meloding, town of Virginia as well as the mines. No *Night-Light Impact* were assessed as **no *Night-Light impact* is anticipated**.

Due to the powerline being placed inside and existing powerline corridor, the proposed powerline exhibited a *low contrast* with the receiving landscape.

Discussions with the aviation impact consultant revealed that it is very unlikely that glint and glare from the proposed project would interfere with the Approach / Departure flight paths for the three local airports that are located approximately 20km – 40km from the proposed project.

The ZVI for the solar panels is quite contained despite the openness of the topography and lack in taller vegetation. Ridgelines contains the ZVI to the eastern half of the Zone of Potential Visual Influence (ZPVI). Drainage channels bisecting the study area cuts into the ZVI from the northwest and southeast. The ZVI for the solar panels covers 14% of the ZPVI for this specific project, a 16km radius around the project components. The ZVI for the powerline is quite expansive and, almost wholly, includes the ZVI of the solar panels except for scattered, small, positions in the east and west. The Doringspruit, Schoemanspruit and Klip Spruit cuts in from the southeast. The ZVI for the powerline covers approximately 64% of the ZPVI area. The combined ZVI for the solar panels and the powerline covers approximately 59 % of the total ZPVI are for this project.

The generalized ***Relevance*** of the visual impact on these receptors were as follows:

- **Residential: *marginal***
- **Transport: *marginal***
- **Business / Occupational / Industrial: *marginal***
- **Open Space Users / Recreational: *marginal***

VSRs with the largest anticipated impact included the farmsteads on the farms Palmiet Fontein No. 229, Blomskraal No. 216, Le Roux No. 766 and Florida No. 633 which was rated as substantial. This rating is a result of their proximity to the proposed powerline rather than the solar park.

Mitigation measures are listed in Table 4 of the Visual Impact Assessment and the EMPr.

From the visual impact analysis, it is clear that the implementation of the proposed Quagga Solar Park & Powerline would have a ***medium significance*** for all visual receptors, during all phases of the project, with or without the correct and effective implementation of the proposed mitigation measures except when mitigation measures are implemented correctly and effectively in the decommissioning phase, then the rating would drop to ***low-medium***.

Cumulative impacts

It should be noted that the study area already contains a transmission substation and a network of powerlines consisting of a range of pylon sizes. These are however, mostly located north of the proposed solar park developments. The powerlines for the proposed developments will all follow along the same route and only divert off to tie into their respective solar park developments. This strategy aims to reduce the anticipated impacts from the powerlines. Each of the proposed powerlines would contribute cumulatively to the effect of the existing powerlines within the context of the receiving environment. The proposed pylons are however smaller than the pylons of the existing powerlines.

The proposed powerline for this project would follow alongside existing powerlines for approximately a 19km, from it will continue to meet the proposed Quagga solar park. Along its route, it will cross 3 other powerlines and run parallel to other existing powerlines for the last 4,5km of its length. The ZVI for the Quagga powerline covers approximately 64% of the ZPVI for this powerline whereas the combined ZVI for all four powerlines would cover approximately 65% of the ZPVI. Individually and cumulatively the impact from the powerline can be rated as intermediate (70 - 41%). The cumulative impact for this powerline would however only be incrementally larger than the proposed Quagga powerline.

There are no other solar parks within the current context / study area. However, the study area has a mixed mining / industrial / pastoral sense of place. As stated above, this project is one of four solar park development projects proposed by the developer as a second phase of a previous round of proposed solar park developments within the same study area. The solar parks are all clustered together, this strategy reduces the overall / cumulative visual impact albeit adding to the mining / industrial sense of place.

The ZVI from the proposed solar park would cover approximately 14% of the ZPVI. Cumulatively, the combined ZVI's of the four proposed solar park projects would cover 29% of the ZPVI for the study area. Both individually and cumulatively, this can be rated as small impact (40 – 11%). The ZVI for this solar park is just less than half of the cumulative ZVI for the solar parks combined.

The combined ZVI for the powerline and solar park would be approximately 59% of the ZPVI. The cumulative impact of all four projects is anticipated to be 58% of the ZPVI. The cumulative impact would be incrementally larger than the individual ZVI.

9.4.11 SOCIO-ECONOMIC ENVIRONMENT

A report on the socio-economic considerations related to the proposed project was compiled and annexed as Annexure M. According to the assessment:

- The largest production sector in the Matjhabeng Local Municipality (MLM) is mining. There was a decline in the gold industry and the economic growth in the MLM was lower than the other economic centres in the Free State. Average economic growth is also lower in the MLM than in the district, province and country's growth.
- In the MLM, the unemployment rate has increased from 21% in 2009 to 34% in 2019. This rise in unemployment is despite numerous efforts at the national, provincial and local level to increase job creation. Youth unemployment has risen from 2009 to 2019 and is currently at an elevated level of 53%.

- The vision statement in the LED strategy is that MLM aims to develop a globally competitive economy through the collaborative diversification of the mining, manufacturing, finance and trade sectors.
- PV Solar, wind and CSP with storage present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present considerable potential for the creation of new industries, job creation and localisation across the value chain.
- Investment in renewable energy is continuing to increase as countries transition their power systems to cleaner sources of energy.
- The proposed Quagga PV Solar plant is consistent with the modelling and findings of the 2019 update of the national Integrated Resource Plan. It is also consistent with the objectives of the RMIPPPP. This proposed project in MLM could contribute 240MW of the current short-term energy capacity gap in the country.
- The District IDP 2021 makes indirect references to renewable energy by encouraging the development of a post-mining economy, especially in Matjhabeng LM. The rezoning of low-potential agricultural land is to be reconsidered for sustainable development.

The following socio-economic impacts are foreseen in the report:

- The project will contribute up to 240 MW to a constrained national grid, thereby reducing the need for load shedding with its negative consequences for economic production, growth and job creation; and maintenance of equipment. Impact is positive with a high significance.
- Capital investment of approximately R4.8bn will be required (240 MW at R20m/MW) of which a substantial proportion is likely to be foreign capital as indicated by the REIPPPP projects that have been procured to date. The impact is positive with a high significance. This excludes the new transmission line.
- Quantity of CO^2 potentially avoided by this project will be approximately 600,000 tons per year based on the average Eskom emission factor of 1.015 tons/MWh and assuming that the PV modules will be mounted on trackers. This impact is positive with high significance.
- Lower and declining electricity tariffs from solar energy compared to fossil fuel generated electricity (solar and wind energy tariffs are R0.62/kWh, compared to the coal tariff of R1.03/kWh). This will have a mitigating effect on administered prices and therefore on inflation. The economic impact of the proposed project will therefore be positive with a moderate significance.
- Every new solar project that is developed in South Africa makes the establishment of an industry to support local manufacturing of components more viable. The economic impact of the proposed project will therefore be positive with a low to moderate significance.
- Permanent job creation on the proposed project could be 55 people. More jobs will emerge within the value chain for the manufacturing of components. An important new range of renewable energy industry skills will be acquired, which are essential for the local competitiveness of this industry. This socio-economic impact is positive, but with a low significance.
- In terms of REIPPPP prescriptions, developers are expected to contribute 1.5% of turnover to community development in the vicinity of the project. The impact is positive with a low

significance in terms of the methodology for impact calculation, although the impact on the community itself could be significant.

- Almost the entire impact of the proposed project on the local solar energy industry value chain referred to will occur before and during the construction phase, because this is when the components will be required. This impact is positive, with a low to moderate significance.
- Approximately 200 construction and panel installation jobs are expected to be created for a period that is unlikely to exceed 24 months. Skills development, especially for panel installation, will contribute meaningfully to the viability of other potential solar project developments in the Free State. This impact will be positive, but with relatively low significance due to its short duration.
- Construction projects are associated with increased levels of crime and disruption to established local social relationships. The risk of an increase in Covid-19 infections could also arise when contractors are recruited from a different location. This impact could be negative, albeit low.
- The socio-economic impact of the proposed Quagga Solar Project is considered positive, and the application is supported, provided that all the mitigation measures proposed by specialist consultants are implemented. The project is consistent with development policies at the national, provincial and local government levels, although the institutional readiness for a project of this nature will have to be confirmed at the municipal level.

9.4.12 AGRICULTURAL POTENTIAL

An Agricultural Potential Impact Assessment on soil potential was conducted and is included in this Report as Annexure G. A thorough investigation of the soil types of the proposed development site is necessary for an accurate classification of the soils. The main aim of the study is to identify the soil types on site and evaluate their specific characteristics to determine the agricultural potential of the soils.

The assessment of agricultural potential and land capability of the study area will be based on a combination of desktop studies to amass general information and then through site visit for status quo assessment, soil sampling and characterization, and the validation of generated information from desktop studies:

- Definition of parameters of land as stipulated by Subdivision of Agricultural Land Act, 1970 (Act No. 70 of 1970) and Amended Regulation of Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983).
- Classification of high potential agricultural land in South Africa compiled by Agricultural Research Council (Schoeman, 2004) for the National Department of Agriculture.
- Long-term climatic data record of the study area, obtained from Weather SA.
- Geophysical features of the site using Geographical Information System.
- Moisture availability class, determined through seasonal rainfall and fraction of the potential evapotranspiration (ARC, 2002).
- Field visit to the project site for general observation, survey of the farm in terms of vegetation, soils, water resources, terrain type and infrastructural profile.
- Previous and current land use of the farm and that of the neighbourhood.
- Other agro-ecological factors prevailing in the area.
- Agricultural potential of the property.

- Possible crop productivity or value of the farm for grazing purposes.

The proposed development site shows some variations in terms of soil characteristics and soil types identified during the survey. The classification of soils on the farm was based on land type description and the Binomial System for South Africa, which classifies soils into forms and families based on the diagnostic horizon of the soil profile. Exposed soil profile characteristics created by road cuttings in the field were also used in describing the local soil form. Soil identification and classification of the dominant soil type were done. The soil type and profile identified on the site will be discussed in detail in the following section.

9.4.11.1 Soil classes

Soils were classified into broad classes according to dominant soil form and family as follows:

- Vertic clay soils of the Hutton (red clay) or Arcadia (black clay) soil form
- Red-yellow apedal soils of the Hutton soil forms.
- Red-yellow apedal soils of the Avalon / Clovelly soil form.
- Yellowish sandyclay soils of the Oakleaf soil form.
- Shallowish, red apedal soils of the Hutton / Glenrosa soil form.
- Shallow, rocky soils of the Glenrosa / Mispah soil form.
- Greybrown clayey soils of the Valsrivier / Katspruit / Rensburg soil forms.

The geological formations and vegetation patterns showed a strong correlation to the major soil units mapped in the study area.

- **Vertic clay soils of the Hutton (red clay) or Arcadia (black clay) soil form**

Description: Arcadia soils are characterised by a vertic A-horizon. The Vertic horizon is strong developed structure with clearly visible, regularly occurring slicken sides in some part of the horizon or in the transition to an underlying layer. The soils occur in the southern and central section of the project area and the most of these areas are currently used for livestock grazing.

The red clay soils are of the Hutton soil form and has an apedal structure. Hutton soils are identified based on the presence of an apedal (structureless) “red” B-horizon. These soils are the main agricultural soil found in South Africa, due to the deep, well-drained nature of these soils. The Hutton soil form on site is deep, although it has a high clay content in combination with the Arcadia soil form.

Landscape: Slightly undulating plains

Depth: 200-500mm

Texture: Clay

Average Clay Content: 25-40%

Agricultural Potential: Medium potential arable soils, due to the depth and clay content being suitable for crop cultivation. The limiting factor is not the soil characteristics, but rather the prevailing climatic conditions.

Land capability: The grazing potential of these areas is medium to high. The most suitable and optimal utilization of the area would be grazing by livestock or wildlife. The soils are however susceptible to erosion and over grazing is a distinct and widespread risk.

- **Red-yellow apedal soils of the Hutton soil forms**

Description: Hutton soils are identified based on the presence of an apedal (structureless) "red" B-horizon. These soils are the main agricultural soil found in South Africa, due to the deep, well-drained nature of these soils. The Hutton soils found on the site are restricted to the solar plant footprint area. The Hutton soil form on site is deep, although it has a low clay content. The relatively high magnesium and iron content of the parent rocks from which these soils are derived, impart the strong red colours noted.

Landscape: Slightly undulating landscape.

Depth: 600-1200mmmm

Texture: Fine sandy to sandy loam

Average Clay Content: 6-15%

Agricultural Potential: Moderate potential soils– soils deep and often very sandy that causes a low water holding capacity, although the clay content of the soils is insufficient. Under the climatic conditions these soils would not sustain arable crop production. The most viable option for crop production on the soil form is under irrigation considering the variable rainfall and moisture availability due to higher day temperatures. Irrigation is not a common practice in the study area though and for any irrigation to be undertaken in the area, it will require the installation of a few surface water impoundments as storage during the dry months. The limited water availability, high evaporation rates and high water demands by crops would therefore render crop cultivation not sustainable in the study area. The many old, cultivated fields confirm that crop cultivation over the longer term is not a financially viable option under the prevailing climatic conditions.

Land capability: Livestock and / or game grazing are viable due to the slightly higher nutrient and organic content of the topsoil in woodland areas that support a mixture of palatable and unpalatable species.

- **Red-yellow apedal soils of the Avalon / Clovelly soil form**

Description: The Avalon soil form is characterised by the occurrence of a yellow-brown apedal B-horizon over a soft plinthic B – horizon. The yellow-brown apedal horizon is the same as described for the Clovelly soil form and the plinthic horizon has the following characteristics:

- Has undergone localised accumulation of iron and manganese oxides under conditions of a fluctuating water table with clear red-brown, yellow-brown or black strains in more than 10%of the horizon.
- Does not qualify as a diagnostic soft carbonate horizon.
- These soils are found between lower down the slopes than the Hutton soils and indicate the start of the soils with clay accumulation.

Clovelly soils can be identified as an apedal “yellow” B-horizon. These soils along with Hutton soils are the main agricultural soil found within South Africa, due to the deep, well drained nature of these soils. The Clovelly soils occur as a mosaic with the Avalon soil forms in the central section of the power line site. The Clovelly soil form on site is deep, although it has very low clay content. Generally, these soils were noted to interface directly on a hard rock or calcrete contact with only a thin saprolitic layer. Compaction and erosion are physical hazards to be aware of, and catered for, when working with these soil types.

Landscape: Plains.

Depth: 800-1200mm

Texture: Sandyloamclay soils

Average Clay Content: 6-20%

Agricultural Potential: Moderate to low potential soils, due to proximity to wetlands and erodibility of soils.

Land capability: The grazing potential of these low-lying areas is high due to the palatable grasses growing throughout the year on these soils. Soils are very sensitive and prone to erosion. A specific strategy is needed to prevent damage to these soils considering that overgrazing and trampling has already caused some degradation of these areas.

- **Yellowish sandyclay soils of the Oakleaf soil form**

Description: Oakleaf soil consists of an orthic A horizon, overlying a neocutanic brown apedal B horizon. Oakleaf soils are good agricultural soils due to their sandy clay loam textures. These soils are cultivated easily, hold water and adsorb nutrients allowing optimal crop production.

Landscape: Slightly undulating plains

Depth: 600 - 1200mm.

Texture: Fine sandyloam soils.

Average Clay Content: 8-15%.

Agricultural Potential: Moderate potential soils– soils deep and often sandyclayloam structure that causes a medium water holding capacity, although the clay content of the soils is sufficient. Under the climatic conditions these soils would not sustain arable crop production. The most viable option for crop production on the soil form is under irrigation considering the variable rainfall and moisture availability due to higher day temperatures. Irrigation is not a common practice in the study area though and for any irrigation to be undertaken in the area, it will require the installation of several surface water impoundments as storage during the dry months. The limited water availability, high evaporation rates and high water demands by crops would therefore render crop cultivation not sustainable in the study area. The many old, cultivated fields in the larger area confirm that crop cultivation over the longer term is not a financially viable option under the prevailing climatic conditions.

Land capability: Livestock and / or game grazing are viable due to the slightly higher nutrient and organic content of the topsoil in woodland areas that support a mixture of palatable and unpalatable species.

- **Shallowish, red apedal soils of the Hutton / Glenrosa soil form**

Description: The shallow Hutton or Glenrosa soil forms occur along the footslopes of ridges on the project site and has a medium depth. The soil in this area has a sandy-loam to loamy structure forms a mosaic of Hutton and Glenrosa soils. Hutton soils are identified based on the presence of an apedal (structureless) “red” B-horizon.

Landscape: Slightly undulating plains (woodland)

Depth: 100-400mm

Texture: Sandyloam to sandyclayloam

Average Clay Content: 10-20%

Agricultural Potential: Moderate to low potential soils, due to the shallow nature of the soils.

Land capability: Livestock and / or game grazing are viable due to the slightly higher nutrient and organic content of the topsoil in grassland and woodland areas that support a mixture of palatable and unpalatable species.

- **Shallow, rocky soils of the Glenrosa / Mispah soil form**

Description: The soils are generally shallow and derived from dolomite or quartzite in the project area. All three these soil forms can be categorised in the international classification group of lithic soil forms. In lithic soil forms the solum is dominated by rock or saprolite (weathered rock). These soils have sandy to sandyloam texture, while topsoil structure is apedal and the profiles are very shallow. Exposed rocks and boulders are spread on the soil surface throughout the area. Where dolomitic soils occur the soil clay content is higher compared to quartzitic soils.

The soil in this area is often weakly structured, sandy to loamy and forms a mosaic of shallow Glenrosa soils and very shallow rocky soils (Mispah soil form). The Mispah and Glenrosa soils found on this section of the site are widespread and shallow in depth, although it has a medium clay content.

Landscape: Outcrops and ridges

Depth: 50-200mm

Texture: Sandy loam soils

Average Clay Content: 8-20%

Agricultural Potential: Low potential soils, due to the shallow nature of the soils and sloping terrain, making these areas not suitable for crop cultivation under arable conditions. The orthic A-horizon of the lithic soil group is unsuitable for annual cropping or forage plants (poor rooting medium since the low total available moisture causes the soil to be drought prone).

Land capability: The grazing potential of these areas is moderate-low. The most suitable and optimal utilization of the area would be grazing by small livestock or game species.

- **Black or dark grey clayey soils associated with the drainage channels and floodplains of the Valsrivier / Katspruit / Rensburg soil forms.**

Description: The Rensburg Soil Form is also characterised by the occurrence of a vertic A horizon, with the A-horison underlain by a G-horizon

Landscape: Drainage channels and wetlands

Depth: 700-1000mm

Texture: Clay

Average Clay Content: 40-60%

Agricultural Potential: Zero potential soils, due to the soil wetness these areas are not suitable for crop cultivation under arable conditions.

