Final Scoping Report **14/12/16/3/3/2/2100**

PROPOSED RENEWABLE ENERGY GENERATION PROJECT ON THE FARM BLOMSKRAAL 216, VENTERSBURG RD, MATJHABENG LOCAL MUNICIPALITY, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE

Short name: VIRGINIA 2 SOLAR PARK

October 2021

Commissioned by: Fornax Energy (Pty) Ltd
Document version 2.0 – Final

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Short name: VIRGINIA 2 SOLAR PARK

October 2021

PROJECT APPLICANT

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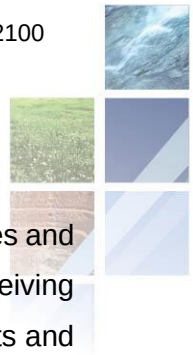

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	Department of Water and Sanitation (DWS)
	Department of Agriculture, Land Reform and Rural Development (DALRRD)
	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)
	Lejweleputswa District Municipality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

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PROJECT MAIN FEATURES IN COMPLIANCE WITH EIA GUIDELINES SUMMARY OF INFORMATION INCLUDED IN THE REPORT

GENERAL SITE INFORMATION

Site location and Property details	
Farm	**Blomskraal 216 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000021600000
Overall Extent	4246.0575 hectares
Land Owner	Forum trading 124 (Pty) Ltd
Diagram deed number	G001861
Title deed number	T6572/1981
Registration date	20020118
Current land use	Grazing, game farming and croplands

Site data	
Latitude (center point)	28° 12' 45" S
Longitude (center point)	26° 59' 24" E
Altitude	1 345 to 1 410 m.a.m.s.l.
Ground slope	Gently undulating 2% average slope

Adjacent properties	
Farm	**Le Roux 717 Ventersburg RD**
Portion	**Portion 1**
LPI code	F03500000000071700001
Land Owner	
Current land use	Croplands & grazing
Farm	**Junctiondrift 217 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000021700000
Land Owner	Pleasant View Farming (Pty) Ltd
Current land use	Grazing
Farm	**Junctiondrift 217 Ventersburg RD**
Portion	**Portion 1**
LPI code	F03500000000021700001
Land Owner	Chris Botha Trust
Current land use	Croplands
Farm	**Junctiondrift 217 Ventersburg RD**
Portion	**Portion 2**
LPI code	F03500000000021700002
Land Owner	Overberg Boerdery (Pty) Ltd
Current land use	Croplands
Farm	**Junctiondrift 217 Ventersburg RD**
Portion	**Portion 3**
LPI code	F03500000000021700003
Land Owner	RSA
Current land use	Croplands

Farm	**Rooiheuwel 57 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000005700000
Land Owner	Thys Delport Trust
Current land use	Croplands
Farm	**Randjesfontein 297 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000029700000
Land Owner	Mariette Trust
Current land use	Grazing
Farm	**De Barracks 356 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000036600000
Land Owner	WP Wessels
Current land use	Croplands & grazing
Farm	**Annies Velden 478 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000047800000
Land Owner	Tswelopele Trust
Current land use	Croplands & grazing
Farm	**Rustgevonden 285 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000028500000
Land Owner	Thys Delport Trust
Current land use	Croplands & grazing
Farm	**Vrede 389 Ventersburg RD**
Portion	**Portion 0**
LPI code	F03500000000038900000
Land Owner	Overberg Boerdery (Pty) Ltd
Current land use	Croplands & grazing
Farm	**De Poort 378 Winburg RD**
Portion	**Portion 0**
LPI code	F03500000000037800000
Land Owner	LM Trust
Current land use	Grazing
Farm	**Spes Bona 493 Winburg RD**
Portion	**Portion 0**
LPI code	F03500000000049300000
Land Owner	Lekkerlewe Trust
Current land use	Grazing
Farm	**Quaggafontein 3 Winburg RD**
Portion	**Portion 0**
LPI code	F03500000000300000
Land Owner	Forum trading 124 (Pty) Ltd
Current land use	Grazing
Farm	**Delaporte 887 Winburg RD**
Portion	**Portion 0**
LPI code	F03500000000088700000
Land Owner	Forum trading 124 (Pty) Ltd
Current land use	Grazing

Farm Portion LPI code Land Owner Current land use	**Palmietfontein 229 Winburg RD** **Portion 0** F03500000000022900000 Forum trading 124 (Pty) Ltd Grazing
Farm Portion LPI code Land Owner Current land use	**Detente 744 Ventersburg RD** **Portion 0** F03500000000074400000 Grazing

PV POWER PLANT DESIGN SPECIFICATIONS AND CONNECTION TO THE ESKOM GRID

Project data	
Project name	**VIRGINIA 2 SOLAR PARK**
Technology	**Photovoltaic power plant**
Number of phases (if necessary)	1
Maximum generating capacity at the delivery point (Export Capactiy)	up to 100 MW
Type of PV modules	Mono/Polycrystalline , mono-facial or bi-facial
Type of mounting system	fixed or horizontal single-axis trackers (SAT)
Expected annual energy production	up to 328.1 GWh/year with fixed mounting system up to 382.8 GWh/year with trackers
Expected Load factor	0.240 with fixed mounting system 0.280 with trackers
Expected Full net equivalent hours (EOH)	2100 h/year (Wh/Wp/y) with fixed mounting systems 2300 h/year (Wh/Wp/y) with trackers

Technical specifications	
Installed power capacity - AC side	**up to 125 MW**
Installed power capacity - DC side	**up to 156 MW**
Minimum structure height above ground level	1.0 m
Maximum structure height above ground level	4.5 m

Other technical information	
Footprint, including internal roads	Up to 245 hectares
PV power plant lifetime	approximately 35 years
Construction site (temporary)	approximately 10 hectares
Construction timeframe	15 to 24 months

Connection solution	
Virginia 2 Solar Park will be connected to the 132 kV busbar of the **Eskom Theseus Main Transmission Substation (MTS)** via a new 132 kV power line. A separate Basic Assessment will be conducted for the authorisation of the 132kV power line connection the on-site substation and switching station to the Eskom Theseus MTS	
Delivery point: voltage level	132 Kv
New HV substation inside the property - footprint	Approximately 10,000 m^2

Water requirements	
Water consumption	See paragraph 4.2.5 - water requirements

Technical details of the proposed facility	
Component	**Description/Dimensions**
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 245 ha. Surface area (within the project footprint) covered by PV modules, internal roads, MV stations, HV substation and BESS is up to 122 ha (cover ratio up to 0.5)
Number of overhead power lines required	1 (one) overhead power line up to 20 km long from the on-site HV substation and switching station of the Solar Park to the Eskom Theseus MTS.
Voltage of overhead power lines	132 kV
Height of the power line	up to 25 m above the ground level
Capacity of the facility	Installed power capacity - DC side (PV modules): up to 156 MWp Installed power capacity - AC side (inverters): up to 125 MW Maximum Export Capacity (@ the point of connection): up to 100 MW
Area occupied by both permanent and construction laydown areas	Project footprint / fenced area is up to 245 ha. Surface area (within the project footprint) covered by PV modules, internal roads, MV stations, HV substation and BESS is up to 122 ha (cover ratio up to 0.5) The construction camp (temporary) will be up to 10 ha in extent, within the project footprint
Additional infrastructure	Battery Energy Storage System (BESS) up to 10 ha within the Project footprint / fenced area
Access roads	The project footprint / development area will have direct access from the **regional road R70** which cross the property along the North-Western to South-Eastern direction.

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Annexure B Photos of the project site

Annexure C Public Participation Process – Comments & Responses Report

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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
DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
DFFE	National Department of Forestry, Fisheries and Environment
DMR	Department of Mineral Resources
DME	Department of Energy
DSR	Draft Scoping Report
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
FSR	Final Scoping Report
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
Property / Project site	Farm Blomskraal 216 Ventersburg RD (Matjabeng Bay Local Municipality, Lejweleputswa District Municipality, Free State Province)
PV	Photovoltaic
RFP	Request for Qualification and Proposals for New Generation Capacity under the IPP Procurement Programme
REIPPPP	Renewable Energy IPP Procurement Programme
RMIPPPP	Risk Mitigation 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
Fornax Energy	Fornax Energy (Pty) Ltd (applicant)

1. INTRODUCTION

FORNAX ENERGY (PTY) LTD (Reg. No. 2021/354777/07) is proposing the establishment of a **renewable energy generation facility (Photovoltaic Power Plant)** with associated infrastructure and structures on:

- **The Farm BLOMSKRAAL 216, Ventersburg RD**

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

Site location - Surveyor-general 21-digit site code:

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

The project site is located ±20 km South-East of Virginia and ±20km South-West of Ventersburg

The renewable energy generation facility will be a **Photovoltaic (PV) Power Plant** with a **maximum generation capacity up to 100 MW** at the point of connection (**Export Capacity**).

The name of the facility will be **VIRGINIA 2 SOLAR PARK.**

The **footprint (fenced area)** of the proposed development is approximately **245 ha in extent**.

Access to the Virginia 2 Solar Park will be from the secondary Virginia – Aldam road, which cross the project site from a northwest to southeast direction.

Fornax Energy intends to participate with the Virginia 2 Solar Park to the Round 6 of the **Renewable Energy Independent Power Producer Procurement Programme (REIPPPP**), to be launched by the **Department of Mineral Resources and Energy** ("**DMRE**").

In order to develop the facility, Fornax Energy must undertake an Environmental Impact Assessment (EIA) process and acquire environmental authorization from the *National Department of Forestry, Fisheries and 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, 2014 published on 4 December 2014, as amended under section 24(5) and 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998).

Fornax Energy is the applicant for the Virginia 2 Solar Park (the proposed project) which will be connected to the Eskom **Theseus Main Transmission Substation (MTS)** is located 16.2 km North-East of the north-western corner of project site.

The connection infrastructure is not part of this EIA process, therefore it is not assessed in this Scoping Report and Specialist Studies. A separate Basic Assessment process is ongoing in respect of the 132kV powerline for the connection of the on-site substation of the Virginia 2 Solar Park to the Eskom Theseus substation. The applicant for the powerline is Norma Energy (Pty) Ltd and the project name is Virginia 3 x 132kV Power lines.

The independent Environmental Assessment Practitioners (EAP's) which have been appointed for the undertaking of the detailed environmental studies in compliance with the 2014 EIA Regulations as amended, are **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 Fornax 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 Virginia 2 Solar Park is defined and evaluated in this Scoping Report and its annexures.

2. MOTIVATION AND RATIONALE OF THE VIRGINIA 2 SOLAR PARK IN LIGHT OF THE RENEWABLE ENERGY IPP PROCURMENT PROGRAMME REQUIREMENTS

2.1. THE CHOICE OF THE FREE STATE PROVINCE AND OF THE SITE LOCATION

The Virginia 2 Solar Park will be located in the Free State Province. During the previous Rounds of the REIPP Procurement Programme, very few projects have been selected by the Department of Energy (now Department of Mineral Resources and Energy) in the Free State Province, and none in the Lejweleputswa District Municipality. Therefore, the macro-area where the project is planned never received the benefits - in terms of socio-economic development and local contents - arising from the previous Rounds of the REIPP Procurement Programme.

The Free State Province and in particular the Matjhabeng Local Municipality has been identified by Fornax Energy as an ideal macro area for establishing a solar PV plant on the basis of several important considerations:

- solar resource is high: the *global horizontal irradiation* is 2,096 kWh/m^2/year (source: https://solargis.info/imaps/);
- there are few green projects currently under operation 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; and
- Free State Province, local municipalities and communities are eager to start establishing an eco-green image in consideration of the burden of CO_2 emissions they have to bear.

In addition to these favourable conditions in terms of desirability of a renewable solar energy projects in the Free State Province, the site of the Virginia 2 Solar Park has been chosen on the basis of several elements:

- the slope of the area and the light colour of the soil, ideal in the case of using bi-facial photovoltaic modules;
- the low to medium ecological sensitivity of the proposed project site (old fields, degraded / modified land); and
- the fact that the proposed solar park can assist the Eskom grid to meet the high energy demand related to the mining activities conducted in the Virginia and Welkom areas. Being a renewable energy project, which does not generate greenhouse gases, it can help to compensate for the greenhouse gas emissions arising from these mining and industrial activities.

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 is available for the connection of new renewable projects for up to 1260 MW.

2.2. NEED AND DESIRABILITY OF THE PROJECT

South Africa currently relies principally on fossil fuels (coal and oil) for the generation of electricity. At the present date, Eskom generates approximately 90% of the electricity used in South Africa. On the other hand, South Africa has a largely unexploited potential in renewable energy resources such as solar, wind, biomass and hydro to produce electricity as opposed to other energy types (liquid fuel or coal).

South Africa's electricity supply still heavily relies upon coal power plants, whereas the current number of renewable energy power plants is still limited. In the last few years, the demand for electricity in South Africa has been growing at a rate approximately 3% per annum.

These factors, if coupled with the 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.

The development of clean, *green* and renewable energy has been qualified as a priority by the Government of South Africa with a target for 2013 of 10 000 GWh, as planned in the Integrated Resource Plan 1 (IRP1) and with the Kyoto Protocol. Subsequently the Department of Energy of South Africa (DoE) decided to undertake a detailed process to determine South Africa's 20-year electricity plan, called **Integrated Resources Plan 2010-2030** (**IRP 2010**). The IRP1 (2009) and the IRP 2010 (2011, updated in March 2014 and in October 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 order to achieve this goal, the DoE announced a Renewable Energy IPP (Independent Power Producers) Procurement Programme.
The Renewable Energy IPP Procurement Programme (REIPPPP), issued on 3rd of August 2011, envisaged the commissioning of 3725 MW of renewable projects (1450 MW with solar photovoltaic technology) capable of beginning commercial operation before the end of 2017. This goal has not been fully fulfilled.
On 2014, the Department of Energy announced the intention to procure an additional **3 600 MW** of renewable energy projects by **2020** (DOE Media Statement of 12 December 2014).

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 solar PV and 14 400 MW of wind between **2022** and **2030**.

The purpose of the proposed Solar Photovoltaic Plant 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 in order to meet the "sustainable 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 proposed solar park will assist the Eskom grid to meet the high energy demand related to the mining and industrial activities conducted in the Virginia and Welkom areas. Furthermore, being a renewable energy project, which does not generate greenhouse gases and it will assist to compensate the greenhouse gas emissions arising from these mining and industrial activities.

The purpose of the proposed **Virginia 2 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 in order 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 can be synthesized as follows:

- low requirement for municipal services;
- compliance with national and provincial energy policies and strategies;
- no impact on people health and wellbeing;
- no waste and noise;
- no impact on air quality;
- compatibility with the ecosystem and the surrounding landscape;
- likelihood of social and economic development of marginalized, rural communities; and
- attraction of environmentally aware (green) tourists to the area.

