



GEOHYDROLOGY

GEOTECHNICAL

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Draft BA Report

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**DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED 3x132kV POWERLINES FOR THE CONNECTION OF THE VIRGINIA 1, 2 & 3 SOLAR PARKS TO THE ESKOM THESEUS SUBSTATION, LOCATED ON THE MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE - Short name: Virginia 3x132kV Powerlines**

October 2021

Commissioned by: Norma Energy (Pty) Ltd  
Document version 1.0 – Consultation  
Compiled by A von Well & EA Grobler



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# DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED 3x132kV POWERLINES FOR THE CONNECTION OF VIRGINIA 1, 2 AND 3 SOLAR PARKS TO THE ESKOM THESEUS SUBSTATION, LOCATED ON MATJHABENG AND MASILONYANA LOCAL MUNICIPALITIES, LEJWELEPUTSWA DISTRICT MUNICIPALITY, FREE STATE PROVINCE

## Short name: Virginia 3x132kV Powerlines

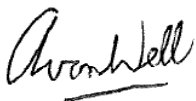
October 2021

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## Table of contents

1	OBJECTIVE OF THE ENVIRONMENTAL BASIC ASSESSMENT PROCESS .....	1
2	DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) ..	1
3	LOCATION OF ACTIVITY .....	2
3.1	SURVEYOR GENERAL 21-DIGIT CODES OF DEVELOPMENT AREAS .....	2
3.2	PHYSICAL ADDRESS AND FARM NAME .....	3
4	PLAN OF THE PROPOSED ACTIVITY .....	6
5	SCOPE OF THE PROPOSED ACTIVITY .....	9
5.1	LISTED ACTIVITIES TRIGGERED IN TERMS OF NEMA .....	9
5.2	DESCRIPTION OF ASSOCIATED STRUCTURES AND INFRASTRUCTURE RELATED TO THE DEVELOPMENT .....	10
5.3	LAYOUT OF INFRASTRUCTURE AND STRUCTURES ON SITE .....	10
5.4	PRIMARY COMPONENTS .....	10
6	LEGAL AND POLICY REQUIREMENTS .....	12
6.1	REGULATORY AUTHORITIES .....	12
6.1.1	National Authorities .....	12
6.1.2	Provincial Authorities .....	12
6.1.3	Local Authorities .....	13
6.2	LEGISLATION, REgulations and Guidelines .....	13
7	NEED/DESIRABILITY OF THE PROJECT .....	16
8	CONSIDERATION OF PROJECT ALTERNATIVES .....	17
8.1	LOCATION ALTERNATIVES .....	17
8.2	TECHNOLOGY ALTERNATIVES .....	17
8.3	POWERLINE CORRIDORS ALTERNATIVES .....	18
8.4	NO-GO ALTERNATIVE .....	19
9	DETAILS OF PUBLIC PARTICIPATION PROCESS UNDERTAKEN .....	20
9.1	Further steps in Public Participation Process .....	21
10	ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROPOSED PV solar park .....	22
10.1	ENVIRONMENTAL FEATURES .....	22
10.2	powerline developments with Environmental Authorisation within 30 km of proposed development area 24	
10.3	Climate .....	25
10.4	Topography and drainage .....	25
10.5	Soils and geology .....	25
10.6	Ecology (fauna & flora) .....	27
10.6.1	Vegetation types .....	27
10.6.2	Species of Conservation Concern (SCC) .....	31
10.6.3	Protected Plants (Free State Nature Conservation Ordinance) .....	31
10.6.4	Protected Trees Species (NFA) .....	31
10.6.5	Conclusions .....	31
10.6.6	Fauna .....	34
10.6.7	Summary and results of the Terrestrial Biodiversity Impact Assessment .....	36
10.6.8	Avifauna .....	38
10.6.9	Visual .....	39
10.7	AGRICULTURAL POTENTIAL .....	40
10.8	CULTURAL AND HERITAGE RESOURCES .....	40
10.8.1	Recommendations BY the ARCHAEOLOGIST .....	40
10.9	PALAEONTOLOGICAL RESOURCES .....	42
10.9.1	Recommendations of the Palaeontological Specialist .....	42
10.10	BASELINE TRAFFIC IMPACT ASSESSMENT .....	42
10.10.2	RECOMMENDATIONS AND TERMS OF REFERENCE FOR THE ENVIRONMENTAL IMPACT ASSESSMENT .....	43
10.11	RADIO FREQUENCY INTERFERENCE ASSESSMENT .....	43
10.12	AVIATION IMPACT REPORT .....	44
10.13	IMPACTS AND RISKS IDENTIFIED .....	45
10.13.1	DEGREE TO WHICH THE IMPACTS CAN BE REVERSED .....	46
10.13.2	DEGREE TO WHICH IMPACTS MAY CAUSE IRREPLACEBLE LOSS OF RESOURCES .....	47
10.13.3	DEGREE TO WHICH IMPACTS CAN BE AVOIDED, MANAGED OR MITIGATED .....	47
10.14	METHODOLOGY USED IN RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL IMPACTS AND RISKS ASSOCIATED WITH ALTERNATIVES .....	47
10.15	ASSESSMENT CRITERIA .....	49
10.16	CUMULATIVE IMPACTS .....	51

10.17 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY ..... 52

10.18 POSSIBLE MITIGATION MEASURES AND RESIDUAL RISK ..... 52

10.19 MOTIVATION FOR NOT INVESTIGATING ALTERNATIVES ..... 52

11 DESCRIPTION OF THE PROPOSED PROCESS TO IDENTIFY AND RANK ENVIRONMENTAL IMPACTS THAT THE ACTIVITY, ASSOCIATED STRUCTURES AND INFRASTRUCTURE WILL IMPOSE ON THE PREFERRED LOCATION THROUGH THE LIFE OF THE ACITIVITY ..... 53

11.1 DESCRIPTION OF ENVIRONMENTAL ISSUES AND RISKS IDENTIFIED DURING THE EIA PROCESS ..... 53

11.2 IMPACTS & MITIGATION MEASURES OF CONSTRUCTION PHASE ..... 54

11.2.1 ATMOSPHERIC POLLUTION AND NOISE ..... 54

11.2.2 GROUNDWATER AND SURFACE WATER POLLUTION ..... 55

11.2.3 WATER USE / WATER QUANTITY ..... 56

11.2.4 LAND & SOILS ..... 57

11.2.5 ARCHAEOLOGICAL, CULTURAL AND SOCIAL FEATURES ..... 58

11.2.6 IMPACT OF THE DEVELOPMENT ON ECOLOGY (FAUNA & FLORA) OF THE AREA ..... 59

11.2.7 VISUAL IMPACTS ..... 62

11.2.8 SAFETY, SECURITY AND FIRE HAZARDS ..... 62

11.2.9 TRAFFIC AND ROAD SAFETY ..... 63

11.3 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS AND RISKS ..... 64

11.3.1 CUMULATIVE IMPACTS ..... 64

11.3.2 NATURE OF IMPACT ..... 65

11.3.3 EXTENT AND DURATION OF IMPACT ..... 65

11.3.4 PROBABILITY OF OCCURRENCE ..... 65

11.3.5 DEGREE TO WHICH IMPACT CAN BE REVERSED ..... 65

11.3.6 DEGREE TO WHICH IMPACT CAN CAUSE IRREPLACEABLE LOSS OF RESOURCE ..... 65

11.3.7 DEGREE TO WHICH IMPACT CAN BE MITIGATED ..... 65

12 SUMMARY AND FINDINGS AND RECOMMENDATIONS OF SPECIALIST REPORTS AND HOW FINDINGS HAVE BEEN INCLUDED IN THE ASSESSMENT REPORT ..... 66

13 ENVIRONMENTAL IMPACT STATEMENT ..... 68

13.1 SUMMARY KEY FINDINGS OF THE BASIC ASSESSMENT ..... 68

13.2 CUMULATIVE ENVIRONMENTAL IMPACT STATEMENT ..... 68

13.3 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES ..... 69

13.4 ASPECTS CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT BY THE EAP OR SPECIALISTS TO BE INCLUDED AS CONDITIONS OF AUTHORISATION ..... 69

14 FINAL PROPOSED ALTERNATIVES RESPONDING TO IMPACT MANAGEMENT MEASURES, AVOIDANCE AND MITIGATION MEASURES IDENTIFIED IN ASSESSMENT ..... 71

15 ASSUMPTIONS UNCERTAINTIES AND GAPS IN KNOWLEDGE ..... 72

16 REASONED OPINION FOR AUTHORISATION OF ACTIVITY AND CONDITIONS IN RESPECT OF THAT AUTHORISATION ..... 73

17 PERIOD OF ENVIRONMENTAL AUTHORISATION AND DATE OF CONCLUSION OF ACTIVITY ..... 74

18 UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP ..... 75

19 BIBLIOGRAPHY ..... 76

**LIST OF FIGURES**

Figure 1 Locality Map (Google Earth): Powerline Study Corridor, 500 m wide, for Basic Assessment .....6

Figure 2: Locality Map (cadastral map): Powerline Study Corridor, 500 m wide, for Basic Assessment .....7

Figure 3 Proposed alignment of the Virginia 3 x 132kV Powerlines .....8

Figure 4. Steel monopole structure for a 132 kV powerline (double circuit) ..... 11

Figure 5. Guyed V tower (voltage: 400kV – maximum tower height: 40 m a.g.l.) on the right; Self-support tower (voltage: 400kV – maximum tower height: up to 40 m a.g.l. with leg extensions) on the left ..... 18

Figure 6. Map of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area .....24

Figure 7. Vegetation Map .....32

Figure 8. Sensitivity Map .....33

Figure 9. Site plan indicating the proposed heritage conservation buffers for the archaeological sites located within the Virginia Solar Parks EIA Project area .....41

## LIST OF TABLES

Table 1. Geographical co-ordinates of the preliminary powerline alignments .....	4
Table 2. Listed Activities triggered, in terms of EIA Regulations 2014, as amended. ....	9
Table 3. Review of relevant legislation .....	13
Table 4 Environmental Screening Tool Table .....	22
Table 5. List of Powerline developments with Environmental Authorisation within 30 km of proposed area .	24
Table 6. Red data list of potential fauna for the study area .....	35
Table 7. Impact Assessment Criteria .....	49

## LIST OF ANNEXURES

### Annexure A Maps and technical drawings of the Virginia 3 x 132kV Powerlines:

- VGPL\_00\_LM1\_r0 Locality Map: Powerline Study Corridor for Basic Assessment
- VGPL\_00\_SEN\_r0 Powerline Study Corridor and Sensitivity Map
- VGPL\_01\_ALN\_r0 Powerlines Alignment and Sensitivity (1 of 3)
- VGPL\_01\_ALN\_r0 Powerlines Alignment and Sensitivity (2 of 3)
- VGPL\_01\_ALN\_r0 Powerlines Alignment and Sensitivity (3 of 3)
- VGPL\_02\_r0 Steel monopole structure (double circuit)