Land capability: The grazing potential of these low-lying areas is high due to the palatable grasses growing throughout the year on these soils. The only limiting factor may be that livestock movement is limited during the wet season when the clay expands, causing livestock to get stuck in the muddy conditions. Soils are very sensitive and prone to erosion. A specific strategy is needed to prevent damage to these soils considering that overgrazing and trampling has already caused some degradation of the floodplains.

9.4.11.2 Agro-Enterprise and Land Capability

Arable land (crop production)
Based on Part 1 of the Regulation of Conservation of Agricultural Resources Act 43 of 1983, the proposed area, earmarked for the development of the Quagga PV Solar Park and connecting power line, located in the Free State Province can be classified as having Moderate potential soils because of the following:

- The proposed development site is composed of clayey to sandy to sandy-loam soils. From the soil textural analysis, it can be concluded that the soil has a clay content varying between 4 (sandy soils) and 30% (clayey soils). The soils are further predominantly red yellow apedal soils with a loamy texture on the plateaus in the north-western and north-eastern section of the site, while the southern section of the development footprint is dominated by black clayey soils.
- The farm is also expected to receive an annual total rainfall of about 560 mm which is relatively low and highly variable. In addition, the farm is in an area which is marginal to dry for rain-fed arable crop production. Economically viable farming is thus, restrictive to irrigated cropping due the high risk that could be associated with dry-land farming. At present no irrigation or centre pivots occur on the property. Furthermore, higher day temperatures and evaporation rates in summer months may hamper soil moisture storage for crop use.
- The nature of the soil makes the potential to cultivate crops under arable conditions marginal, even though some areas of the site is currently used for maize cultivation. The cultivated land was largely not considered for the development outside the limits of the compliance guidelines, and therefore only 0.25ha of cultivated and will be developed

per 1 MW of land used for the solar plants. Therefore, the site should be classified as marginally suitable for arable agriculture due to its physical characteristics.

- Although the soil texture and depth are suitable for arable agriculture, the climatic conditions (annual rainfall 560mm) render the soils marginal for arable agriculture.

Grazing land (Livestock production)

The current vegetation at the proposed site of development consists mainly of areas of native woody perennial species and unpalatable grasses (low quality grazing grass species) on the dark clayey to sandy soils. Mixed quality grazing (highly palatable and unpalatable grasses) occurs on the site and these areas can support limited grazing by livestock and game species. The nature of the vegetation and size of the properties make the area marginal for extensive livestock production. Using planted pasture to supplement livestock production is also not an option considering the limited water availability for extensive irrigation.

Considering that re-growth of grass will take place under the panels as the mounting systems are at least 1m above ground level, the grazing value of the land will still be available to small livestock such as game and sheep. At the end of the lifetime of the solar plant, structures will be removed, and natural vegetation will re-establish naturally. The grazing value of the land can therefore be increased by using planted pasture underneath the solar panel mounts. The nature of the vegetation at the farm is therefore marginal for extensive livestock production. Using planted pasture to supplement livestock production is however possible but this could be constrained by high demand for irrigation water due to the shallow and often sandy nature of the soil and relatively higher day temperatures in summer.

The results obtained from the study were done after field observations were done to verify the soil potential classified by the Department of Agriculture on a small scale. The site should subsequently be considered as moderate potential grazing land with Moderate potential for arable agriculture considering the climatic conditions, soil physical characteristics and size of land potentially available.

The nature of the vegetation at the farm is therefore marginal for extensive livestock production. The low agricultural potential of the soils and the low to moderate grazing capacity is further confirmed by the Agricultural Maps below:

Land Capability Map - site is classified as partially arable to non-arable.

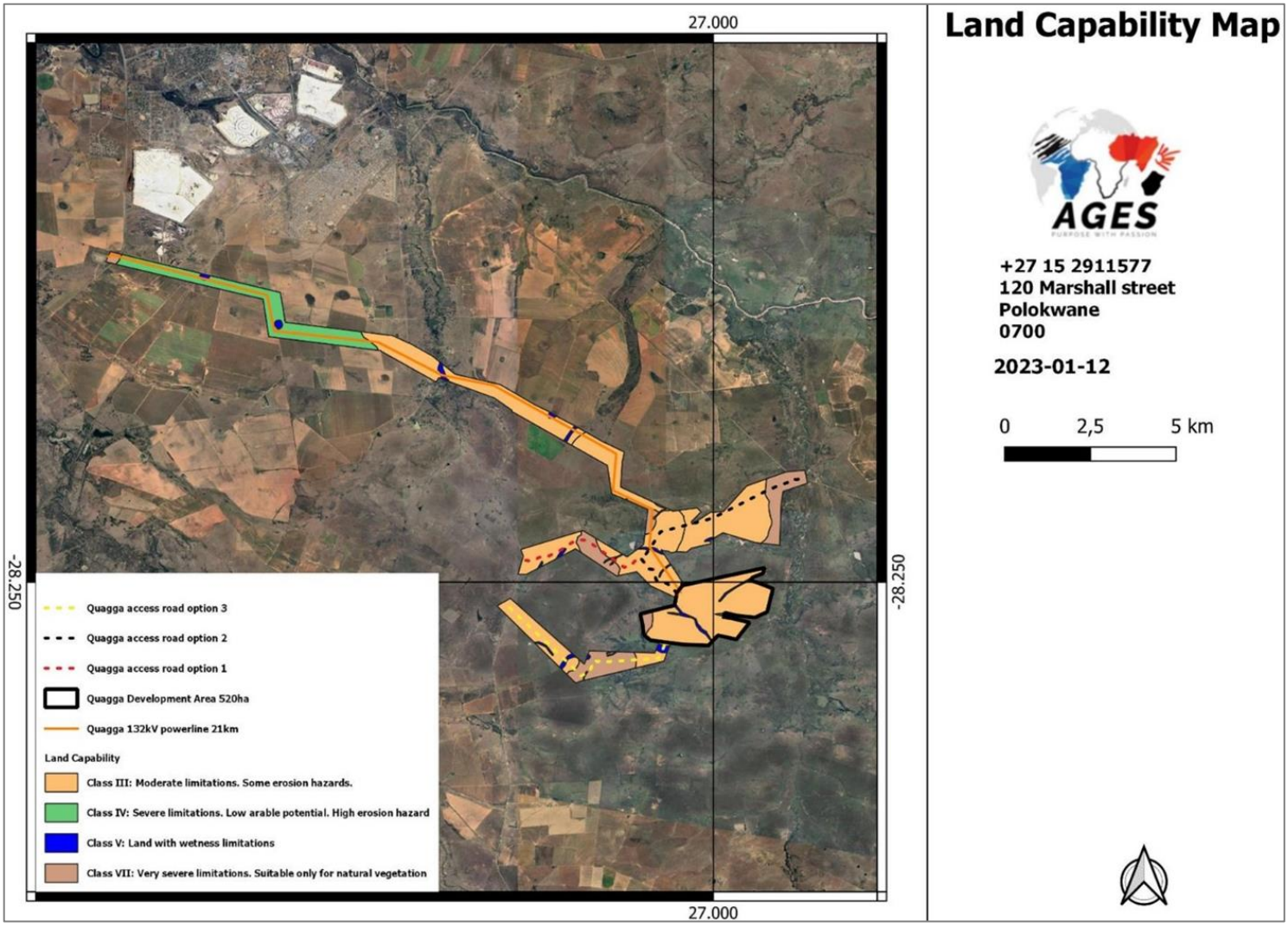

Figure 16. **Land capability Map of the project area**

Impacts on the agricultural capability

The impacts associated with the proposed development on the agro-ecosystem capability will depend on the specific area where the development will take place. The following list of impacts is anticipated with the proposed developments on the soils and land capability in the area during the construction phase:

- Disturbance of soils (soil compaction, erosion, and crusting).
- Sterilisation of soil (soil stripping).
- Soil contamination due to leaching of soluble chemical pollutants.
- Loss of current and potential agricultural land.

9.4.11.3 Alternative development footprint assessment on low or medium sensitivity areas

The areas with a low or medium sensitivity from an agricultural point of view was not considered suitable due to having near seasonally wet soils.

9.4.11.4 Site micro-siting and allowable development limits

Table 18 presented below was considered during the micro-siting of the layout plan to prevent high impacts on the cultivated land of the project area. The proposed solar development is completely in line with the allowable development limits set in the table below. No deviation occurred from the set development limits.

The extent of the impact of the proposed development on the agricultural resources is considered Medium to low considering that most of the croplands will be left undeveloped (only 0.25ha developed for each MW of the solar plants). All reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities.

Table 27. Allowable development limits for solar developments generating 20MW or more.

Criteria (land capability evaluation value and category of crop boundary)	Allowable development limits in hectares per MW of installed generation capacity (with sensitivity ratings from the national web based environmental screening tool shown in brackets)	
	Within field crop boundaries	Outside field crop boundaries
Land capability evaluation value of 11 – 15; Irrigation, horticulture/viticulture, shade-net; high value agricultural areas with a priority rating A and/or B	0 (Very High Sensitivity)	0 (Very High Sensitivity)
Land capability evaluation value of 8 – 10; all cultivated areas including sugarcane; high value agricultural areas with a priority rating C and/or D	0.20 (High Sensitivity)	0.35 (Medium Sensitivity)
Land capability evaluation value of 6 - 7;	0.25 (High Sensitivity)	2.50 (Low Sensitivity)
Land capability evaluation value of 1 - 5;	0.30 (High Sensitivity)	2.50 (Low Sensitivity)

The proposed development area is rated as land with land capability evaluation value of 6-7. This allows a development limit of 0.25 ha per MW of installed generation capacity in high sensitivity areas and 2.50 ha per MW of installed generation capacity in low sensitivity areas. Provided that the proposed development and layout plans is consistent with the agro-ecosystem sensitivity map and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.

9.4.13 CULTURAL AND HERITAGE RESOURCES

An Archaeological Impact Assessment (Annexure H) was conducted by Mr N Kruger from CES to ascertain whether there are any remains of significance in the area that will be affected by the proposed development. The farms Delaporte and Quaggafontein were portioned towards the end of the 19th century and no particular reference to archaeological sites or features of heritage potential were recorded during an examination of literature thematically or geographically related to the property. An examination of historical aerial imagery and archive maps indicate that Delaporte and Quaggafontein properties had been utilized for agriculture during the last century and portions of the project areas have been altered and transformed in the last century.

This inference was confirmed during an archaeological site assessment which identified a number of heritage receptors, and the following observations are made for the proposed Quagga Solar Park Project in terms of heritage resources management.

- A possible Iron Age Farmer site (**QGS-IA01**) is of medium significance in terms of its regional representation in the archaeological landscape and its relation to the vast and prominent later Iron Age representations of the Free State. The site is situated in the Quagga Solar Park project area and impact might occur. It is recommended that a 50 m development no-go buffer be implemented prior to commencement of the construction phase. The site and the buffer should be monitored throughout all phases of the project in order to detect impact on the site and / or destruction of previously undetected heritage sites at the earliest opportunity. Should impact on the site be foreseen, a Phase 2 heritage assessment subject to necessary SAHRA permitting should be initiated and application should be made for a destruction permit during the preconstruction phase.
- The remains of a large Historical Period settlement (**QGS-HP01**) occur within the proposed powerline corridor area and impact on the site is likely. The site of medium-low significance and its features are generally protected under the National Heritage Resource Act (NHRA 1999). Since human burials occur in the vicinity of the site, it is recommended that a 20m development no-go buffer be implemented prior to commencement of the construction phase. The site and the buffer should be monitored throughout all phases of the project to detect impact on the site and / or destruction of previously undetected heritage sites at the earliest opportunity. Should impacts on the site be foreseen application should be made for a destruction permit during the preconstruction phase. Another small Historical Period settlement (**QGS-HP02**) occurs within the proposed powerline corridor area and impact on the site is likely but the little remains of the site in terms of features and material culture and it is rated as low significance. The site should be monitored throughout all phases of the project to avoid the potential destruction of undetected heritage sites.
- A cemetery (**QGS-BP01)** occurs within the proposed powerline corridor area and impact on the high heritage significance heritage resource is likely**.** It is primarily recommended that infrastructure such as the placement of monopoles, pylons and service roads be designed to avoid the burial site where a 50m no-go buffer should be demarcated prior to the construction phase. The site should be fenced, or a permanent construction barricade should be erected to clearly indicate the site and the margins of the no-go buffer. The cemetery must be monitored on a frequent basis during all phases of the project by an informed ECO to detect direct or indirect impact on these sites. A Site Management Plan (SMP) should be implemented, detailing these conservation measures, and indicating responsible parties in this regard. Should impact on the resources prove inevitable, the graves should be relocated by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials.
- As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.

Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages

of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended, and the archaeological specialist should be notified immediately.

The following table list all identified heritage features on site, their field rating and mitigation measures.

Table 28. List of identified heritage sites

Site Code	Coordinate S E	Short Description	Field Rating	Mitigation Action	Project Phase
QGS-IA-01	S28.251358° E27.012257°	Later Iron Age Site	**3. Medium Significance**	**IF SITE IS RETAINED:** **Avoidance:** Implement a development no-go buffer of 50m. **Site Monitoring:** Strict frequent monitoring by the heritage consultant or an ECO familiar with the heritage occurrences of the site.	**Pre-Construction Construction Operations Decommissioning**
				IF IMPACT IS TO OCCUR: **Site Impact Mitigation:** Phase 2 Assessment, permitting (if impact is to occur)	**Pre-Construction**
				Close-Out Reporting: ECO review management procedures and ensure that effective measures were implemented.	**Decommissioning**
QGS-BP-01	S28.232145° E26.983951°	Burial Site	**4a. High Significance**	**IF SITE IS RETAINED:** **Avoidance:** Redesign project infrastructure to avoid impact, implement a development no-go buffer of 50m (if site is retained) **Site monitoring:** Weekly monitoring during initial site clearing and earth moving activities by an ECO familiar with the sensitivity of receptors, or the Heritage Consultant. Monthly monitoring of the burial sites is recommended during subsequent stages of development. A Site Management Plan (SMP) and a 50m conservation buffer should be implemented.	**Pre-Construction Construction Operations Decommissioning**
				IF IMPACT IS TO OCCUR: **Site Impact Mitigation:** Grave Relocation, permitting, social consultation (if impact is to occur).	**Pre-Construction**
				Close-Out Reporting: ECO review management procedures and ensure that effective measures were implemented.	**Decommissioning**
QGS-HP-01	S28.23525° E26.98127°	Historical Period Site	**2a. Low Significance**	**IF SITE IS RETAINED:** **Site Monitoring:** If the site is retained, monitor the 20m conservation buffer to detect potential impact on the site at the earliest opportunity. **General Site Monitoring** to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	**Pre-Construction Construction Operations Decommissioning**
				IF IMPACT IS TO OCCUR: **Destruction Permitting:** Apply for destruction permit (if impact is to occur).	**Pre-Construction**
QGS-HP-02	S28.185712° E26.912904°	Historical Period Site	**2a. Medium Low Significance**	General Site Monitoring to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.	**Pre-Construction Construction Operations Decommissioning**

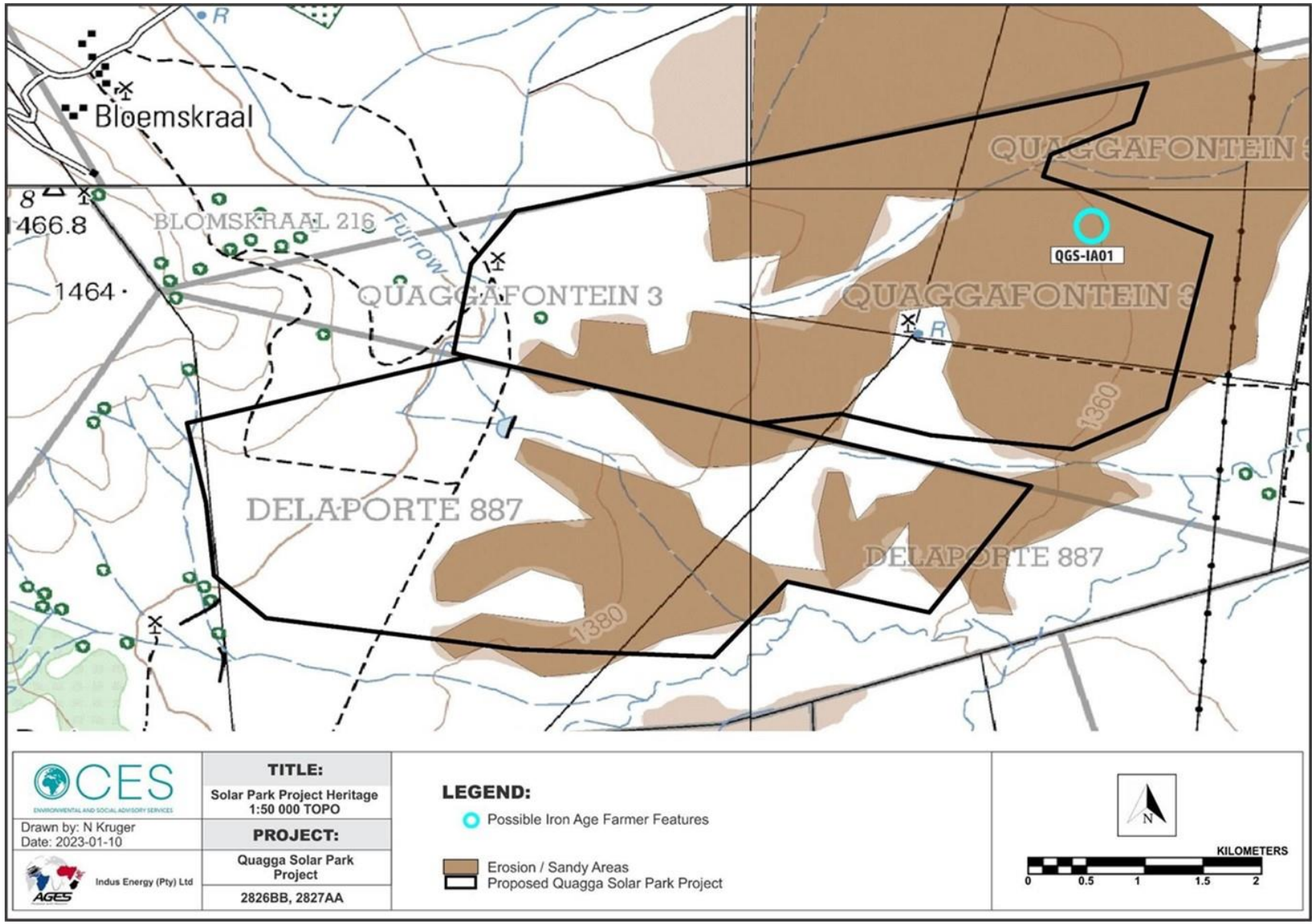

Figure 17. Heritage archaeological sites located within the Quagga Solar Park project area