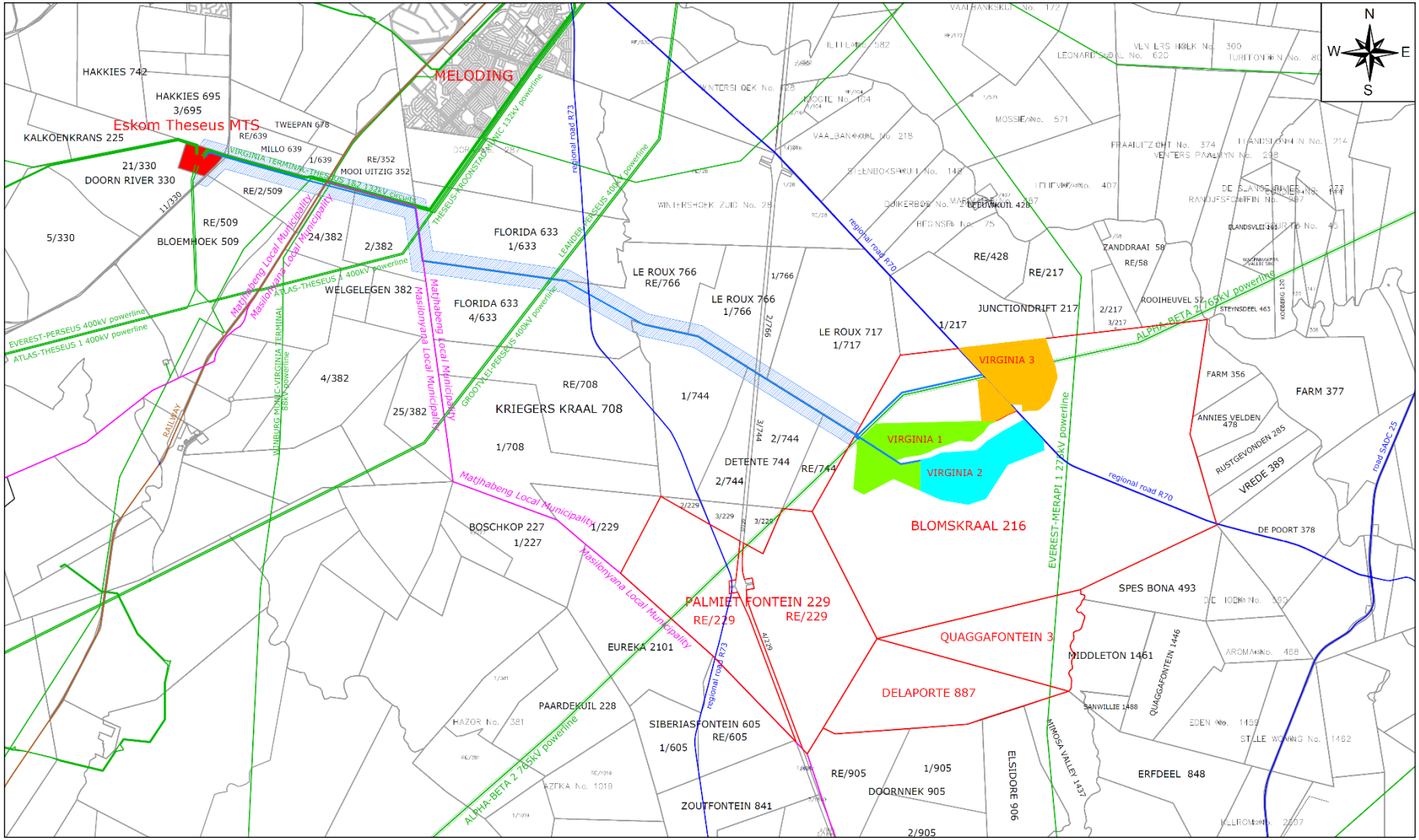

Figure 1. Locality map (cadastral map)

3. AUTHORITIES, LEGAL CONTEXT AND ADMINISTRATIVE 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.).

3.1. REGULATORY AUTHORITIES

3.1.1. National Authorities

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

- *Department of Mineral Resources and Energy (DMRE):* This Department is the competent and responsible authority 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 Environment (DFFE):* This Department is the competent and responsible authority 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 authorisation.
- *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 licence for independent power producers.
- *South African Heritage Resources Agency (SAHRA):* This Agency is responsible for the protection and the survey, in association with provincial authorities of listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes under the terms of the National Heritages Resources Act (Act no. 25 of 1999).
- *South African National Roads Agency Limited (SANRAL):* This Agency is responsible for all National Road routes.

3.1.2. 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.

3.1.3. 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 Local Municipality* which is part of the *Lejweleputswa Municipality*.

Under the terms of the Municipal System Act (Act no. 32 of 2000), all municipalities are deemed to go through 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.

3.2. LEGISLATION, REGULATIONS AND GUIDELINES

A review of the relevant legislation involved in the proposed development is detailed in table 1 below.

Table 1. 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 erection of a boundary fence (S7) • Clearing bush for boundary fencing (S17) • Access to land for purpose of 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 RSA to the actions of all organs of state, which may significantly affect the environment.

	• **NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 985 of 4 December 2014)** • 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 South Africa
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 solar PV and 14 400 MW of wind between **2022** and **2030**.
Renewable Energy IPP Procurement Programme (REIPPPP)	• Renewable Energy IPP Procurement Programme, issued on 3 August 2011 by DoE, envisages the commissioning of **3 725 MW** of renewable projects (**1 450 MW with Solar photovoltaic technology**) **capable of beginning commercial operation before the end of 2020**.
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

3.3. LISTED ACTIVITIES IN TERMS OF NEMA

The "listed activities" in terms of sections 24 and 24D of NEMA, included in **Listing Notices 1, 2 & 3 of the EIA Regulations, 2014, as amended,** involved (or *potentially* involved) in the proposed development, are detailed in table 3 below.

Table 2. Listed Activities in terms of EIA Regulations 2014 potentially triggered by the proposed development

GN R.983 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.**	The on-site substation of Virginia 2 Solar Park will be a 132 kV step-up substation and switching station located outside urban areas or industrial complexes.
GN R.983, Item 28 (i) **Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development:** **(i) will occur inside an urban area, where the total land to be developed is bigger than 5 ha**	The Virginia 2 Solar Park can be regarded as an industrial development, where the total area to be transformed (footprint) will be bigger than 5 ha (up to 245 ha). The project site is currently being used for livestock grazing and agriculture.
GN R.983, Item 24 (ii) **The development of -** **(ii) a road with a reserve wider than 13,5m, or where no reserve exists where the road is wider than 8m**	During construction phase, access road will have a reserve wider than 13.5 m to allow the transportation of abnormal goods (e.g. power transformers, etc.).
GN R.984 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, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.**	The project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a Maximum Export Capacity up to 100 MW with associated infrastructure and structures, to be partially located outside an urban area.
GN R.984 Item 15 **The clearance of an area of 20 ha or more of indigenous vegetation**	The PV Power Plant with associated infrastructure and structures will be constructed and operated on a footprint bigger than 20 ha (up to 245 ha). The required footprint should be cleared from the existing vegetation.
GN R.985, Item 12 (i) (ii) **The clearance of an area of 300 m² or more of indigenous vegetation:** **(a) In Free State province:** **(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;** **(ii) Within critical biodiversity areas identified in bioregional plans** **(iii) Areas within a watercourse/wetland or within 100 m from the edge of a watercourse/wetland.**	The Virginia 2 Solar Park 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

The listed activities applied for may be revised during the EIA phase, once all the outcomes of the specialist studies will be available and the potential impacts are fully assessed and if this is the case a new application form will be submitted with the Final EIA Report.

There are layout and site plans in draft format (Annexure A) which will be finalized once inputs, via public participation have been received, analysed and reviewed. All information acquired will be analysed in order to determine the proposed final development layout and site plans. Such approach will ensure a holistic view of future requirements of the site and that resources are utilised to their full availability in terms of social and environmental sustainability. This application and all other development applications, in the area, are considered together in order to ensure general sustainability in the Local and District Municipal areas.

4. PROJECT DESCRIPTION AND FUNCTIONING

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 100 MW.

The construction timeframe is estimated to be approximately 15 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:

- **2100 kWh/kWp/year** (load factor = 0.240), in the case of PV modules mounted on fixed mounting systems; or
- **2450 kWh/kWp/year** (load factor = 0.280) in the case of bi-facial PV modules mounted on trackers.

Therefore, the Virginia 2 Solar Park will generate:

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

The Global Horizontal Irradiation of the site is 2 104 kWh/m^2/year (source: https://solargis.info/imaps/).

The energy generated by the Virginia 2 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 Virginia 2 Solar Park.

The quantity of the avoided CO_2 is calculated as follows: the energy produced by the Virginia 2 Solar Park (up to 328.1 GWh/y or 382.8 GWh/y) is multiplied by the 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).

This means that, in the case of Virginia 2 Solar Park, the avoided CO_2 emissions are approximately 323 276 tons of CO_2 per year in the case of PV modules mounted on fixed mounting systems, or 377 155 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 Virginia 2 Solar Park will be approximately 88 682 tons of coal / year in the case of PV modules mounted on fixed mounting systems, or 103 463 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 given in the following paragraphs.

4.1. PROJECT LAYOUT

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

The PV plant is designed and conceived in order to minimize visual and noise impacts, as well as to operate safely and assuring a high level of reliability, with low water consumption and the need only for easy and quick maintenance and repair for approximately 30 years.

The footprint (fenced area) of the Virginia 2 Solar Park will be up to 245 ha.

The main drives 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 in the north western corner of the farm, partially on croplands area and partially on natural areas.
- to avoid the Critical Biodiversity Areas (CBAs);

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 on the fenced area - will be the same: up to 245 ha, and the maximum height of the structures (PV modules and support frames) will be approximately 4.5 m above the ground level. Therefore, the impacts and mitigation measures will remain exactly the same.

The location of the planned footprint will be further assessed (and amended - if required) in the Draft and Final Environmental Impact Assessment Reports. All inputs and comments arising from the Public Participation Process will be taken into account.

The project layout and the other plant components are detailed in the drawings attached in Annexure A and include:

- VG2SP_01_r0 Layout Plan of the Virginia 2 Solar Park
- VG2SP_02_r0 Layout Plan of the Virginia 2 Solar Park and Sensitivity Map
- VG123SP_00_LM1_r1 Locality Map Study area and powerline corridor
- VG123SP_00_LM2_r0 Locality Map Project site and development areas
- VG123SP_01_r0 Layout Plans - PV power plants up to 100 MW each
- VG123SP_02_r0 Layout Plans and Sensitivity Map
- VG123SP_03_r0 Mounting System – Alternative option 1: fixed mounting systems
- VG123SP_04_r0 Mounting System – Alternative option 2: single-axis horizontal trackers
- VG123SP_05_r0 Medium-voltage stations
- VG123SP_06_r0 Control building and medium-voltage receiving station
- VG123SP_07_r0 On-site high-voltage substation and switching station
- VG123SP_08_r0 Warehouse 1_2
- VG123SP_08_r0 Warehouse 2_2

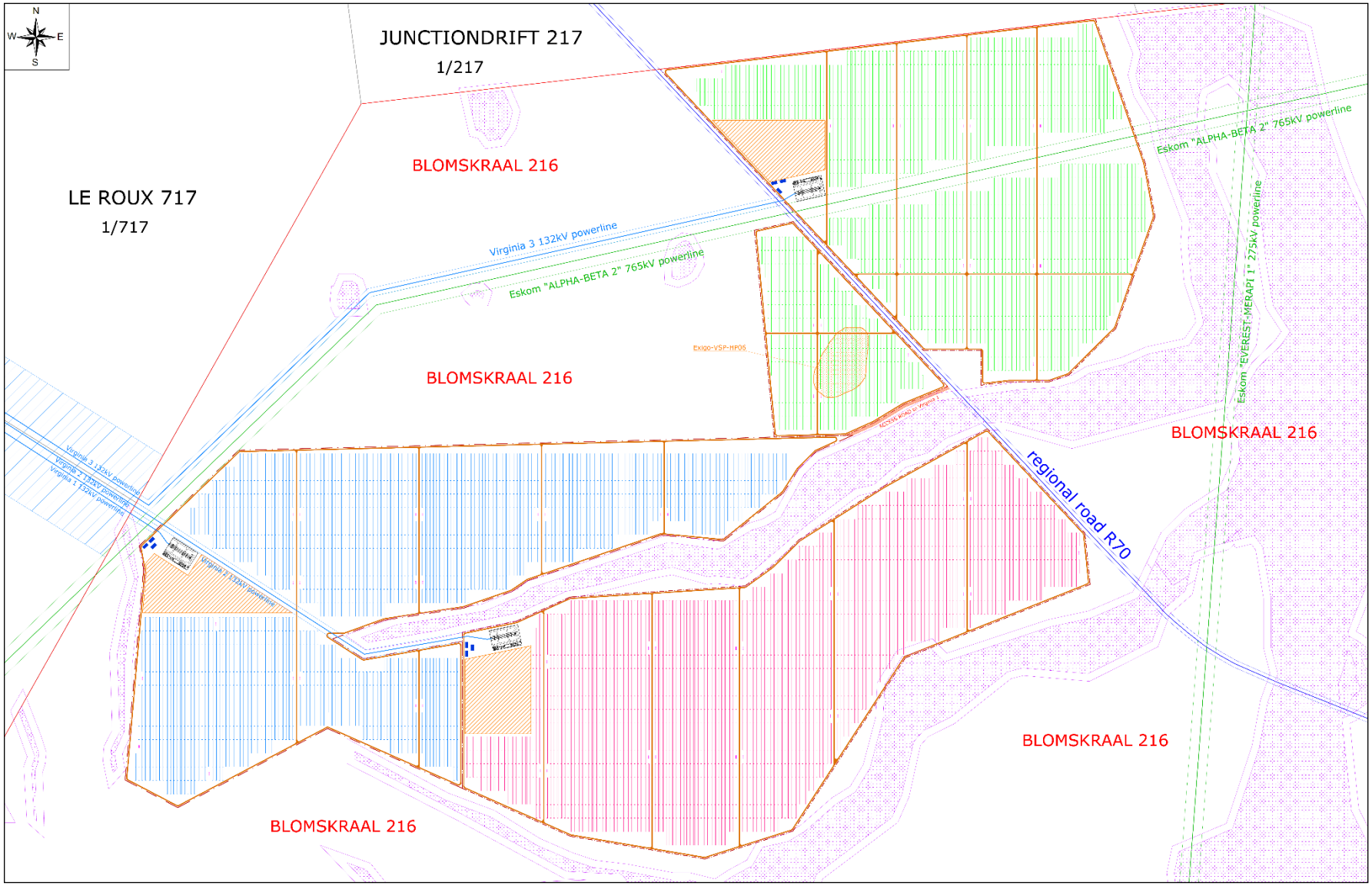

Figure 2. Proposed Layout Plan of the Virginia 2 Solar Park (Red polygon)

4.2. 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 the voltage to 132kV, and one high-voltage busbar with metering and protection devices (switching station)
- **Battery Energy Storage System (BESS),** with a Maximum Export Capacity up to 100 MW and a 6-hour storage capacity up to 600 MWh, with a footprint up to 10 ha within the proposed PV plant footprint / fenced area.
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point, water supply pipelines, water treatment facilities
- Sewage system

During the construction phase, the site may be provided with additional:

- Water access point, water supply pipelines, water treatment facilities
- Pre-fabricated buildings
- Workshops & warehouses

to be removed at the end of construction.

The connection may also entail interventions on the Eskom grid, according to Eskom's connection requirements/solution.

The connection may also entail interventions on the Eskom grid, according to Eskom's connection requirements/solution.

A **separate Basic Assessment** will be conducted for the authorisation of the 132kV power line connection the on-site substation and switching station to the Eskom Theseus MTS.

4.2.1. 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 in order to create electrical energy.

The preferred technical solutions are:

- Mono / bi-facial mono / polycrystalline modules, mounted on:
- fixed mounting systems or 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 the time of the commission date, 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 700 ha, and the maximum height of the structures (PV modules and support frames) will be approximately 4.5 m above the ground level. Therefore. the impacts and mitigation measures will not change. For further reference please refer to section 5.2.

The required footprint (including internal roads) will not exceed 245 ha.

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.

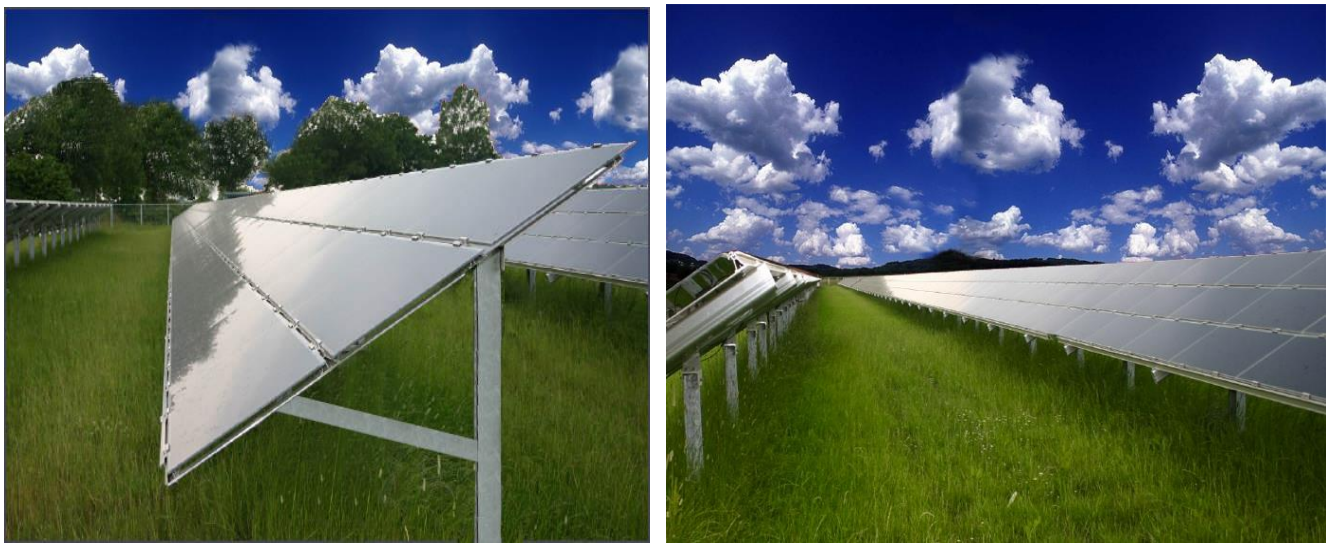

Figure 3. Lateral views of PV arrays mounted on fixed mounting systems

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

For further details, Please refer to the Figures 3 and 4 above and to the drawing included in Annexure A:

- VG123SP_03_r0 *Mounting System – Alternative option 1: fixed mounting systems*

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 an horizontal axis, driven by a motor. The horizontal axis allows the rotation of the PV arrays toward the West and East direction, in order to follow the daily sun path. The maximum mounting structure height will be up to 4.5 meters above ground level.