### Annexure B Comments & Responses Report

### Annexure C Terrestrial Biodiversity Impact Assessment

### Annexure D Wetland Delineation and Riparian Report

### Annexure E Avifaunal Assessment

### Annexure F Agricultural Compliance Statement

### Annexure G Geo-Technical and Geo-hydrological Report

### Annexure H Archaeological Impact Assessment

### Annexure I Palaeontological Impact Assessment

### Annexure J Visual Impact Assessment

### Annexure K Environmental Screening Report

### Annexure L1 Aviation Theme documents

### Annexure L2 RFI Theme Report

### Annexure M Traffic Impact Assessment

### Annexure N Socio-Economic Impact Assessment

### Annexure O Environmental Management Programme

### Annexure P Curriculum Vitae of EAP



**ABBREVIATIONS AND ACRONYMS**

AGES	Africa Geo-Environmental and Engineering Services (Pty) Ltd
BID	Background Information Document
CO	Carbon Monoxide
CO <sub>2</sub>	Carbon Dioxide
CSP	Concentrating Solar Power
DALRRD	Department of Agriculture, Land Reform and Rural Development
DESTEA	Department of Economic, Small Business Development, Tourism & Environmental Affairs (DESTEA): Free State Province
DFFE	National Department of Forestry, Fisheries and the Environment,
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environment Impact Assessment Report
EMPr	Environmental Management Programme
ESS	Environmental Scoping Study
GHG	Green House Gases
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
kV	kilovolt
MW	Mega Watt
MWp	Mega Watt peak
NEMA	National Environmental Management Act - Act no. 107 of 1998
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act - Act no. 25 of 1999
Norma Energy	Norma Energy (Pty) Ltd (applicant)
NWA	National Water Act - Act no. 36 of 1998
PoS	Plan of Study
Property	The Remaining Extent of the farm Blomskraal, 216, Registration Division Ventersburg RD, (Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province)
Project site	Part (approx. 230ha) of the Remainder of the farm Blomskraal, 216, Ventersburg RD, (Matjhabeng 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

## **1 OBJECTIVE OF THE ENVIRONMENTAL BASIC ASSESSMENT PROCESS**

According to the EIA Regulations, 2014, as amended, the objective of the Environmental Basic Assessment process is to, through a process of consultation:

- a. Identify the policies and legislation relevant to the study and how the study complies with the policies and legislation.
- b. Motivate the need and desirability of the proposed activity including the need and desirability of the activity in the context of the preferred location.
- c. Identify the location of the development footprint within the preferred site, based on an impact assessment and risk ranking process which includes cumulative impacts and a ranking process of all the identified alternatives focussing on the geographical, physical, biological, social, economic and cultural aspects of the environment.
- d. Determine the
  - a. Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform preferred alternatives; and
  - b. Degree to which these impacts
    - i. Can be reversed,
    - ii. May cause irreplaceable loss of resources, and
    - iii. can be avoided, managed, or mitigated.
- e. Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment.
- f. Identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity.
- g. Identify suitable measures to avoid, manage or mitigate identified impacts, and
- h. Identify risks that need to be managed and monitored.

## **2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)**

Name of EAP: AGES – Anton von Well and Engela Grobler

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Expertise of EAP: A National Higher Diploma in Nature Conservation. 21 years of experience in with the management and conducting of EIA's. Registered EAP at EAPASA. Curriculum Vitae of EAP is included in Annexure P.

### 3 LOCATION OF ACTIVITY

#### 3.1 SURVEYOR GENERAL 21-DIGIT CODES OF DEVELOPMENT AREAS

The new distribution powerlines (Virginia Powerlines) will consist of three 132 kV powerlines which will connect the proposed Virginia 1, 2 and 3 Solar Parks to the Eskom Theseus Main Transmission Substation (MTS).

The Virginia 1, 2 and 3 Solar Parks are proposed on Farm BLOMSKRAAL 216 Ventersburg RD, Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province; the environmental authorisation process of these photovoltaic projects is currently ongoing, with DFFE Reference 14/12/16/3/3/2/2099, 14/12/16/3/3/2/2100 and 14/12/16/3/3/2/2101.

The Eskom Theseus Main Transmission Substation (MTS) is located on Portion 6 of the Farm DOORN RIVIER 330 Theunissen RD, Masilonyana Local Municipality, Lejweleputswa District Municipality, Free State Province, 16 km North-East of the planned location of the Virginia 1, 2 and 3 Solar Parks.

The following properties fall in the “powerline study corridor for Basic Assessment” (500m wide) and will be crossed by three (3) powerlines, subject to the final alignment:

- Farm Blomskraal 216,
- Portion 3 of the Farm Detente 744,
- Portion 2 of the Farm Detente 744,
- Portion 1 of the Farm Detente 744,
- Remaining Extent of the Farm Detente 744,
- Remaining Extent of the Farm Le Roux 766,
- Portion 4 of the Farm Florida 633,
- Portion 27 of the Farm Welgelegen 382,
- Portion 24 of the Farm Welgelegen 382,
- Portion 2 of the Farm Welgelegen 382,
- Portion 3 of the Farm Bloemhoek 509,
- Portion 2 of the Farm Bloemhoek 509,
- Remaining Extent of the Farm Bloemhoek 509,
- Portion 21 of the Farm Doorn Rivier 330,
- Portion 11 of the Farm Doorn Rivier 330 and
- Portion 6 of the Farm Doorn Rivier 330,
- Portion 1 of the farm LE ROUX 717
- Portion 1 of the farm LE ROUX 766
- Portion 2 of the farm LE ROUX 766

The listed farms are located within the Matjhabeng and Masilonyana Local Municipalities, Lejweleputswa District Municipality, Free State Province.

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

F	0	3	5	0	0	0	8	0	0	0	0	0	2	1	6	0	0	0	0
F	0	3	5	0	0	0	8	0	0	0	0	0	7	4	4	0	0	0	3
F	0	3	5	0	0	0	8	0	0	0	0	0	7	4	4	0	0	0	2
F	0	3	5	0	0	0	8	0	0	0	0	0	7	4	4	0	0	0	1
F	0	3	5	0	0	0	8	0	0	0	0	0	7	4	4	0	0	0	0
F	0	3	5	0	0	0	8	0	0	0	0	0	7	6	6	0	0	0	0
F	0	3	5	0	0	0	8	0	0	0	0	0	6	3	3	0	0	0	4
F	0	3	5	0	0	0	8	0	0	0	0	0	3	8	2	0	0	0	7
F	0	3	5	0	0	0	8	0	0	0	0	0	3	8	2	0	0	0	4
F	0	3	5	0	0	0	8	0	0	0	0	0	3	8	2	0	0	0	2
F	0	3	3	0	0	0	3	0	0	0	0	0	5	0	9	0	0	0	3
F	0	3	3	0	0	0	3	0	0	0	0	0	5	0	9	0	0	0	2
F	0	3	3	0	0	0	3	0	0	0	0	0	5	0	9	0	0	0	0
F	0	3	3	0	0	0	3	0	0	0	0	0	3	3	0	0	0	0	1
F	0	3	3	0	0	0	3	0	0	0	0	0	3	3	0	0	0	0	1
F	0	3	3	0	0	0	3	0	0	0	0	0	3	3	0	0	0	0	6
F	0	3	3	0	0	0	3	0	0	0	0	0	7	1	7	0	0	0	1
F	0	3	3	0	0	0	3	0	0	0	0	0	7	6	6	0	0	0	1
F	0	3	3	0	0	0	3	0	0	0	0	0	7	6	6	0	0	0	2
1	2	3	4	5															

**3.2 PHYSICAL ADDRESS AND FARM NAME**

NORMA ENERGY (PTY) LTD (Reg. No. 2021/534225/07) is proposing the establishment of three (3) new 132kV powerlines for the connection of three (3) renewable energy generation facilities (Photovoltaic Power Plants) with associated infrastructure and structures on:

- **Farm BLOMSKRAAL 216 Ventersburg RD, Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province.**

The renewable Photovoltaic (PV) Power Plants will be connected to the Eskom grid via three new 132kV powerlines (Virginia Powerlines) between the three proposed solar parks and the Eskom Theseus Main Transmission Substation (MTS). The Eskom Theseus Main Transmission Substation (MTS) is located 16 km North-East of the project site, on Portion 6 of the Farm Doorn Rivier 330.

The name of the proposed facility will be VIRGINIA 3 x 132kV POWERLINES.

The geographical co-ordinates of the preliminary alignments of the 3 x 132 kV powerlines, within the project site of the solar parks and the 500 m wide powerline study corridor, are as follows:

Table 1. Geographical co-ordinates of the preliminary powerline alignments

Point Location	Virginia 1 powerline (latitude / longitude)	Virginia 2 powerline (latitude / longitude)	Virginia 3 powerline (latitude / longitude)
01 Start (on-site substation of the Solar Park)	28°12'54.60"S 26°58'31.90"E	28°13'07.70"S 26°59'22.50"E	28°12'05.70"S 27° 0'10.30"E
01bis turning point project site	N/A	N/A	28°12'19.50"S 26°59'03.30"E
02 turning point project site	28°12'52.50"S 26°58'29.70"E	28°13'9.90"S 26°59'2.50"E	28°12'49.10"S 26°58'28.60"E
03 turning point powerline study corridor	28°11'41.00"S 26°56'20.70"E	28°11'39.90"S 26°56'21.20"E	28°11'38.80"S 26°56'21.70"E
04 turning point powerline study corridor	28°11'31.80"S 26°55'33.00"E	28°11'30.70"S 26°55'33.40"E	28°11'29.60"S 26°55'33.90"E
05 turning point powerline study corridor	28°11'02.90"S 26°54'34.70"E	28°11'01.90"S 26°54'35.10"E	28°11'00.70"S 26°54'35.60"E
06 turning point powerline study corridor	28°10'48.60"S 26°52'39.60"E	28°10'47.50"S 26°52'40.80"E	28°10'46.50"S 26°52'42.00"E
07 turning point powerline study corridor	28°10'11.80"S 26°52'34.00"E	28°10'10.80"S 26°52'35.10"E	28°10'10.00"S 26°52'36.40"E
08 turning point powerline study corridor	28°09'33.20"S 26°49'53.40"E	28°09'31.70"S 26°49'52.90"E	28°09'30.40"S 26°49'52.40"E
09 Eskom Theseus MTS 132kV yard	28°09'33.20"S 26°49'44.90"E	28°09'33.20"S 26°49'44.90"E	28°09'33.20"S 26°49'44.90"E
<b>Overall length</b>	<b>16.3 km</b>	<b>17.9 km</b>	<b>19.5 km</b>

Norma Energy intends to include Virginia Powerlines as part of the submission of the three (3) Virginia Solar Parks, to the next **Window of the Renewable Energy Independent Power Producers Procurement Programme (REIPPP)**, to be issued by the Department of Mineral Resources and Energy ("DMRE").