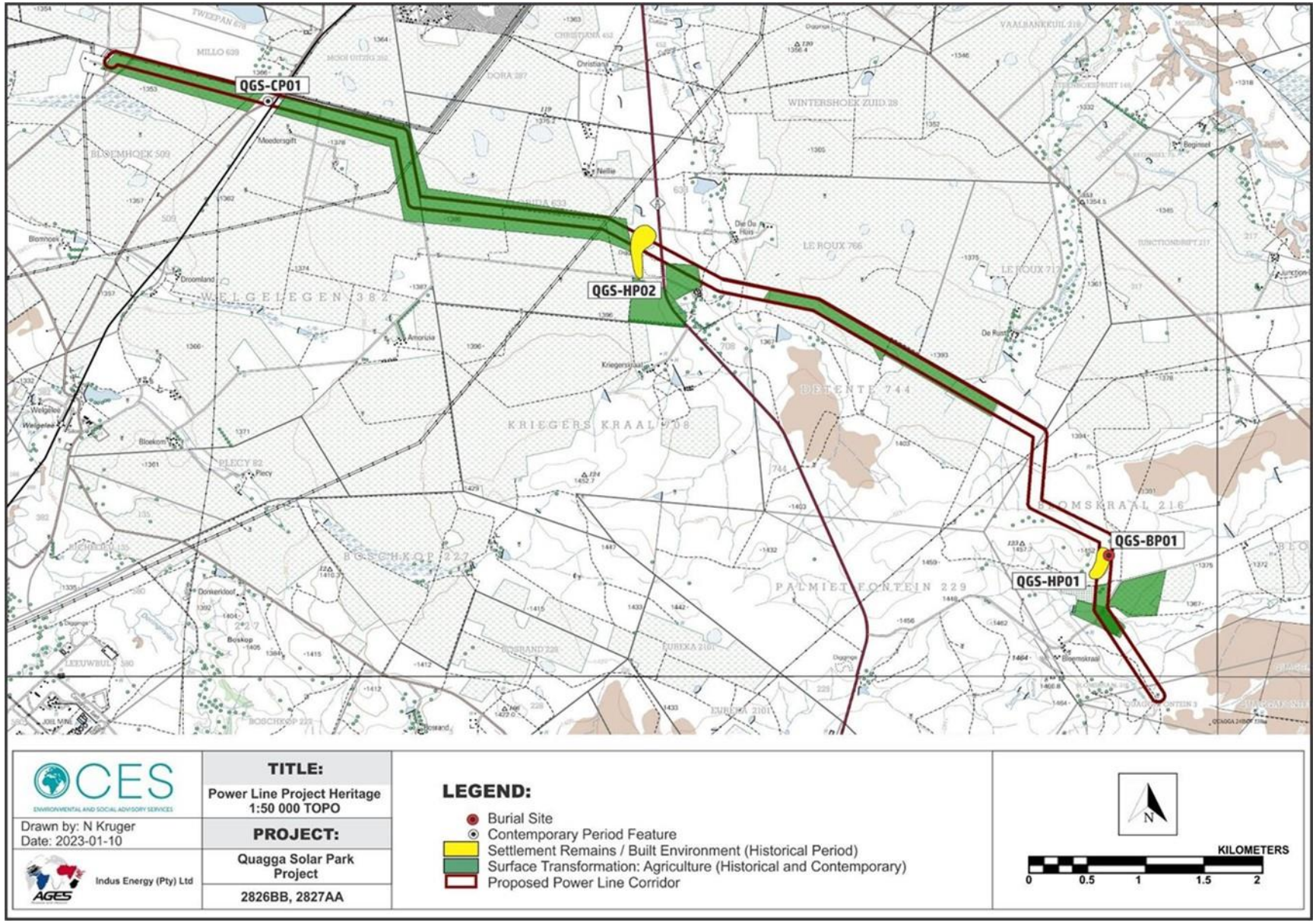

Figure 18. Heritage archaeological sites located within the connecting powerline corridor

9.4.14 PALAEONTOLOGICAL RESOURCES

Palaeontological Impact Assessments (Annexure I) were conducted by Prof Marion Bamford for the PV area and connecting powerline. The site lies in the central part of the Karoo basin where the middle Karoo Supergroup strata are exposed. Along the rivers and streams much younger reworked sands and alluvium overly the older strata.

The area is very highly sensitive for most of Farm Quaggafontein and the northern part of Farm Delaporte. For the Adelaide Subgroup and the rest is moderately sensitive for the Quaternary sands and alluvium. The site for development is in the Adelaide Subgroup and in the Daptocephalus Assemblage Zone (Smith at al., 2020).

Plants and vertebrates are not common in the Adelaide Subgroup but it has the equivalent of the upper *Cistecephalus* Assemblage Zone and the ***Daptocephalus* Assemblage Zone**. The latter is recognised by the co-occurrence of the dicynodontoid *Daptocephalus leoniceps*, the therocephalian *Theriognathus microps*, and the cynodont *Procynosuchus delaharpeae* (Viglietti, 2020). This has been further divided into two subzones, the lower *Dicynodon -Theriognathus* Subzone (in co-occurrence with Daptocephalus), and the upper *Lystrosaurus maccaigi – Moschorhinus kitchingi* Subzone (ibid). Other taxa include fish, amphibians, parareptiles, eureptiles, biarmosuchians, anomodontians, gorgonopsians, therocephaleans, cynodonts and molluscs.

Plants in the Adelaide Subgroup are from the Glossopteris flora, dominated by Glossopteris leaves but including lycopods, sphenophytes, ferns, cordaitaleans and early gymnosperms. These are mostly preserved as impressions in the fine-grained shales and mudstones. Quaternary sands and alluvium do not preserve fossils (Botha, 2021; Cowan, 1995) but they might trap transported fossils or cover fossil traps such as palaeo-pans and palaeo-springs (Goudie and Wells, 1985). Such features are usually visible in satellite imagery. Pans are fairly common in the Free State but there are none visible in this area.
There were no rocky outcrops in the area and no fossils of bones or plants were present on the land surface. The soils appeared to be fairly deep and covered by secondary grassland. The entire area comprised open fields that have been cleared and cultivated in the past. The land was almost flat to gently undulating so visibility was good.
There were NO FOSSILS visible on the land surface and no rocky outcrops on site that could potentially preserve any fossils.

Recommendations of the Palaeontological Specialist
Based on the fossil record for the area but confirmed by the site visit and walk through there are no rocky outcrops and NO FOSSILS of the Daptocephalus Assemblage Zone (Adelaide Subgroup, Beaufort Group, Karoo Supergroup) of flora or fauna even though fossils have been recorded from rocks of a similar age and type in South Africa. It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Adelaide Subgroup so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the contractor, environmental officer, or other responsible person, once

excavations and drilling have commenced, then they should be rescued, and a palaeontologist called to assess and collect a representative sample.

Cumulative Impact

None. Since each fossil outcrop is unique and may or may not be extensive. The destruction or preservation of one site will not impact on other sites. The same applies to developments on the sites. They are independent of each other. In addition, there are no fossils on this project footprint so there is no impact on the national paleontological heritage.

9.4.15 TRAFFIC IMPACT ASSESSMENT

9.4.14.1 Findings of the traffic assessment

- Access to the proposed development will be via the R73 road.
- Overall, the road surface of Road R73 is in good condition based on visual inspection.
- The road network-related impact from a road capacity perspective due to the proposed Quagga Solar Park would have a low significance due to a low volume of vehicles along Road R73 as determined by the relevant 12-hour manual traffic counts and no road capacity-related mitigating measures would be required.
- The road network-related impact from a road safety perspective in terms of intersection spacing would have a low significance due to the rural locality of the Proposed Quagga Solar Park and no other formal access intersections and limited insignificant activity within the vicinity of the Proposed Quagga Solar Park along Road R73 and that no road safety-related mitigating measures in terms of intersection spacing would be required.
- The road network-related impact from a road safety perspective in terms of intersection sight distances due to the Proposed Quagga Solar Park access intersection (Point E) would have a low significance due to the required intersection sight distances being sufficient at the proposed access intersection and no mitigating measures would be required.
- The road network-related impact from a road safety perspective in terms of the speed limit along Road R73 would have a low significance on the Proposed Quagga Solar Park and no road safety-related mitigating measures in terms of the speed limit would be required.
- Road network-related impact from a road safety perspective in terms of a need for dedicated right-turn and left-turn lanes along Road R73 as part of the Proposed Quagga Park access intersection would have a medium-high significance. Most vehicles to Quagga Solar Park are expected from the north of Road R73. A dedicated left-turn lane on the northern approach of Road R73 is recommended to allow safe space for vehicles turning left to reduce speed for turning and allowing through traffic to continue at normal speed. With the provision of the above-mentioned at the proposed access intersection (Point E), the impact from a road safety perspective in terms of the need for dedicated turning lanes would have a low significance.
- The road network-related impact from a road safety perspective in terms of pedestrian movements with the proposed access intersection (Point E) due to the Proposed Quagga Solar Park would have a low significance as no pedestrian activity is expected along Road R73 due to the rural locality of the Proposed Quagga Solar Park and limited

public transport availability, and that no road safety-related mitigating measures in terms of pedestrian movement would be required.

- The road network-related impact from a road safety perspective in terms of loading and off-loading of workers, specifically during the construction phase, as part of the Proposed Quagga Solar Park would have a medium-high significance if a dedicated loading and off-loading area is not provided on site as part of the Proposed Quagga Solar Park and workers are loaded and off-loaded within the road reserve of Road R73. With the provision of a dedicated loading and off-loading area on site as part of the Proposed Quagga Solar Park and ensuring that contractors make use of the dedicated area, the impact from a road safety perspective in terms of loading and off-loading workers would have a low significance.
- It is furthermore possible to conclude that owing to the type and nature of the Proposed Quagga Solar Park, it is expected that the activities as part of the construction and operational phases of the Proposed Quagga Solar Park will have a manageable impact on vehicle traffic during the construction and operational phases, as long as road infrastructure improvements such as loading and off-loading by public transport are implemented as indicated in Section 3.2 of the Traffic Impact Assessment.

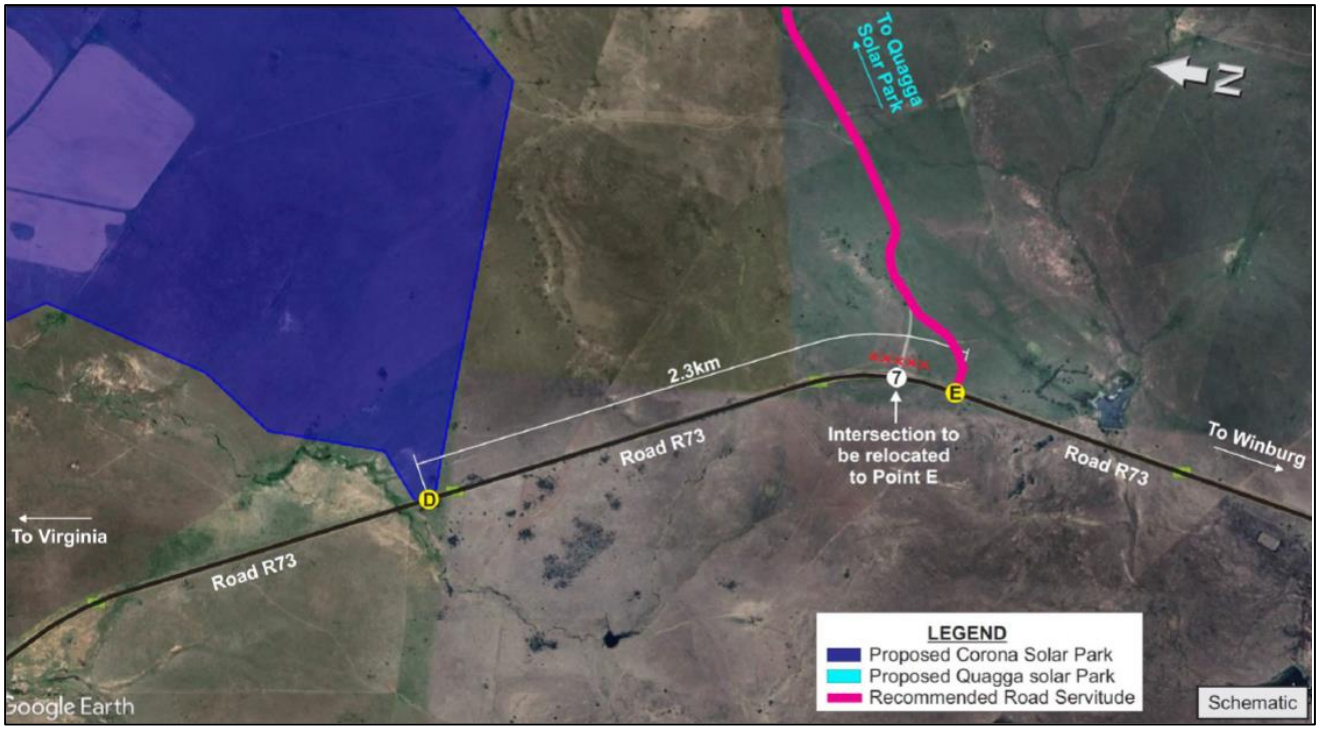

Figure 19. Proposed access point (E) for the Quagga PV Park

9.4.14.2 Recommendations by traffic engineer

The following recommendations are made from a traffic engineering point of view:

- The following intersection improvements are recommended in Table 3.3 of the Traffic Impact Assessment with regards to an intersection performance point of view (technical/capacity) and road safety point of view:
  - Provide reflective road studs as part of the proposed intersection to improve visibility of the intersection geometry when it is dark.
  - Provide relevant road traffic signs and road markings.

- Relocate existing Farm Access Road (Point 7) to Point E.
- It was anticipated that the anticipated vehicle trips to be generated by the Proposed Quagga Solar Park would come from and go north of Road R73, and therefore no dedicated right-turn lane is recommended.
- Provide 60 metres dedicated left-turn lane on the northern approach of Road R73.

- As part of the construction phase, a dedicated loading and off-loading area on site should be established where workers can safely be loaded and off-loaded by public transport or arranged transport.
- From a road safety perspective, on-site dust suppression of the proposed access roads (if gravel road) should be conducted when required to avoid road visibility issues caused by dust from vehicles making use of the road, which could lead to vehicle accidents.
- Approval for the position and geometric layout for the proposed access intersection (Point E) from and to the R73 road should be obtained from the Free State Department of Police, Roads, and Transport as part of the detailed design phase.

9.4.14.3 Reasoned opinion for authorisation of the proposed development

In conclusion of the findings as part of the investigations, Siyazi Limpopo Consulting Services (Pty) Ltd is of the opinion that the Proposed Development would have a manageable impact on the relevant road network during all phases and regardless of whether only one facility is constructed and operational or all facilities are constructed and operational at the same time, as long as the mitigation measures are implemented as recommended in the Traffic report. In this case, it is therefore recommended that authorisation be granted.

The Traffic Impact Assessment Report is included in Annexure K.

9.4.16 RADIO FREQUENCY INTERFERENCE (RFI) ASSESSMENT

The RFI Assessment (Annexure L) was conducted by Mr. PF Smuts, an ECSA registered Engineer with more than 30 years of experience in the field of Radar, microwave, and RF technology.

No registered radio and/or communication sensitive installations were identified, and all equipment used by this project, will be subjected to the standard ICASA transmission/reception regulations and approval. After evaluation and consideration of all activities identified, it is classified as low sensitivity to RFI and there should be no unacceptable impact on existing and potential, future installations if all equipment to be used permanently or temporarily has acceptable EMI/RFI levels that have been subjected to the ICASA requirements.

No Cumulative RFI effects are expected at any of the adjacent sites and whether there are one or more PV solar sites the outcome will be the same.

9.4.17 CIVIL AVIATION IMPACT REPORT

The applicant intends to undertake an activity identified in the scope of the Protocol for the Specialist Assessment and minimum Report Content Requirements for Environmental Impacts on Civil and Military Aviation Installations. Although a "low" sensitivity has been identified, TAC (Pty) Ltd (Aviation Consultant) undertook a safeguarding assessment for proposed new transmission lines in the Free State in the vicinity of Welkom Airport (FAWM), Harmony Mine Airport (FAHA) and Beatrix Mine Airport (FABX). There are no Military installations in the vicinity of the Quagga PV Solar Park & Power Line project.

The specialist verified that the Quagga PV Solar Park Project will NOT interfere and will NOT have an impact on either Harmony Mine or Beatrix Mine Airport's Obstacle Limitation surfaces, or the Approach/Departure surfaces. This is because the Quagga PV Solar Park project location is outside the Harmony Mine and Beatrix Mine Airport's Approach and Departure surfaces.

There will be no cumulative impact resulting from the Quagga PV Solar Project as the Quagga Project's location is outside the Harmony Mine and Beatrix Mine Airport's Approach and Departure surfaces. Harmony Mine Airport will therefore have no problem becoming an Instrument rated airport in the future.

As FAHA and Beatrix Mine Airports is Visual Flight Rules airports, only the Approach/Departure Surfaces were assessed. The Quagga PV Solar Park and Powerline project will not interfere or affect both FAHA and Beatrix Mine Airport Obstacle Approach/Departure Surfaces. The Approach/Departure Surfaces path of all the runways do not pass over the project plant or powerlines.

The Aviation assessment report is attached as Annexure N.