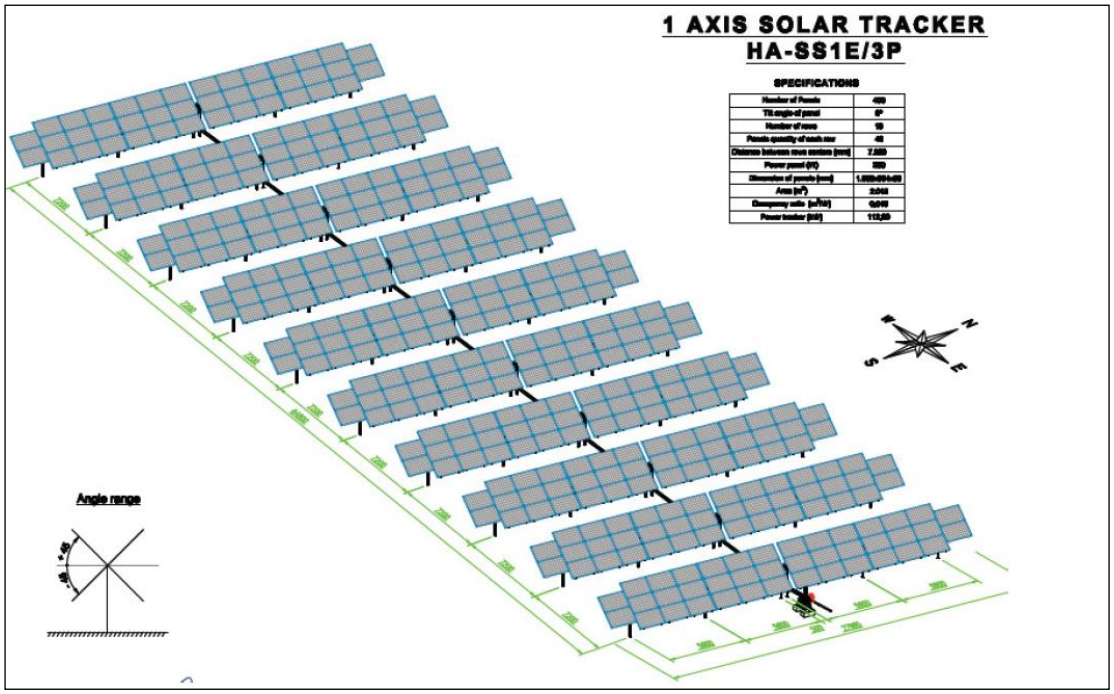

Figure 5. Simulation views of the PV arrays mounted on 1-axis horizontal tracker

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

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

- VG123SP_04_r0*Mounting System – Alternative option 2: horizontal single-axis trackers*

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 (270 V); subsequently the AC will pass through a medium-voltage transformer in order to increase the voltage up to 22 kV (or 11 kV).

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

- VG123SP_05_r0 *Medium-voltage stations*

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 (250 MVA each, plus one as spare), which will step up the electric energy from the medium voltage level (11 kV or 22 kV) to the required connecting voltage (i.e.132 kV). The power transformers will be connected to an on-site 132 kV busbar (the so called “switching station”), to be equipped with protection and metering devices. The new on-site HV substation will need to be equipped with circuit breakers upstream and downstream, in order 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:

- VG123SP_06_r0 *Control building and medium-voltage receiving station*
- VG123SP_07_r0 On-site *high-voltage substation and switching station*

Virginia 2 Solar Park will be connected to the 132 kV busbar of the **Eskom Theseus Main Transmission Substation (MTS)** via a new power line.

A separate Basic Assessment will be conducted for the authorisation of the 132kV power line connection the on-site substation and switching station to the Eskom Theseus MTS.

The power generation capacity at the delivery point (Maximum Export Capacity) will be up to 100 MW.

4.2.2. Battery Energy Storage System (BESS)

A Battery Energy Storage System (BESS) with an output capacity up to 100 MWac and a storage capacity up to 600 MWh (6-hour storage) will be installed next to the on-site step-up substation and switching station, within the footprint and fenced area of the Virginia 2 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 pick 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 10 hectares** and will comprise of the following equipment:

- Up to 120 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 50 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. However, where required, internal access roads will be constructed.
- 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;
- Temporary infrastructure including a site camp and a laydown area.

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 shall 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 the Renewable Power Plant for HV conversion and grid interconnection.

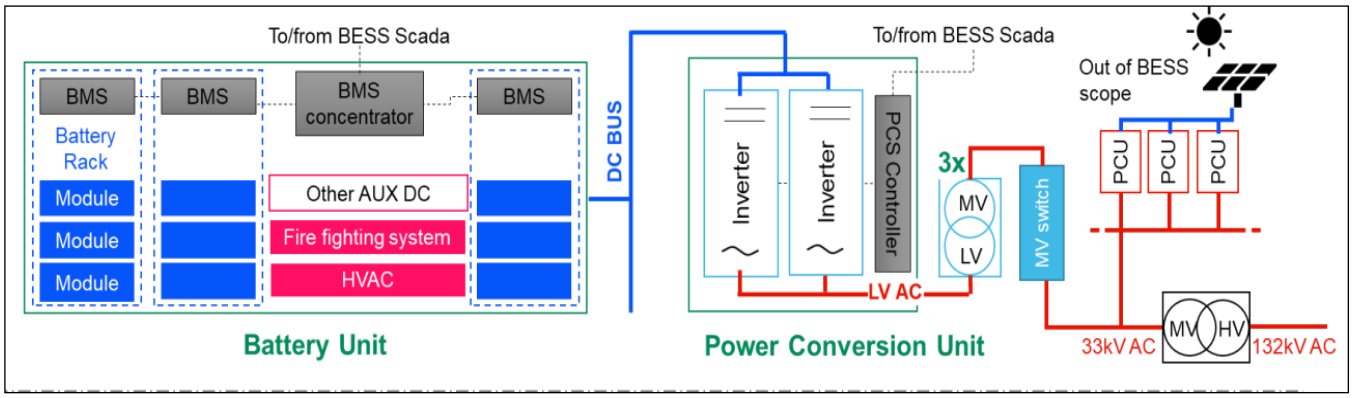

Figure 7. Battery Energy Storage System (BESS)

Battery Storage in combination to 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, spinning reserve.

4.2.3. Access road and internal roads

Access to the Virginia 2 Solar Park will be from the regional road R70, which cross the project site along the North-Western to the South-Eastern direction.

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

During construction phase, access roads will have a road reserve wider than 13.5 m (up to 16.0 m) to allow the transportation of abnormal goods (e.g. power transformers, etc.).

During operation, access roads will be up to 8 m wide with a road reserve up to 13.5 m

Once the solar farm is in operation, the 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.

4.2.4. 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.
During the night, the video-surveillance system will use infra-red (or micro-wave) video-cameras, which do not need a lighting system (which could reduce the functioning).

4.2.5. 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, and the existing drainage patterns will be left undisturbed.

4.2.6. Water requirements

4.2.6.1. Water requirements during the construction phase

The construction phase will last approximately 15 months.

A) Construction of internal gravel roads

- Water is necessary for the construction of internal gravel roads, in order to get the gravel compacted to optimum moisture content (OMC).
- The surface of internal gravel roads will be approximately 137 000 m^2.
- 50 liters of water / m^2 of internal of roads will be required.

B) Workers

- Approximately 100 people are expected to be employed during the construction period, although this number can increase to 150 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 Energy and having finalized the Connection Agreement with Eskom, where in particular it is agreed the envisaged connection timeline - evaluates to build the Virginia 2 Solar Park in a timeframe shorter than 15 months (i.e. 330 working days). For example, in the case the construction works are planned to last only **6 months** (*i.e.* 132 working days), the average number of workers required on site during construction is **250**.
- Each worker needs 50 liters / 8 working hours for sanitary use.
- Water consumption will be:
  - 100 people x 50 l/person x 330 working days = 1650 m^3 over 15 months, or:
  - 250 people x 50 l/person x 132 working days = 1650 m^3 over 6 months.

C) Concrete production

- Concrete is necessary for the basements of the medium-voltage stations, the high-voltage loop-in loop-out substation, the control building, the warehouse and workshop, the basement of the Battery Energy Storage System (BESS) and for the foundations of the mounting systems. The overall amount of concrete to be produced will be *approximately* 15 000 m^3
- 200 litres of water are needed for 1 cubic meter of concrete.

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 the 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 3. 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*	15
Timeframe of the construction activities - calendar days	*days*	450
Overall water consumption for internal roads	m^3	6,850
Overall water consumption for sanitary use	m^3	1,650
Overall water consumption for concrete production	m^3	3,000
OVERALL WATER CONSUMPTION	***m^3***	**11,500**
Daily water consumption (average over 450 calendar days)	***m^3/day***	**25.5**

Storage tanks will be sized in order to provide a reserve of water approximately **200m^3**.

4.2.6.2. 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 may be only for routine washing of vehicles and other similar uses.

A) Water for sanitary use

Approximately 35/40 people will be employed during the operation phase of the PV power plant, which will have a lifetime of approximately 25-30 years.
Virginia 2 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 14 people daytime and 6 people at night.
The average daily water consumption for sanitary use is estimated to be 150 litres/day/person for 20 people (14 people daytime and 6 people at night). The daily water consumption will be approximately 3000 litres/day.

B) Water consumption to clean the PV modules

The cleaning activities of the solar panels will take place twice per year. It is assumed that up to 1.0 litre per m^2 of PV panel surface will be needed. Therefore, the amount of water for cleaning is up to 850 m^3 per cleaning cycle and 1 700 m^3/year. PV modules cleaning activity can last less than 1 month. If the cleaning activity lasts approximately 2 weeks (12 working days), the daily water consumption will be approximately **71,000 liters/day**, **over 12 days**.

Conclusion
The daily water requirement will be approximately **3,000 liters/day** over 12 months for sanitary use (i.e. **90,000 l/month** and **1,095 m^3/year**).

The water consumption will increase up to **74,000 liters/day** during the cleaning of the solar modules (71,000 liters/day for cleaning activity and 3,000 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 4. 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*	3,000
Average daily water consumption during cleaning activity (*)	*l/day*	74,000
Average monthly water consumption for sanitary use (over 30 days)	*l/month*	90,000
Annual water consumption for sanitary use	***m^3/year***	**1,095**
Annual water consumption for PV modules cleaning activities (twice/year)	***m^3/year***	**1,700**
ANNUAL WATER CONSUMPTION DURING OPERATION	***m^3/year***	**2,795**
DAILY WATER CONSUMPTION DURING OPERATION (average over 365 day)	***m^3/day***	**7.66**

(*) over 12 working days, twice per year

4.2.6.3. Water provision during construction and operation

Water needs for the construction phase (11,500 m^3 over approximately 15 months) and the operational phase (2795 m^3/year) can be obtained from the Matjhabeng Local Municipality and/or from on-site boreholes. The Matjhabeng Local Municipality will be consulted in this respect.

4.2.7. 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 sewerage 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. The effluent from the wastewater treatment system will be suitable for irrigation of lawns, or re-use in the dwellings as water for the flushing of toilets, or for fire-fighting purposes. This could reduce the overall water requirement of the development substantially.

More detail on the type of system and the possible impacts on the environment will be provided in the Draft EIR.

4.2.8. 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.
During the operational phase (approx. 30 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.

Virginia 2 (Fornax Energy) will enter into an agreement with the Lejweleputswa 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, to be submitted with the Draft and Final EIA Reports.

4.3. TEMPORARY CONSTRUCTION CAMP

The construction camp (approximately 10ha) will be located on the area which is 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 sizes of the construction camp and the BESS will be, approximately the same.

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.

In addition, 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.

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

4.3.1. 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.

4.3.2. Phase II

During the fencing operation as described in Phase I, trees with a conservation value, will be removed and placed temporarily in a safe location for future planting at the end of work. This procedure is required for environmental mitigation. The other tree species will be cut down and transferred to facilities for wood processing.

4.3.3. 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 in order to minimize trips. The road system is planned for a width of 8 meters. Roads will be 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.

4.3.4. 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 may 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;
- waste water 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.

4.3.5. Earthworks

Clearing activity is required to remove shrubs and trees from the planned footprint (±245 ha).
Due to the flatness of the development area, no 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 possible.

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 and no deep cuts or fills will be required. Considering a road pavement thickness of 300 mm and an overall road surface approximately 137,000 m², the amount of cut or fill is estimated to be approximately 41,000 m³.

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 the existing drainage patterns will be left undisturbed.

Small 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 10 000 m^2).
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.

The concrete necessary for the basements of the medium-voltage stations, the high-voltage substation, the control building, and the warehouse will be provided from commercial sources in the vicinity of the development. Gravel necessary for the construction of internal roads may be provided from commercial sources in the vicinity of the development.

4.4. TRAFFIC IMPACT OF THE PROPOSED DEVELOPMENT

4.4.1. Traffic impact – construction phase

Approximately 100 people are expected to be employed during the construction period (15 months), although this number can increase to 150 during peak periods.

A small accommodation area with prefabricated buildings inside the work site may be foreseen, if accommodation facilities in the area is not sufficient to accommodate all workers.

Overall traffic to and from the work site will amount to approximately 3 800 medium / heavy vehicle trips over the whole construction period. As indicated in the table below, the average number of medium and heavy trucks to and from the site will be of 11.5 trucks per working day.

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.

Table 5. Construction timeframe: average daily trips of medium and heavy vehicles (*)

Transportation of:	months	1	2	3	4	5	6	7	8
fencing and tools	trips/month	32	32	0	0	0	0	0	0
clearance of the site (vegetation transportation)	trips/month	56	32	0	0	0	0	0	0
piles / frames for mounting systems	trips/month	0	0	80	80	80	80	80	0
sands & gravel for on-site concrete production	trips/month	0	120	192	192	192	208	208	216
PV modules	trips/month	0	0	0	0	0	0	0	0
MV stations	trips/month	0	0	0	0	0	48	48	48
HV substation components	trips/month	0	0	32	32	32	0	0	0
cables	trips/month	0	0	0	0	0	0	0	64
Average trips per month	trips/month	**64**	**280**	**304**	**304**	**304**	**336**	**336**	**328**
Average trips per working day (*)	trips/day	**2.9**	**12.7**	**13.8**	**13.8**	**13.8**	**15.3**	**15.3**	**14.9**

Transportation of:	months	9	10	11	12	13	14	15	TOTAL
fencing and tools	trips/month	0	0	0	0	0	0	0	**64**
clearance of the site (vegetation transportation)	trips/month	0	0	0	0	0	0	0	**88**
piles / frames for mounting systems	trips/month	0	0	0	0	0	0	0	**400**
sands & gravel for on-site concrete production	trips/month	208	192	128	0	0	0	0	**1 856**
PV modules	trips/month	0	64	128	272	264	136	0	**864**
MV stations	trips/month	48	48	0	0	0	0	0	**240**
HV substation components	trips/month	0	0	0	0	0	0	0	**96**
cables	trips/month	64	0	0	0	0	0	0	**128**
Average trips per month	trips/month	**320**	**304**	**256**	**272**	**264**	**136**	**0**	**3 808**
Average trips per working day (*)	trips/day	**14.5**	**13.8**	**11.6**	**12.4**	**12.0**	**6.2**	**0.0**	**11.54**

(*) assuming 22 working days per month

4.4.2. Traffic impact – operation phase

The traffic impact during the operation phase will be insignificant, considering that about 60/70 people will work on the PV facility, in the following manner:

- during the daytime approximately 14 people;
- during the night-time 6 people.

4.5. MANAGEMENT OF THE SOLAR PARK DURING OPERATION

Approximately 35/40 people will be employed during the operation phase of the PV power plant, which will have a lifetime of 25-30 years. Virginia 2 Solar Park will be in operation 7 days per week and personnel will operate in shifts. The surveillance team will be on site during daytime, night-time and weekends.

The operational team will consist of the following people:

- 1 person as plant manager
- 2 people for administration
- 6/8 people as technicians / plant operators
- 7/10 people for electric and generic maintenance
- 15/16 people as guards

The “fire team” will be composed of people for generic maintenance, who will attend a comprehensive fire-fighting training program. After this training programme, the fire team will be able to drive/use/manage the fire extinguishers and the fire fighting vehicle that will be available on the site, properly,

5. PROJECT ALTERNATIVES

The EIA Regulations, 2014, as amended, 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).

5.1. SITE ALTERNATIVES

Several sites have been inspected to find out the best solution for the PV power plant. The following selection criteria were applied:
- Connection availability and proximity
- Land availability
- Sufficient land surface area (±245 ha)
- Current land use
- Environmental impact (biodiversity)
- Agricultural potential
- Solar radiance
- Socio-economic issues (land cost and local community unemployment)

An alternative site selection report is included in Annexure O, which describes the alternatives considered.

5.2. TECHNOLOGY ALTERNATIVES

5.2.1. PV 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, among other factors, the PV solution requires a minor quantity of water.