In order to develop the proposed infrastructure, Norma Energy must undertake a Basic Assessment (BA) process and acquire environmental authorization from the National Department of Forestry, Fisheries and the Environment, (DFFE), in consultation with the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA), in terms of the EIA Regulations, 2014 published on 4 December 2014, as amended under section 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

Norma Energy is the applicant for the Virginia Powerlines (the proposed project), which will connect the Virginia 1, 2 and 3 Solar Parks to the Eskom Theseus Main Transmission Substation (MTS) located  $\pm 16$  km North-East of the solar park site.

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 Norma 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 Powerlines is defined and evaluated in this Draft Basic Assessment Report and its annexures.



#### 4 PLAN OF THE PROPOSED ACTIVITY

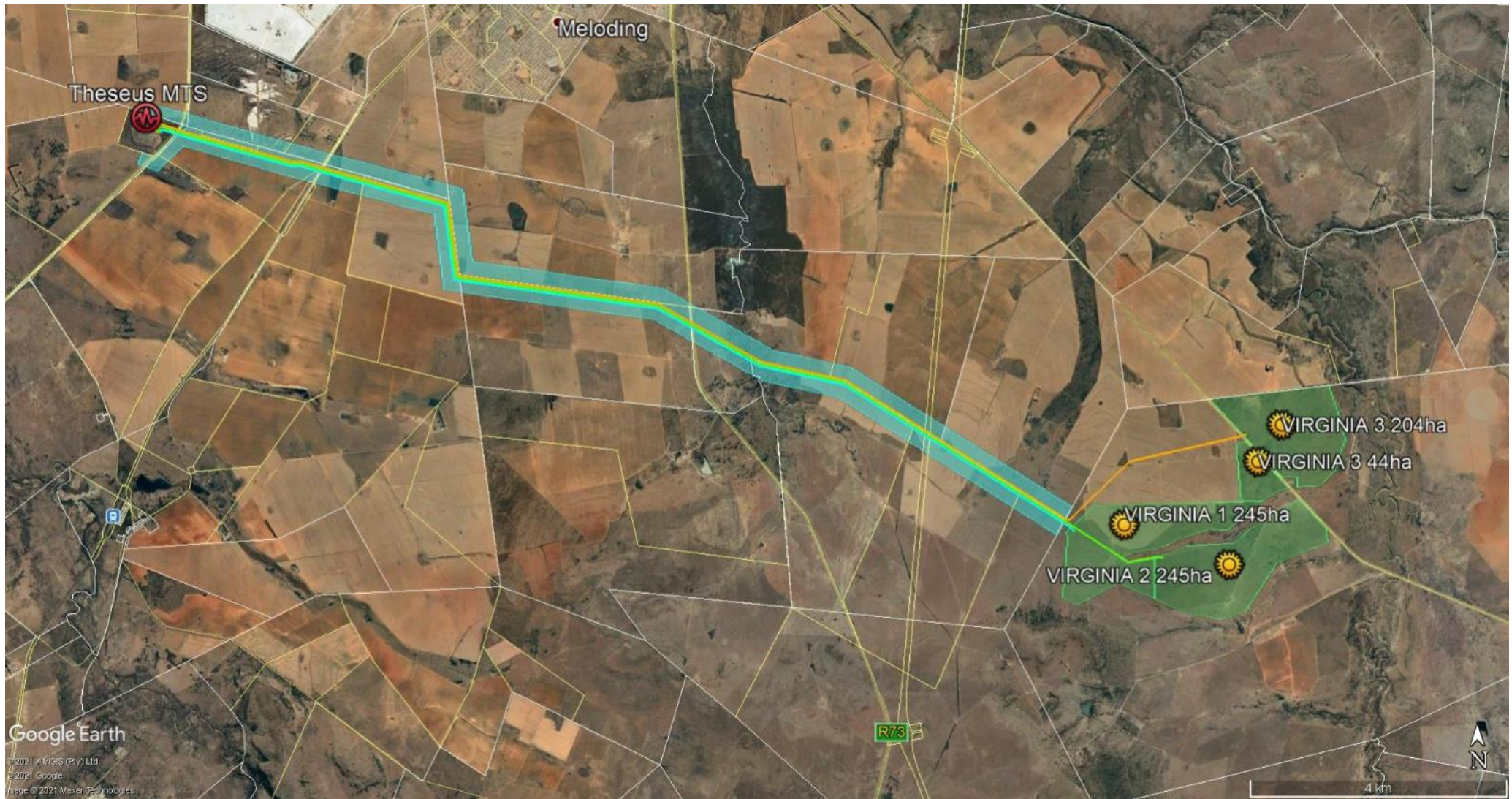


Figure 1 Locality Map (Google Earth): Powerline Study Corridor, 500 m wide, for Basic Assessment



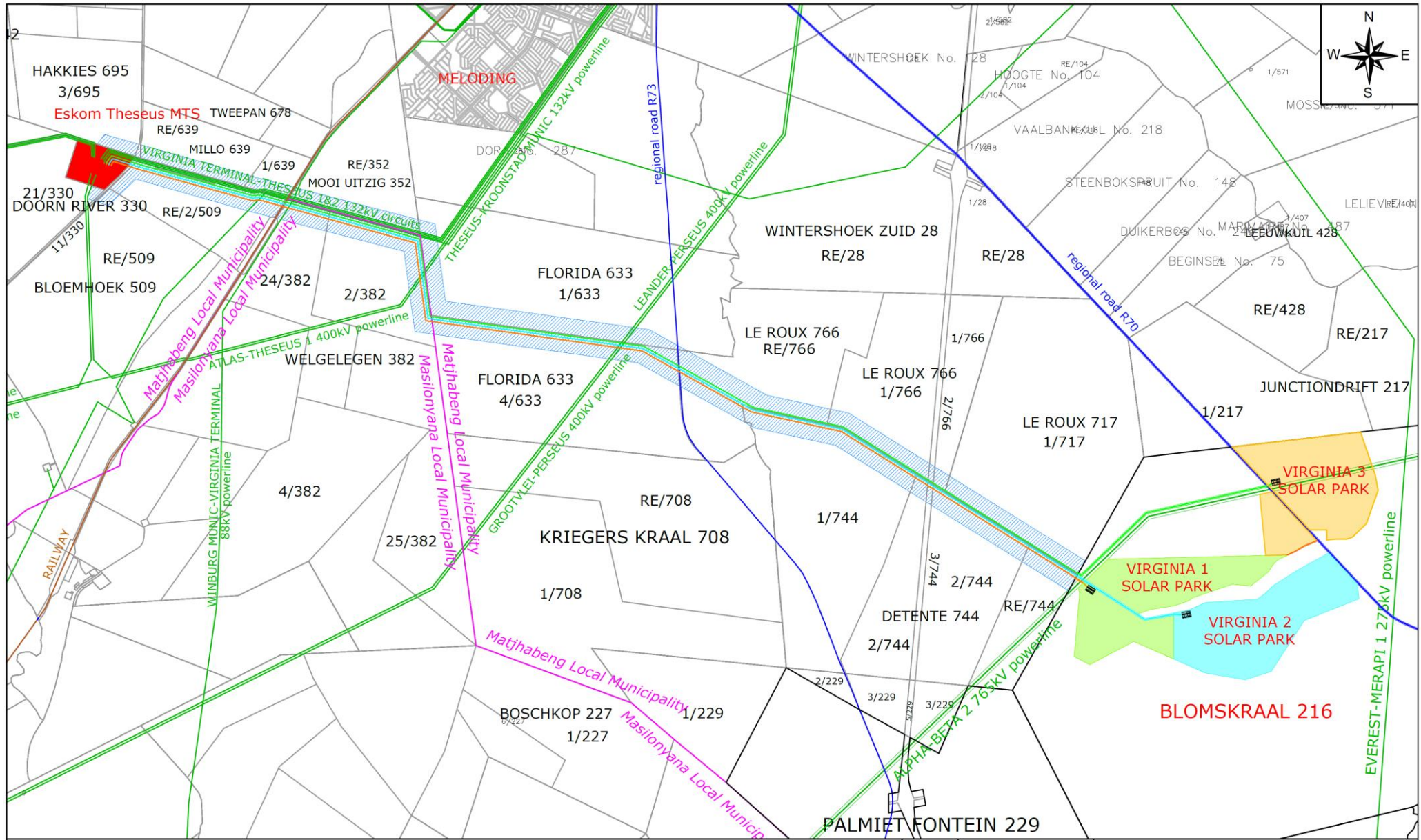


Figure 2: Locality Map (cadastral map): Powerline Study Corridor, 500 m wide, for Basic Assessment