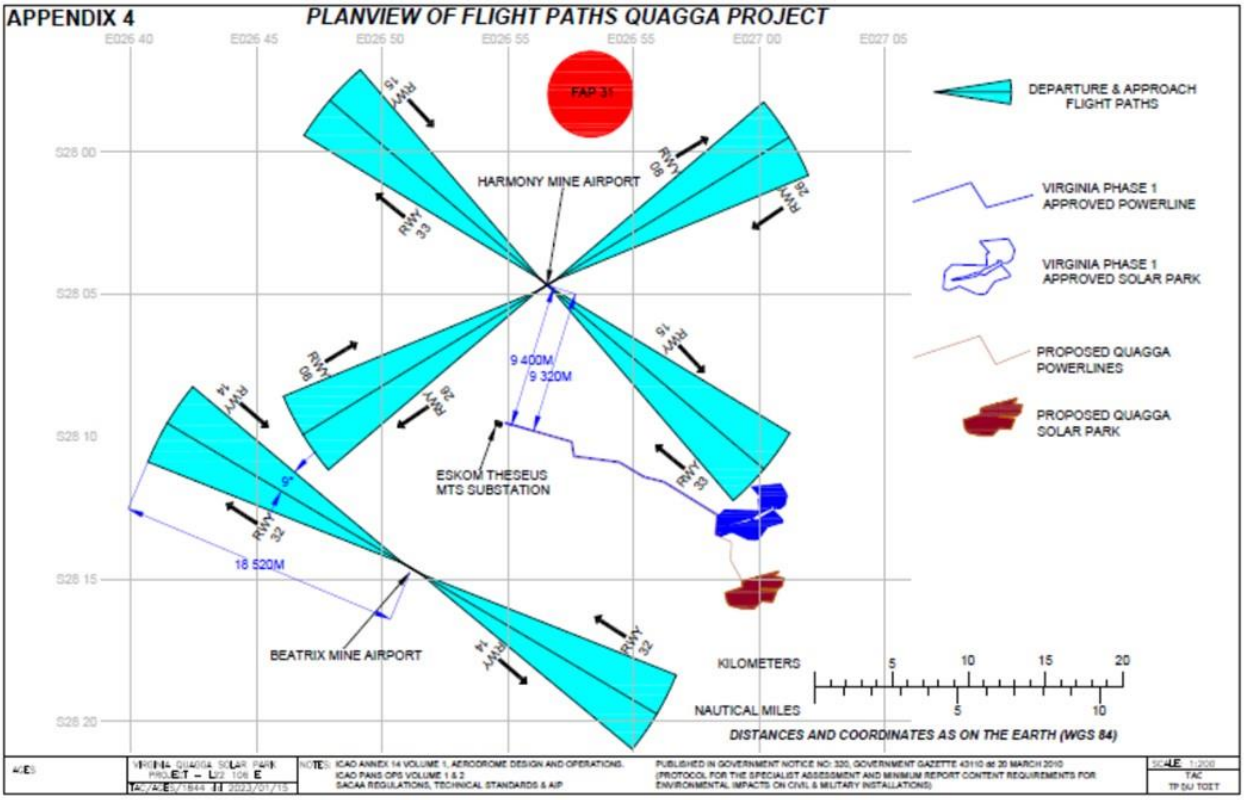

Figure 20. Flight paths for Quagga PV Solar park project

9.5 IMPACTS AND RISKS IDENTIFIED

A clear statement will be made, identifying the environmental impacts of the construction, operation, maintenance and management of the proposed project. As far as possible, the suite of potential environmental impacts identified in the study will be quantified and the significance of the impacts will be assessed. Each impact will be assessed and rated. The assessment of the data, where possible, will be based on broadly accepted scientific principles and techniques. In defect, judgements and assessments will be necessarily based on the consultant's professional expertise and experience.

As previously described, construction activities for the establishment of the proposed PV power plant include:

- land clearing activities necessary for preparation of the site and access routes;
- excavation and filling activities;
- transportation of various materials;
- construction of the storage structures;
- installation of the PV modules and construction of associated structures and infrastructure; and
- construction of the on-site high-voltage substation and new 132 kV powerline connecting the on-site substation to the new "Florida 132kV/400kV substation and 400kV switching station" (this 132kV/400kV substation is not part of this EIA application).

EXTENT

The extent of most of the construction activities is localized and impacts will only occur at the development site. Some activities will extend to adjacent landowners as access roads will be used which will lead to an increase in the traffic in the area. These will be further investigated and mitigations measures are included in the EIA report.

DURATION

The impact of construction activities will only be for the duration of the construction phase, after which it will cease completely. (Construction period planned to last a minimum of 18 months and a maximum of 24 months).

PROBABILITY

The probability of impacts occurring during the construction is phase very high as there will be impacts on the vegetation as most will be removed to make way for the proposed development.

Environmental impacts associated with the operational phase of a solar energy facility include visual and other impacts.

The decommissioning activities of the PV plant mainly include the removal of the project infrastructure and restoration and rehabilitation of the site *status quo ante*.

The identification of impacts will be based on:

- legal and administrative requirements;
- the nature of the proposed activity;

- the nature of the receiving environment;
- specialist studies and
- issues raised during the public participation process.

Environmental impacts associated with the operational phase of a solar energy facility may include visual and other impacts.

The decommissioning activities of the PV plant mainly include the removal of the project infrastructure and the restoration and rehabilitation of the site *status quo ante*.

The identification of impacts will be based on:

- legal and administrative requirements;
- the nature of the proposed activity;
- the nature of the receiving environment;
- amended specialist studies; and
- issues raised during the public participation process.

Potential impacts include:

- Impacts on soils & agricultural potential.
- Impacts on ground water.
- Impacts on the road system and traffic.
- Impacts on air quality and potential emissions.
- Geological, soil and erosion impacts.
- Impacts on avifauna.
- Impacts on vegetation.
- Impacts on heritage resources.
- Noise impacts.
- Impacts on tourism.
- Social impacts.
- Visual impacts.

Potential impacts identified include:

- **Impacts on soils & agricultural potential**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: High
  - Significance: Low
- **Impacts on ground water**
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 35 years)
  - Probability: Medium
  - Significance: Low
- **Impacts on the road system and traffic**
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 35 years)
  - Probability: Low
  - Significance: Low
- **Impacts on air quality and potential emissions**
  - Extent: Regional
  - Duration: Life of the project (approx. 35 years)
  - Probability: Very Low
  - Significance: Very Low
- **Geological, soil and erosion impacts**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: Low
  - Significance: Low
- **Impacts on avifauna**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: Low
  - Significance: Low
- **Impacts on vegetation**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: High
  - Significance: Medium
- **Impacts on heritage resources**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: Low
  - Significance: Medium-High
- **Noise impacts**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: Low
  - Significance: Very Low

- **Impacts on tourism**
  - Extent: Regional
  - Duration: Life of the project (approx. 35 years)
  - Probability: Low
  - Significance: Low
- **Social impacts**
  - Extent: Regional & Locally
  - Duration: Life of the project (approx. 35 years)
  - Probability: High
  - Significance: High - Positive
- **Visual impacts.**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 35 years)
  - Probability: Definite
  - Significance: Medium

The significance of the potential impacts were determined as all the specialist studies have been obtained.

9.5.1 DEGREE TO WHICH THE IMPACTS CAN BE REVERSED

- The visual impact is resident for a long time (25-35 years). It can be reversed during decommissioning and rehabilitation of the area.
- Biodiversity impacts can be reversed at the decommissioning stage of the development. Plants can be replanted, and animals will return to the project area.
- Impacts on soil (erosion) can be reversed by careful handling of storm water on site.
- Impacts on water quality and quantity can be reversed at the decommissioning stage.
- Agricultural resources will again become available after decommissioning of the facility.
- Impacts on Heritage resources could be permanent without mitigation.
- The potential impacts on river systems, drainage channels, pans and wetlands will be minimal. Impacts on these resources can be reversed successfully.
- Socio-economic impacts can be reversed at the decommissioning phase, though this will have a nett negative effect on the area.

9.5.2 DEGREE TO WHICH IMPACTS MAY CAUSE IRREPLACEBLE LOSS OF RESOURCES

The only impact which may cause an irreplaceable loss of resources is an impact on the heritage resources where heritage sources are destroyed. This should not happen as the heritage resources are well surveyed and protected from development impacts.

- The Iron Age Farmer site (**QGS-IA01**) is of medium significance. Should impact on the site be foreseen, a Phase 2 heritage assessment subject to necessary SAHRA permitting will be initiated and application will be made for a destruction permit during the preconstruction phase.
- The remains of a large Historical Period settlement (**QGS-HP01**) within the proposed powerline corridor is of medium-low significance. Should impact on the site be

foreseen application will be made for a destruction permit at the preconstruction phase.

- A cemetery (**QGS-BP01)** within the proposed powerline corridor is of high heritage significance. A Site Management Plan (SMP) will be compiled and implemented, and should impact on the resources prove inevitable, the graves should be relocated, in accordance with relevant legislation pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials.
- As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.

9.5.3 DEGREE TO WHICH IMPACTS CAN BE AVOIDED, MANAGED OR MITIGATED

It is not possible to completely avoid the impacts of the development on the environment. By following the mitigation and management measures detailed in the impact section in this report, most of the impacts and the effects it can have on the environment can be successfully lowered to a lower degree of significance to the environment. This can be done to a point where the impacts are acceptable and where the benefits of the development are greater than the detriment to the environment.

9.6 HIGH LEVEL RISK ASSESSMENT FOR BESS TECHNOLOGY

Batteries store electrical energy in chemical form. The range of electrochemical technologies include:
a) batteries with solid electrolyte, as Lithium-ion battery;
b) batteries with liquid electrolyte, as Na–S battery, Lead–Acid (PbA) battery, nickel - cadmium (Ni–Cd) battery or other types of liquid metal battery

A Li-ion battery cell is a sealed article, with a typical voltage of 3.6V DC per cell and it is an article with no intended release of its substances.

The preferred technology for the Battery Energy Storage System ("BESS") is **Lithium-ion battery cells**, which will be pre-assembled at the supplier factory and installed in the containers prior to delivery to the site. Lithium-ion cells technology offers the highest energy density (compared to the other cell technologies), does not suffer from memory effect and is low maintenance. Typical lithium-ion cells used for BESS hold a solid rechargeable electrolyte (the energy accumulator), therefore they don't hold any liquid or gas. The main benefit of solid ceramic electrolytes is that there is no risk of leaks, which is a serious safety issue for batteries with liquid electrolytes.

A BESS does not emit any gas to the atmosphere during construction and/or normal operation. The containers of the batteries are equipped with a firefighting system conceived to effectively detect smoke and high temperatures and automatically activate the extinguishers to prevent fire. Furthermore, the external metallic surface of the cells is conceived to resist to fire.

The preferred technology is therefore Lithium-ion battery cells with solid rechargeable electrolyte.

Under normal conditions of use, the battery does not release its content as it is sealed. In case of accidental release of the batteries components, please refer to the emergency response guidance below)

In case of large electrical serial assembly, modules and full battery may offer high Voltage hazard (> 36 Volts).

The presence of the High Voltage warning sign requires dedicated intervention equipment:

The primary focus is on the fire hazards associated with Li-ion batteries and potential for a condition known as “thermal runaway”. Thermal runaway results from **internal shorts** inside a battery cell which occur due to a variety of reasons and **can ultimately lead to the battery catching fire**.

The following measures will reduce the fire risk to an acceptable level:

- The Battery Management System should include an approved device to preclude, detect, and control thermal runaway.
- The BESS should incorporate appropriately certified inverters/inverter systems and must comply with other recognised safety standards which address risk assessment and controls.
- The BESS must be located well away from critical buildings or equipment and located in a non-combustible enclosure. Sufficient clearance should be maintained around the installation to provide for fire service access.
- Clear signage should be visible to include warnings of a possible fire hazard.
- An approved, monitored, automatic smoke detection system must be installed at the BESS. A fire suppression system must be designed and installed at the BESS.
- Regular inspections must be undertaken to ensure the battery systems are not overheating.
- Portable fire extinguishers must be provided at the BESS.
- Installations should have emergency power disconnects to ensure manual, remote, and local disconnect is possible adjacent to the BESS.
- The BESS must have an online condition monitoring system. The system should be fitted with temperature monitoring which incorporates a high temperature alarm for the battery room and container. Temperatures should be monitored at a constantly attended location.

Additional general recommendations to prevent and manage potential contamination of water resources in the BESS area:

- Compilation and adherence to a procedure for the safe handling of battery cells.
- Lithium-ion batteries must have battery management systems (containment, automatic alarms and shut-off systems) to monitor and protect cells from overcharging or damaging conditions, such as temperature extremes.

- Compilation of an Emergency Response Plan for implementation in the event of a spill of electrolyte from the batteries.
- Provision of spill kits on-site for clean-up of spills and leaks.
- Immediate clean-up of spills and disposal of contaminated absorbents and materials or soil at a licensed hazardous waste disposal facility.
- Recording and reporting of all significant electrolyte spills so that appropriate clean-up measures can be implemented. A copy of these records must be made available to authorities on request throughout the project lifecycle.
- Frequent and appropriate disposal of any hazardous waste to prevent pollution of soil and groundwater.
- On-site battery maintenance should only be undertaken on impermeable surfaces with secondary containment measures. Any resulting hazardous substances must be disposed of appropriately.
- Provision of suitable emergency and safety signage on-site, and demarcation of any areas which may pose a safety risk (including hazardous substances). Emergency numbers for the local police, fire department, Eskom and the Local Municipality must be placed in a prominent clearly visible area on the site.
- Dispose of waste batteries in accordance with national legislation. When collected waste batteries must undergo recycling to comply with national regulations. Batteries should not be disposed of into the environment.

Safe handling advice

- When handling the batteries (cells), use personal protective equipment (non-conductive gloves), specifically to avoid short-circuits between the battery poles.

Technical measures/precautions.

- Follow the instructions reported in the user's manual prepared by the manufacturer.
- Do not short (+) or (-) battery terminals with conductors, do not allow battery terminals to contact each other.
- Do not use unadopted charging systems.
- Do not reverse the polarity,
- Do not mix different types of batteries or mix new and old ones together e.g., in a power pack,
- Do not open the battery system or modules,
- Do not use the unit without its electronic management system,
- Do not submit to static electricity risks to avoid damages to the protecting electronic circuit,
- Do not submit to excessive mechanical stress,
- Do not expose the battery to water or humidity (avoid water condensation),
- Do not expose to heat. Unsuitable use can cause leakage or evacuate through a safety valve gaseous electrolyte fume that may cause fire,
- Immediately disconnect the batteries and isolate in a safe place if, during operation, they emit an unusual smell, develop heat, change shape/geometry, or behave abnormally. Contact the manufacturer if any of these problems are observed.

Storage

- Keep in a dry, cool and well-ventilated place, check the recommended storage temperature usually reported in the user's manual prepared by the manufacturer, (e.g., 35°C),
- Keep away from heat sources (max 60°C) and sources of ignition. Protect from direct exposure to sunlight.
- Keep away from water and condensation.
- Store in closed container and packaging, in such a way to prevent short circuits and damages during storage or transportation. Packaging qualified for transport is generally suitable for storage.
- In case of risk of thermal runaway during storage or transport, it is necessary to use strong outer packaging as recommended by the UN Special Provision 376 to restrict the potential ejection of cells constituents and battery parts during fire.
- In case of mixed storage of goods and articles, organize separate storage area for lithium-ion batteries and maintain a distance of 2.5m between the Lithium-ion batteries storage area and other goods.
- Store in limited quantities and in isolated area under external surveillance, unless stored in a specifically designed storage building (detectors and/or sprinklers protection systems).
- Infra-Red cameras may be used to detect any excessive temperature raise in stored quantities, e.g., > 85°C.

Potential hazard by damaged lithium batteries *in absence of fire* is mainly a release of electrolyte containing corrosive salts. Measures must be taken to protect operators from inhaling volatile organic substances. Reaction of electrolyte with water/humidity may generate hydrofluoric acid and irritate eyes, nose, throat and skin.

Personal precautions

- Use personal protective equipment.
- Avoid contact with skin and eyes.
- Ventilate the area.
- Position yourself in the wind direction.

Environmental precautions

- Eliminate all possible sources of heat or ignition.
- Prevent leakage or spillage if safe (use absorbent cloth or other inert absorbent non-conductive mineral e.g. sand, sodium bicarbonate, alumina or vermiculite).
- Dry clothes can also be used as a absorbent material in absence of fire.
- Do not allow material to contaminate ground water system.

The information below refers to exposure to the substances contained in the battery.

Call for emergency services. Consider and decide about the adapted intervention plan (ACTIVE/PASSIVE Response, proximity, or distance response).

In active response, (with Fire)

- Large flow of water can be used to **reduce the temperature of the batteries** and stop the fire reactions inside the batteries. Specific care should be taken for large and compact batteries, where cooling may require more time.
- Foam and specialized products can be used to reduce access of oxygen to the fire and stop flames but are generally less efficient than cooling down batteries. Be aware of risk of re-ignition until the batteries have been cooled down below 100°C.

In passive response, control extension of fire to neighbour materials and buildings

- Use abundant flow of water to cool down cells or batteries adjacent to the ones that have caught fire (maintain low temperature) whatever the type of batteries at the origin of the fire.
- The first responders need to be informed that in case of fire there is a risk of ejection of projectiles from the battery.

Suitable extinguishing media

- Water (see below)
- Specialized products, liquid foam, carbon dioxide (CO^2), sand, vermiculite.

Warning/risk for the use of water

- If water is used on active batteries, caution should be taken to avoid the electrical hazard that may be present (in case of high voltage battery, > 36 Volts).
- The decision to use large amount of water is depending on the local circumstances (water retentions systems, environment risks, etc.)
- In case of fire including large Lithium metal or Lithium metal polymer batteries, the use of water may increase the energy /heat release.
- In such case, stop the use of water and allow the energetic fire of the battery for 15 minutes.
- Protect or cool with water the surrounding areas to avoid propagation of the fire.

Treatment of Wastewater

- Confine the effluent or the contaminated material and collect it further as hazardous waste (water) for appropriate treatment.
- Pick up and transfer to properly labelled containers.
- Dispose of in accordance with local waste management legislation and emissions regulations

9.7 METHODOLOGY USED IN RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL IMPACTS AND RISKS ASSOCIATED WITH ALTERNATIVES

To assess the impacts on the environment, the process will be divided into two main phases namely the Construction phase and the Operational phase. The activities, products and services present in these two phases will be studied to identify and predict all possible impacts. In any process of identifying and recognising impacts, one must recognise that the determination of impact significance is inherently an anthropocentric concept. Duinker and Beanlands, (1986) in DEAT 2002. Thompson (1988), (1990) in DEAT 2002 stated that the significance of an impact is an expression of the cost or value of an impact to society.

However, the tendency is always towards a system of quantifying the significance of the impacts so that it is a true representation of the existing situation on site. This will be done by using where possible, legal and scientific standards which are applicable.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The consequence matrix uses parameters like severity, duration and extent of impact as well as compliance to standards. Values of 1-5 are assigned to the parameters that are added and averaged to determine overall consequence. The same process is followed with the likelihood that consists of two parameters namely frequency and probability. The overall consequence and the overall likelihood are then multiplied to give values ranging from 1 to 25. These values as shown in the following table are then used to rank the significance.