5.2.2. 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.

5.2.3. 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 hgher 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. Consequently, the final decision about the mounting system technology will be taken only at the commissioning date.

The selection of fixed mounting system or horizontal single-axis trackers will 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 (245 ha) and the height of the structures (PV modules and support frames) will be maximum 4.5 m above the 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.

5.2.4. BESS Technology alternatives

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 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.

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

5.3. NO-GO ALTERNATIVE

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 not create any new employment opportunities, and therefore the anticipated economic benefits of the project will accrue to the study area (see the paragraph 6.3 *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 benefits related to the establishment of a renewable energy power plant are for example analysed in detail in the REFIT Regulatory Guideline published by NERSA (March 2009):

- ***Enhanced and increased energy security***: renewable energy plays an important role in terms of power supply, improving grid strength and supply quality and contemporarily reducing transmission and distribution costs and losses.
- ***Resource economy and saving***: the energy production by coal fired plants consumes a significant amount of water, this amount of water could instead be saved if a renewable energy facility like the proposed one is put in operation.(the Energy White Paper envisages that the implementation of its targets will determine water savings approximately 16.5 million kilolitres). This will be beneficial on the large scale for the water conservation measures that the country is currently undertaking.
- ***Support of new technologies and new industrial sectors***: the development and establishment of renewable energy power plants contribute to the growth of new technologies and new industrial sectors with benefits for its economy.
- ***Exploitation and capitalization of South Africa's renewable resources***: with the aim of increasing energy security.
- ***Employment creation and career opportunities***: the construction and operation of a renewable energy power plant contributes to job creation and new career opportunities.
- ***Pollution reduction***: the use of renewable energy resources decreases the demand and the dependence from coal and oil for electricity generation.
- ***Contrast to Global warming and climate mitigation***: the development of renewable energy contributes to reduce global warming through the reduction of greenhouse gas (GHG) emissions.
- ***Protection of natural foundations of life for future generations***: the development and establishment of renewable energy power plants offers the opportunity of consistently reducing the risks related to climate change caused by CO^2 and CO emissions, therefore preserving life for future generations.
- ***Acceptability to society and community***: the use of renewable energy is largely accepted by society and community as a mean to reduce pollution concerns, improve human health and wellness, protect the environment, the ecosystem and climate;
- ***Commitment to and respect of international agreements***: in particular in light of the possible commitment to the Kyoto Protocol.

6. STATUS QUO OF THE RECEIVING ENVIRONMENT

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.

6.1. PROPERTY DESCRIPTION AND CURRENT LAND USE

The proposed development will be on the farm Blomskraal 216, Ventersburg RD located within the Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province. The project site is located 14 km South-East of the Virginia, West of the road linking the R73 with the N1.

Table 6. Site location and Property details

Site location and Property details	
Farm	**Blomskraal 216, Ventersburg RD**
Portion	**Portion 0 (Remaining Extent)**
LPI code	F03500000000021600000
Overall Extent	4246.0575 hectares
Land Owner	Forum trading 124 (Pty) Ltd
Diagram deed number	G001861
Title deed number	T6572/1981
Registration date	20020118
Current land use	grazing, game farming and croplands

6.2. ENVIRONMENTAL FEATURES

6.2.1. Environmental Screening Report

Table 7. Environmental Screening Tool Table

Theme	Very high	High	Medium	Low	Specialist studies conducted	Motivation for no Specialist Studies
Agriculture	X				X	
Animal species				X	X	
Aquatic biodiversity	X				X	
Archaeological and Cultural Heritage				X	X	
Avian		X			X	
Bats				X		
Civil Aviation				X		An application for approval will be submitted to the Civil Aviation Authority.
Defence				X		
Landscape	X				X	
Paleonthology	X				X	
Plant species				X	X	
RFI				X		
Terrestrial Biodiversity	X				X	

The following environmental sensitivities are identified for the project area:

- **Agriculture Theme**
  Sensitivity - Very High land capability.
  The agricultural soil potential specialist study conducted (Annexure F) concluded that the agricultural potential of soils on the proposed development area varies is low (shallow, soils or very sandy soils with low to moderate suitability for grazing) to moderate-low (suitable for grazing by livestock or game on deeper, sandy soils). The site is classified as partially arable to non-arable.

- **Animal species Theme**
  Sensitivity - Low

- **Aquatic Biodiversity Theme**
  Sensitivity - Very high (wetlands & freshwater ecosystem priority area).
  The project area is not located within any Strategic Water Source Area. According to the National Freshwater Ecosystem Priority Areas (NFEPA, 2011) dataset the project area is located within the listed NFEPA river, named Maselspruit, although this river will not be impacted on by the development footprints. There are no wetland features located within the proposed development area but there are two man made dams outside the project area. The wetland specialist also confirmed this – Appendix G.

- **Avian Species Theme**
  Sensitivity - High
  The avifaunal assessment conducted (Annexure E) concluded that no significant bird flight paths, migratory routes or roosting sites were identified but the modified farmland habitats do attract nomadic species for transitory feeding and breeding purposes.

- **Bats Theme**
  Sensitivity - Low

- **Civil Aviation Theme**
  Sensitivity - Low
  An application for approval will be submitted to the Civil Aviation Authority.

- **Defence Theme**
  Sensitivity - Low

- **Paleontological Theme**
  Sensitivity - Very High
  The palaeontologist concluded that it is unlikely that fossils will be exposed as a result of the proposed development. If Karoo rocks are exposed by development this will create an opportunity to find fossils in an area which has delivered very few Late Permian Karoo fossils. the proposed solar park development should proceed but should be constrained to the flat, grass and bushy vegetation covered areas currently used for cattle and game farming, as well as the irrigated cropland.. The implementation of the Chance Find Protocol measures is essential – Annexure I.

- **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. (Annexure L)

- **Terrestrial Biodiversity Theme (Annexure D)**
  Sensitivity -
  Very High because of CBA and ESA areas
  Most of the proposed development footprints represent ESA1 and ESA2 areas although most of these areas represent cultivated land or degraded grassland. The management objective for this area is to maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern.
  Small sections represent CBA1 or CBA2 areas, although the site is more representative of ESAs.

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

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

Table 8. 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	12/12/20/2669	Solar PV	Approved	18.1
2	12/12/20/2666/A	Solar PV	Approved	22.8
3	12/12/20/2668	Solar PV	Approved	19.4
4	14/12/16/3/3/1/1322	Solar PV	Approved	19.1
5	12/12/20/2666	Solar PV	Approved	22.8
6	12/12/20/2667	Solar PV	Approved	19.4
7	12/12/20/2667	Solar PV	Approved	18.1

Table 9. List of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area – additional information

No	EIA Reference No	Project Name	Project Capacity [MW]	Applicant	Date of application [aaa/mm/dd]
1	12/12/20/2669	The Proposed Construction Of The Photovoltaic 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 Photovoltaic 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 StateS	5		2014/11/07

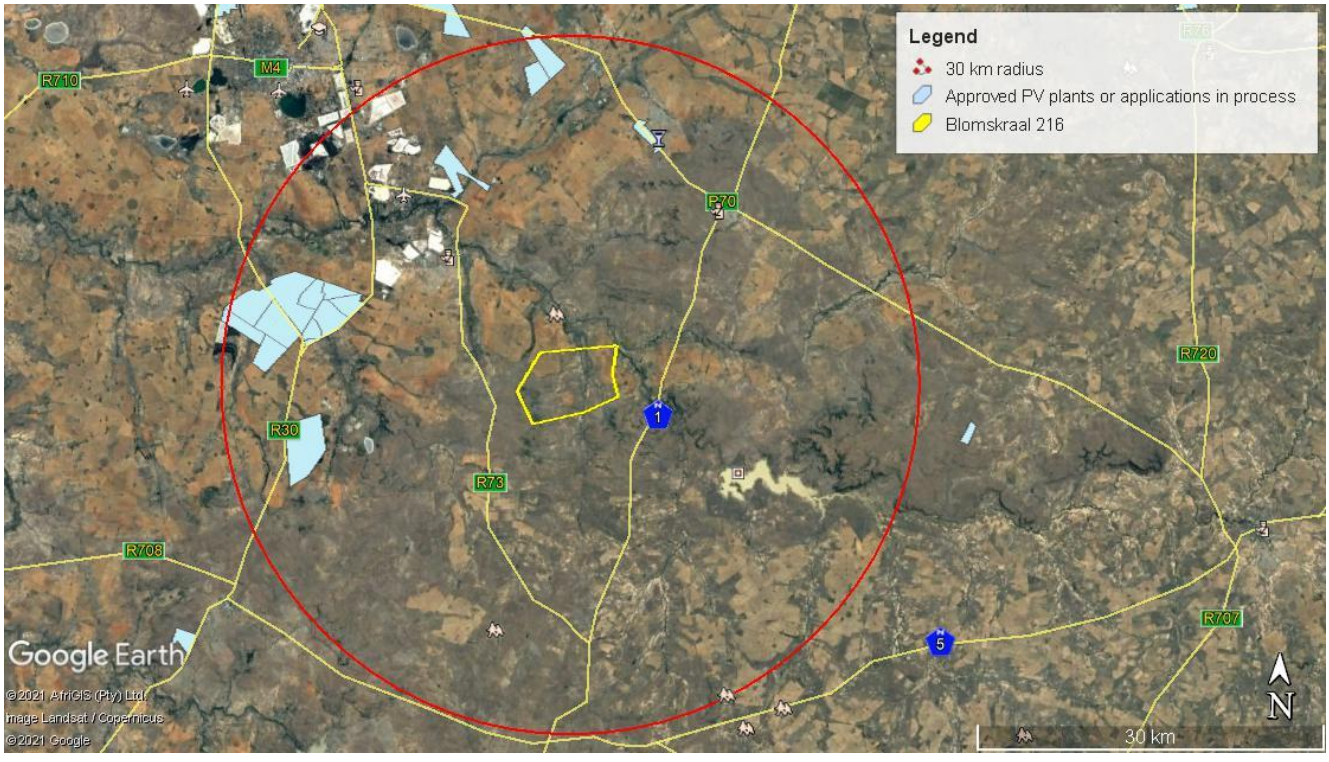

Figure 8. Map of Wind and Solar developments with Environmental Authorisation or applications under consideration within 30 km of the proposed area

It should be noted that none of these projects, applied for, have been built so far. A number of these applications have lapsed or have been withdrawn. No additional information has been found about these solar projects.

For these reasons, the cumulative impact cannot be assessed at this stage. Additional investigation will be conducted during the EIA phase, to check the real status of these projects and get more information, to assess the cumulative impact in the case all the projects are successful and built.

6.2.3. 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.
The 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 2226mm, with Mean Annual Soil Moisture Stress of 78%.

6.2.4. Topography, drainage and Land use

The study area 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. The topography of the site can be described as generally favourable, when 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).

Most properties situated within a 500m radius are being used for livestock and crop cultivation. The proposed development land is used for livestock farming and maize cultivation at present. The natural vegetation of the site is mostly intact.

The site is located within the C42G and C42H quaternary catchments and is situated in the Middle Vaal Water Management Area. Drainage occurs as sheet-wash into the drainage channels on site that eventually drains into the major river namely the Maselspruit that bisect the site from south to North.

6.2.5. Soils and geology

Geology is directly related to soil types and plant communities that may occur in a specific. A Land type unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The land type unit represented within the study area include the Bd 20 and Dc12 land types (Land Type Survey Staff, 1987) (ENPAT, 2001). The land type, geology and associated soil types is presented in Table 1 below as classified by the Environmental Potential Atlas, South Africa (ENPAT, 2000).

Table 10. 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.
Dc12	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

Soils associated with the site vary between very sandy on the plateaus and higher lying areas, to dark clayey soils in the low-lying plans and bottomlands. The soils in the Virginia 2 area is mostly of the Black Greyish soils of the Arcadia /Swartland soil forms. 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 soils are however susceptible to erosion and over grazing is a distinct and widespread risk. when working with these soil types.

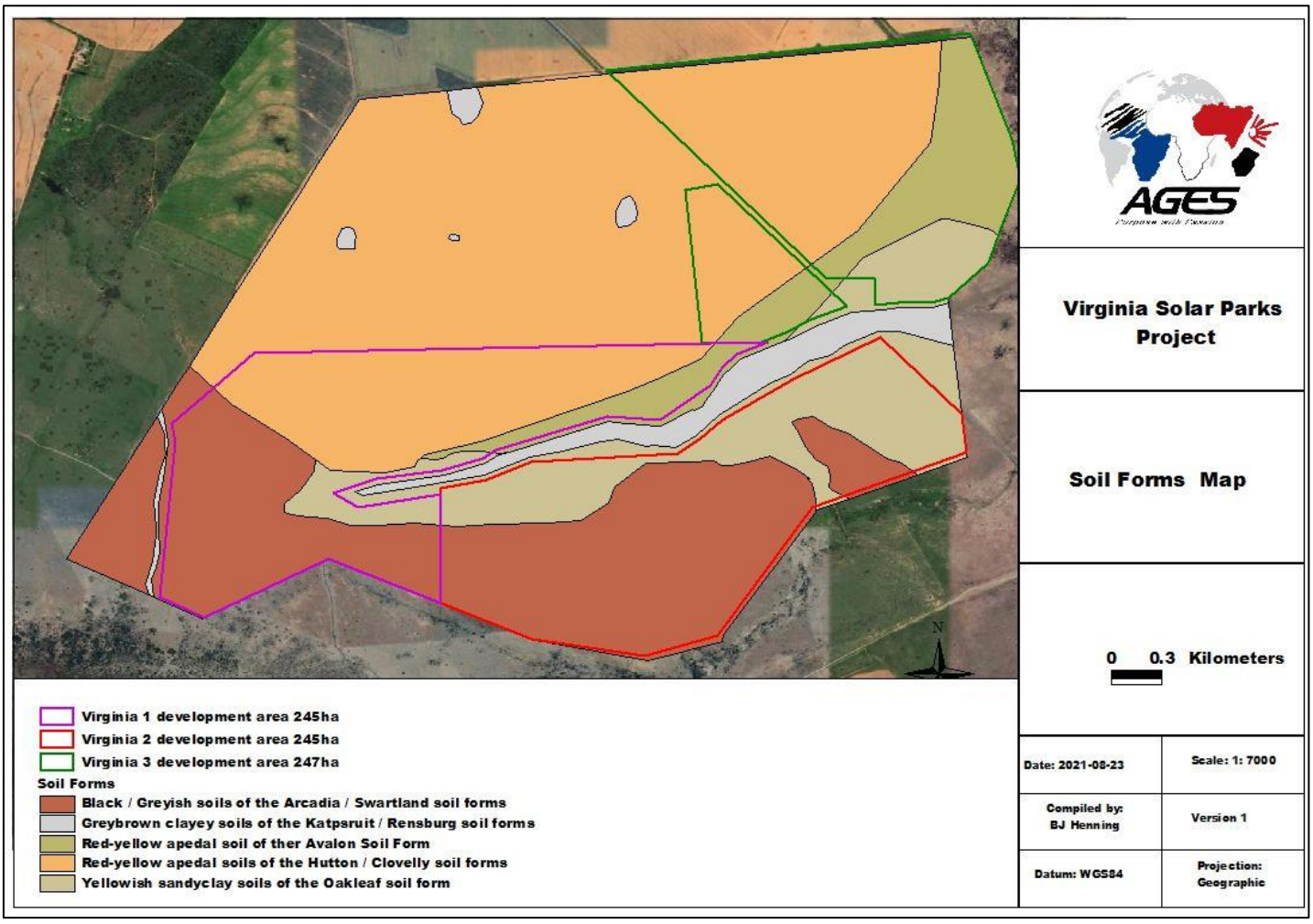

Figure 9. Soil Form Map

A Geo-technical study will be conducted in the EIA Phase of the proposed development.

6.2.6. Ecology (fauna & flora)

A Terrestrial Biodiversity Impact Assessment (Annexure D) was conducted by AGES in order 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 therefore 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 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 15 & 16 April 2021 to verify the ecological sensitivity and ecological components of the site at ground level.

6.2.6.1. Vegetation types

The most recent classification of the Virginia area by Mucina & Rutherford (2006) shows that the site is classified as Central Free State Grassland.
The landscape of the 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. 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 the Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves as well as in some private nature reserves.

The site for three potential solar parks forms part of a larger farm used for livestock farming and maize cultivation. Vegetation units were identified on the footprint development sites and can be divided into 6 distinct vegetation units according to soil types and topography. Vegetation units were identified during the ecological surveys according to plant species composition, previous land-use, soil types and topography..

The plant species for the QDS as listed by the South African National Biodiversity Institute (SANBI) Plants of Southern Africa (POSA) database is included in Appendix A of the Terrestrial Biodiversity Impact Assessment (Annexure D), while the detailed species list for each vegetation unit is included in Appendix B of the Terrestrial Biodiversity Impact Assessment (Annexure D).