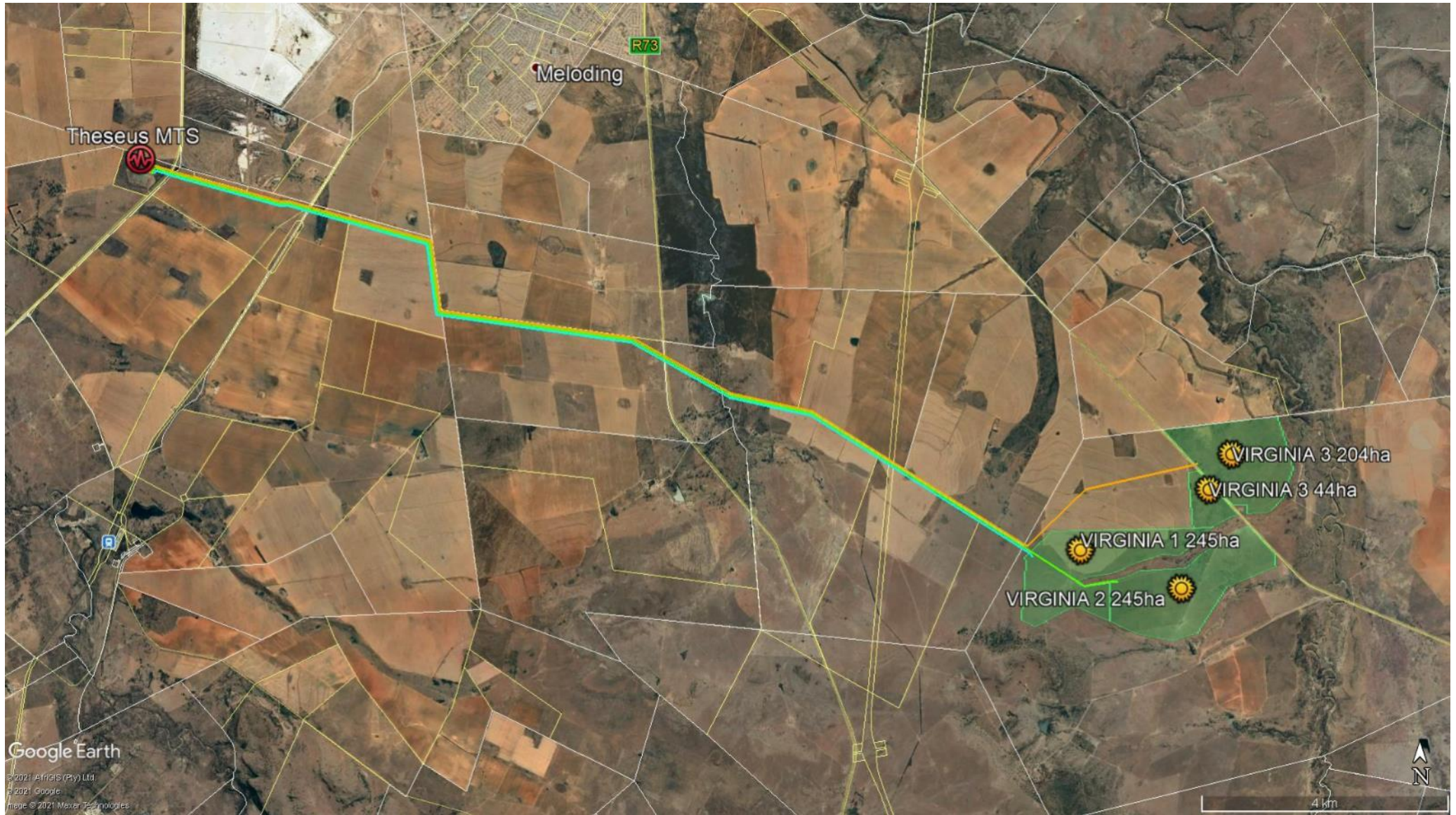


Figure 3 Proposed alignment of the Virginia 3 x 132kV Powerlines

## 5 SCOPE OF THE PROPOSED ACTIVITY

### 5.1 LISTED ACTIVITIES TRIGGERED IN TERMS OF NEMA

The “listed activities” in terms of sections 24 and 24D of NEMA, included in Listing Notices 1, 2 & 3 of the EIA Regulations, 2014, as amended, involved in the proposed development, are listed in table below.

Table 2. Listed Activities triggered, in terms of EIA Regulations 2014, as amended.

Relevant notice	Activity No.	Description
R.983, 04 December 2014	11	<p><b><i>The development of facilities or infrastructure for the transmission and distribution of electricity:</i></b></p> <p><b><i>Outside urban areas or industrial complexes with a capacity of more than 33 kilovolts but less than 275 kilovolts: or</i></b></p> <p>The proposed infrastructure (Virginia Powerlines) will consist of three (3) 132 kV powerlines which will connect the proposed Virginia 1, 2 and 3 Solar Parks to the Eskom Theseus Main Transmission Substation (MTS).</p> <p>The Eskom Theseus Main Transmission Substation (MTS) is located on Portion 6 of the Farm Doorn Rivier, 330 Theunissen RD, Masilonyana Local Municipality, Lejweleputswa District Municipality, Free State Province, 16 km North-East of the planned location of the Virginia 1, 2 and 3 Solar Parks.</p> <p>The proposed 3 x 132kV Virginia Powerlines will be 16 to 20 km long, depending on the exact location of the on-site substations of the three solar parks on farm Blomskraal 216 Ventersburg RD.</p>
R.983, 04 December 2014	12	<p><b><i>The development of –</i></b></p> <p><b><i>(ii) infrastructure or structures with a physical footprint of 100m<sup>2</sup> or more;</i></b></p> <p><b><i>(c) within 32m of a watercourse, measured from the edge of a watercourse,</i></b></p> <p>The proposed 3 x 132 kV Virginia Powerlines will cross some watercourses (drainage lines) and their 32 m buffer zones.</p>
R.983, 04 December 2014	19	<p><b><i>The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of 10 cubic metres from a watercourse;</i></b></p> <p>The proposed 3 x 132 kV Virginia Powerlines will cross some watercourses (drainage lines). The installation of the power line structures will require the removal of more than 10 cubic meters of soil from the watercourses.</p>
R.983, 04 December 2014	24	<p><b><i>The development of-</i></b></p> <p><b><i>(ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</i></b></p> <p>A new access road (dirt road) will be constructed within the power line servitude, for the construction activities. This dirt road will be approximately 4 m wide. In correspondence of the turning points, the road reserve will be up to 14 m in order to allow the transportation of abnormal loads (steel monopoles).</p>

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 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 to ensure general sustainability in the Local and District Municipal areas.

## **5.2 DESCRIPTION OF ASSOCIATED STRUCTURES AND INFRASTRUCTURE RELATED TO THE DEVELOPMENT**

The purpose of the Virginia 3 x 132 kV Powerlines is to connect the proposed Virginia 1, 2 and 3 Solar Parks to the Eskom Theseus Main Transmission Substation (MTS).

The Virginia 1, 2 and 3 Solar Parks are proposed on Farm BLOMSKRAAL 216 Ventersburg RD, Matjhabeng Local Municipality, Lejweleputswa District Municipality, Free State Province; the environmental authorisation process of these photovoltaic projects is currently ongoing, under DFFE Reference 14/12/16/3/3/2/2099, 14/12/16/3/3/2/2100 and 14/12/16/3/3/2/2101.

## **5.3 LAYOUT OF INFRASTRUCTURE AND STRUCTURES ON SITE**

The Virginia Powerlines route was based on the locality of the proposed three Virginia Solar Plants and the locality of the Eskom Theseus Substation. The proposed route / powerline study corridor (500 m wide) is also based on current Eskom infrastructure as well as the natural topography of the area.

The proposed three (3) x 132kV Virginia Powerlines will be 16 to 20 km long, depending on the exact location of the on-site substations of the three solar parks on farm Blomskraal 216 Ventersburg RD.

## **5.4 PRIMARY COMPONENTS**

The new powerlines will consist of a series of steel or aluminium monopole structures to be installed approximately 200 – 260 m apart, with supporting electrical cables. The proposed structures will be between 18 m and 25 m high and the basement of each pole will have a footprint of approximately 0.6 m<sup>2</sup>.

The construction phase will last approximately 6 months and will involve a team of 10 to 15 people. Monopole structures installation will not require the establishment of a permanent construction site, but will be done step-by-step, to only affect small stretches of corridor and for a short time.



An access road (dirty road), approximately 4.0 m wide, will be constructed within the power line servitude, for construction and maintenance activities. In correspondence of the turning points, the road reserve will be up to 14 m in order to allow the transportation of abnormal loads (steel monopoles).

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

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

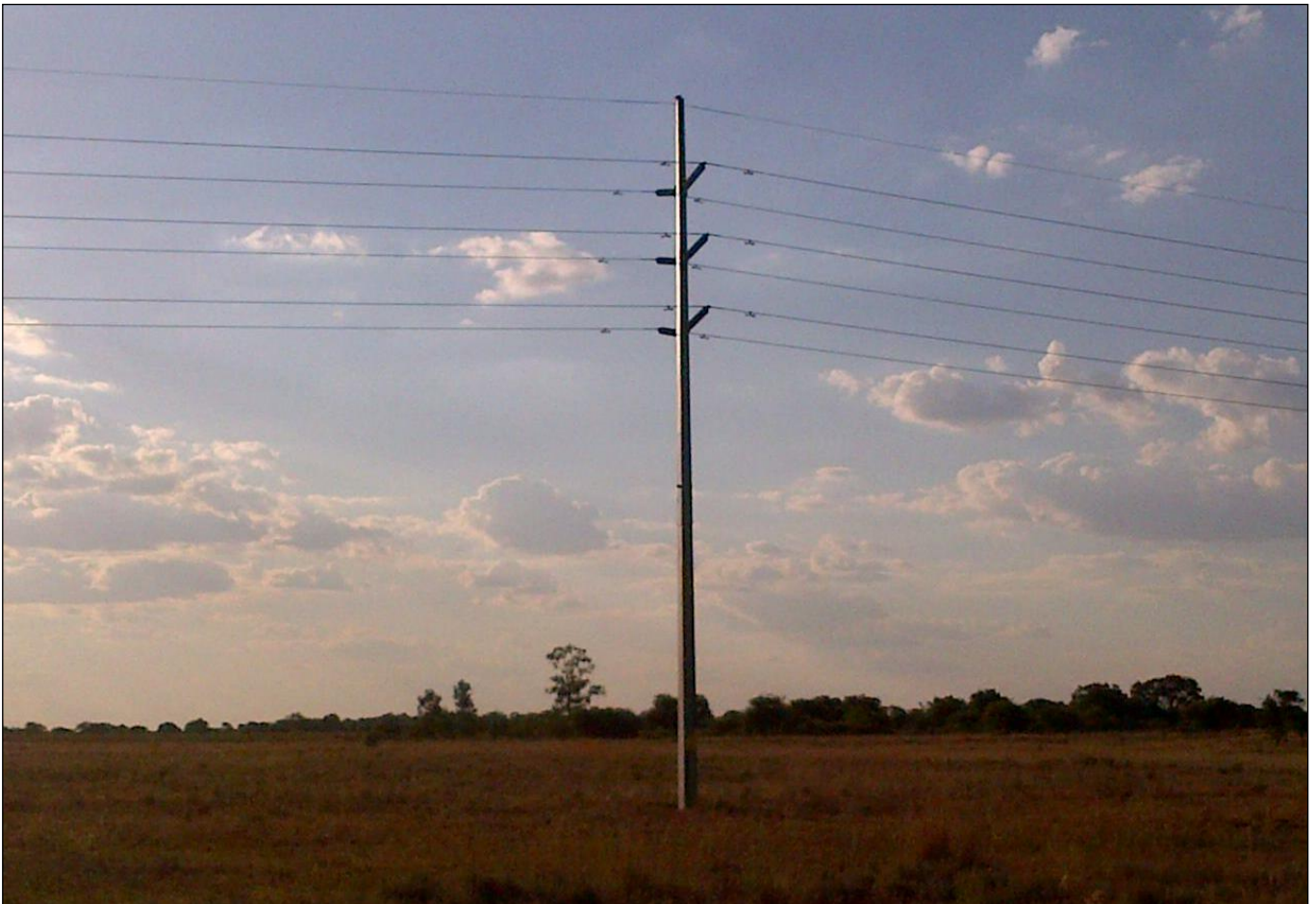


Figure 4. Steel monopole structure for a 132 kV powerline (double circuit)

## 6 LEGAL AND POLICY REQUIREMENTS

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

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

### 6.1 REGULATORY AUTHORITIES

#### 6.1.1 NATIONAL AUTHORITIES

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

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

#### 6.1.2 PROVINCIAL AUTHORITIES

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

### 6.1.3 LOCAL AUTHORITIES

At a local level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Free State Province, Municipalities and District Municipalities are involved in various aspects of planning and the environment related to solar energy facilities development. The proposed powerline route falls within two Local Municipalities, namely the Matjhabeng and Masilonyana Local Municipalities which is part of the Lejweleputswa District 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 in order to protect visual and aesthetic resources with reference to urban edge lines, scenic drives, special areas, signage, communication masts etc.