It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified.

The formulas for calculating Consequence, Likelihood and Significance are provided below.

Table 29. Consequence and likelihood formulas

- **C**onsequence = **s**everity + **d**uration + **e**xtent + **c**ompliance / 4 (**C = s + d + e + c / 4**)
- **L**ikelihood = **f**requency + **p**robability / 2 (**L = f + p / 2**)
- **S**ignificance = **C**onsequence x **L**ikelihood (**S = C x L**)

Table 30. Consequence and likelihood values

Consequence		
Severity		
Low	Low cost/high potential to mitigate. Impacts easily reversible, non - harmful insignificant change/deterioration or disturbance to natural environments	1
Low-medium	Low cost to mitigate Small/ potentially harmful Moderate change/deterioration or disturbance to natural environment	2
Medium	Substantial cost to mitigate. Potential to mitigate and potential to reverse impact. Harmful Significant change/ deterioration or disturbance. to natural environment	3
Medium-high	High cost to mitigate. Possible to mitigate Great/Very Harmful Very significant change/deterioration or disturbance to natural environment	4
High	Prohibitive cost to mitigate. Little or no mechanism to mitigate. Irreversible. Extremely Harmful Disastrous change/deterioration or disturbance to natural environment	5
Duration		
Low	Up to one month	1
Low-medium	One month to three months	2
Medium	Three months to one year	3
Medium-high	One to ten years	4
High	Beyond ten years	5
Extent		
Low	Within the proposed footprints	1
Low-medium	Within the application farms	2
Medium	Within surrounding farms	3
Medium-high	Within Local Municipalities areas	4
High	Within District Municipality area	5
Compliance		
Low	Best Practise	1
Low-medium	Compliance	2
Medium	Non-compliance/conformance to Policies etc. - Internal	3
Medium-high	Non-compliance/conformance to Legislation etc. - External	4
High	Directive, prosecution of closure or potential for non-renewal of licences or rights	5
Likelihood		
Frequency		
Low	Once/more a year or once/more during operation	1
Low-medium	Once/more in 6 months	2
Medium	Once/more a month	3
Medium-high	Once/more a week	4
High	Daily	5
Probability		
Low	Almost never/almost impossible	1
Low-medium	Very seldom/highly unlikely	2
Medium	Infrequent/unlikely/seldom	3
Medium-high	Often/Regularly/Likely/Possible	4
High	Daily/Highly likely/definitely	5

Table 31. Significance ratings (Plomp 2004)

Significance	Low -	Low-Medium -	Medium -	Medium-High -	High -
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

Significance	Low +	Low-Medium +	Medium +	Medium-High +	High +
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

9.8 DESCRIPTION OF THE PARAMETERS USED IN THE MATRICES

Severity:

Low	Low cost/high potential to mitigate. Impacts easily reversible, non-harmful insignificant change/deterioration or disturbance to natural environments.
Low-medium	Low cost to mitigate small/potentially harmful Moderate change/deterioration or disturbance to natural environment.
Medium	Substantial cost to mitigate. Potential to mitigate and potential to reverse impact. Harmful Significant change/ deterioration or disturbance to natural environment.
Medium-high	High cost to mitigate. Possible to mitigate Great/Very Harmful Very significant change/deterioration or disturbance to natural environment.
High	Prohibitive cost to mitigate. Little or no mechanism to mitigate. Irreversible. Extremely Harmful Disastrous change/deterioration or disturbance to natural environment.

Duration:

Low	Up to one month (1)
Low-medium	One month to three months (2)
Medium	Three months to one year (3)
Medium-high	One to ten years (4)
High	Beyond ten years (5)

Extent:

Low	Within footprint area (1)
Low-medium	Whole of site (2)
Medium	Adjacent properties (3)
Medium-high	Communities around site area (4)
High	Local Municipal area (5)

Compliance:

Low	Best Practise (1)
Low-medium	Compliance (2)
Medium	Non-compliance/conformance to policies etc. – internal (3)
Medium-high	Non-compliance/conformance to legislation etc. – external (4)
High	Directive, prosecution of closure or potential for non-renewal of licences/rights (5)

Frequency:

Low	Once/more a year or once/more during operation (1)
Low-medium	Once/more in 6 months (2)
Medium	Once/more a month (3)
Medium-high	Once/more a week (4)
High	Daily (5)

Probability:

Low	Almost never/almost impossible (1)
Low-medium	Very seldom/highly unlikely (2)
Medium	Infrequent/unlikely/seldom (3)
Medium-high	Often/Regularly/Likely/Possible (4)
High	Daily/Highly likely/definitely (5)

9.9 CUMULATIVE IMPACTS

Cumulative impacts have been assessed in relation to other renewable energy developments in the proximity of the proposed Quagga PV Solar Park. Mitigation measures are proposed, to mitigate the impacts that may result from the establishment of the Quagga PV Solar Park to an acceptable level.

The general approach to this study was guided by the principles of Integrated Environmental Management (IEM). In accordance with the IEM Guidelines issued by the DEA, an open approach, which encourages accountable decision-making, was adopted. The principles of the IEM require:

- informed decision-making.
- accountability for information on which decisions are made;
- a broad interpretation of the term “environment”;
- an open participatory approach in the planning of proposals.
- consultation with I&APs;
- due consideration of alternatives;
- an attempt to mitigate negative impacts and enhance positive impacts of proposals;
- an attempt to ensure social costs of developments are outweighed by social benefits;
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of proposals; and
- the opportunity for public and specialist input in the decision-making process.
-

Method and process used for assessment of cumulative impacts at Quagga PV Solar Park:

Step 1: Initiate the process by identifying possible cumulative impacts of the proposed project on the surrounding environment at the project location. The possible cumulative impacts can be selected based on information related to current or anticipated future conditions, the occurrence of protected species or habitats, and the presence or anticipated presence of other human activities that would (adversely) affect the same environment. Once the possible cumulative impacts have been selected, they should be subject to each of the following five steps.

Identified possible cumulative impacts:

- Visual impact
- Loss of Agricultural Resources
- Loss of Biodiversity
- Increase in Traffic Impact
- Increased positive Socio-economic Impact

Step 2: Identify other past, present, and reasonably foreseeable future actions within the space and time boundaries that could contribute to cumulative effects in the area. Based on this knowledge, identify appropriate spatial and temporal study boundaries.

- Visual impact
- Loss of Agricultural Resources

- Loss of Biodiversity
- Increase in Traffic Impact
- Increased positive Socio-economic Impact

Step 3: For the identified cumulative impacts, assemble appropriate information and describe and assess the historical to current conditions of the area. The historical information should coincide with the selected past temporal boundary (or historical reference point). Further, and depending upon the availability of information, any identified trends in the conditions of the area should be identified.

Step 4: Numerous types of tools could be used to establish either descriptive or quantitative connections. Predictions related to future cumulative impacts, resulting from multiple actions may be problematic due to the absence of detailed information; however, identification of changes in the environment and their indicators can be useful. Finally, emphasis should be given to the anticipated cumulative impacts.

Step 5: Assess significance of cumulative effects. Such significance determinations should begin with incremental effects (direct and indirect effects) of the proposed development on directly surrounding areas. Concept of environmental sustainability (social and economic sustainability) could be considered in relation to incremental effects and cumulative effects.

Step 6: For negative incremental impacts from the proposed project and for which the cumulative effects are significant, develop appropriate action-specific mitigation measures for such impacts. Further, if significant cumulative effects are anticipated consideration should be given to multi-stakeholder collaboration to develop joint cumulative effects management measures, either locally or regionally, or both. Finally, multi-stakeholder collaboration in follow-up activities can be both cost-efficient and an aid in local and regional planning.

Environmental Assessment Framework and Cumulative Effects Assessment (A tool to be used as referred to in Step 4):

1. Scoping
2. Analysis
3. Mitigation
4. Significance
5. Follow-up

9.10 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY

- The positive impact that the development will have on the environment and community is a Socio-economic impact. It will create *temporary jobs* during the construction phase.
- The Quagga PV Solar Park will assist in reducing pressure on the Eskom grid in the country with far fewer negative impacts on the natural resources of the area than in the case of power generation using other sources like coal, gas, water, and nuclear energy.

- During the operational phase the PV Solar Park might have a negative impact on the *visual environment)* around the PV Facility.

9.11 POSSIBLE MITIGATION MEASURES AND RESIDUAL RISK

- Panels must be washed with methods that can save on water use. Employees living/sleeping at the site must be educated on the saving of water.
- Water used for domestic purposes (sanitation) must be treated before release to comply with standards for effluent release.
- Storm water must be managed so that erosion is not caused on the site.
- Domestic waste must be removed from the site on a regular basis not to impact on the soils or water bodies in the area.

9.12 CONCLUDING STATEMENT INDICATING THE PREFERRED ALTERNATIVE AND LOCATION OF ACTIVITY

The preferred alternative was selected as it will have the *smallest impact* on the environment, having been located on the *least sensitive area*, avoiding potentially sensitive heritage sites and will be in line with Eskom requirements.

Negative impacts, including *cumulative* impacts can be effectively mitigated and managed to reduce the negative effect these impacts would have on the environment, so that the development, with a positive impact on the socio-economic environment as well as the positive impact of sustainable, renewable energy generation, will have a positive effect on the environment as a whole, which would offset the negative effects of the development.

10 DESCRIPTION OF THE PROPOSED PROCESS TO IDENTIFY AND RANK ENVIRONMENTAL IMPACTS THAT THE ACTIVITY, ASSOCIATED STRUCTURES AND INFRASTRUCTURE WILL IMPOSE ON THE PREFERRED LOCATION THROUGH THE LIFE OF THE ACITIVITY

An environmental impact is defined as a change in the environment, be it the physical/chemical, biological, cultural and or socio-economic environment. Any impact can be related to certain aspects of human activities in this environment and this impact can be either positive or negative. It could also affect the environment directly or indirectly and the effect of it can be cumulative.

10.1 DESCRIPTION OF ENVIRONMENTAL ISSUES AND RISKS IDENTIFIED DURING THE EIA PROCESS

The potential aspects to be assessed during the EIA process include:

- Soils & agricultural potential
- Hydrological aspects
- Avifauna aspects
- Vegetation aspects
- Heritage resources aspects
- Noise aspects
- Socio-economic aspects
- Visual aspects

The **decommissioning activities** of the PV plant mainly include the removal of the project infrastructure and the restoring and rehabilitation of the site to its *status quo ante*.

The identification of impacts will be based on:

- legal and administrative requirements;
- the nature of the proposed activity;
- the nature of the receiving environment;
- specialist studies; and
- issues raised during the public participation process.

Potential impacts include:

- Impacts on soils & agricultural potential.
- Impacts on the water resource.
- Impacts on avifauna.
- Impacts on vegetation.
- Impacts on heritage resources.
- Social impacts.
- Visual impacts.

The following possible key environmental impacts were identified:

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Air Pollution and noise		
Dust	• Construction machines and vehicles during clearing and construction of the PV Solar facility.	• Health problems • Air pollution • Public nuisance
Emissions	• During operation of construction equipment. • Spraying of insecticides and herbicides during operation. • During veld fires.	
Noise	• Construction noise.	
Water quality		
Pollution of water sources Pollution by *E.coli*	• Spillages of fuel & oil from vehicles during construction. • Pollution from solid general waste if not removed regularly. • Use of insecticides and herbicides. • Poorly planned and managed sanitation facilities.	• Pollution of surface and groundwater • Health risk • Lower water quality • Soil degradation
Water quantity		
Impact on amount of water resources available Over-use of water	• Use of water during construction of the PV solar facility. • Water use during operation.	• Loss of a scarce resource • Increased pressure on water supply sources
Land/Soil degradation		
Soil contamination and degradation	• Spillages of oil, chemicals from machinery and vehicles during construction. • Site clearing during construction. • Use of pesticides and fertilizers. • Loss of agricultural potential of soil. • Erosion if storm water is not correctly managed.	• Pollution of soil • Soil degradation • Loss of topsoil • Effect soil characteristics, ecology & groundwater • Loss of topsoil

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Biodiversity		
Decline in fauna and flora diversity	• Clearing of site for construction. • Loss of habitat due to construction of panels. • Power lines to Eskom substation.	• Loss of biodiversity • Loss of habitat • Negative impact on biodiversity • Negative impact on rare / endangered/ endemic species and habitats • Wildlife injury and/or mortalities.
Cultural/Heritage		
Possible loss of heritage sites Damage to palaeontological resources	• Damage during construction or operation.	• Possible loss of cultural heritage sites paleo-resources
Visual impact		
Change in the visual characteristics of the site	• Clearing of vegetation for panels. • Presence of Solar facility.	• Visual intrusion
Socio-economic impacts		
Job creation	• Increase in temporary and permanent work opportunities during the construction and operational phases. • Loss of land available for farming without fair compensation.	• Socio- economic benefit

10.2 IMPACTS & MITIGATION MEASURES OF CONSTRUCTION AND OPERATIONAL PHASE

All possible impacts that can be predicted during both the construction and operational (limited) phase of the PV Solar Park are addressed. Specific mitigation measures are proposed, and the significance of these impacts is described with and without the mitigation measures. Furthermore, considering that all or part of the construction infrastructure may be owned and/or operated by Eskom, the mitigation measures described in the following paragraphs and in the attached Environmental Management Programme (EMPr) must become the responsibility of Eskom or of the developer.

10.2.1 ATMOSPHERIC POLLUTION AND NOISE

Construction Phase

During this phase there will be a concentration of earthmoving equipment and construction vehicles that will level the area, clear vegetation for construction purposes and in the process, will create dust and exhaust smoke that will impact on air quality. There will also be more noise created by the vehicles during this phase. Burning of waste and fires at construction sites can also create smoke.

Operational phase

The increase in traffic volumes and people will lead to increased levels of air pollution and noise. Smoke from burning of waste will cause air pollution.

Project Phase	Impact Atmospheric Pollution and noise									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Earthworks and Vegetation clearance	Air pollution Dust	Low-medium	Medium	Medium	Low-medium	High	High	Low-medium	Medium
	Vehicle movement	Air pollution: Smoke	Low	Medium-high	Low	Low	High	High	Low	Low-Medium
	Vehicle movement	Air pollution: Dust	Low	Medium-high	Low-medium	Low-medium	High	High	Low-medium	Medium
	Vehicle movement	Noise pollution	Low	Medium-high	Low	Low-medium	High	High	Low	Low-Medium
	Burning of cleared vegetation, solid waste & veld fires	Air pollution by excessive smoke	Low-medium	Low	Medium	Low-medium	Low-Medium	Low	Low	Low-Medium
	Cooking fires of workers	Air pollution: Smoke	Low	Medium-high	Low	Low-medium	Low-Medium	Medium	Low	Low
Operation	Vehicle movement	Noise pollution	Low	High	Low-medium	Low-medium	High	Medium-high	Low-medium	Medium
	Veld fires	Air pollution caused by smoke	Medium	Low	Medium	Low-medium	Low	Medium-high	Low	Low-Medium
	Burning of vegetation refuse and solid waste	Air pollution by excessive smoke	Low-medium	Low	Low-medium	Low-medium	Low-Medium	Low-medium	Low	Low
Cumulative impacts	Dust formation & Noise during construction phase	Increase in release of dust and increase in noise levels	Low	Medium-high	Low-medium	Low-medium	Medium-high	High	Low	Low-Medium

Mitigation measures - Construction Phase

- Vehicles must be well serviced to prevent excessive smoke and noise.
- Speed of construction vehicles should be kept as low as possible (20-30km/h) to reduce generation of dust and noise.
- Construction areas must be dampened/treated to prevent excessive dust formation. This would lower the cumulative impact of dust formation.
- The clearing of the site should be done in phases as the construction progresses.
- Construction should only take place during the hours between sunrise and sunset on weekdays and Saturdays.

- Contractors must comply with provincial noise regulations. The construction machinery must be fitted with noise mufflers and be maintained properly. This would lower the cumulative impact of noise during this phase.
- Solid waste generated by the construction teams will not be burned on site or the surrounding areas but be regularly removed to the municipal waste disposal site.
- Fire belts must be made around the development according to the regulations of the Veld and Forest Fire Act.
- The cleared vegetation must be stock-piled and should be removed at regular intervals to a composting plant. The cleared vegetation must not be burned on site.
- Cooking at construction site should not be done on open fires. Gas stoves can be used.

Mitigation Measures - Operational Phase

- Speed of vehicles on roads should be controlled e.g., speed bumps and speed restrictions (20-30km/h), with visible signage.
- All roads should preferably be treated with chemicals to eliminate dust formation caused by strong winds and vehicle movement.
- Solid waste must not be burned on the project area.
- Fire belts around the development must be made according to the regulations of the Veld and Forest Fire Act.
- Vegetation underneath the panels must be kept short (grazing by sheep or slashing).
- Vegetation refuse should be composted if possible.

During operation the cumulative impact of dust generation and noise is low. Comparatively, agricultural activities would create more dust and noise.

10.2.2 LAND AND SOILS

Construction phase

During construction, the vehicles used have the potential to spill diesel and lubricants that can pollute the soil. The storage of solid waste before it can be disposed of has the potential to pollute the soil and becomes a nuisance.

The cumulative impact of possible soil erosion can be increased with the development.

Operational phase

Solid waste can be a nuisance and has the potential to pollute the soil if not managed correctly. The use of conventional fertilizers, herbicides and insecticides should be limited as far as possible. Wastewater from activities can pollute the soil.