The following vegetation units were documented on thee Virginia 2 site:

- *Setaria incrassatae – Themeda triandra* clay grassland
- *Themeda triandra – Triraphis andropogonoides* grassland.
- *Themeda triandra – Aristida congesta* secondary grassland.
- Drainage features:
    - Non-perennial channels
    - Exorheic depressions (dams).

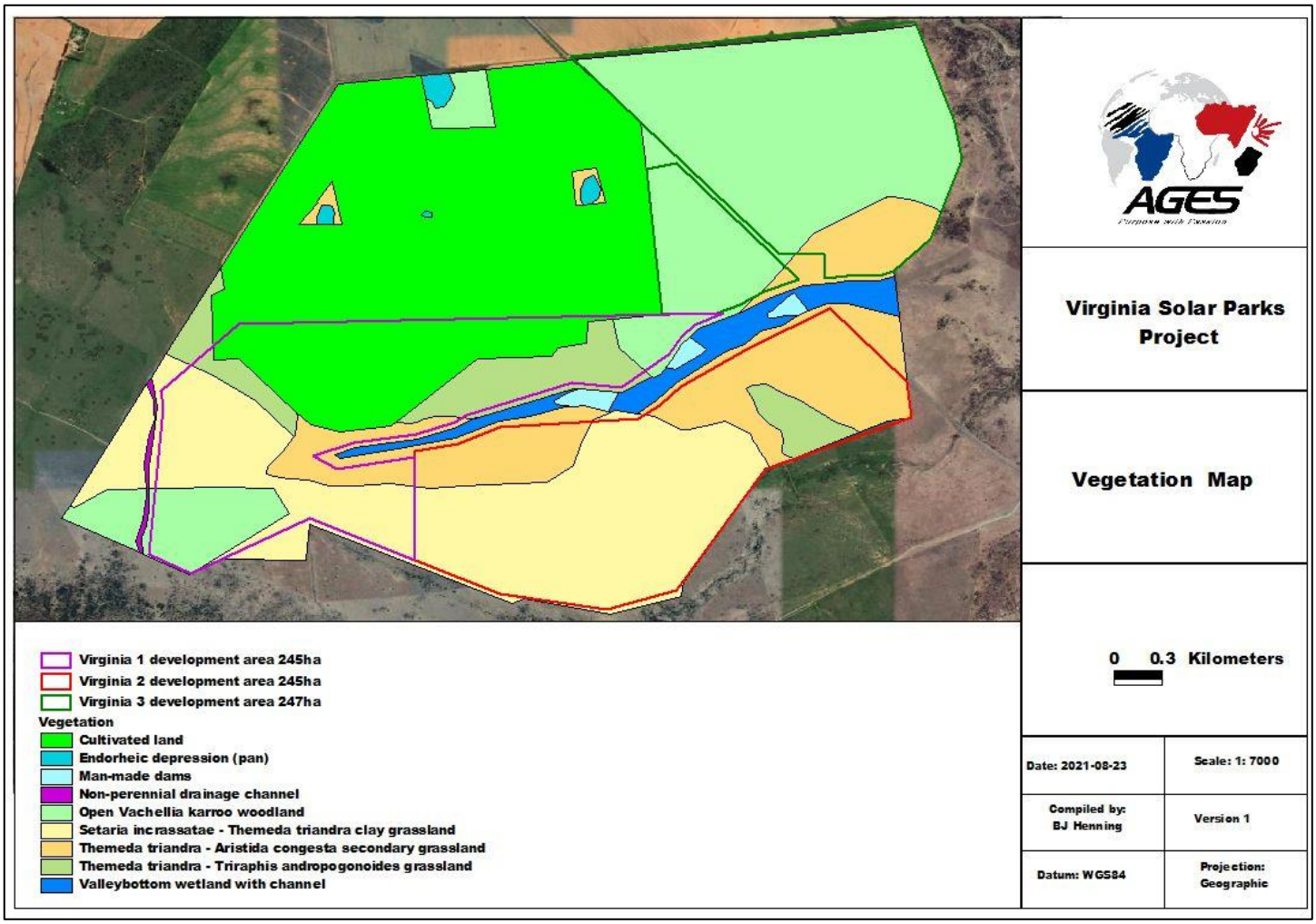

Figure 10. Vegetation Unit Map of the proposed development area (From Biodiversity report)

The vegetation units had Low-medium and medium sensitivity while the maize fields were completely modified. The drainage feature are all classified as having a high sensitivity with high conservation priority while the natural vegetation outside the flood line is natural woodland with a medium sensitivity.

Vegetation units occurring specifically on the Virginia development site includes:

- *Setaria incrassatae – Themeda triandra* clay grassland

It occurs to the south of the croplands around the valleybottom wetland in the project area. The grass layer is well developed and underlied by dark clayey soils of the Arcadia or Swartland Soil Forms. No red listed or protected species were documented in the area. The vegetation unit is classified as having a Medium sensitivity due to the widespread status through the larger area.

- *Themeda triandra – Triraphis andropogonoides* grassland.

A small section of the proposed development footprint forms medium tall grassland on red-yellow apedal soils of the Hutton or Clovelly soil forms. The grass layer is well developed and dominated by species such as *Themeda triandra, Eragrostis chloromelas* and *Triraphis andropogonoides*. The vegetation unit is classified as having a Medium sensitivity due its widespread occurrence in the Grassland Biome. The eradication of protected plant species *Boophane* 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.

- *Themeda triandra – Aristida congesta* secondary grassland.

This vegetation unit occurs on sensitive Oakleaf soils adjacent to the valley-bottom wetland area. 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 vegetation unit is classified as having a Medium-low sensitivity due to the secondary state of succession and degradation evident in the area. The eradication of protected plant species *Boophane* 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.

- Drainage features:

6.2.6.2. 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.

6.2.6.3. 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 April 2021, the listed species *Boophane disticha* and *Helichrysum nudifolium* confirmed for the site. No eradication should be allowed without a permit.

6.2.6.4. Protected Trees Species (NFA)

The National Forest Act (no.84 of 1998: National Forest Act, 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 DWS (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.

6.2.6.5. Invasive Alien 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 11. 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.

6.2.6.6. 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 indigenous woodland/grassland with widespread status to degraded grassland in a secondary state of succession.

The protected plant species *Boophane 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.

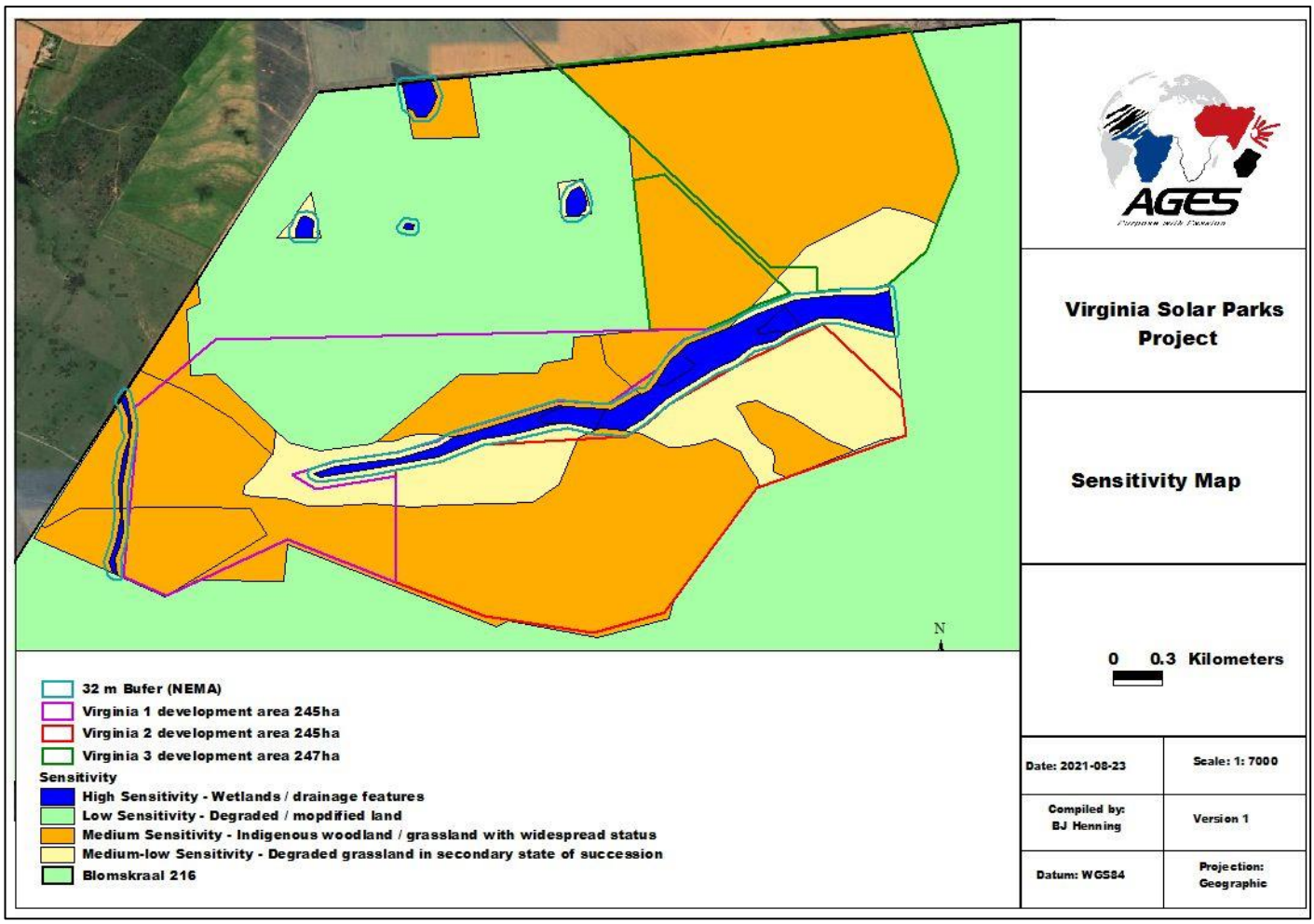

Figure 11. Sensitivity Map

6.2.6.7. Fauna

A survey was conducted during April 2021 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.

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.

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.

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.

Avifauna

Bird species richness is relatively high within the Highveld Ecoregion (Harrison et al. 1997). However, Botha's lark (*Spizocorys fringillaris*) is the only bird species strictly endemic to the ecoregion, where it inhabits heavily grazed grassland.

More than 250 bird species have been recorded in the project area and surroundings. Globally threatened species include Secretarybird and Black-winged Pratincole. Congregatory birds are Egyptian Goose, Western Cattle Egret, Spur-winged Goose, South African Shelduck, Cape Shoveler and African Spoonbill.

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 wetland nationally, with many having already been destroyed. In the study area, man-made dams represent wetland areas.

Herpetofauna

Twenty-nine amphibians occur within the eco-region, but none are endemic

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 by 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.

According to the existing databases and field survey the following number of fauna species included in the IUCN red data lists can potentially be found in the study area:

Table 12. 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

English Name	Conservation Status	Probability of occurrence on site
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

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 following general mitigation and management actions taken on site, the impact on faunal populations should be low:

- Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction process;
- No animals may be poached during the construction of the solar park. Many animals are protected by law and poaching or other interference could result in a fine or jail term;
- Do not feed any wild animals on site;
- Waste bins and foodstuffs should be made scavenger proof;
- Roads in the area should be designed without pavements to allow for the movement of small mammals;
- Monitoring of the environmental aspects is recommended for the future phases of the proposed development should the authorities approve the application. The monitoring phase would ensure that negative impacts on the fauna and flora of the area are limited to a minimum during the construction phase.

6.2.6.8. Summary and results of the Terrestrial Biodiversity Impact Assessment

Detailed ecological (fauna habitat & flora) surveys were conducted during April 2021 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 project area.

Most sensitive habitats: Many threatened species are grassland and riparian 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.

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.

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

- Most of the natural grassland and microphyllous 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 wetlands (including valley bottoms and pans) and riparian zones have a high sensitivity and should be preserved as important fauna and flora habitats.
- Other sensitive habitats in the southern section of the site (outcrops) will be avoided during the development.

The protected plant species *Boophane 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 in order to protect species habitat;
- Corridors between the development zones are also important to allow fauna to move freely between the areas of disturbance. The preservation of the herbaceous layer below the solar panels will play an important role in this regard and therefore habitat fragmentation for smaller mammals, birds and herpetofauna will be minimal.

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 ecosystems leading to reduction in the overall extent of a particular habitat;
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts (habitat fragmentation);
- Increased soil erosion;
- Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species;
- Establishment and spread of declared weeds and alien invader plants;
- Soil and water pollution due to spillages;
- Air pollution as a result of dust;
- Negative effect of human activities on the fauna and for a of the area during construction..

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 wetlands and riverine areas, while also allowing corridors of indigenous grassland and outcrops 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.). 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 is consistent with the sensitivity map, guidelines stipulated and provided by Cape Nature and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.

6.2.7. Avifauna Assessment

An Avifauna Impact Assessment (Annexure E) was conducted by Joe Grosel *(Pr.Sci.Nat.)* in order to determine whether the proposed development would have negative impact on avifauna.

The field survey area covered the entire farm of 4300 hectares and approximately 150m beyond its perimeter. The assessment also included a thorough desktop study which encompassed a wider geographical range than the field survey. The field survey was conducted on the 05, 06 and 07 April 2021.

Based on data from the abovementioned sources, 161 bird species occur within the general area of the survey site. Of these, 132 are South African breeding residents while 11 are intra African breeding migrants and15 are non-breeding Palearctic migrants. Based on the presence of suitable habitat and resources it is expected that at least 94 bird species breed within the proposed Virginia Solar Park site. With regards to endemism, 13 species on the survey list are considered to be Southern African endemics.

Four „priority" bird species have been recorded within, and in the vicinity of the Blomskraal survey site including two red data listed species and two nationally protected species. Under the threat classification of „Vulnerable" Secretarybird *Sagittarius serpentarius* have been recorded near the proposed site and although Lanner Falcon *Falco biarmicus* was not recorded during field surveys or feature in the SABAP2 datasets for the area there is a very strong possibility that it will sporadically venture into the region of the proposed site. Of the two nationally protected species found on or near the site Lesser Kestrel *Falco naumanni*is a non-breeding, nomadic summer visitor while the Blue Korhaan *Eupodotis caerulescens* seems to be a scarce resident in the area.

Nine vegetation communities and landforms which constitute distinct bird habitats have been identified on the proposed Bloemskraal site. Of these, four show relatively high avian diversity whilst supporting various habitat specific, localised and endemic species. The ridge habitats, the riparian sections, the *Vachellia karroo* thickets and the undisturbed grasslands should according to the bird specialist not be considered for any development. The Virginia 2 Solar Park Area is located in the *Grasslands bird habitat area.* There are however two other grasslands areas also on the farm , one smaller and one larger than this proposed Virginia 2 area where this grassland habitat can still be preserved if Virginia 2 is to be developed.

The Ecologist indicated this Virginia 2 area as a Medium to Medium-Low sensitivity area as the grassland is moderately degraded in certain sections of this grassland which would make it more suitable for the development.

On the contrary the current and fallow maize and sunflower cropland as well as the degraded grassland habitats which make up a significant portion of the proposed site have already been moderately to severely transformed. These areas could be considered, „suitable for development" should the proposed project be permitted. Unfortunately, only a certain percentage of cropland may be trans=formed into renewable energy development areas which results in other natural areas to be considered for the development.

No significant bird flight paths, migratory routes or roosting sites were identified on the site, however, the maize and sunflower croplands will attract many large granivorous species such as guinea fowl, francolin and geese, particularly after the reaping season. The field survey revealed that no particularly sensitive avian habitats exist on the proposed site.

The risk assessments revealed that the majority of these impacts fall within the „high" to „moderate" risk categories but should down scale to the „low" risk level after mitigation and provided the recommended bird conservation measures are employed.

Through the impact assessments and additional findings of this study it is concluded that the proposed development of the Virginia 2 Solar Park can proceed with acceptable levels of impact on the area's bird fauna with the proviso that the avian and avian habitat conservation and management recommendations in this report are seriously regarded.

The avifaunal assessment report will be amended, and a monitoring report will be added to the current report. Unfortunately, the specialist passed away before the monitoring report could be obtained. Another qualified avifauna specialist was appointed, and he will compile an avifaunal monitoring report, which will be attached to the amended avifauna assessment report to be included in the Draft EIA Report.

6.2.8. Preliminary Visual Assessment

A preliminary Visual Impact Assessment (Annexure J) and methodology for visual impact assessment was conducted by Mitha Cilliers an independent visual Specialist to determine the visual impact of the proposed solar park. The full visual impact assessment will proceed to analyse and rate the impact of the proposed projects on the visual environment as well as the sense of place of the receiving landscape.

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 closests being the Allemanskraal Dam, approximately 16km South-East of the nearest solar park site, on the outer edge of the visual analysis.