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

## 6.2 LEGISLATION, REGULATIONS AND GUIDELINES

A review of the relevant legislation involved in the proposed development is detailed in table 3 below.

Table 3. Review of relevant legislation

National Legislation	Sections applicable to the proposed project
Constitution of the Republic of South Africa (Act no. 108 of 1996)	<ul style="list-style-type: none"> <li>• Bill of Rights (S2)</li> <li>• Rights to freedom of movement and residence (S22)</li> <li>• Environmental Rights (S24)</li> <li>• Property Rights (S25)</li> <li>• Access to information (S32)</li> <li>• Right to just administrative action (S33)</li> </ul>
Fencing Act (Act no. 31 of 1963)	<ul style="list-style-type: none"> <li>• Notice in respect of a boundary fence (S7)</li> <li>• Clearing bush for boundary fencing (S17)</li> <li>• Access to land for boundary fencing (S18)</li> </ul>
Conservation of Agricultural Resources Act (Act no. 43 of 1983)	<ul style="list-style-type: none"> <li>• Prohibition of the spreading of weeds (S5)</li> <li>• Classification of categories of weeds &amp; invader plants and restrictions in terms of where these species may occur (Regulation 15 of GN R0148)</li> </ul>

	<ul style="list-style-type: none"> <li>Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R0148)</li> </ul>
Environment Conservation Act (Act no. 73 of 1989)	<ul style="list-style-type: none"> <li>National Noise Control Regulations (GN R154 dated 10 January 1992)</li> </ul>
National Water Act (Act no. 36 of 1998)	<ul style="list-style-type: none"> <li>Entrustment of the National Government to the protection of water resources (S3)</li> <li>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)</li> <li>Duty of Care to prevent and remedy the effects of water pollution (S19)</li> <li>Procedures to be followed in the event of an emergency incident which may impact on water resources (S20)</li> <li>Definition of water use (S21)</li> <li>Requirements for registration of water use (S26 and S34)</li> <li>Definition of offences in terms of the Act (S151)</li> </ul>
National Forests Act (Act no. 84 of 1998)	<ul style="list-style-type: none"> <li>Protected trees</li> </ul>
National Environmental Management Act (Act no. 107 of 1998)	<ul style="list-style-type: none"> <li>Definition of National environmental principles (S2): strategic environmental management goals and objectives of the government applicable within the entire RSA to the actions of all organs of state, which may significantly affect the environment</li> <li><b>NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 985 of 4 December 2014), as Amended</b></li> <li>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)</li> <li>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</li> <li>Procedures to be followed in the event of an emergency incident which may impact on the environment (S30)</li> </ul>
National Heritage Resources Act (Act no. 25 of 1999)	<ul style="list-style-type: none"> <li>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)</li> <li>Provision for protection of all archaeological objects, paleontological sites and material and meteorites entrusted to provincial heritage resources authority (S35)</li> <li>Provision for the conservation and care of cemeteries and graves by SAHRA, where this is not responsibility of any other authority (S36)</li> <li>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)</li> <li>Requirement for compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites for promotion of tourism (S44)</li> </ul>
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	<ul style="list-style-type: none"> <li>Provision for MEC for Environmental Affairs/Minister to publish a list of threatened ecosystems and in need of protection (S52)</li> </ul>

	<ul style="list-style-type: none"> <li>• Provision for the MEC for Environmental Affairs/Minister to identify any process or activity which may threaten a listed ecosystem (S53) Provision for the MEC 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</li> <li>• 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)</li> </ul>
National Environmental Management: Air Quality Act (Act no. 39 of 2004)	<ul style="list-style-type: none"> <li>• Provision for measures for dust control (S32)</li> <li>• Provision for measures to control noise (S34)</li> </ul>
National Environmental Management: Waste Management Act (Act no. 59 of 2008)	<ul style="list-style-type: none"> <li>• Waste management measures</li> <li>• Regulations and schedules</li> <li>• Listed activities which require a waste licence</li> </ul>
Occupational Health and Safety Act (Act No. 85 of 1993)	<ul style="list-style-type: none"> <li>• Health and safety of all involved before and after construction must be protected.</li> </ul>

<b>Policies and White Papers</b>	<b>Sections applicable to the proposed project</b>
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	<ul style="list-style-type: none"> <li>• The White Paper supports investment in renewable energy initiatives, such as the proposed solar power plant project</li> </ul>
The White Paper on Renewable Energy (November 2003)	<ul style="list-style-type: none"> <li>• The White Paper outlines the Government’s vision, policy, principles, strategic goals and objectives for the promotion and the implementation of renewable energy in SA</li> </ul>
Integrated Resource Plan (IRP1)  Integrated Resources Plan 2010-2030 (IRP 2010).  Update of the Integrated Resources Plan 2010-2030 (IRP 2019)	<ul style="list-style-type: none"> <li>• 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).</li> <li>• 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.</li> <li>• In the <b>IRP 2019</b>, published in October 2019, provision has been made to procure an additional <b>6 000 MW</b> of solar PV and 14 400 MW of wind between <b>2022</b> and <b>2030</b>.</li> </ul>
Renewable Energy IPP Procurement Programme (REIPPPP)	<ul style="list-style-type: none"> <li>• Renewable Energy IPP Procurement Programme, issued on 3 August 2011 by DoE, envisages the commissioning of <b>3 725 MW</b> of renewable projects (<b>1 450 MW with Solar photovoltaic technology</b>) <b>capable of beginning commercial operation before the end of 2020</b>.</li> </ul>
Equator Principles (July 2006)	<ul style="list-style-type: none"> <li>• The Equator Principles provide those future developments with total project capital costs of US\$10 million or more shall be financed only if socially and environmentally sustainable</li> </ul>



## 7 NEED/DESIRABILITY OF THE PROJECT

The Virginia Powerlines will form part of the Virginia 1, 2 and 3 PV Solar Park project for which applications have been submitted for Environmental Authorization to the Department of Forestry, Fisheries and the Environment.

If this project is selected by the Department of Mineral Resources and Energy under the Independent Power Producer Procurement Programme (RMIPPPP), it will fit into the National Development Plan for 2030. The Plan states that South Africa should invest in and help exploit the wide range of opportunities for low-carbon energy from hydroelectric and other clean energy sources in Southern Africa, procuring at least 20,000 MW of renewable electricity by 2030, importing electricity from the region, decommissioning 11,000 MW of ageing coal-fired power stations and stepping up investments in energy-efficiency. The proposed Project will contribute towards the goals of the National Development Plan.

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.

Frequent shortages in electricity, fluctuations in supply and low voltages are currently experienced in South Africa. Therefore, the presence of new Photovoltaic Power Plants and associated infrastructure (Virginia Powerlines) in the Virginia area, could contribute towards increasing the availability and improving the reliability of the Eskom network. The proposed solar projects and associated Virginia Powerlines will assist the Eskom grid to meet the high energy demand in the Welkom area, where several mining activities are currently undertaken.

The purpose of the proposed solar projects and associated Virginia Powerlines is to add new capacity for the generation of renewable electric energy to the national electricity supply in compliance with the REIPP Procurement Programme and 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 projects, it is important to consider that South Africa has one of the highest levels of solar radiation in the world.

The proposed solar parks will assist the Eskom grid to meet the high energy demand related to the industrial and mining activities conducted in the Virginia and Welkom area.

## 8 CONSIDERATION OF 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.

### 8.1 LOCATION ALTERNATIVES

There are no location alternatives. There is only one powerline corridor because the proposed Virginia Photovoltaic Power Plants must be connected to the Eskom grid in the area from the approved locality, specifically to the Theseus MTS which is the closest available point of connection.

The proposed Virginia PV Power Plants are already located outside ecological sensitive areas, which limits space for alternative powerline corridors.

The shortest powerline route is always cheaper, and it has less visual impact and less potential impact on birds, as a lower number of monopole structures and overhead cables will be used.

### 8.2 TECHNOLOGY ALTERNATIVES

#### **Structure Alternative 1: steel or aluminium monopole (preferred alternative)**

The new powerlines will consist of a series of steel or aluminium monopole structures supporting the electrical cables and a communication cable, to be installed approximately 200 – 260 m apart. The proposed structures will be between 18 m and 25 m high and the basement of each pole will have a footprint of approximately 0.6m<sup>2</sup>.

#### **Structure Alternative 2: wood poles (not preferred)**

The new powerlines may be built as wood poles (e.g. H-poles). This technology is not used anymore by Eskom for powerlines at 132 V, because of the shorter lifetime of the wood poles (as opposed to steel poles). Furthermore, the new steel monopole structure was designed with the aim to reduce the risk of electrocution for avifauna, thanks to the position of the cables.

#### **Voltage Alternative 1: 3x132kV powerlines (preferred alternative)**

Powerlines transmit large quantities of electricity over long distances via wires carried on a system of mainly metal towers (pylons) and large substations.

The servitude width for a 132kV powerline is 36.0 m (18 m on either side of the centre line of the powerline).

The whole power line servitude will be up to 108 m (18 m + 36 m + 36 m + 18 m), but can be smaller if a separation distance between adjacent lines shorter than 36 m is accepted by Eskom.