Project Phase	Impact: Land and soils									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Spilling of oil/diesel by construction machines or tanks	Contaminate soil	Low-medium	Medium-high	Low	Low	Medium	Medium-high	Low	Low-Medium
	Spilling of chemicals/sewage	Contaminate soil	Low-medium	Medium-high	Low	Low	Medium	Medium-high	Low	Low-Medium
	Solid waste disposal	Soil pollution & nuisance	Low	Medium-high	Low-medium	Low-medium	Medium-high	Medium-high	Low	Low-Medium

Project Phase	Impact: Land and soils									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
	Storm water over roads and cleared areas	Erosion	Low-medium	Medium-high	Low-medium	Low-medium	Low-Medium	Medium-high	Low	Low-Medium
	Trenches for electric cables and water and sewerage pipes	Erosion	Low-Medium	Medium-high	Low	Low-medium	Low-Medium	Medium	Low	Low-Medium
	Moving of equipment over soils	Compaction of soils	Low-Medium	Medium-high	Low-Medium	Low	High	High	Low-Medium	Medium
	Using land for solar facility	Sterilising of Agricultural land	Low-medium	High	Low	Low-medium	High	High	Medium	Medium
Operation	Solid waste	Soil pollution + nuisance	Low	High	Low-Medium	Low	High	Medium -high	Low	Medium
	Storm water from cleared areas, roads and solar panels	Erosion	Low-medium	High	Low-medium	Low-medium	Low-Medium	Medium	Low	Low-Medium
	Use of fertilizers, insecticides and herbicides	Pollution	Low-Medium	High	Low-Medium	Low-medium	Medium	Medium-High	Low	Low-Medium
Cumulative impacts	Increased potential for negative impacts on soil resource	Increased potential for erosion and soil pollution	Low-Medium	High	Low-medium	Low-medium	Medium	Medium-high	Low	Low-Medium
	Negative impacts on soil resource	Sterilise agricultural land	Low-Medium	High	Low-Medium	Low-medium	High	High	Medium	Medium

Mitigation measures - Construction Phase

- Clearance of vegetation should be restricted to the footprint areas.
- Construction activities should be restricted to the proposed development footprints.
- Construction vehicles must be well maintained and serviced to minimise leaks and spills.
- Spill trays must be used during refuelling of vehicles on site.
- Temporary diesel storage must not exceed 30 000 litres at construction camp. Diesel tanks and other harmful chemicals and oils must be within a bunded area and water from this bunding must be channelled through an oil/water separator.
- Solid waste must be kept in containers and disposed of regularly at licensed dumping site.
- Building rubble must be removed to a licensed disposal site regularly during construction.
- Trenches that are dug for the supply of services and electrical cables must be filled up and compacted well and slightly higher than the areas around it.
- The clearing of the site should be done in phases as the construction progresses.
- Slopes produced by removing soil must be kept to a minimum to reduce the chances of erosion damage to the area.
- During construction, sensitive soils with high risk of compaction (e.g., clayey soils) must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts.
- Institute a storm water management plan including temporary and permanent erosion

control plans.
- Minimise bare areas - revegetate as soon as possible to prevent soil erosion and mitigate the cumulative effect of erosion.

Mitigation measures - Operational Phase
- Solid waste must be kept in weather- and scavenger proof waste bins and removed on a weekly basis to the waste disposal site.
- The surface drainage system should be monitored after storms and storm water damage should be repaired. The maintenance of the roads must be kept up to standard to prevent and reduce the incident of erosion next to the roads.
- The use of eco-friendly products e.g., organic compost, herbicides and insecticides should be promoted and should only be used according to the specifications.
- Revegetate bare areas to minimise soil erosion and mitigate this cumulative impact in the area.

10.2.3 GROUNDWATER AND SURFACE WATER POLLUTION

Construction phase
- Lack of sanitation facilities could result in ground water pollution and associated health risks.
- Construction vehicles that will be refuelled at the construction camp.
- Spillage of fuel and lubricants from construction vehicles could occur. Storm water contamination by solid waste could lead to groundwater and surface water pollution.
- Soil cover and vegetation is removed and storm water in the area can cause erosion. Road construction will increase a possibility of erosion, because of increased storm water run-off.

Operational Phase
- Pollution by sanitation system leakages, solid waste and erosion can lead to water pollution. Storm water run-off over open areas can cause erosion.
- Storm water flowing over polluted areas could lead to ground and surface water pollution.
- Fertilizers, pesticides, and herbicides used at the project during operation can create pollution if not handled and applied correctly.
- Cumulative impacts could be a concentration of water runoff during rain events.

Project Phase	Impact: Groundwater and Surface water Pollution									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Spillage of fuel and lubricants from construction vehicles & fuel tanks	Groundwater Pollution	Low-Medium	Medium -high	Medium	Low-medium	Medium	Medium -high	Low	Low-Medium
	Clearing of vegetation	Erosion & siltation of streams	Low-Medium	Medium -high	Medium	Low-medium	Low-Medium	Medium -high	Low	Low-Medium
	Solid waste disposal	Pollution of freshwater resources	Low	Medium -high	Low-Medium	Low-medium	High	Medium -high	Low-medium	Medium

	Sanitation seepage from chemical toilets and/or from the temporary sanitation system	Groundwater Pollution	Low-Medium	Medium -high	Low-medium	Low-medium	Medium	Medium	Low	Low-Medium
Operation	Spillage of fuel and lubricants from vehicles	Groundwater Pollution	Low-Medium	High	Low-medium	Low-medium	Medium -high	Medium -high	Low-medium	Medium
	Solid waste disposal	Groundwater Pollution	Low	High	Low-medium	Low	Low	Low-medium	Low	Low-Medium
	Leakage from the permanent sanitation system	Groundwater Pollution	Low-Medium	High	Low-Medium	Low	Low-Medium	Low-Medium	Low	Low-Medium
	Use of fertilizers, insecticides and herbicides	Pollution of streams & rivers	Low-Medium	High	Low-Medium	Low-medium	Medium	Medium -High	Low	Low-Medium
	Storm water runoff	Erosion & siltation of streams	Low-medium	High	Low-medium	Low-medium	Medium	Medium -high	Low	Low-Medium
	Cooling water for fire/thermal runaway at BESS	Pollution of surface and Groundwater	Low-Medium	High	Low-Medium	Low	Low-Medium	Medium	Low	Low-Medium
Cumulative impacts	Water pollution and increased water run-off	Increased potential for water pollution and water run-off	Low-Medium	High	Low-Medium	Low-medium	Medium -High	Medium -high	Low	Medium

Mitigation measures – Construction phases

The following precautionary measures are recommended to prevent any surface or groundwater pollution:

- A Water Use License from DWS must be obtained prior to commencement of site clearance, for all water uses identified on site.
- The site-specific groundwater management plan (GWMP) drafted during the pre-construction phase to protect the already vulnerable aquifer, must be implemented.
- The site-specific surface water management plan (SWMP) drafted during the pre-construction phase to protect hydrological features (streams, drainage lines, pans, wetlands, dams and catchments) and other environmentally sensitive areas from construction impacts including the direct or indirect spillage of pollutants, must be implemented.
- Clearance of vegetation should be restricted to footprint area.
- Construction activities should be restricted to the proposed footprint area.
- Cleared areas should be rehabilitated by reintroducing a grass layer to limit soil erosion.
- Berms to limit water flow over cleared areas, to limit erosion.
- Drip pans should be used during re-fuelling and servicing of construction vehicles. Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products.
- Oil traps must be installed in the vehicle wash bay to prevent pollution. Oil traps must be serviced on a regular basis by an approved service agent.
- Diesel storage must not exceed 30 000 litres at construction camp. Diesel tanks and other harmful chemicals and oils must be within a bunded area. Any water from out of this bunding must flow through an oil/water skimmer.
- Chemical/temporary sanitation facilities at construction site must be regularly serviced to ensure no spills or leaks to surface and/or groundwater.
- Solid waste must be kept in adequate waste bins. Building/construction waste and various waste products must be removed regularly to a licensed landfill site.

Mitigation measures - operational phase

- The conditions of the Water Use License must be adhered to for the lifecycle of the project. Audits as stipulated in the license must be carried out.
- The groundwater management plan (GWMP) to protect the vulnerable aquifer from operational impacts, must be updated as necessary, and the plan must be implemented.
- The surface water management plan (SWMP) to protect hydrological features (streams, drainage lines, pans, wetlands, dams and catchments) and other environmentally sensitive areas from operational impacts including the direct or indirect spillage of pollutants, must be updated as necessary, and the plan must be implemented.
- Solid waste must be kept in weather- and scavenger proof waste bins and removed on a weekly basis to a licensed landfill site.
- The use of eco-friendly products e.g., organic compost, herbicides and insecticides should be promoted.
- A permanent closed, sewage treatment system to treat effluent to the required standards of the DWS must be installed at the solar facility.
- The permanent sanitation system should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place.
- Storm water run-off from the site must be managed in such a way that erosion of the area is not caused by water accumulated on the site.
- Water used for extinguishing a fire or thermal runaway at BESS must be contained and disposed of or treated at a Hazardous waste facility.

10.2.4 WATER USE / WATER QUANTITY

Construction phase

During this phase, water consumption will be the highest because it will be utilized for gravel roads and construction of buildings. The water needed for the construction activities will be provided from boreholes.

Operational phase

Water use will be limited except for short periods when the PV modules are cleaned.

Project Phase	Impact: Water use									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Construction process	Water consumption	Low-medium	Medium -High	Medium	Low	High	High	Low-Medium	Medium
Operational	Water use & cleaning of panels	Water consumption	Low	High	Medium	Low	High	High	Low-Medium	Medium
Cumulative impacts	Water use	Increased pressure on local water resources	Low-Medium	High	Medium	Low	High	High	Low-Medium	Medium

Mitigation measures – Construction Phase

- Water must be used sparingly, and it should be ensured that no water is wasted.
- Roads should be treated with chemicals to lower water use for dust suppression.

- Washing of construction vehicles should be limited to once or twice a month and must be done with high-pressure sprayers to reduce water consumption.
- Water use in construction must be managed in such a way that there is no wastage of water as a resource.

Mitigation measures - Operational Phase

- Cleaning of panels should be done only when necessary to limit the impact on water resources.
- Roads should be treated with chemicals to lower the use of water for dust suppression.
- Washing of vehicles should be limited to once a week and must be done with high-pressure sprayers to reduce water consumption.
- Care must be taken not to waste any water. In the offices, half-flush systems in the toilets as well as water aerators in all taps must be installed to reduce water consumption.
- Personnel must be educated on the value of water and how to use it sparingly.

10.2.5 ARCHAEOLOGICAL, CULTURAL AND SOCIAL FEATURES

Construction phase

The clearing of the site may have a negative impact on the archaeological features of the site. Care must be taken in the excavations and moving of soil to observe any other archaeological, previously undetected, features of importance, which must be left undisturbed and reported to the archaeological consultant for comments and actions.

Operational phase

The operational phase will not have any negative impact on the archaeological features of the site if the recommendations of the Heritage Impact Assessment and Palaeontological assessment are strictly adhered to.

Project Phase	Impact: Loss of Archaeological, Cultural and social features									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Earth moving and soil clearance	Destroy archaeological evidence and heritage.	High-High	High	Low	Low	Low	Medium-High	Low	Low-Medium
	Earth moving and soil clearance	Impact on Palaeontological resources	Medium	High	Low	Low	Medium-High	Low-medium	Low	Low-Medium
Operation	Operational activities of development	Destroy archaeological evidence and heritage and graves	High-high	High	Low	Low	Low	Medium	Low	Low-Medium
Cumulative impacts	Activities on site during construction and operation	Increase in potential to unearth archaeological evidence and graves	Medium-high	High	Low	Low	Low-Medium	Medium	Low	Low-Medium

Mitigation measures – Construction and operational phases

- The Iron Age Farmer site **(QGS-IA01)** identified and indicated on the site lay out plan must be protected from construction activities. A 50m development no-go buffer must be implemented prior to commencement of the construction phase.
- The Historical Period settlement **(QGS-HP01)** identified and indicated on the site lay out plan must be protected from construction activities. A 20m development no-go buffer should be implemented prior to commencement of the construction phase. Should impact on the site be foreseen application to SAHRA must be made during the preconstruction phase for a destruction permit.
- The Historical Period settlement **(QGS-HP02)** identified and indicated on the site lay out plan (proposed powerline corridor) must be protected from construction activities.
- Cemetery **(QGS-BP01)** identified and indicated on site lay out plan (proposed powerline corridor) must be protected from construction activities.
- Infrastructure such as the placement of monopoles, pylons and service roads should be designed to avoid burial site where a 50m no-go buffer should be demarcated prior to construction. Site should be fenced, or a permanent construction barricade should be erected to clearly indicate the site and the margins of the no-go buffer.
- These sites and buffers must be monitored by an informed ECO, on a frequent basis during all phases of the project to detect and prevent impact on these sites.
- A **Site Management Plan (SMP)** must be implemented, detailing these conservation measures and indicating responsible parties in this regard.
    - Should impact on the resources prove inevitable, the graves should be relocated by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains.
    - A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials.
    - As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.

- It is not feasible for a specialist monitor to be continuously present at the earth works and therefore, personnel must be involved in mitigation by watching for fossils.
- Follow the steps outlined in the Chance Find Protocol in the Paleontological report if any fossilised remains are found.
- The ECO must contact the palaeontologist or archaeologist contracted to be on standby in the case of finds. The latter will liaise with SAHRA on the nature of the find and suitable consequent actions to be taken, such as an immediate site inspection and/or application for a palaeontological collection permit.
- Care must be taken during the construction process that anything else of archaeological value that is unearthed must be recorded. Please refer to the Heritage Impact Assessment (Annexure H). The archaeologist or SAHRA must be notified whenever anything of importance is discovered.

10.2.6 IMPACT OF THE DEVELOPMENT ON ECOLOGY (FAUNA & FLORA) OF THE AREA

Planning and construction phase

The removal of natural vegetation and destruction of habitat will have a negative effect on the biodiversity and is part of a cumulative effect together with other renewable energy development projects in the area. It is though partly on agricultural lands areas which has a LOW - MODERATE agricultural potential. The specific mitigation measures included in the Terrestrial, Avifauna and Wetland/Riparian Impact Assessments (Annexures D, E & F) should be adhered to.

Operational phase

Operation of the development can have a negative impact on biodiversity if not managed correctly. Exotic invasive plant species can have negative impacts on indigenous vegetation.

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)									
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Earthworks and vegetation clearance at construction site	Loss of indigenous species & disturbance to sensitive habitat	Medium	High	Low	Low	Medium	High	Low-Medium	Medium
	Vegetation clearance and movement of people on the site at different development areas	The introduction and spreading of exotic invasive plant species	Low-Medium	Medium	Low-Medium	Low-Medium	Medium-High	Medium-High	Low	Low-Medium
	Vegetation clearance and construction activities	Impact on avifauna	Medium	High	Low-Medium	Low	Medium	High	Low-Medium	Medium
	Construction activities close or in sensitive areas	Impact on wetlands and drainage channels	Medium	High	Low-Medium	Low	Medium	Medium-High	Low	Low-Medium
	Littering (e.g. cans and plastics) along access road and at construction site	Public nuisance and loss/death of indigenous fauna	Low-Medium	Medium-High	Medium	Low-Medium	High	Medium-High	Low	Medium
	Chemical pollution	Damaging or killing of species	Low-Medium	Medium-High	Low-Medium	Low	Medium-High	Medium	Low	Low-Medium
	Rehabilitation of cleared areas	Spreading of exotic invasive plant species	Low-Medium	Medium	Low-Medium	Low-Medium	Medium-High	Medium-High	Low	Low-Medium
	The occurrence of veld fires	The loss of indigenous fauna and flora	Medium-High	Medium	Medium	Low-Medium	Low	Medium	Low	Low-Medium

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)									
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Operation	Loss of habitat	The loss of indigenous fauna and flora	Medium	High	Low	Low	Low	High	Low-Medium	Low-Medium
	The occurrence of veld fires	The loss of indigenous fauna and flora	Medium -High	Medium	Medium	Low-Medium	Low	Medium	Low	Low-Medium
	Disposal and storage of solid waste and littering	The death/loss of indigenous fauna e.g. raptors, mammals and reptiles	Low-Medium	High	Low-Medium	Low	Medium -High	Medium	Low	Low-Medium
	The control of pests and vermin	Killing and poisoning of fauna feeding on poisoned vermin / pest	Low-Medium	High	Low-Medium	Low	Medium -High	Medium	Low	Low-Medium
	The feeding of fauna e.g. birds & small mammals	Disturbance to biodiversity and natural movement of animals through the site	Low-Medium	High	Low-Medium	Low	Medium -High	Low-Medium	Low	Low-Medium
	Catching of wild animals e.g. reptiles, bids and small mammals as pets	Disturbance to biodiversity and decline in indigenous faunal numbers	Medium -High	High	Low-Medium	Low	Medium	Low	Low	Low-Medium
	Birds colliding with power line and panels	Electrocution of birds	Medium	High	Low-Medium	Low	Medium	Medium	Low	Low-Medium
	The erection of fences and the construction of roads with a kerb	The fragmentation of available habitat and the restriction of movement of small mammals, reptiles and amphibians	Low-Medium	High	Low-Medium	Low-medium	High	Medium -high	Low	Medium
Cumulative Impacts	Increased potential negative impacts on ecology of the area	Increase in natural vegetation to be removed.	Medium -High	High	Medium	Low	Low	High	Low-Medium	Low-Medium
	Birds colliding with power line and panels	Electrocution of birds	Medium	High	Medium	Low	Medium	Medium	Low	Low-Medium

Mitigation measures – Construction phase

- At least one month prior to construction, appoint an Avifauna specialist to conduct Regime 2-monitoring during peak-season (between September and February) so that mitigation measures can be adapted to ensure the development does not have a long-term impact on the SCC in the area.
- The design of the transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2017).
- Bird diverters or spirals must be added to the transmission line to reduce fatalities.
- Monitoring by the Avifauna specialist must be done throughout the development and construction phase. Standard methods as per the species protocols must be followed.
- Bird nests found in this phase must be reported to the ECO.
- Powerline pylons must be placed outside sensitive areas (wetlands, pans, drainage lines and riparian habitat) as far as possible.
- In sensitive areas, tower assembly must take place off-site or away from sensitive positions.

- Overhead cables/lines across water resource areas must be fitted with industry standard bird flight diverters to make the lines as visible as possible to collision-susceptible species.
- All areas to be developed must be walked through prior to any activity to ensure no animal species are found in the area. Should any Species of Conservation Concern (SCC) be found and not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.
- Clearance of vegetation and construction activities must be restricted to footprint area and access roads.
- The vegetation associated with the water courses and wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended. The potential to impact on the habitat is high and therefore a sufficient buffer zone of 32 meters is applicable from the development site to the flood line zone.
- All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features on site. No development can be done within the flood line zone without a Water Use Licence, except if outside the 1:100-year flood line or 100 meters from the delineated riverine areas or 500 meters from the wetlands.
- Speed limit of 30 km/h must be enforced on the roads.
- Care must be taken that unnecessary clearance of vegetation does not take place.
- Where possible, natural vegetation (grass and herb layer) must be retained to limit this impact.
- The herbaceous layer should be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project. Small animals like sheep could also graze beneath the panels.
- Herbicides used to control invasive plant species should be chosen in consultation with an ecologist, as some of the agents might be detrimental to the surrounding indigenous fauna and flora e.g. Roundup is for example extremely toxic to frogs.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- “Critter tunnels” must be placed for a variety of small fauna that might occur in the area, with specific reference to its size and placing (aboveground / underground).
- Speed limit of 20-30km/h on site to avoid collisions with night birds and twilight active birds.
- All the parts of the infrastructure must be bird nest proofed and anti-perch devices placed on areas that can lead to electrocution.
- All probable and high-risk perching surfaces should be fitted with bird guards and perch guards as deterrents.
- Where possible the installation of artificial bird space perches or platforms at a safe distance from energised components
- Only power lines structures that are considered safe for birds should be erected to avoid the electrocution of birds (particularly large raptors) perching or attempting to perch.