The residential component of the study area includes farmsteads with associated workers housing as well as the towns of Virginia and Ventersburg and the townships of Meloding and Mmamahabane.

Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. The relevance consisting of the sensitivity and the magnitude will be determined to find the visual impact of the development on the receptors in the area.

According to the visual specialist the vanishing threshold for the magnitude has been established at 8km away. This is the distance where no discernible impact is observed, even if the proposal is technically still visible.

At closure, after rehabilitation of the site, the impact will reduce to insignificant, as the site will be rehabilitated, and structures and infrastructure removed.

6.3. SOCIO-ECONOMIC ENVIRONMENT

A report on the socio-economic considerations related to the proposed project will be compiled and annexed to the Draft Environmental Impact Assessment (EIA) Report. The following issues can be anticipated:

- The national and local economies will benefit from civil contractor work, labour and building materials that will be required on site.
- After approval, the project will take approximately **15 months** to be built and will have a lifetime of 30 years. Approximately **100 people** are expected to be employed during the construction period, although this number can increase to 150 during peak periods. During operational phase, the power plant will require a permanent staff of approximately **35/40 people**. That impact will be positive.
- The presence of permanent security personnel may be beneficial to the overall safety and security situation in the area.
- Approximately **50% of the operational costs** will have a local economic return (mostly for maintenance works by local sub-contractors), then the impact will also be positive during the operational phase (30 years).
- The most important economic benefit is likely to be the experience that will be gained with regard to solar electricity generation in the Free State and in South Africa, considering that this forms part of a national strategic plan. This experience will be essential for the roll-out of the strategy, for efficiency improvements and for the establishment of a local manufacturing supply chain for equipment requirements. The project will also contribute towards reducing the carbon emissions per unit of electricity generated in South Africa, albeit very small to start with.
- Furthermore, the project will comply with the Economic Development Requirements, as requested by the REIPP Procurement Programme. This economic development programme identifies needs of the surrounding communities in order to have a positive socio-economic impact.

6.4. AGRICULTURAL POTENTIAL

An Agricultural Potential Impact Assessment on soils potential (Annexure F) was conducted by Dr BJ Henning.
Although the soil texture and depth are suitable for arable agriculture, the climatic conditions (annual rainfall 560mm) render the soils marginal for arable agriculture.

Arable land
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.

Virginia 2 Solar Park is located in the north western section of Bloemskraal farm just south of a non-perennial drainage line on Yellowish sandy clay soils of the Oakleaf soil form and Black / Greyish clayey soils of the Swartland/ Arcadia soil forms. These soil forms are used well for grazing as the limited water availability does not permit arable agriculture.

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 which places a restriction on the cropping viability o the area . Although the soil texture and depth are suitable for arable agriculture, the climatic conditions (annual rainfall 560mm) render the soils marginal for arable agriculture.

Furthermore, higher day temperatures and evaporation rates in summer months may hamper soil moisture storage for crop use. The site is classified as partially arable to non-arable.

Grazing Land

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 in the central and southern section of 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, goats 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 low agricultural potential of the soils and the low to moderate grazing capacity is further confirmed by the Agricultural Map below:

Land Capability Map - site is classified as partially arable to Non-arable - Classes VI and VII.
The low agricultural potential of the soils and the low to moderate grazing capacity is further confirmed by the Agricultural Maps.

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.

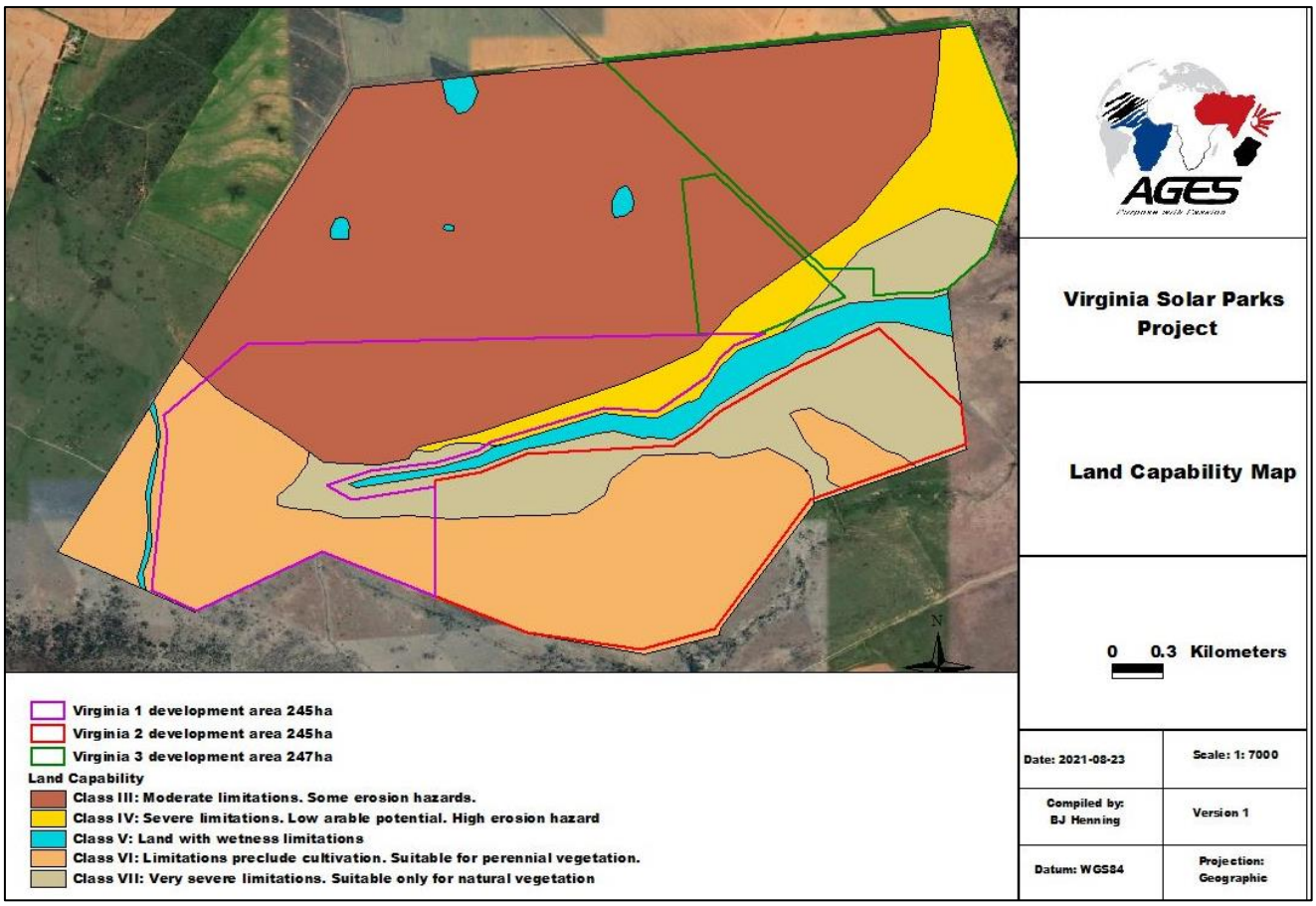

Figure 12. Land Capability Map of the project area

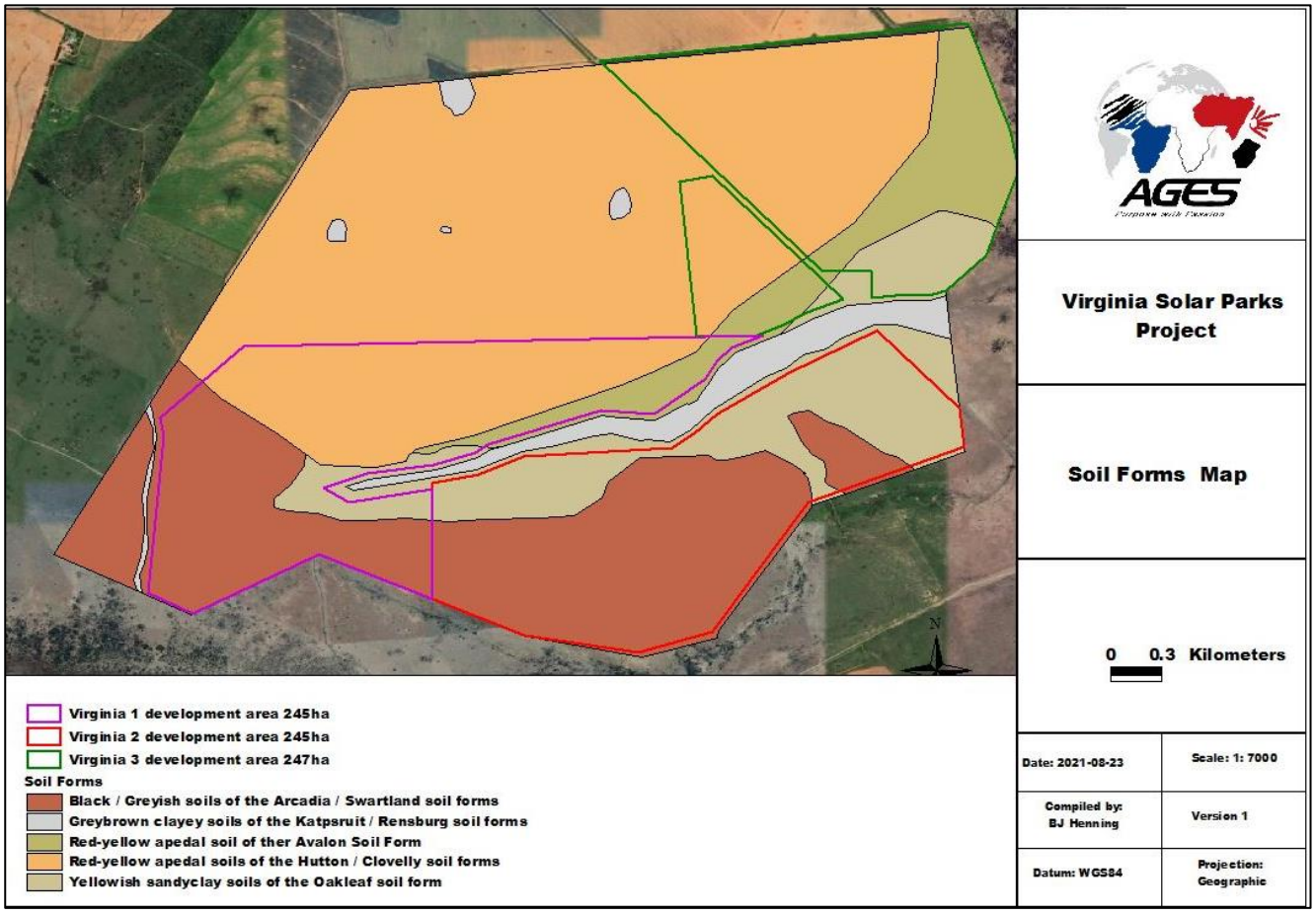

Figure 13. Land capability Map of the project area

Virginia 2 solar park site is located mostly in the Class VI and VII area with limitations for arable agriculture.

Allowable development limits

The table 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 13. 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 areas 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

The land in general has a low capability for crop cultivation, except under extensive irrigation on large pockets of land and deeper soil forms and can mostly be utilized as grazing for wildlife.

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.

Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. Furthermore, the proposed layout plan of the PV plant should be consistent with the agro-ecosystem maps and recommendations stipulated in this report, and the impact on the sensitive soil forms on site should be kept to a minimum.

According to the soil specialist who conducted the Agricultural Potential Impact Assessment, 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.

6.5. CULTURAL AND HERITAGE RESOURCES

An Archaeological Impact Assessment (Annexure H) was conducted by Exigo Sustainability (Mr Neels Kruger) to ascertain whether there are any remains of significance in the area that will be affected by the proposed development.
T
he farm Bloemskraal subject to this assessment was 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.
Heritage receptors were identified and recommendations were made in terms of heritage resources management. This is shown in the following table from the Heritage report:

Virginia 2 solar park does NOT have any heritage remains on the site that could exclude it as solar park site.

More detail on the heritage remains on the rest of the farm is found in the Heritage report in Annexure H.

Table 14. Virginia solar parks EIA project heritage sites locations

Site Code	Coordinate S E	Short Description	Field Rating	Mitigation Action
EXIGO-VSP-BP01	S28.24446° E26.97455°	Burial Site	**4a. High Significance**	**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.
EXIGO-VSP-BP02	S28.21054° E27.03028°	Burial Site	**4a. High Significance**	
EXIGO-VSP-BP03	S28.21805° E27.03251°	Burial Site	**4a. High Significance**	**Avoidance**: **50**m conservation buffers, site fencing and access control, site management plan (SMP). **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. **Grave Relocation**: Grave relocation subject to authorizations and permitting if impacted on.
Exigo-VSP-HP01	S28.21863° E27.03644°	Historical Period Site		**Site Monitoring**: Site monitoring by the heritage consultant or an ECO familiar with the heritage occurrences of the site. 20m conservation buffer if site is retained. **Permitting**: Apply for alteration / destruction permits if sites are impacted on.
Exigo-VSP-HP02	S28.21316° E27.02874°	Historical Period Site	**2a. Low Significance**	**Site Monitoring**: Site monitoring by the heritage consultant or an ECO familiar with the heritage occurrences of the site. 20m conservation buffer.
Exigo-VSP-HP03	S28.23525° E26.98127°	Historical Period Site	**2a. Low Significance**	
Exigo-VSP-HP04	S28.24624° E26.97652°	Historical Period Site	**2a. Low Significance**	
Exigo-VSP-HP05	S28.19797° E27.04970°	Historical Period Site	**2a. Low Significance**	**Site Monitoring**: Site monitoring by the heritage consultant or an ECO familiar with the heritage occurrences of the site.
Exigo-VSP-HP06	S28.20857° E27.00485°	Historical Period Site	**2a. Low Significance**	
Exigo-VSP-IA01	S28.21136° E27.03523°	Later Iron Age Site	**3. Medium Significance**	**Avoidance**: Implement a heritage conservation buffer of at least 100m. **Site Monitoring**: Strict frequent monitoring during construction by the heritage consultant or an ECO familiar with the heritage occurrences of the site. **Phase 2 Mitigation**: Legally compliant Phase 2 Study and assessment if impacted on. **Permitting**: Apply for relevant alteration / destruction permits for Phase 2 and consequent impact.

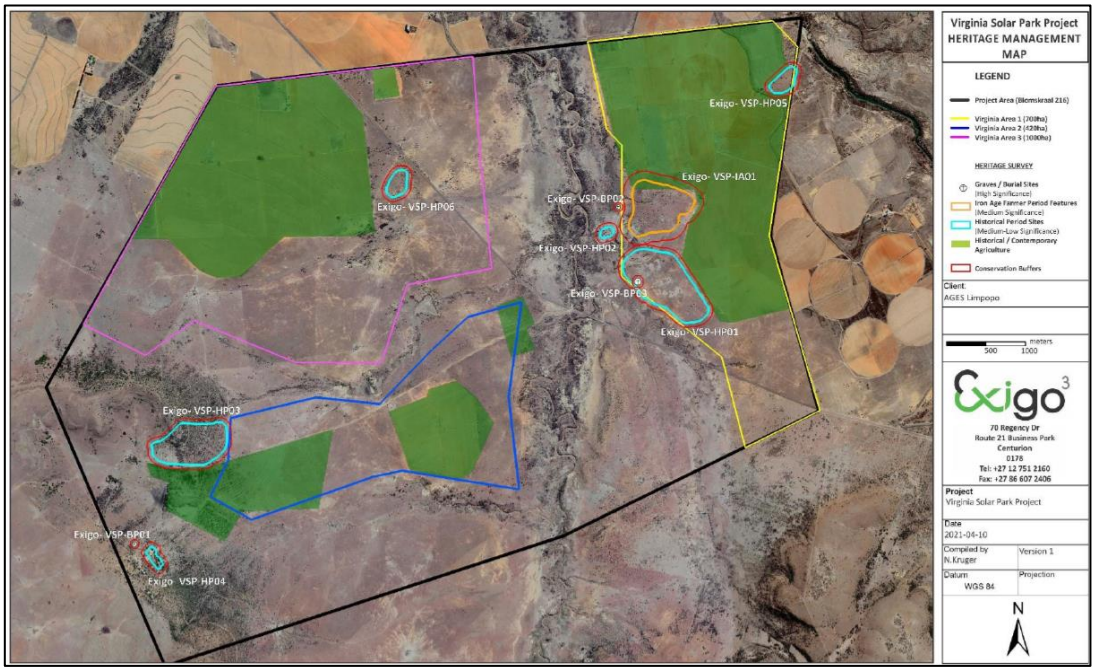

Figure 14. Site plan indicating the proposed heritage conservation buffers for the archaeological sites located within the Virginia Solar Parks EIA Project area.