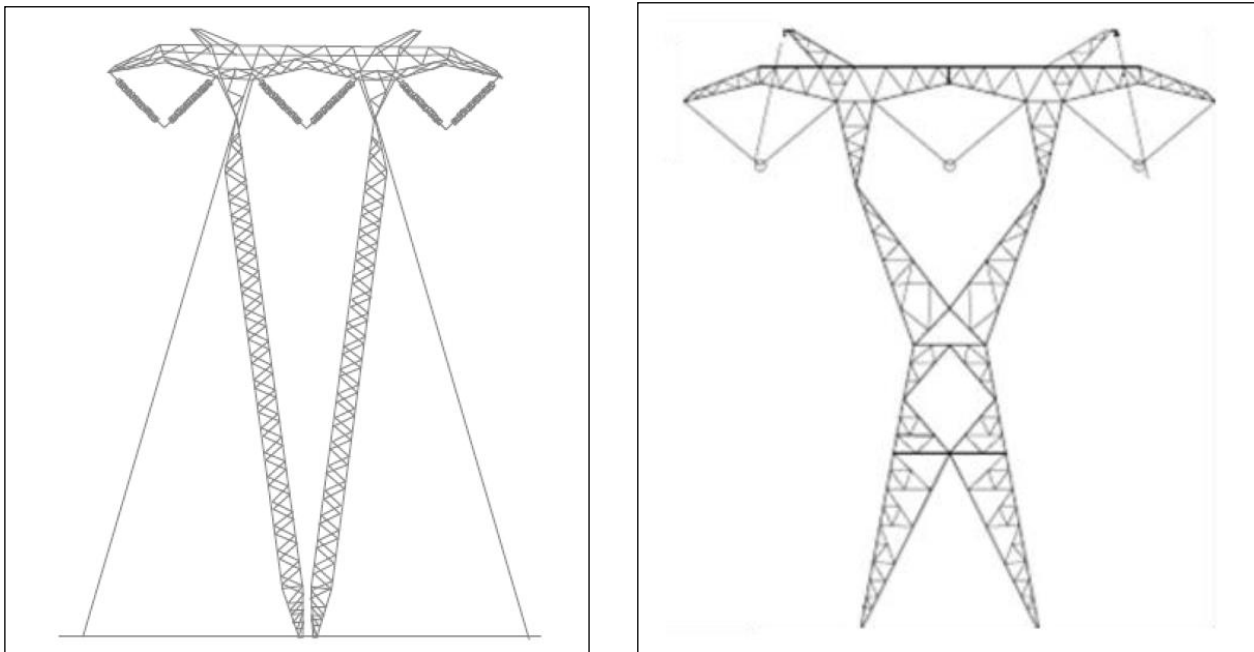
**Voltage Alternative 2: 3 x 400kV powerlines (not preferred)**

In the case alternative 2 is selected, the 400 kV pylons will be “Guyed V tower” type, because this type of structure requires a servitude of only 23.5 m from each side of the centre line and it is the least intrusive in terms of visual impact. Where the power line alignment changes direction, “Self-supporting” structures will be used as per Eskom standards. Please refer to the figure below.

The separation distance between adjacent lines for this type of structures is 35 m as per the Eskom guidelines.

The whole power line servitude will be up to 117 m (23.5 m + 35 m + 35 m + 23.5 m).

Figure 5. Guyed V tower (voltage: 400kV – maximum tower height: 40 m a.g.l.) on the right; Self-support tower (voltage: 400kV – maximum tower height: up to 40 m a.g.l. with leg extensions) on the left



The 132kV voltage alternative is the preferred option, due to the reduced visual impact and reduced potential impact on birds of 132kV poles if compared to 400 kV towers.

**8.3 POWERLINE CORRIDORS ALTERNATIVES**

There are no location alternatives. There is only one powerline corridor because the proposed Virginia Photovoltaic Power Plants must be connected to the Eskom grid in the area from the approved locality, specifically to the Theseus MTS which is the closest available point of connection.

The proposed Virginia PV Power Plants are already located outside ecological sensitive areas, which limits space for alternative powerline corridors.

The shortest powerline route is always cheaper and it has less visual impact and less potential impact on birds, as less monopole structures and overhead cables will be used.

#### **8.4 NO-GO ALTERNATIVE**

The no-go alternative is the option of not establishing the Virginia Powerline infrastructure associated with the proposed Virginia PV Solar Plants. If the Virginia Powerlines are not developed, the Virginia PV Solar Parks will not be able to be connected to the Eskom grid and the Virginia Solar Parks (EIA application in process) will not be established. The environment will remain in its current state (*status quo* will remain).

No new employment opportunities will be created and additional capacity to the Eskom grid will be forfeited with no economic benefits for the Virginia and Welkom area and no further reduction in the pressure on the Eskom grid.

## 9 DETAILS OF PUBLIC PARTICIPATION PROCESS UNDERTAKEN

All relevant I&AP's have been identified and involved in the public participation process from the beginning of the project as per sections 54, 55, 56 and 57 of the EIA regulations 2014, as amended. The public participation process offers the opportunity to become actively involved through constant sharing of information. The main purposes of the public participation process are to ensure that:

- all relevant information in respect of the application is made available to I&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&AP's to the Draft Basic Assessment Report are submitted and evaluated in a reasonable timeframe and in predetermined terms.

The initial stage of the public participation was conducted from 2 September 2021 until 2 October 2021.

In the enclosed Annexure B (Comments & Responses Report), there is a list of all components of the public participation process. The public was informed of the project by means of:

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

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

Site notices were put up on site on 1 September 2021.

After a Deed Search was done on the surrounding properties a Background Information Document was sent to the adjacent landowners. Proof of this is attached in Annexure B. A number of these documents were also distributed to the relevant governmental departments including inter alia Department of Water and Sanitation, Department of Agriculture, Land Reform & Rural Development, *etc.* Other identified interested and/or affected parties/stakeholders include Eskom, the Local municipality, the District municipality *etc.* Proof of all correspondence is included in Annexure B.

A newspaper advertisement was published in the 2 September 2021 edition of the Vista, which is a local newspaper, distributed locally.

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

The Draft Basic Assessment Report (in electronic format) will now be made available for a 30-day commenting period for comments and is also provided as hard copy on request.

## **9.1 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 (Basic Assessment) process:

- Notification letters will be sent to applicable government departments and potential I&As to inform them of the availability of the Draft Basic Assessment Report (BAR) to comment on.
- The Draft BAR will be made available for a commenting period of 30 days.
- Registered I&As and governmental organizations will be notified about the final decision of the DFFE (Environmental Authorisation granted or not).

## 10 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROPOSED PV SOLAR PARK

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

### 10.1 ENVIRONMENTAL FEATURES

#### Environmental Screening Report

Table 4 Environmental Screening Tool Table

Theme	Very high	High	Medium	Low	Specialist studies conducted	Motivation for no Specialist Studies
Agriculture		X			X	Compliance Statement – Annexure F
Animal species			X		X	Annexure C
Aquatic biodiversity	X				X	Annexure D
Archaeological and Cultural Heritage				X	X	Annexure H
Civil Aviation		X			X	An application for approval will be submitted to the Civil Aviation Authority. Annexure L
Defence				X		
Paleontology	X				X	Annexure I
Plant species				X	X	Annexure C
Terrestrial Biodiversity	X				X	Annexure C

The following environmental sensitivities are identified for the project area:

- #### Agriculture Theme

Sensitivity - High.

*The agricultural compliance statement (Annexure F) indicates that 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 northwestern and northeastern section of the site, while the southern section of the development footprint is dominated by black clayey soils. The farm is expected to receive an annual rainfall of ±560 mm which is relatively low and highly variable. The farm is in an area which is marginal to dry for rain-fed arable crop production. Economically viable farming is restricted to irrigated cropping due a high risk associated with dry-land farming. At present no irrigation or centre pivots occur on the property. Higher day temperatures and evaporation rates in summer months may hamper soil moisture storage for crop use.*

- **Animal species Theme**

Sensitivity - High.

*This study has shown that the area holds four priority bird species albeit at low densities. Blue Korhaan and Secretarybird are resident in the greater area, Lanner Falcon may visit the site occasionally and Lesser Kestrel is a fairly common summer visitor to the region. The assessment of impacts identified by Birdlife SA as significant for PV developments has revealed that the majority of these impacts fall within the „high to moderate“ risk categories but should drop down to „lower“ risk levels after mitigation and provided the recommended bird conservation protocols are employed – (Annexure C - Terrestrial Biodiversity Assessment and Annexure E – Avifaunal Assessment).*

- **Aquatic Biodiversity Theme**

Sensitivity - Very high.

*According to the National Freshwater Ecosystem Priority Areas (NFEPA, 2011) dataset there are wetland features located within the proposed development area. A Wetland and Riparian Impact Report compiled by a wetland specialist is included in Annexure D.*

- **Civil Aviation Theme**

Sensitivity - High

*Virginia 1, 2 and 3 Solar Parks and 3 x 132kV Powerlines do not interfere with any civilian or military installations but an application for approval will be submitted to the Civil Aviation Authority. See Annexure L1.*

- **Paleontological Theme**

Sensitivity – Very High

*A Phase 1 Palaeontological Impact Assessment was conducted. Due to palaeontological sensitivity, 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 is not recommended – Annexure I.*

- **Plant Species Theme**

Sensitivity - Low

*The botanist concluded that the development can be supported provided that the mitigation measures are implemented – Annexure C.*

- **Terrestrial Biodiversity Theme**

Sensitivity - Very High

*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 – Annexure C.*



## 10.2 POWERLINE DEVELOPMENTS WITH ENVIRONMENTAL AUTHORISATION WITHIN 30 KM OF PROPOSED DEVELOPMENT AREA

The following solar projects, within 30km from the project site, received Environmental Authorisation according to the DFFE database:

Table 5. List of Powerline developments with Environmental Authorisation within 30 km of proposed area

DFFE Ref No.	Project Title	Applicant	MW
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
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.		19.9
14/12/16/3/3/2/328	The proposed development of co-generation facility at the Beatrix Gold Mine Shaft 4, located between Theunissed and Virginia, within Masilonvana Local Municipality, Free State.	Beatrix Gold Mine	4
12/12/20/2669/A	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.		20
14/12/16/3/3/2/526	Proposed 75MW Oryx solar energy facility near Virginia, Free State.		75
14/12/16/3/3/1/1322	Proposed construction of Hennenman 5MW solar energy facility, near Hennenman, Free State.		5