- Overhead transmission cables should be marked with bird diverters or spirals to make the lines as visible as possible to collision-susceptible species.
- Fires should only be allowed at designated places within the construction camp and extra care should be taken to prevent veldt fires of occurring.
- Firebreaks should comply with the National Veld and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).
- Cleared areas should be rehabilitated by reintroducing a vegetation layer as soon as possible to limit the occurrence of erosion.
- The cleared vegetation must not be burned on site.
- Solid waste must be kept in weather- and scavenger proof waste bins at the construction camp and construction sites. Building rubble and various wastes should be removed on a regular basis to the closest available landfill site.
- Regular clean-up programs should be put into effect along the access road and throughout the premises to limit the impact of littering caused by construction activities.
- Stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain. This can be done by restricting the height of the stockpiles, sandbagging, and avoiding steep slopes.
- No animals must be killed, captured, or hunted on site by construction workers. Do not feed any wild animals on site.
- Trenches pose a risk to animals and must be cordoned off with mesh/net or similar screen during construction to prevent animals from falling into the trenches. This risk can be reduced by backfilling of trenches, immediately/as soon as possible, following installation of services, during construction.
- The EMPr must be adhered to during the construction phase and regular monitoring must be done to ensure that there is sound environmental practice at the Quagga PV Solar Park.

Mitigation measures – Operational phase

- The herbaceous layer must be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project to limit open soils which is prone to erosion.
- An ecologist should be consulted on the use of herbicides/eco-friendly products to control exotic tree and shrub species.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for all applications.
- High-risk sections of the power line from the Solar Park should be marked with a suitable anti-collision marking device on the earth wire as per Eskom guidelines.
- Report all incidences of collisions of birds with panels.
- Speed limit of 20-30 km/h on site to avoid collisions with night birds and twilight active birds.
- Regular monitoring of powerlines should be undertaken to detect bird carcasses, to enable identification of areas of high impact to be marked with bird diverters.
- Solid waste must be kept in animal proof waste bins.
- A monitoring program must be compiled and implemented to ensure that the sewage treatment system is functioning properly and that the treated wastewater

conforms to the standards set by the Department of Water and Sanitation (DWS).

- Staff members must be discouraged from attempting to catch or kill any wildlife for use as food, pets or to feed any wild animals.
- Firebreaks should comply with the National Veld and Forest Fire Act, 1998.
- Outside lighting must be designed and limited to minimize impacts on avifauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) motion detection lights must be used wherever possible.
- The impact on the flying invertebrates and night birds must be minimized using sodium vapour (red/green) motion detection lights.
- A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on **energy@birdlife.org.za**. Data must be presented as described in *Jenkins, A.R., Ralston-Paton, S., & Smit-Robinson, H. (2017). Best Practice Guidelines: Birds and Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.*
    - Raptor and larger ground birds: Drive transects & incidental
    - Passerines: Point counts
    - All species: Nest monitoring
- The use of eco-friendly products e.g., organic compost and/or Effective Microorganisms (EM), which reduces the frequency of application of conventional fertilizers, herbicides, and insecticides, should be promoted.

10.2.7 VISUAL IMPACTS

Construction phase

The natural aesthetic character of the site will be changed. However, local communities will be informed of the development stages and impacts on them during the construction phase.

Operational phase

Buildings and the solar modules have a visual impact to surrounding properties and to the sensitive viewers around the project site and lights at night can be a nuisance.

Project Phase	Impact: Visual disturbance									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Buildings& panels	Visual	Low-Medium	High	Medium	Low	High	High	Medium	Medium
	Lights	Visual	Low-Medium	High	Medium	Low	High	High	Low-Medium	Medium
Operation	Buildings and panels	Visual	Low-Medium	High	Medium	Low	High	High	Medium	Medium
	Lights	Nuisance	Low-Medium	High	Medium	Low	High	High	Low-Medium	Medium

Project Phase	Impact: Visual disturbance									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Cumulative Impacts	Increased visibility of another solar park in the area	Increased visual intrusion and nuisance	Medium	High	Medium	Low	High	High	Medium	Medium

Mitigation measures

- Only the footprint and a small "construction buffer zone" around proposed components are exposed and natural occurring vegetation, should be retained.
- Revegetate bare areas with vegetation that occur naturally in the area to limit the visual impact.
- Ensuring that cut to fill areas (if any) are revegetated with indigenous species that relate to the original vegetation types, as soon as possible after the establishment of terraces/roads/parking areas.
- Structures should be painted in a manner that mimics the hues of existing vegetation, specifically the warehouses, workshops and control buildings associated with the substation.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond immediate surrounds of project site and aimed away from public roads and areas around the site. Minimise lighting to security lighting.
- Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site.
- Ensure the perimeter fence is of a 'see through' variety and that its colour blends with the environment.
- Minimise number of light fixtures to the bare minimum and connecting these lights to motion sensors to limit light pollution.
- A video-surveillance system using infrared or microwave video cameras, which do not need a switched-on lighting system, is recommended. These facilities should be carefully considered to minimize visual impacts i.e. they should be located 'in rhythm' with other project components.

10.2.8 SAFETY, HEALTH, SECURITY AND FIRE HAZARDS

Construction phase

Construction activities such as excavating of foundations and trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site increases the risk of injury. The activities of construction personnel on site may contribute to an increase in the level of crime in the area and may also contribute to an increased fire risk.

Operational phase

Fires and criminal activities pose a significant risk during the operation of the development.

Project phase	Impact: Safety, , Health, Security and Fire hazards									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Construction activities – excavation of foundations, trenches etc.	Loss or injury to human life	Medium -High	High	Low	Low	High	Medium-High	Low	Medium
	Health issues	Spreading of diseases	Medium -High	High	Low	Low	Medium-High	Low-Medium	Low	Low-Medium
	Security	Crime	Medium -High	High	Low-medium	Low	Low-Medium	Medium	Low	Low-Medium
	Veldfires	Loss of human life and construction equipment etc.	Medium -High	Low	Medium	Low-Medium	Low-Medium	Medium-High	Low	Low-Medium
	Fire hazards from BESS	Loss of human life and construction equipment etc.	Medium -High	Low	Medium	Low	Low	Low-Medium	Low	Low
Operation	Security	Crime	Medium -High	High	Low-medium	Low	Low-Medium	Medium	Low	Low-Medium
	Fire hazards at Panels and BESS	Loss of human life, biodiversity, buildings, infrastructure etc.	Medium -High	Low	Medium	Low	Low	Low-Medium	Low	Low
Cumulative Impacts	Higher number of people in the area increases safety risks	Potential for an increase in criminal activity	Medium -High	High	Medium -High	Low-Medium	Medium	Medium-High	Low-Medium	Medium

Mitigation measures – Construction phase

- The Contractor shall conform to the Occupational Health and Safety act (Act 85 of 1993) and regulations applicable. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Mitigation measures is required in the form of equipment design and on-site security. To ensure the panels and equipment are well protected.
- A security fence should be constructed along the boundary of the development.
- Contractors must ensure that all the health protocols of the time are followed.
- Open trenches or excavations must be marked with danger tape or safety netting and must be filled and compacted as soon as possible.
- Number of construction workers to stay on site should be limited to the minimum.
- Proper access control (I.D. cards) should be enforced to ensure that no authorised persons enter the site.
- No solid waste or vegetation must be burnt on the premises or surrounding areas.
- Firebreaks must comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to prepare and maintain firebreaks).
- The fire management plan must include management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility.
- The BESS must incorporate appropriately certified inverters/inverter systems and must comply with other recognised safety standards which address risk assessment and controls.

- The BESS must be well away from critical buildings or equipment and located in a non-combustible enclosure. Sufficient clearance should be maintained around the installation to provide for fire service access.
- Advisory and warning signage must be visibly displayed.
- An approved, monitored, automatic smoke detection system must be installed at the BESS. A fire suppression system must be designed and installed at the BESS.

Mitigation measures – Operational phase

- Proper access control (I.D. cards) should be enforced to ensure that no authorised persons enter the site.
- No solid waste or vegetation must be burnt on the premises or surrounding areas.
- Firebreaks must comply with the National Veld and Forest Fire Act, 1998 (Chapter 4: Duty to prepare and maintain firebreaks).
- Fire extinguishers and fire-fighting equipment must be available especially to be able to combat fires at the BESS.
- The Battery Management System must include an approved device to preclude, detect, and control thermal runaway.
- Regular inspections must be undertaken to ensure the battery systems are not overheating.
- Installations should have emergency power disconnects to ensure manual, remote, and local disconnect is possible adjacent to the BESS.
- The BESS must have an online condition monitoring system. The system must be fitted with temperature monitoring which incorporates a high temperature alarm for the battery room and container. Temperatures must be monitored at a constantly attended location.
- The fire management plan must include management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility.
- Personal protective equipment must be issued to personnel working at the BESS to protect them against, shock, inhalation of vapours and contact with chemical substances especially when there is a fire hazard.

10.2.9 TRAFFIC AND ROAD SAFETY

Construction phase

Trip generation during the construction phase will be much higher than during operational phase. It is assumed that construction will take 24 months. If 10% of the trips occur in the peak hour approximately 4 trucks will arrive and leave in the peak hour. Private vehicles will also be used by construction supervision and admin staff to access the site as well as the construction workers who will arrive via bus or taxi.

Operational phase

During the operational phase, the facility will be managed by staff supported by admin and maintenance personnel. These are low traffic volumes (<20vph) that will have an insignificant impact on the road network surrounding the proposed development. Dedicated left turn lanes will improve road safety at the intersection.

Project phase	Impact: Traffic and Road Safety									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction & Operation	Construction activities – Increase in traffic	Higher volume of vehicle trips could contribute to a higher rate of deterioration of road surfaces	Low-Medium	High	Low-Medium	Low	High	Medium -High	Medium	Medium
	Road Safety Issues	Development access from provincial road creating accidents possibility	Medium	High	Low-medium	Low	Medium	Medium	Low	Low-Medium
	Road Safety Issues Public transport	Loading and off-loading of visitors and workers by public transport/ arranged shuttle transport could lead to the unsafe manoeuvres by vehicles at intersections it could lead to fatal vehicle accidents.	Medium	High	Low-Medium	Low-Medium	Medium - High	High	Low-Medium	Medium
Cumulative Impacts	Construction activities – Increase in traffic	High volume of vehicle trips could contribute to a higher rate of deterioration of road surfaces	Low-Medium	High	Low-Medium	Low	High	Medium -High	Medium	Medium
	Road safety issues	Accidents, and injuries or fatalities to road users	Medium	High	Low-Medium	Low	High	High	Low-Medium	Medium

Mitigation measures

- Provide reflective road studs as part of the proposed intersection to improve visibility of the intersection geometry when it is dark.
- Provide relevant road traffic signs and road markings.
- Relocate existing Farm Access Road (Point 7) to Point E.
- It was anticipated that the anticipated vehicle trips to be generated by the Proposed Quagga Solar Park would come from and go north of Road R73, and therefore no dedicated right-turn lane is recommended.
- Provide 60 metres dedicated left-turn lane on the northern approach of Road R73.
- During construction phase, ensure that contractors load and off-load pedestrians on site and not at the access intersection.
- Provide a dedicated loading and off-loading area on site and ensure that contractors make use of it and not stop within road R73 road reserve at the proposed access intersection to load and off-load workers.

10.2.10 SOCIO-ECONOMIC IMPACT

Construction phase

The construction and operation phases of the development will have a positive impact on the socio-economic environment of beneficiary communities through employment opportunities and training and skills development.

Operational phase

Several permanent jobs will be created for local people during this phase.

Project phase	Impact: Socio-economic impact									
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Compliance	Frequency	Probability	Significance	
									With Mitigation	Without Mitigation
Construction	Job creation	Job Creation (160 jobs)	High +	High +	Medium -High +	Low-Medium +	High +	High +	N/A	High +
	Solar energy value chain	Boost local business for solar components	High+	Medium -High	High	Low-Medium +	High+	High+	N/A	High+
	Crime	Possible rise in crime levels in area	Medium-	High-	Medium -	Low-	Medium -	Medium -High	Low-Medium-	Medium-
Operation	Local Community /businesses development	Local Community development	High +	High +	Medium -High +	Low-medium +	High +	High +	N/A	High +
	Contribute power to the National Grid	Reduce load shedding periods	High+	High	High	Low-medium +	High+	High+	N/A	High +
	Investment of R4bn.	Foreign investment in country and province	High+	High+	Medium -High+	Low-Medium +	Low+	High+	N/A	Medium +
	CO^2 Emissions	Reduce CO^2 Emissions opposed to coal power stations	High+	High+	High+	Low+	High+	High+	N/A	High +
	Permanent Job Creation	55 new permanent jobs created	High +	High +	Medium -High +	Low-Medium +	High +	High +	N/A	High +
	Vandalism	Possible theft of solar panels	Medium-	Low-Medium -	High-	Low-	Low-	Low-	Low	Low
Cumulative impacts	Job creation.	Increased potential for local Community development	High +	High +	Medium -High +	Low-Medium +	High +	High +	N/A	High +

Mitigation measures

- During the construction and operational phases, jobs must be created for unemployed local people and skills must be transferred to them.
- Security: Mitigation measures will be required in the form of equipment design and on-site security for protection of assets.
- Where viable, the work must be executed in a labour-intensive manner to create as many jobs as possible.
- The cumulative impact of this impact can just be positive. As one of the larger provinces in South Africa, the Free State Province is in need of more job opportunities.

10.3 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS AND RISKS

Impacts with a rating of Medium-high or High are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment, NO impacts were regarded as potentially significant impacts.

11 SUMMARY AND FINDINGS AND RECOMMENDATIONS OF SPECIALIST REPORTS AND HOW FINDINGS HAVE BEEN INCLUDED IN THE ASSESSMENT REPORT

The main issues identified because of the specialist studies include the following:

- Visual impacts
- Soil erosion (wind and water)
- Impact on biodiversity (flora & fauna)
- Impact on avifauna
- Impact on wetlands, drainage channels and riparian vegetation
- Impacts on the water resource (detailed geohydrological study will be done following receipt of Preferred Bidder status)
- Impacts on soil stability (detailed geotechnical study will be done following receipt of Preferred Bidder status)
- Impact on loss of agricultural land
- Damage to heritage sites
- Palaeontological finds
- Impacts on traffic safety

SPECIALIST	FINDINGS	RECOMMENDATIONS
Landscape Architect: Visual Impacts	• In the light of the mixed agro-industrial sense of place and the other characteristics of the receiving environment, the proposed project components will exhibit a medium contrast with the receiving environment. No night-light impact is anticipated. Discussions with the aviation impact consultant revealed that it is very unlikely that glint and glare from the proposed project would interfere with the Approach / Departure flight paths for the three local airports that are located approximately 20km – 40km from the proposed project. • There were no visual receptors with extreme relevance ratings for Quagga PV Solar Park.	• Good housekeeping to reduce dust to an absolute minimum in all working areas and the access roads. • Structures should be painted in a manner that mimics the hues of existing vegetation, specifically the warehouses, workshops and control buildings associated with the substation. • Screening of construction camp during construction. • Dust suppression must be done during construction. • Existing vegetation should be retained where possible. • Rehabilitation plan to be implemented after vegetation clearance. • Construction activities to be limited to daylight hours. • Refrain from causing 'light spillage' beyond the construction camp by installing light fixtures with directional illumination. • Keep lighting to a minimum by installing low-level bollard type lights instead of post top lights along walkways between buildings. • Where possible avoid high flood lights, and instead use lower locally lit installations. • The solar park developments should make use of a video-surveillance system. These systems use infra-red or micro-wave video-cameras, which do not need a lighting system. Only small internal streetlamps will be lit during the operational phase of this project. Security lighting will only be activated during illegal intrusion to the property. • The infrastructure should be earthy tones and greys with toned-down hues, instead of white or cream colored or black.
Soil Specialist: Soil Potential assessment	• The nature of the soil makes the potential to cultivate crops under arable conditions marginal, even though some areas of the site is currently used for maize cultivation. • Although soil texture and depth are suitable for arable agriculture, climatic conditions render the soils marginal for arable agriculture. • Considering that re-growth of grass will take place under the panels as the mounting systems are at least 1m above ground level, the grazing value of the land will still be available to small livestock such	• Unnecessary soil compaction must be avoided. • Minimize the area of land disturbance. • Erosion and dust control measures to be implemented. • Storm water management plan to be implemented. • Exposed, bare soil must be minimized. • Topsoil to be conserved and maintained where possible. • Store chemicals on impervious area • Soil pollution to be avoided and prevented. • Treat spillages according to correct procedures • Stockpile topsoil separately from subsoil • Restrict development to specific areas.

SPECIALIST	FINDINGS	RECOMMENDATIONS
	as sheep.	
Archaeologist: Archaeology and graves	• A possible Iron Age Farmer site (QGS-IA01) is situated in the Quagga Solar Park project area and impact might occur. • The remains of a large Historical Period settlement (QGS-HP01) occur within the proposed powerline corridor area and impact on the site is likely. • Another small Historical Period settlement (QGS-HP02) occurs within the proposed powerline corridor area and impact on the site is likely but the little remains of the site in terms of features and material culture and it is rated as low significance. • A cemetery (QGS-BP01) occurs within the proposed powerline corridor area and impact on the high heritage significance heritage resource is likely.	• A 50m development no-go buffer should be implemented prior to commencement of the construction phase. The site and the buffer should be monitored throughout all phases of the project to detect impact on the site and /or destruction of previously undetected heritage sites at the earliest opportunity. • Should impact on the site be foreseen, a Phase 2 heritage assessment subject to necessary SAHRA permitting should be initiated and application should be made for a destruction permit during the preconstruction phase. • 20m development no-go buffer should be implemented prior to construction phase. The site and the buffer should be monitored throughout all phases of the project to detect impact on the site an/or destruction of previously undetected heritage sites at the earliest opportunity. • The site should be monitored throughout all phases of the project to avoid the potential destruction of undetected heritage sites. • Infrastructure such as the placement of monopoles, pylons and service roads should be designed to avoid the burial site where a 50m no-go buffer should be demarcated prior to the construction phase. • The site should be fenced, or a permanent construction barricade should be erected to clearly indicate the site and the margins of the no-go buffer. The cemetery must be monitored on a frequent basis during all phases of the project by an informed ECO to detect direct or indirect impact on these sites. • A Site Management Plan (SMP) should be implemented, detailing these conservation measures and indicating responsible parties in this regard. Should impact on the resources prove inevitable, the graves should be relocated by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials. • As burials have been located on the project property, it is recommended that the EIA public participation and social consultative process address the possibility of further graves occurring in the project area.