6.6. PALAEONTOLOGICAL RESOURCES

A Palaeontological Impact Assessment (Annexure I) on the farm Blomskraal was conducted by Prof Bruce Rubidge.

The study area is situated in the Main Karoo Basin of the Free State province. The farm is underlain by Late Permian rocky deposits of the Adelaide Subgroup of the Lower Beaufort Group of the Karoo Supergroup. These Karoo rocks are overlain by Quaternary alluvial deposits (soil) which are covered by vegetation, grasses and bushes over most of the farm, irrigated cropland in the northwest and northeast, and two small *koppies* or hills capped by Jurassic dolerite, west and east. Biostratigraphically, the farm Bloemskraal, 216, lies within the upper *Daptocephalus* Assemblage Zone (*Lystrosaurus maccaigi-Moschorhinus* subzone) (Viglietti *et al*, 2016, Viglietti 2020). Good outcrops of fossil bearing rocks in this part of the basin, near Virginia, are sparse, and fossils are rare.

A Phase 1 Palaeontological Impact Assessment was conducted, including a Desktop Study and an onsite inspection for fossils by Marc Van den Brandt over three days (7, 8 and 10 April 2021). The on-site study found that on the farm Bloemskraal, 216, the mapped Permian bedrock is almost entirely covered in thick Quaternary alluvial deposits which in turn is covered by grass and bush. The north-south running Maselspruit River cuts into the Permian bedrock and exposes patches of potentially fossiliferous mudstone/siltstone and sandstone, but no Permian fossils were found, apart from erratic fossil wood fragments in the Quaternary alluvial deposits.
The edges of the Maselspruit expose Quaternary alluvium deposits (sandy soil to more consolidated gravel) which had isolated fossilised mammal bones, teeth and shells of the bivalve *Unio*. There is an exposed sandstone ridge in the east and the small western and eastern hills are capped with dolerite.

6.6.1. Recommendations of the Palaeontological Specialist

It is thus recommended that, from a palaeontological perspective, the proposed solar park development should proceed but should be constrained to the flat, grass and bushy vegetation covered areas currently used for cattle and game farming, as well as the irrigated cropland. Development should not take place near the north-south running Maselspruit River, its four erosional guiles or tributary streams, the eastern sandstone ridge, and the western and eastern dolerite hills.

Although the Palaeontological sensitivity of the Late Permian mudstone/sandstone deposits is HIGH, Quaternary alluvial deposits (soil), with LOW sensitivity, covers most of the farm and most of the Permian bedrock. Sensitive Permian Karoo bedrock is only exposed in places in the Maselspruit River and in even fewer places in the four erosional gullies or streams of the river, and in two regions of an exposed sandstone ridge. If development is avoided in these Palaeontologically sensitive areas of Permian outcrop, the Palaeontological impact of the proposed development is **LOW**.

Due to palaeontological sensitivity, the specialist does not recommend development on the north-south Maselspruit River, the three east-west erosional gullies or tributary streams west of the Maselspruit, the south-east running erosional gully or tributary stream east of the Maselspruit, the sandstone ridge in the east, the western dolerite *koppie* or hill, and the eastern dolerite *koppie* or hill. Virginia 2 Solar Park is located south of one of the east-west tributaries west of the Maselspruit but the development will be kept buffered from the stream areas.

In the event that fossils are discovered in the course of the proposed development, the Environmental Control Officer must follow the steps outlined in the Chance Find Protocol (Appendix A) whereby a qualified palaeontologist must be contacted to assess the exposure for fossils so that the necessary rescue operations are implemented. The Chance Find Protocol must be incorporated into the Environmental Management Programme (EMP) for the proposed development.

6.7. BASELINE TRAFFIC IMPACT ASSESSMENT

6.7.1. FINDING OF THE BASELINE ASSESSMENT

- Access to the proposed development will be via Virginia Road.
- Virginia Road between the intersection of Virginia Road and Road R73 (east of the proposed development) and the proposed development sites are in a poor condition with several sections containing potholes, road surface cracks, deteriorating road surface and overgrown shoulders.
- Virginia Road between the proposed development site area 3 and the intersection of Virginia Road and Road N1 (west of the proposed development) is in a fair condition with some sections having road surface cracks and overgrown shoulders.
- No reflective road studs are installed along Virginia Road and road markings are faded.
- Relevant road capacity is available along Virginia Road.

6.7.2. RECOMMENDATIONS AND TERMS OF REFERENCE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

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

- Access to all three areas of the proposed development would be possible and should be investigated in more detail as part of the detail design phase.
- Collaboration with the relevant road authority is recommended in terms of the rehabilitation of Virginia Road which includes maintaining road markings, road surface and growth of vegetation within the road reserve. This is recommended to ensure that during the construction phase, staff, consumables, and construction materials can be transported to the proposed development sites and that during the operational phase staff can have access to and from the proposed development via Virginia Road.
- As part of the construction phase, it is recommended that all construction materials and consumables are transported to site from the east via Road N1 due to the poor condition of Virginia Road to the west.

6.7.3. POTENTIAL ROAD RELATED CONSTRAINTS, FATAL FLAWS AND RED FLAGS AS PART OF THE PROPOSED DEVELOPMENT

No road related constraints, fatal flaws or red flags that could have an impact on the feasibility of the proposed development could be identified as part of this study for the existing road network in terms of road safety and the anticipated potential vehicle trips that could be generated by the proposed development, as long as road safety improvements recommended as part of this report have been implemented.

In relation to road and intersection reserve capacity it can be reported that reserve capacity is available. The extent (number of vehicle trips to be generated) by the proposed development will, however, determine if the existing reserve capacity would be sufficient.

6.8. RADIO FREQUENCY INTERFERENCE ASSESSMENT

The following findings are made with respect to the RFI sensitivity of this project:

- No corridors or buffer areas are identified or required within or close to the project footprint
- After evaluation and consideration of all activities identified, it is still considered to be classified as low sensitivity to RFI.
- For the proposed development referred to in this report, 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.

6.9. AVIATION IMPACT REPORT

The applicants above intend 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. A specialist assessment has been identified on the screening tool on a site identified as being of “low” sensitivity and no further assessment requirements are identified.

Although a “low” sensitivity has been identified, Tappas Aviation Consultant undertook a safeguarding assessment for proposed new transmission lines 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 Virginia Solar Parks & Power Line project.

It was decided to assess the development using the methodology of an obstacle assessment in accordance to international and national civil safeguarding rules. FAWM is a certified airport under Instrument Flight Rules, therefore both the Obstacle Limited Surfaces as well as the Approach/Departure Surfaces will be assessed. FAHA end FABX airport are Visual Flight Rules airports so only the Approach/Departure Surfaces will be assessed.
The Virginia Solar Parks & Power Line project will not interfere or affect FAWM Obstacle Limitation Surfaces or the Approach/Departure Surfaces due to the distance from the project plant site and powerline’s location. FAWM reference point is 24.63KM Km from the end of the power line and 37.94Km from the project plant. This places the location of the project plant and powerlines outside the limitation of the Obstacle Limitation Surfaces or the Approach/Departure Surfaces of FAWM.

As FAHA and Beatrix Mine Airports is Visual Flight Rules airports, only the Approach/Departure Surfaces were assessed. The Virginia Solar Parks & Power Line 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.

FAHA Approach/Departure Surface is the nearest to the power line with the closest distance of 5.63KM. FAHA distance from the power plant is 17.91KM.

Beatrix Mine Airport’s Approach/Departure Surface nearest distance to the power lines is 8.84KM. The distance from the power plant is 4.25Km.

These distances place the location of the project plant and powerlines outside of the limitation of the Approach/Departure Surfaces of both FAHA and Beatrix Mine Airport.

7. IMPACT IDENTIFICATION AND ASSESSMENT

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, whereas 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 of the four 132 kV power lines, for the connection to the on-site substation of the Virginia 2 Thermal Power Plant.

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 will be 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 between a minimum of 6 months and a maximum 15 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.
Please note that the evaluation of environmental impacts as a result of the proposed development will be discussed in detail in the EIA report. 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 restoring 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.

Potential impacts may include:

- **Impacts on soils & agricultural potential;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: Low

- **Impacts on ground water;**
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 30 years)
  - Probability: Medium
  - Significance: Low

- **Impacts on the road system and traffic;**
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low

- **Impacts on air quality and potential emissions;**
  - Extent: Regional
  - Duration: Life of the project (approx. 30 years)
  - Probability: Very Low
  - Significance: Very Low

- **Geological, soil and erosion impacts;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low

- **Impacts on avifauna;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low

- **Impacts on vegetation;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: Medium

- **Impacts on heritage resources;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low

- **Noise impacts;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Very Low

- **Impacts on tourism;**
  - Extent: Regional
  - Duration: Life of the project (approx. 30 years)
  - Probability: Unknown
  - Significance: Unknown

- **Social impacts;**
  - Extent: Regional & Locally
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: High - Positive

- **Visual impacts.**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Definite
  - Significance: to be determined

Please note that the statements above with regard to potential impacts are preliminary and have not been analysed as all the information to do this accurately has not been obtained yet.

In the following section: Plan of Study for EIA it is outlined which studies are to be conducted in order to evaluate the identified impacts and to propose mitigation measures.

The significance of the potential impacts can and will be determined once all the specialist studies have been obtained.

8. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS AND PUBLIC PARTICIPATION PROCESS

The environmental impact studies can be summarized in a two-phased approach:

- Phase 1: Environmental Scoping Phase
- Phase 2: Environmental Impact Assessment (EIA) and Environmental Management Program (EMPr)

The scope of the EIA procedure is to provide an assessment of all impacts related to the proposed project in compliance with the EIA Regulations 2014, as amended.

8.1. SCOPING PHASE

The Scoping Phase aims to produce the following:

- a description of the proposed activity, the property and the receiving environment;
- the identification of potential significant positive and negative impacts;
- the identification of opportunities and constraints, alternatives and mitigation measures which need to be evaluated and investigated during the successive EIA phase, especially in order to prevent environmental fatal flaws and sensitive or “no-go” areas.

The Scoping Phase includes the Public Participation Process. The PPP has the aim to identify concerns and issues by the interested and affected parties (I&AP’s). Issues and concerns raised by the I&AP’s and key stakeholders during the Public Participation Process will be collected, processed and addressed in the Comments and Response document which forms a part of this Final Scoping Report. All issues and concerns identified during the Scoping Phase are documented in this Final Scoping Report which will be submitted to the DFFE together with a Plan of Study for EIA.

8.2. EIA PHASE

The next step of the EIA process is the development of guidelines for execution of the impact assessment and the compilation of an Environmental Impact Assessment Report.

The database of the stakeholders and I&AP’s developed during the previous EIA process will be used as a reference to ensure that stakeholders are involved and participate in the second phase of the EIA process. All relevant issues considered during the Scoping Phase will be further investigated and assessed during the EIA Phase of this project. The EIA will involve various specialist studies and should provide an overall assessment of the biophysical, social and economic environment affected by the proposed project.

A detailed assessment will be carried out in terms of environmental criteria and rating of significant impacts of all options identified in the scoping phase. Appropriate mitigation measures will be identified and recommended for all significant impacts. These measures should be included in an Environmental Management Program (EMP) to be submitted together with the Environmental Impact Assessment Report (EIAR) to the DFFE.

During the EIA phase stakeholders and I&AP’s will be notified in writing of the continuation of the project to the EIA Phase and will be informed as to the way forward and where and when the Draft Environmental Impact Assessment Report will be made available for review. Comments from the stakeholders and I&AP’s on the Draft EIR and the Draft EMPr will be incorporated into the final EIAR. The stakeholders and I&AP’s will furthermore be informed of the final decision regarding the Environmental Authorization and the appeal process.

8.3. PUBLIC PARTICIPATION PROCESS

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&AP's 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 notifications to the I&APs of the property owners adjacent to the farm Blomskraal, 216, Ventersburg RD, could not be completed yet as most of them are in the name of TRUSTS or the contact details are not available (POPI Act).

Various attempts to contact these adjacent landowners have so far proven extremely difficult as many of them do not reside on their farms. Another attempt will be made with the distribution of the Draft Scoping Report to notify the adjacent landowners of occupiers of the land.

The original Background information Document (BID) indicated that the 3 Solar Parks were to be located on the farms of Blomskraal, 216, Ventersburg RD, Remainder of Palmiet Fontein, 229, Winburg RD, Delaporte, 887, Winburg RD and Portion 3 of Quaggafontein, 3, Winburg RD, but this has been changed since then due to habitat restrictions after specialist studies were carried out.

A new BID with altered properties has been drawn up to be distributed to I&APs which will also include the Power lines relevant to the 3 Solar Parks proposed.

The public was informed of the proposed development and the database of Interested and Affected parties was populated.

In the enclosed Annexure C, there is the list of all components of the public participation process. The public was informed of the project by means of:

- **Site notices** were put up at the proposed development site at 2 areas on the fences at the proposed development area on **4 February 2021.**
- **Background Information Documents (BIDs**) were emailed to most of the Authorities involved on **4 February 2021.**
- **A Notice / Advertisement** was published in the **VISTA local newspaper, appearing on Thursday 4 February 2021** which is distributed in the general area.
- **Emails of the BID** were sent to other most of the relevant **Authorities** possible interested and affected parties/stakeholders (other **I&APs**).

- BIDs were sent to:
    - Matjhabeng Local Municipality
    - Local Municipality Ward Councillor 1, 3 and 4
    - Matjhabeng LM Mayor
    - Masilonyana Local Municipality
    - Local Municipality Ward Councillor 6
    - Masilonyana LM Mayor
    - Lejweleputswa District Municipality
    - Department of Water & Sanitation
    - Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs (DESTEA)
    - Free State Department: Agriculture and Rural Development
    - Eskom
    - Department of Minerals and Energy
    - DMR (Department of Mineral Resources).
    - Department of Science & Technology
    - South African Astronomical Observatory (SAAO) and Southern African Large Telescope (SALT)
    - South African Radio Astronomy Observatory (SARAO) and Square Kilometre Array (SKA)
    - Council for Scientific and Industrial Research (CSIR)
    - SANRAL
    - Department of Agriculture, Forestry & Fisheries: Provincial
    - SACAA
    - DFFE: Directorate: Climate Change & Air Quality, Biodiversity & Conservation, Protected Areas Systems Management:
    - Transnet
    - SAHRA
    - Free State Agriculture (NGO)
    - Endangered Wildlife Trust (EWT)
    - Bird Life SA

- **An I&AP Register** was created and opened which will be maintained and added to as required.

- **Registrations of I&APs'**
  Several people registered as I&APs, but no comments were received during the initial public participation process from adjacent landowners and/or interested and/or affected parties.

- **The Draft Scoping Report** (in electronic format) was made available for a 30-day commenting period for comments and was also provided as hard copy on request.

8.3.1. Further steps in Public Participation Process

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

- The Final Scoping Report and the Plan of Study for EIA will be submitted to the DFFE or review and approval

- Once the Final Scoping Report and the Plan of Study for EIA is approved by the DFFE, the Draft EIA Report will be submitted and made available for a commenting period of 30 days. Notifications will be sent out to inform registered I&APs and governmental organisations that the Draft EIA Report was submitted and is again available for comments.

- Registered I&APs and governmental organisations will be notified about the final decision of the DFFE (Environmental Authorisation granted or not).

9. PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Hereinafter there is a brief description of the approach that will be used in the EIA study. Assumptions and sources of information will be identified, and the knowledge of local people will be incorporated in the final scoping study.

9.1. DESCRIPTION OF THE AFFECTED ENVIRONMENT

A further description of the affected environment will be provided. An additional indication of the sensitivity of the affected environment will also be provided. Sensitivity, in this context, refers to the "ability" of an affected environment to tolerate disturbance, for example, if disturbance of the natural habitat results in the permanent loss of its biodiversity the affected environment could be categorised as having a "low tolerance" to disturbance and is, therefore, termed a highly sensitive habitat. Instead, if a habitat is able to withstand significant disturbance without a marked impact on its biodiversity, the affected environment could be categorised as having a high tolerance to disturbance (i. e. "low sensitivity" habitat).

9.2. IMPACT IDENTIFICATION AND ASSESSMENT

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, whereas 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 Virginia 2 Solar Park include:

- the land clearing activities necessary for preparation of the site and access routes;
- the excavation and filling activities;
- the transportation of various materials;
- the preparation of the temporary worksite;
- the installation of the PV modules and construction of associated structures and infrastructure; and
- construction of the on-site high-voltage substation and of the 132 kV power line, up to 210m long, for the connection to the on-site substation of the Virginia 2 Solar Power Plant.

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 restoring 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 may 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; and
- Visual impacts.