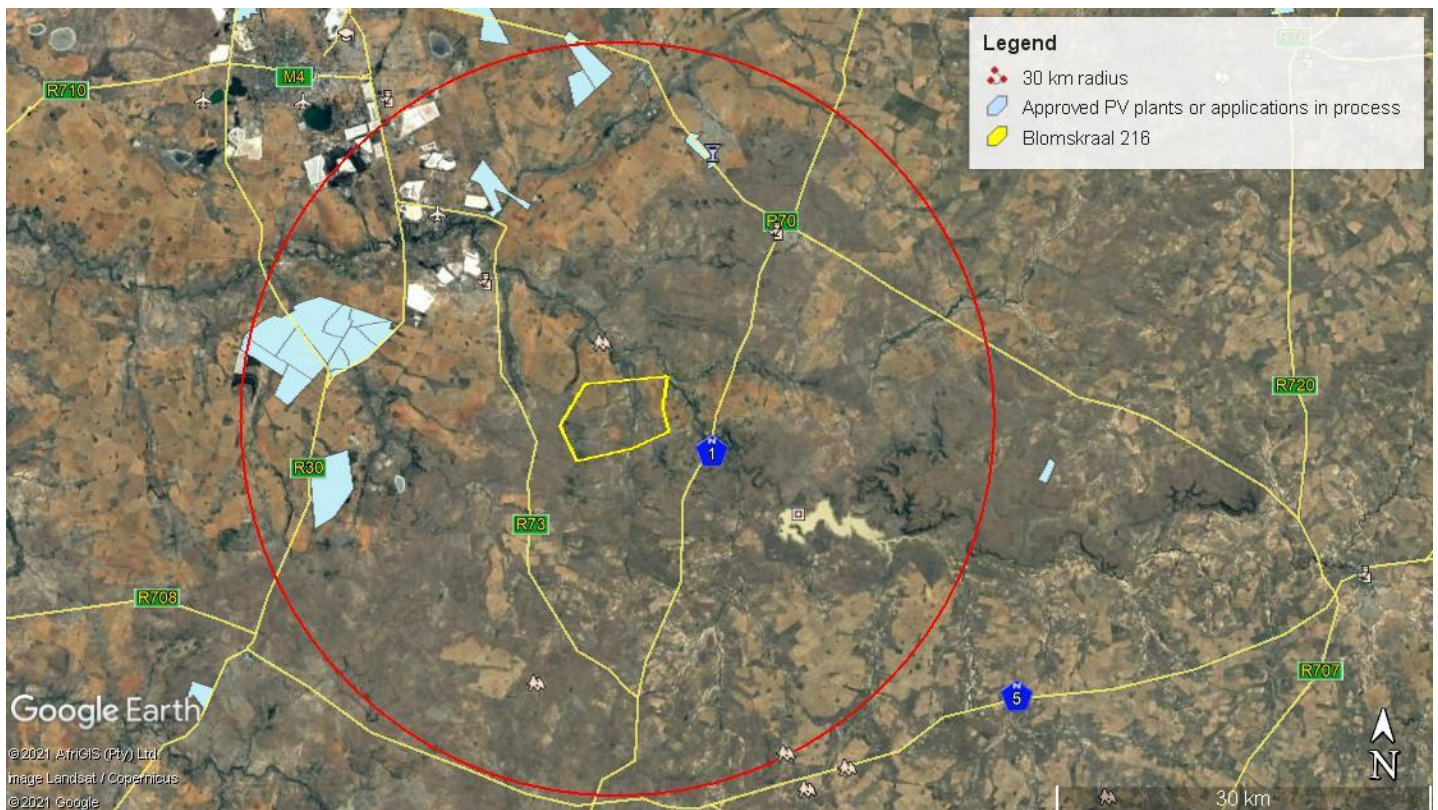


Figure 6. Map of Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

### **10.3 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%.

### **10.4 TOPOGRAPHY AND DRAINAGE**

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 of the region is flat with gentle, open undulations. The powerline corridor eastern elevation is at 1393 m amsl and the point at the MTS substation is at 1361 m amsl; the highest point is 1398 m amsl and the lowest point is at the Merriespruit at 1354 m amsl.

Merriespruit is the only local drainage that is crossed by the transmission line.

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. More detailed is included in the Geo-technical report in Annexure G.

### **10.5 SOILS AND GEOLOGY**

A Geo-technical desktop study was conducted in September 2021. The report is attached in Annexure G.

The Geological Survey of South Africa (now the Council for Geoscience) has mapped the area at 1:250 000 scale (2826 Windburg).

The entire area is underlain by very fine to coarse grained, buff white and white sandstone, blue grey mudstone and shale with subordinate conglomerates of the Adelaide Subgroup (Pa), the upper unit of the Beaufort Group, Karoo Sequence. Overlying the sandstone is aeolian sand (Qs) and calcretized sand deposits along drainage courses. An intrusive dolerite sill (Jd) is only intersected on the western bank of Merriespruit. The dolerite is similar in character to the basalts of the Lesotho Highlands but are generally younger than the basalts and were emplaced during the waning stages of the Drakensberg Volcanics.

## **Soil profiles and geotechnical risk assessment:**

Four soil profile are expected on site:

- Profile 1 - Transported aeolian sand overlying weathered sandstone
- Profile 2 – Calcretized deposits close to the drainage features
- Profile 3 – Weathered Karoo sandstone
- Profile 4 – Weathered dolerite

For profile 1 the geotechnical risk with respect to development is A2 indicating that collapse potential of the transported soil horizon overlying the sandstone bedrock.

For profile 2 the geotechnical risk with respect to development is F2 indicating that shallow bedrock conditions exist where between 10 and 40% of total excavation of 1.5 m trenches will be hard due to the expected presence of calcretized sand and hardpan calcrete.

For profile 3 the geotechnical risk with respect to development is F2 indicating that shallow bedrock conditions exist where between 10 and 40% of total excavation of 1.5 m trenches will be hard and that the soil exhibit a shallow bedrock conditions.

For profile 4, where the dolerite sill occurs along the alignment of the transmission line corridor the geotechnical risk with respect to development is F2 indicating that shallow bedrock conditions exist where between 10 and 40 % of total excavation of 1.5m trenches will be hard and that the soil exhibit shallow bedrock conditions.

Due to the climatic region and the underlying geology, it is unlikely that any expansive or dispersive soils exist on the property. The calcrete has potential for differential settlement and the soils derived from the dolerite sill may be moderately settlable and active.

### **Excavatability:**

Using the COLTO Standard excavatability is classified as hard (boulders larger than 0.1 m<sup>3</sup>, blasting or pneumatic and mechanical rock breaking tools required) or soft (all other conditions). The expected excavatability of the upper 0.5 m will is soft across the site. Below that level calcrete will be variable and the sandstone and dolerite will be intermediate to hard below 1.5 m.

The potential for collapse of side walls of deep excavations is low. It is however recommended that the sidewalls excavated be battered back to a 1:1.5 grade slope or shored in excavations deeper than 1.5m to comply with minimum safety regulations.

In terms of the intended land use limited excavatability is not a critical problem for the proposed powerline, it is rather a positive impact as it will result in sturdy foundations.

No Shallow groundwater conditions are expected along the Powerline Corridor.

**Land use classification:**

Based on the local geology, topography and weathering profile of the soil and rock formation expected on along the transmission line corridor, only one land use area has been identified. The area is defined as developable with minor precautions due to the relative thin soil profile and the use of pre-drilled piled foundations. Developable with minor risk with respect to the proposed solar park development. Transported soil has a low to moderate collapse potential but the pylons will be founded in the underlying competent moderately weathered or better bedrock.

**Foundation solutions:**

The project area is underlain by aeolian sand and calcrete, overlying weathered sandstone and sandstone bedrock. The soil profile is generally poorly developed therefore it is recommended that the pylons be founded in pre-bored holes drilled with a percussion drilling machine as augers will refuse prematurely.

**Conclusions:**

The Virginia Powerline Corridor is defined as developable with minor precautions due to the relative thin soil profile and the use of specialized foundations for pylons. The recommendations proposed in the Geotechnical Report should be adhered to.

**10.6 ECOLOGY (FAUNA & FLORA)**

A Terrestrial Biodiversity Impact Assessment (Annexure C) was conducted by AGES in order to describe the ecology (fauna and flora) present in the project site (where the solar parks are planned) and along the powerline study corridor, to assess its ecological sensitivity and to indicate the most suitable areas for the proposed development. For this purpose, detailed ecological (fauna habitat & flora) surveys were conducted during April 2021 to verify the ecological sensitivity and ecological components at ground level.

**10.6.1 VEGETATION TYPES**

The most recent classification of the area by Mucina & Rutherford (2006) shows that the site is classified as Central Free State Grassland and Vaal-Vet Sandy 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 Vaal-Vet Sandy Grasslands vegetation unit is described as plains-dominated landscape with some scattered slightly irregular undulating plains and hills. Mainly low tussock grasslands with an abundant karroid element. *Themeda triandra* is dominant in this vegetation unit. This vegetation type is described as Endangered because approximately 63% of it has been transformed for commercial crop cultivation and grazing pressure from cattle and sheep. Only 0.3% of this vegetation type is statutorily conserved in Bloemhof Dam, Schoonspruit, Sandveld, Faan Meintjies, Wolwespruit and Soetdoring Nature Reserves.

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 site:

1. *Setaria incrassatae* – *Themeda triandra* clay grassland.
  2. Degraded grassland.
  3. *Themeda triandra* – *Aristida congesta* secondary grassland.
  4. Open *Vachellia karroo* – *Asparagus larycinus* woodland.
  5. Cultivated land (Maize fields).
  6. Exotic bushclumps.
  7. Old slimes dams.
  8. Drainage features:
    - Valleybottom wetland with channel.
    - Non-perennial channels.
    - Floodplains Rivers.
    - Exorheic depressions (dams).
    - Endorheic depressions (pans).
- *Setaria incrassatae* – *Themeda triandra* clay grassland

This vegetation type occurs in the eastern section of the proposed powerline corridor. The grass layer is well developed and underlied by dark clayey soils of the Arcadia or Swartland Soil Forms. Grasses that dominate on the clayey soils are species such as *Setaria incrassatae* and *Themeda triandra*. The vegetation structure is tall, closed grassland. No red listed or protected species were documented in the area. The vegetation unit is classified as having a Medium sensitivity due to the widespread status through the larger area. The development of the solar development is considered suitable in this area.

- Degraded grassland

A small section of the proposed development footprint represents degraded. This vegetation unit is divided into two variations namely a *Hyparrhenia hirta* – *Verbena bonariensis* degraded grassland close to the substation and primary old fields dominated by *Cynodon dactylon* and *Eragrostis plana* close to the Theunisen tar road (R73). The grass layer is well developed and dominated by species such as *Hyparrhenia hirta*, *Cynodon dactylon*, *Eragrostis plana*, *Eragrostis chloromelas* and various exotic weeds such as *Verbena bonariensis*.

The vegetation unit is classified as having a Low sensitivity due to the degraded state of the herbaceous layer and the development of the powerline is considered suitable in this area

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

This vegetation unit occurs on sensitive Oakleaf soils adjacent to the valleybottom 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 will need a permit from local authorities in the Free State.

The development of the powerline is considered suitable in this area.