SPECIALIST	FINDINGS	RECOMMENDATIONS
Paleontological specialist	• The proposed site lies on the moderately fossiliferous Quaternary sands and alluvium and the potentially highly fossiliferous Adelaide Subgroup that could preserve vertebrate fossils such as therapsids, fish, amphibians and parareptiles of the Daptocephalus Assemblage Zone. The site visit and walk through on 19 January 2023 by palaeontologists confirmed that the area has been or is being used for agriculture and the fields have been ploughed. • There were no rocky outcrops and NO FOSSILS present on the land surface. Given the lack of surface outcrop, there is only a very small chance that there is outcrop in the soils below the surface. • Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, developer, environmental officer or other designated responsible person once excavations or drilling activities have commenced. Since the impact will be low to moderate, as far as the palaeontology is concerned, the project should be authorised.	• It is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Adelaide Subgroup so a Fossil Chance Find Protocol should be added to the EMPr. • If fossils are found by the contractor, environmental officer, or other responsible person, once excavations and drilling have commenced, then they should be rescued, and a palaeontologist called to assess and collect a representative sample.
Avifauna specialist: Impact on biodiversity (bird collisions)	• The assessment area consisted of four avifauna habitats; transformed areas, degraded grassland, grassland and bush clumps. These habitats were still mainly in a natural state except for the regions disturbed by livestock grazing and transformed due to anthropogenic activities. Three SCC were confirmed in the assessment area (Blue Korhaan (*Eupodotis caerulenscens*), Lanner Falcon (*Falco biarmicus*) and Secretarybird (*Sagittarius*	• Servitudes must be maintained as a two-track with indigenous vegetation and a wide road must not be cleared between pylons during operation. • Outside lighting must be designed and limited to minimize impacts on avifauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (red/green) motion detection lights must be used wherever possible. • All construction and maintenance motor vehicle operators must undergo an environmental induction that includes instruction on the need to comply with speed limit (40 km/h), to respect all forms of wildlife. Speed limits must be

SPECIALIST	FINDINGS	RECOMMENDATIONS
	serpentarius)). Some high-risk avifauna species were recorded from the project area and surrounding, including raptors and water birds. • The project will result in habitat loss and degradation of avifaunal habitats. The development will lead to the clearing of vegetation and an alteration in the undeveloped nature of the area. Based on the high receptor resilience and the medium biodiversity importance, the assessment area was given low site ecological importance, with transformed areas having a very low site ecological importance (SEI). Even though the overall sensitivity is considered to be low, the specialist strongly suggests a follow-up survey to confirm the low sensitivity at the end of the wet season. • Development will lead to sensory disturbance, collision and electrocution risks. Even though impacts can be effectively mitigated, habitat loss cannot be mitigated. Considering number of applications and current solar developments in the area cumulative impact is regarded as being high. • Mitigation hierarchy implemented in this report is per information provided in section 2(4)(a)(i) of NEMA as well as overall policy on Environmental offsetting (Biodiversity Offset Guidelines, section 24J of NEMA, Sept 2021). Mitigation hierarchy includes first avoiding impact, then minimising it, then rehabilitation, and then offsetting. Where residual impact, even after mitigation, is high, then offsetting should be considered. In this case, no impacts are high post-mitigation and according to available data, offset will not be required. Mitigation measures will reduce most impacts to Moderate or Low, which is considered within limits of acceptable change.	enforced to ensure that road killings and erosion is limited. • Schedule or limit (where feasible) activities during least sensitive periods (May – August), to avoid migration, nesting and breeding seasons. • All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna populations in the region. Noise should be limited at night and during dusk and dawn to avoid disturbing roosting birds. • All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern be found and not move out of the area, or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken. • The design of the proposed transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2017). • Bird diverters or spirals must be added to the transmission line to reduce fatalities. • All the parts of the infrastructure must be nest-proofed and anti-perch devices placed on areas that can lead to electrocution. • Any exposed parts must be covered (insulated) to reduce electrocution risk. • Monitoring by an Avifauna specialist should take place between September and February so that mitigation measures can be adapted to ensure the development does not have a long-term impact on the SCCs in the area. • A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. • Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on **energy@birdlife.org.za** • Data must be presented as described in Jenkins, A.R., Ralston-Paton, S., & Smit-Robinson, H. (2017). *Best Practice Guidelines: Birds and Solar Energy: Guidelines for assessing and monitoring* the impact of solar power generating

SPECIALIST	FINDINGS	RECOMMENDATIONS
		facilities on birds in southern Africa. - Raptor and larger ground birds: Drive transects & incidental - Passerines: Point counts - All species: Nest monitoring
Terrestrial Biodiversity Specialist	• No red data species was documented during the surveys on the footprint of the solar park development site. Ecological monitoring should however still be implemented during the construction phase and specific sensitive habitats (riparian) needs to be avoided to ensure that any potential red data species potentially missed during the field surveys are preserved and not potentially impacted on. • No protected tree species occur in the area. • The protected species *Boophone disticha* and *Helichrysum nudifolium* confirmed for the site. No eradication should be allowed without a permit. • Ten different Alien invasive and exotic plant species were recorded on the study area during the surveys. • A few fauna species included in the IUCN red data lists can potentially be found in the study area. The development would not have a significant impact on the above-mentioned red data fauna since adequate and natural habitat/vegetation would be available on the peripheral grassland and woodland habitats surrounding the development site. • Provided that the proposed development is consistent with the sensitivity map, and guidelines and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.	• A permit should be obtained from the authorities before any of the protected plants are eradicated. These plants should form part of a rescue and relocation program should the development activities impact on populations. • Natural vegetation removal should be kept to a minimum during any future construction activities and only vegetation on the footprint areas should be removed. The unnecessary impact on the surrounding vegetation types should be avoided as far as possible. Considering the footprint area to form part of an area that is degraded, the impact on the vegetation of the larger area would be low. • A detailed species rescue, relocation and re-introduction plan should be developed and implemented by a qualified person before any excavations or disturbance commence. • Mitigation measures and monitoring should be implemented should the development be approved. • Where trenches pose a safety risk, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. • No animals must be poached during the construction of the solar park. • Do not feed any wild animals on site. • Waste bins and foodstuffs must be scavenger proof. • Roads should be designed without pavements to allow for the movement of small mammals. • “Critter tunnels” must be placed for a variety of small fauna that might occur in the area, with specific reference to its size and placing (aboveground / underground).
Wetland & Riparian Specialist	• Two wetland types were identified on the site for the proposed solar and power line development namely:	• The vegetation associated with the water courses and wetlands has a high sensitivity with a high conservation priority. No major alteration of these

SPECIALIST	FINDINGS	RECOMMENDATIONS
	○ Valleybottom wetland with channel ○ Depressions: ○ Exorheic depressions (man-made dams). ○ Endorheic depressions(pans). • The other drainage features on the proposed development footprint sites are classified as channels (rivers) with riparian woodland. The rivers are classified as Floodplain Rivers and Non-perennial drainage channels.	important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the habitat is high and therefore a sufficient buffer zone of 32 meters is applicable for the development site or the flood line zone. • All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features on site. No development can be done within the flood line zone without a Water Use Licence, except if outside the 1:100-year flood line or 100 meters from the delineated riverine areas or 500 meters from the wetlands.
Traffic Engineer	• Access will be from the R73 road. • Overall, the road surface of Road R73 is in good condition based on visual inspection. • The road network-related impact from a road capacity perspective due to the Proposed Quagga Solar Park would have a low significance due to a low volume of vehicles along Road R73 as determined by the relevant 12-hour manual traffic counts and no road capacity-related mitigating measures would be required. • The road network-related impact from a road safety perspective in terms of intersection spacing would have a low significance due to the rural locality of the Proposed Quagga Solar Park and no other formal access intersections and limited insignificant activity within the vicinity of the Proposed Quagga Solar Park along Road R73 and that no road safety-related mitigating measures in terms of intersection spacing would be required. • The road network-related impact from a road safety perspective in terms of intersection sight distances due to the Proposed Quagga Solar Park access intersection (Point E) would have a low significance due to the required intersection sight distances	• Provide 60 metres dedicated left-turn lane on the northern approach of Road R73. • Provide reflective road studs as part of the proposed intersection to improve visibility of the intersection geometry when it is dark. • Provide relevant road traffic signs and road markings. • Relocate existing Farm Access Road (Point 7) to Point E. • It was anticipated that the anticipated vehicle trips to be generated by the Proposed Quagga Solar Park would come from and go north of Road R73, and therefore no dedicated right-turn lane is recommended. • Provide a dedicated loading and off-loading area on site as part of the Proposed Quagga Solar Park and ensure that contractors make use of the dedicated area.

SPECIALIST	FINDINGS	RECOMMENDATIONS
	being sufficient at the proposed access intersection and no mitigating measures would be required. • The road network-related impact from a road safety perspective in terms of the speed limit along Road R73 would have a low significance on the Proposed Quagga Solar Park and no road safety-related mitigating measures in terms of the speed limit would be required. • The road network-related impact from a road safety perspective in terms of the need for dedicated right-turn and left-turn lanes along Road R73 as part of the Proposed Corona Quagga Park access intersection (Point E) would have a medium-high significance. Most vehicles to the Proposed Quagga Solar Park are expected from the north of Road R73. A dedicated left-turn lane on the northern approach of Road R73 is recommended to allow safe space for vehicles turning left to reduce speed for turning and allowing through traffic to continue at normal speed. With the provision of the above-mentioned at the proposed access intersection (Point E), the impact from a road safety perspective in terms of the need for dedicated turning lanes would have a low significance. • The road network-related impact from a road safety perspective in terms of pedestrian movements with the proposed access intersection (Point E) due to the Proposed Quagga Solar Park would have a low significance as no pedestrian activity is expected along Road R73 due to the rural locality of the Proposed Quagga Solar Park and limited public transport availability, and that no road safety-related mitigating measures in terms of pedestrian movement would be required.	

SPECIALIST	FINDINGS	RECOMMENDATIONS
	• The road network-related impact from a road safety perspective in terms of loading and off-loading of workers, specifically during the construction phase, as part of the Proposed Quagga Solar Park would have a medium-high significance if a dedicated loading and off-loading area is not provided on site as part of the Proposed Quagga Solar Park and workers are loaded and off-loaded within the road reserve of Road R73. With the provision of a dedicated loading and off-loading area on site as part of the Proposed Quagga Solar Park and ensuring that contractors make use of the dedicated area, the impact from a road safety perspective in terms of loading and off-loading workers would have a low significance. • It is furthermore possible to conclude that owing to the type and nature of the Proposed Quagga Solar Park, it is expected that the activities as part of the construction and operational phases of the Proposed Quagga Solar Park will have a manageable impact on vehicle traffic during the construction and operational phases, as long as road infrastructure improvements such as loading and off-loading by public transport are implemented as indicated in Section 3.2 of the TIA.	

12 ENVIRONMENTAL IMPACT STATEMENT

12.1 SUMMARY KEY FINDINGS OF THE EIA

It can be concluded that there will be environmental impacts including cumulative impacts because of the proposed development of the Quagga PV PV Solar facility. However, all the impacts can be mitigated to an extent which would make the development possible. Most of the impacts can be avoided and potential impacted areas such as the heritage sites will be demarcated as no-go areas, therefore limiting the possible negative environmental impacts to an acceptable level.

13 FINAL PROPOSED ALTERNATIVES RESPONDING TO IMPACT MANAGEMENT MEASURES, AVOIDANCE AND MITIGATION MEASURES IDENTIFIED IN ASSESSMENT

The preferred alternative was identified after all possible negative impacts were mapped and demarcated as no-go zones.

To minimize negative environmental impacts, there are areas that are not suitable and therefor available for future development of any kind. To mitigate the following negative impacts, the proposed mitigation measures must be implemented:

- Visual impacts
- Soil erosion (wind and water)
- Impact on biodiversity (flora & fauna)
- Impact on avifauna
- Impact on wetlands, drainage channels and riparian vegetation
- Impact on loss of agricultural land
- Damages to heritage sites
- Paleontological finds
- Impacts on traffic safety

14 ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT BY THE EAP OR SPECIALISTS WHICH ARE TO BE INCLUDED AS CONDITIONS OF AUTHORISATION

- A detailed, specialist geotechnical report, must be compiled prior to construction, detailing the ground conditions possible foundation problems and solutions on site.
- A geo-hydrological assessment must be conducted, before construction commences, as well as a hydro census and target generation and drilling exercise to determine whether sufficient groundwater is available to support the proposed development.
- Plant species found on site, protected in terms of the Free State Nature Conservation Ordinance include *Boophone disticha* and *Helichrysum nudifolium*. No eradication of these species should be allowed without a permit.
- Permit for removal of protected species must be obtained from: Free State Department of Economic, Small Business Development, Tourism and

Environmental Affairs (DESTEA).

- The drainage lines and wetland / pans must be avoided and access to these areas must be restricted. Buffers around these areas must be physically marked and be clearly visible.
- No development can be done within the flood line zone without a Water Use License, except if outside the 1:100-year flood line or 100 meters from the delineated riverine areas or 500 meters from the wetlands.
- Exotic and/or invasive plant species found on site must be eradicated, according to the amended regulations (No. R280), March 2001 of the Conservation of Agricultural Resources Act 1983 (Act no. 43 of 1983). It is the legal duty of the land user / landowner to control invasive alien plants occurring on the land under their control.
- At least one month prior to construction, appoint an Avifauna specialist to conduct Regime 2-monitoring during peak-season (between September and February) so that mitigation measures can be adapted to ensure the development does not have a long-term impact on the SCC in the area.
- The design of the transmission line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa *(Jenkins et al., 2017).*
- Bird diverters or spirals must be added to the transmission line to reduce fatalities.
- A follow-up assessment on avian biodiversity and species abundance within the assessment area and surrounding areas must be conducted within one year after the facility has been in operation and should be repeated every 3-5 years. Information obtained from the monitoring must be provided to BirdLife Renewable Energy Programme on **energy@birdlife.org.za**. Data must be presented as described in *Jenkins, A.R., Ralston-Paton, S., & Smit-Robinson, H. (2017). Best Practice Guidelines: Birds and Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa.*
- Monitoring by the Avifauna specialist must be done throughout the development and construction phase. Standard methods as per the species protocols must be followed and the developer must liaise with Birdlife SA (BLSA) in this regard.
- Conservation and monitoring protocols must be implemented.
- Recommendations by Landscape Architect must be adhered to, in order to minimize visual impacts.
- A destruction permit must be obtained from SAHRA before any archaeological sites are impacted or destroyed on the proposed development site for Quagga PV Solar Park.
- If any other artefacts of potential archaeological/paleontological significance are found, the archaeologist as well as SAHRA must be notified immediately.
- Inform staff of the need to watch for potential fossil occurrences. The Chance Finds Protocol must be implemented in the event of potential fossil finds.
- All recommendations by the traffic engineer must be implemented to minimize negative impacts on or resulting from traffic.

15 ASSUMPTIONS UNCERTAINTIES AND GAPS IN KNOWLEDGE

Uncertainties could be limited by implementing a thorough ground-truthing process before construction commences.

It is assumed that the developer will always act responsibly towards the environment during the development and will always comply with the conditions of the environmental authorization.

16 REASONED OPINION FOR AUTHORISATION OF ACTIVITY AND CONDITIONS IN RESPECT OF THAT AUTHORISATION

It is the opinion of the EAP that the environmental impacts associated with the proposed development were identified and that the mitigation measures proposed to mitigate the negative impacts will decrease the environmental negative impacts to acceptable levels.

The EAP respectfully request that the Environmental Authorization be issued for the proposed Quagga PV Solar Park.

Conditions to be included in the environmental authorization
The following conditions can be added to the conditions listed in Section 14.

- Appoint an environmental control officer on site during construction of the development to monitor the development for compliance with the conditions of the environmental authorization and the EMPr.
- Permits for protected plants to be affected by the development, and which must consequently be removed from the construction area, must be obtained prior to clearance.
- Invader plants must be controlled though removal and destruction of the plants.
- Only vegetation inside the development footprint may be removed for construction.
- The development must stay clear of the identified heritage features found on the proposed site.
- Should any previously undetected surface of subsurface paleontological or archaeological material be exposed during development activities, all activities should be suspended, and the archaeological specialist should be notified immediately.
- Sanitary facilities for convenience may not be sited at least 100m from the nearest watercourse.
- Soil erosion control and storm water management must be put in place.
- A pre-construction walk-through of the final development footprint must be undertaken to locate and identify Species of Conservation Concern that can be translocated.
- Sensitive habitats in close proximately to the development footprint must be avoided or demarcated as No-Go area.
- Search and rescue plan, Alien Invasive Species Eradication plan and Rehabilitation plan compiled as part of the Draft EMPr must be included in the final EMP report.

- Suitable bird repelling structures and bird diverters must be considered to avoid collision of birds with the PV facility.

17 PERIOD OF ENVIRONMENTAL AUTHORISATION AND DATE OF CONCLUSION OF ACTIVITY

The period for which the EA is required is for 10 years from date of Environmental Authorisation.

The date on which the activity will be concluded is within 10 years from date of Environmental Authorisation.

Post construction monitoring must be done for at least 2 years after finalisation of construction.

18 UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP

I, Anton von Well, appointed EAP for the proposed Quagga PV Solar Park and connecting power line application for Environmental Authorization, hereby confirm:

- Correctness of the information provided in this report.
- All comments and inputs and responses from stakeholders and I&APs are included herein.
- All inputs and recommendations from the specialist reports where relevant, are included.
- Any information provided by the EAP to interested and affected parties and responses by the EAP to comments or inputs made by Interested and affected parties will form part of the Final report.

Signed …… Date…08 /08/2023…….

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