The terms of reference for the EIA study will include criteria for the description and assessment of environmental impacts. These criteria are drawn from the *Integrated Environmental Management Guidelines Series, Guideline 5*: *Assessment of Alternatives and Impacts*, published by the DFFE in terms of the Environmental Impact Assessment. These criteria include:

Table 15. Impact Assessment Criteria

Nature of impact This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. The description should include what is being affected, and how.		
Extent The physical and spatial size of the impact.	**Site**	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
	Local	The impacted area extends only as far as the activity, e.g. a footprint.
	Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
Duration The lifetime of the impact; this is measured in the context of the lifetime of the proposed base.	**Short term**	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the phases.
	Medium term	The impact will last up to the end of the phases, where after it will be entirely negated.
	Long term	The impact will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter.
	Permanent	The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity	**Low**	The impact alters the affected environment in such a way that the natural processes or functions are not affected.

	Medium	The affected environment is altered, but function and process continue, albeit in a modified way.
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Probability This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time.	**Improbable**	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
	Probable	There is a possibility that the impact will occur to the extent that provisions must be made therefore.
	Highly probable	It is most likely that the impacts will occur at some or other stage of the development. Plans must be drawn up before the undertaking of the activity.
	Definite	The impact will take place regardless of any prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect.
Determination of significance. Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	**No significance**	The impact is not substantial and does not require any mitigation action.
	Low	The impact is of little importance but may require limited mitigation.
	Medium	The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
	High	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

9.3. CUMULATIVE IMPACTS

Cumulative impacts will be assessed in relation to other renewable energy developments in the proximity from the proposed Virginia 2 Solar Park. Mitigation measures will be proposed, in order to mitigate the impacts that may result from the establishment of the Virginia 2 Solar Park to an acceptable level.

9.4. RISK ASSESSMENT FOR BESS TECHNOLOGY

The primary focus is on the fire hazards associated with Li-ion batteries and the 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 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.

9.5. SPECIALIST STUDIES

Specialist studies have been carried out to address the impacts during the EIA process. Specialist studies which have been conducted and included in the FSR, are the following:

- **Annexure D Terrestrial Biodiversity Impact Assessment**
- **Annexure E Avifaunal Assessment**
- **Annexure F Agricultural Agro-ecosystem Assessment**
- **Annexure G Wetland riparian Delineation and Aquatic Biodiversity report**
- **Annexure H Archaeological Impact Assessment**
- **Annexure I Palaeontological Impact Assessment**
- **Annexure J Preliminary Visual Impact Assessment**
- **Annexure K Baseline Traffic Impact Assessment report**
- **Appendix L Radio Frequency Interference Assessment**
- **Appendix M Aviation Impact Report**
- **Annexure N Environmental Screening report**
- **Annexure O Alternative site selection assessment**

The following specialist reports will be conducted for the EIA phase:

- **Geo-Technical Assessment**
- **Socio - Economic Impact Assessment**
- **Services Report**
- **Storm Water Management Plan**
- **Complete Visual Impact Assessment**
- **Amended Avifauna Assessment**

9.6. TERMS OF REFERENCE FOR SPECIALIST STUDIES

9.6.1. Ecological (Terrestrial Biodiversity) Impact Assessment (Annexure D)

Objectives

- The primary aim of this project is to investigate options for enhancing and/or maintaining biodiversity to mitigate the impact of the proposed development and related infrastructure with the overall objective of preventing further loss of biodiversity. The end product would be a tool for promoting and lobbying for the recognition of the importance of species habitat and habitat conservation. Options available to maintain the current level of floral diversity include:
  - Protection of native vegetation restored elsewhere in return for unavoidable clearing;
  - Minimisation of habitat fragmentation;
  - Minimisation of any threats to the native flora and fauna and their habitats during the construction and operational phases of the developments and;
  - Rehabilitation to establish plant communities / landscaping that will provide future habitat values.
- To produce a clear and agreed species and habitat priorities for conservation actions. This includes the following:
  - Determine the potential ecological impacts and actions the developments will have on the biodiversity on a species and habitat level;
  - Conduct a risk analyses of the impacts identified to determine the significance of the impacts on the fauna and flora of the study area;
  - Protection and enhancement of vegetation / habitats of high conservation value;
  - The retention of a substantial amount of native vegetation / habitat of adequate size and configuration to promote the conservation of the existing flora communities;
  - The retention and / or creation of vegetation links, wildlife corridors and vegetation buffers wherever possible, subject to the appropriate bush fire risk management; and
  - The protection of water quality in the locality so as not to threaten native aquatic flora that rely on the watercourse for survival.
- Provide recommendations on the ecological mitigation measures to be implemented by the developer and the way forward.

Scope

- Detailed flora survey – in each vegetation type/plant community on site:
  - After studying the aerial photograph identify specific areas to be surveyed and confirm location by making use of a Geographical Positioning System (GPS).
  - Conduct a site visit and list the plant species (trees, shrubs, grasses, succulents and other herbaceous species of special interest) present for plant community and ecosystem delimitation.
  - Identify potential red data plant species, possible encroacher species, medicinal plants of value and exotic plant species.
  - Indicate suitable plant species that can be used for the landscaping around the proposed developments.

- Plant community delimitation and description:
  - Process data (vegetation and habitat classification) to determine vegetation types on an ecological basis.
  - Describe the habitat and vegetation.

- Fauna scoping:
  - List the potential fauna (mammal species, red data birds, reptiles, amphibians, invertebrates) present linked to the specific potential habitats that occur as identified in the vegetation survey.
  - Analyse the data and identify potential red data fauna species, as well as other endemic or protected species of importance.
  - Indicate species mitigation measures and management measures to be implemented to prevent any negative impacts on the fauna of the area.

- General:
  - Identify and describe ecologically sensitive areas. Create a sensitivity map to indicate specific sensitive areas based on various environmental parameters such as natural vegetation in a good condition, rockiness, slopes, flood lines etc.
  - Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.
  - Make recommendations, impact ratings and risk assessments for each specific impact.

9.6.2. Wetland riparian Delineation and Aquatic Biodiversity report (Appendix G)

Objectives

- Conduct a desktop and field investigation to confirm the presence or absence of wetlands and riparian areas within the study area;
- Delineate and map the identified wetland areas on site;
- Classify wetlands according to their hydro-geomorphic characteristics;
- Determine the impacts associated with the proposed development on the wetlands;
- Specify mitigation measures and management plan for the wetlands on site;
- Compile a report with the findings and maps.

9.6.3. Avifauna Impact Assessment (Annexure E)

Objectives

- Compile an avifauna scoping assessment report. Determine the number of bird habitats present in the direct area of the proposed development from relevant databases and field surveys (micro-habitats);
- Determine the potential ecological impacts and actions the proposed solar development will have on the avifauna populations and recommend mitigation and monitoring guidelines.

Scope

- Bird habitat survey – in each vegetation type/plant community on site:
  - After studying the aerial photograph to identify specific bird habitats where micro-habitats might occur to be surveyed and confirm location by making use of a Geographical Positioning System (GPS);
  - List the potential bird species present and link them to the specific potential habitats that occur as identified in the habitat survey;
  - List the bird species observed during the field survey as well as specific relevant habitat characteristics.
  - An inclusive list of priority species likely to occur there, with notes on the relative value of the site for these birds,

  - Input on likely seasonality of presence/absence and/or movements for key species,
  - Identifying any obvious, highly sensitive, no-go areas to be avoided by the development from the outset.
- Identify the impact of the proposed development on the avifauna of the area, with specific relevance to the red data birds potentially occurring in the area.
- Indicate species mitigation measures and management measures to be implemented to prevent any negative impacts on the avifauna of the area.
- Make recommendations and impact rating assessments for each specific impact on the avifauna.
- Compile a monitoring report for application during the construction and operational phases.

9.6.4. Agricultural Potential Soil Assessment (Annexure F)

Objectives

- Conduct a soil survey on the proposed development site and identify the different soil types / forms present on the site;
- From the soil survey results link the optimal land use and other potential uses and options to the agricultural potential of the soils by classifying the soils into different Agricultural Potential classes according to the requirements set by the Department of Agriculture, South Africa. From these results soil maps and an agricultural potential map will be compiled;
- Discussion of the agricultural potential and land capability in terms of the soils, water availability, grazing capacity, surrounding developments and current status of land;
- Identify potential impacts of the development on the soils and provide mitigation measures to manage these impacts.

9.6.5. Heritage and Palaeontological Impact Assessments (Annexures H and I)

The heritage component of the EIA is provided for in the National Environmental Management Act, (Act 107 of 1998) and endorsed by section 38 of the National Heritage Resources Act (NHRA - Act 25 of 1999). In addition, the NHRA protects all structures and features older than 60 years (see Section 34 of the Act), archaeological sites and material (see Section 35 of the Act) and graves as well as burial sites (see Section 36 of the Act). The objective of this legislation is to enable and to facilitate developers to employ measures to limit the potentially negative effects that the development could have on heritage resources.

Based hereon, this project functioned according to the following terms of reference for heritage specialist input:

- Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.
- Assess the nature and degree of significance of such resources within the area.
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance.
- Assess any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.
- Propose possible heritage management measures provided that such action is necessitated by the development.
- Liaise and consult with the South African Heritage Resources Agency (SAHRA).

9.6.6. Geo-Technical Assessment (to be conducted)

Terms of Reference
Geotechnical Consult Services (GCS) has been contracted to conduct a level 2 geotechnical Investigation for the Virginia 2 Park Project.

Scope of Work
The scope of work for this project, for a Level 2 assessment:

- Desktop assessment of the soil and rock stratigraphy on the site.
- Confirmation of soil and rock stratigraphy on site.
- Identification of problem soils.
- Evaluation and recommendations regarding the geotechnical land use of the property.
- Identification of geo-hydrological conditions on the site.
- Identification of groundwater impacts.
- Define the potential availability of groundwater and the quality thereof, for the proposed project.
- Recommend a groundwater management plan.

9.6.7. Socio-economic Impact Assessment (to be conducted)

The purpose of this assessment is to document socio-economic issues at the conceptual level that should be considered as part of the environmental impact assessment of the proposed Virginia 2 Solar Park.
The study will be conducted according to the following terms of reference and scope of work:

Terms of Reference

- Project Description from a socio-economic perspective
- Socio-Economic context of Saldanha Bay Local Municipality
- Proposed project fit within the national, provincial and local development policy context

Scope of Work

- Anticipated economic impact of the project
- Other socio-economic considerations
- Conclusion and recommendations

9.6.8. Visual Impact Assessment (Annexure J)

Terms of Reference
A specialist study is required to establish the visual baseline and to identify and assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference was established:

- Data collected during the site visit (carried out on 16 and 17 Sept 2020) will allow for a description and characterization of the receiving environment.
- Identify issues that must be addressed in the impact assessment phase.
- Describe the landscape character, quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the project; and
- Rate the significance of impact of the project.
- Proposed mitigation measures to reduce the potential impact of the project.

Methodology

The following methods will be used:

- Site visit: A field survey was undertaken when the study area was scrutinized to the extent that the receiving environment could be documented and adequately described. The climate conditions were mostly sunny with some cloud cover.
- Project components: The physical characteristics of the project components were described and illustrated based on information supplied by AGES Limpopo.
- General landscape characterization: The visual resource (i.e. receiving environment) was mapped using the field survey, Google Earth imagery and Mucina and Rutherford's (2006) reference book, The Vegetation of South Africa, Lesotho, and Swaziland. The description of the landscape focused on the nature of the land rather than the response of a viewer.
- The character of the landscape was described and rated in terms of its aesthetic appeal using recognized contemporary research in perceptual psychology as the basis, and its sensitivity as a landscape receptor.
- The sense of place of the study area was described as to its uniqueness and distinctiveness. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historic / current use of the land.
- Visibility of the proposed Project was determined using computer generated viewshed analyses.
- Illustrations, in basic simulations, of the proposed project were overlaid onto panoramas of the landscape, as seen from nearby sensitive viewing points to give the reviewer an idea of the scale and location of the proposed project within their landscape context3.
- Visual intrusion (contrast) of the proposed project was determined by simulating its physical appearance from these sensitive viewing areas.
- The impact on the visual environment of the proposed project was rated based on a professional opinion and the method described above; and
- Measures to mitigate the negative impacts of the proposed project were recommended.

9.6.9. Traffic Impact Assessment report (Appendix K)

The purpose of the traffic study is:

a) To determine the status quo of the relevant road network adjacent the proposed development.

b) To determine and identify any potential traffic management constraints for the proposed development.

- The *status quo* of the land use and road network characteristics of roads relevant to the proposed development which consists of the following information:
    - Existing land use information.
    - Existing road characteristics and modal distribution.
    - Traffic counts as a basis for making traffic-engineering calculations.
- The future land use and road network characteristics relevant to the proposed development which consists of the following information:
    - Land use information, including existing and proposed approved future developments
    - in the area.
    - Determination of vehicle trips expected to be generated due to the proposed
    - development.
- Access to and from the proposed development.
- The current levels of service at the relevant intersections under investigation.
- Other traffic-related matters.

9.6.10. Radio Frequency Interference Assessment(Appendix L)

The report must evaluate and assess the possibility of the new solar power development site, together with its supporting infrastructure, having the potential of being generation sources of RF (radio frequency) interference signals thus effecting existing or new equipment and infrastructure in the surrounding.

- The evaluation and assessment process followed will be to look at the layout of the site geographically.
- Determine what and where any existing infrastructure is located relative to the proposed development site.
- Evaluate according to existing experience as to the scenarios that can pose a problem as well as the methods of limiting potential RF Interferences and effects.

9.6.11. Aviation Impact Report(Appendix M)

Undertake 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). Use the methodology of an obstacle assessment in accordance to international and national civil safeguarding rules.

FAWM is a certified airport under Instrument Flight Rules, therefore both the Obstacle Limited Surfaces as well as the Approach/Departure Surfaces will be assessed.

FAHA end FABX airport are Visual Flight Rules airports so only the Approach/Departure Surfaces will be assessed.

9.6.12. Stormwater Management Plan

The purpose of this report is to provide an oversight of the hydrological setting of the projects, and to provide the scope of work for further hydrological assessment and the development of the STORM WATER MANAGEMENT PLAN for the Solar plant site.

Aspects of importance in the management plan are:

- Hydrological characteristics including flood volumes, possible flood line challenges and general flow patterns expected on site. (Topography and climatological drivers).
- Water quality due to site activities.
- Mitigating the hydrologic impact of the solar farm development.

The purpose of the Storm Water Management Plan (SWMP) must be to:

- To provide guidance to align all phases of development and the eventual operation to the relevant Acts of Law.
- To provide for rational thinking in concept development and design.
- To minimise risk of on site and / or downstream damage due to hydrological impact. This includes exposure to runoff associated with normal rain, as well as during more extreme flood events.
- To minimise the risk to on site and / or downstream contamination through storm water due to waste on site.
- It needs to consider the impact of rain on the site, the impact of water entering the site from higher ground and the impact of water leaving the site.

The SWMP Report will not be a design report; guidance is given in it for compliance by the eventual design-implementation- and operational teams.

The **technical parameters** to be detailed in the stormwater management plan are

- Geographical orientation
- Topography of the site
- Surface conditions on site
- Climatic conditions in the area
- Hydrological setting of the area

10. DECOMMISSIONING PHASE

Decommissioning activities of the PV plant mainly include removal of project infrastructure and restoring of the site's *status quo ante*.

The decommissioning phase will start at the end of the PV power plant lifetime (approx. 30 years) and will last approximately 8 months, involving a team of 150 workers.

Decommission will be subject to a decommissioning plan once the project is nearing its operational life (30 years). Decommissioning will also be subject to an environmental authorisation.

10.1. SITE PREPARATION

In order to ensure a correct decommissioning of the site, the first step of the process will include adequate site preparation. Integrity of access points and of lay down areas will be confirmed and eventually re-established in order to accommodate equipment and to load vehicles.

10.2. DISASSEMBLE AND REPLACEMENT OF EXISTING COMPONENTS

All components will be disassembled. Silicon of the PV modules will be recycled, as well as mounting structures (aluminium or zinced steel frames and piles) and cables (copper and/or aluminium conductor).

Non-recyclable components of inverter, transformers and electrical devices will be disposed in appropriate way, in compliance with applicable laws and international standards.

10.3. RESTORATION OF THE SITE

Adequate measures will be undertaken in order to restore the site by re-planting of indigenous plant species.

10.4. ALTERNATIVE OPTION: UPGRADING THE SOLAR PARK

At the end of the PV power plant lifetime (approx. 30 years), as alternative option to the decommissioning, it will be evaluated the feasibility of upgrading the solar park with the most appropriate technology/infrastructure available at that time.

11. CONCLUSIONS AND RECOMMENDATIONS

This Final Scoping Report and Plan of Study for Environmental Impact Assessment (EIA) describe the activities that will be undertaken for the proposed development of the Virginia 2 Solar Park and give an indication to the DFFE related to the EIA which assessments will be conducted.

A detailed assessment of the status quo of the receiving environment was conducted, in order to ensure that all pertinent environmental aspects were correctly identified and addressed.

A comprehensive public participation process will be conducted during the Scoping Phase (details of the public participation process are enclosed under Annexure C). All issues and questions raised will be noted and addressed during the EIA phase.