- Open *Vachellia karroo* – *Asparagus larycinus* woodland

The woody layer is dominated by species such as *Vachellia karroo*, *Vachellia tortilis* and *Ziziphus mucronata*. The woody structure varies from being open woodland to slightly denser woodland with bushclumps in some areas. The grass layer is in a slightly degraded state due to previous overgrazing and dominated by *Setaria incrassatae*, *Themeda triandra* and *Panicum maximum*.

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

- Cultivated land (Maize fields)

The croplands in the project area form homogenous stands of maize on sandy soils. Exotic weeds and pioneer grasses often colonize the areas surrounding the croplands.

No detailed survey was considered for this area due to the completely modified state of the vegetation.

- Exotic bush clumps

A small section of the project area is characterised by homogenous stands of exotic trees such as *Eucalyptus camaldulensis*. Exotic weeds and pioneer grasses colonize the area, and the area has a low sensitivity as the vegetation is in a completely modified state.

- **Old slimes dams**

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

- **Drainage features:**

Valley-bottom wetland with channels

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

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

Valley bottom wetlands also provide a distribution route for weeds and invading trees. Many of the usual weeds were recorded and included, amongst others, *Xanthium strumarium* (Large cocklebur) *Datura stramonium*, *Tagetes minuta* and *Bidens bipinnata*. Weeds and invaders must be removed.

Depressions

The depressions in the project area can be classified into two variations namely man-made dams or natural pans classified as endorheic depressions.

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

River channels and floodplains

All rivers and streams with their associated riparian vegetation in the project area are ecologically sensitive, forming important, limited, and specialised habitats for several plant and fauna species. The species composition is unique and relatively limited in distribution and coverage. These habitats also form linear corridors linking different open spaces.

The non-perennial drainage channels are characterized by a channel that cuts through a slightly undulating landscape. The non-perennial riverine areas form two narrow channels. These riverine areas support low riparian woodland dominated by species such as *Vachellia karroo* and various grasses such as *Setaria sphacelata*, *Themeda triandra*, *Sporobolus africanus* and *Eragrostis rotifer*.

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



### 10.6.2 SPECIES OF CONSERVATION CONCERN (SCC)

Species of conservation concern are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient – Insufficient Information (DD).

A list of red data plant species previously recorded in the grid square in which the proposed development is planned was obtained from SANBI. No red listed plant species occur in the -QDS or was recorded in the project 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. The EIA screening tool also did not highlight any red listed flora.

### 10.6.3 PROTECTED PLANTS (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.

### 10.6.4 PROTECTED TREES SPECIES (NFA)

The National Forest Act, 1998 (Act No.84 of 1998) provides a list of tree species that are considered important from a South African perspective because of scarcity, high utilization, common value, etc. In terms of the National Forest Act of 1998. These 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 a license granted by a delegated authority. Obtaining relevant permits are required prior to any impact on these trees. **No protected tree species** were found during the field surveys.

### 10.6.5 CONCLUSIONS

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



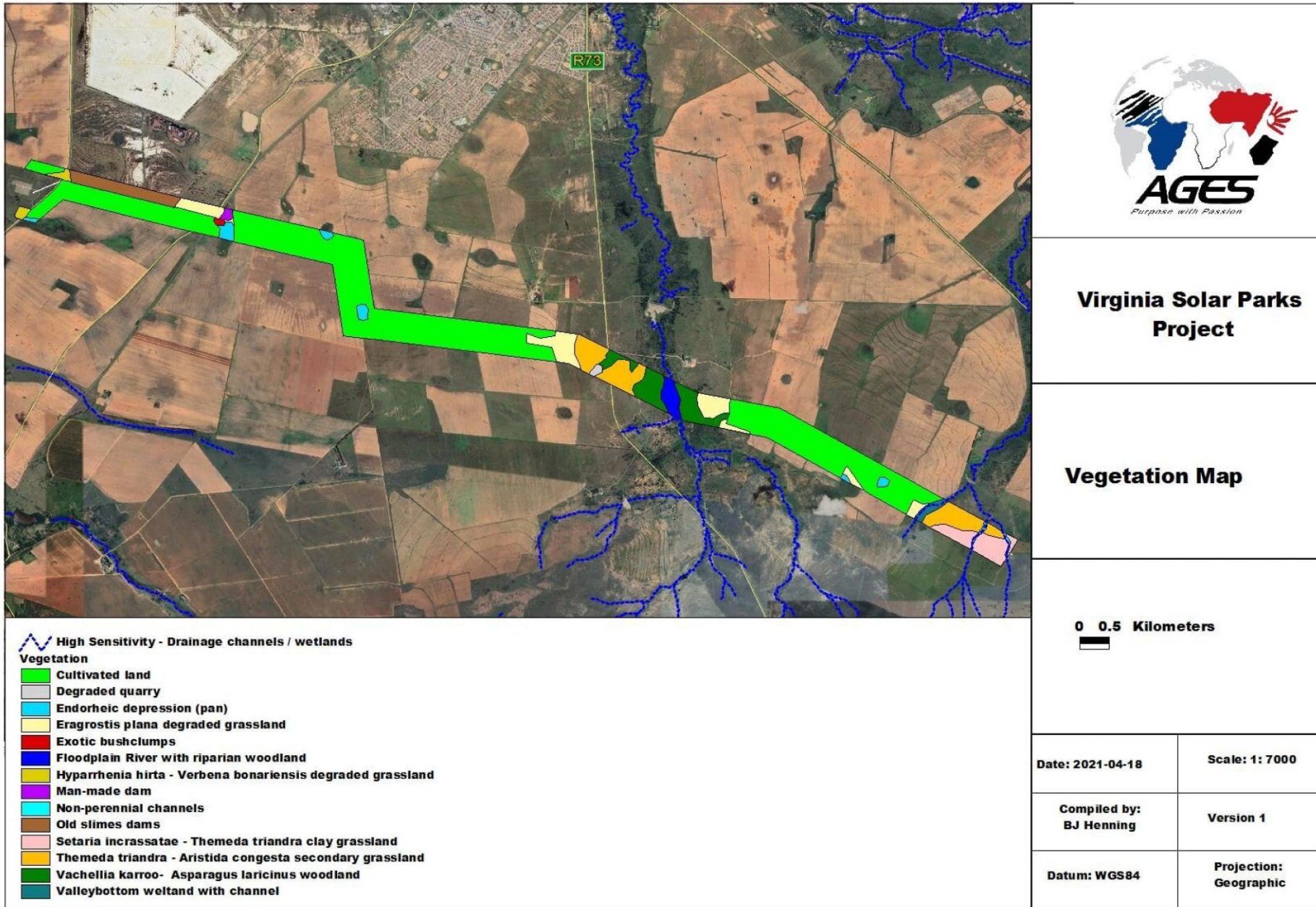


Figure 7. Vegetation Map



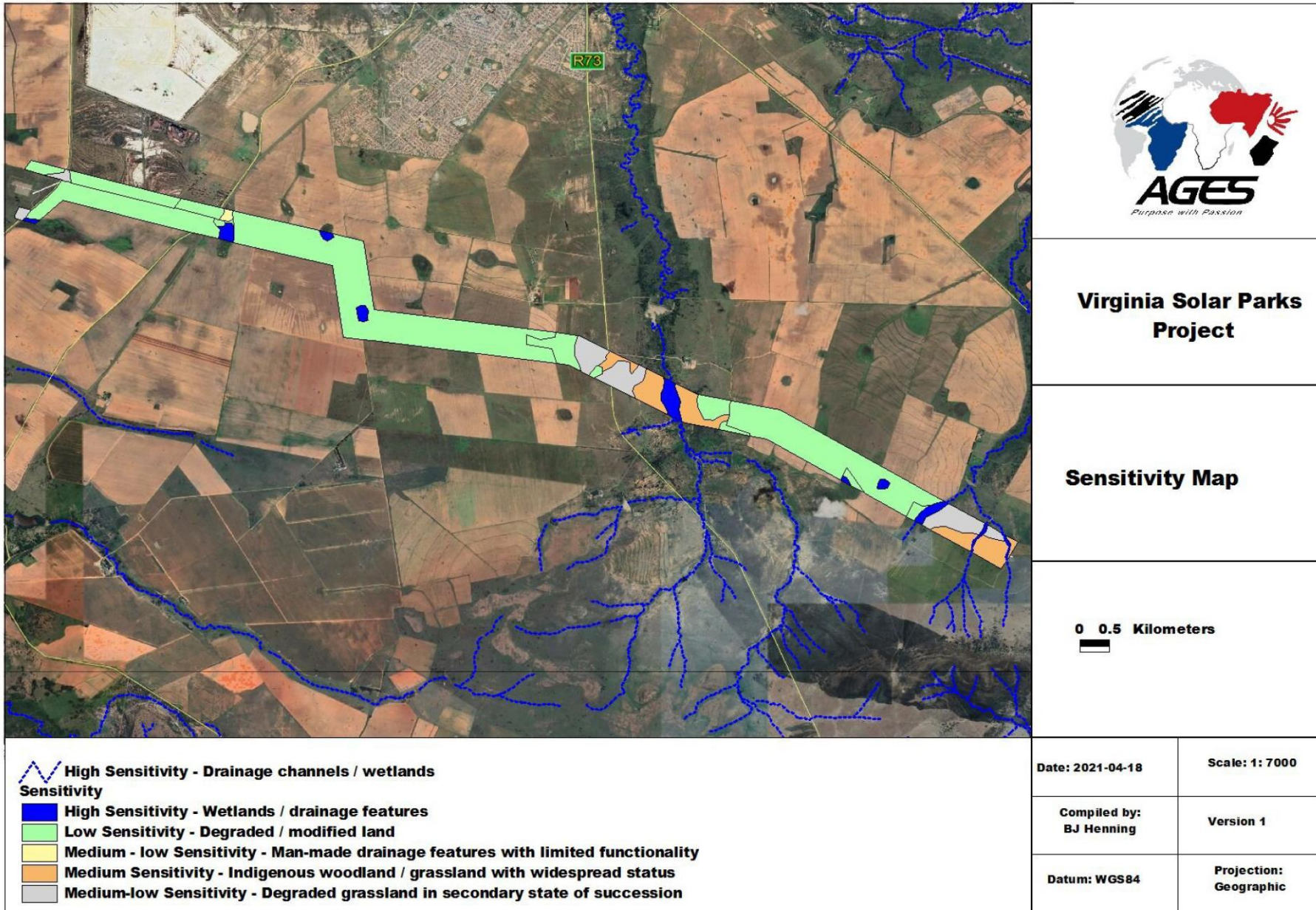


Figure 8. Sensitivity Map

### 10.6.6 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 Eco-region contains a higher number of mammals, although only the orange mouse (*Mus orangiae*) is restricted to the ecoregion, and the rough-haired golden mole (*Chrysofalax villosa*) is near-endemic.

Predators that still roam freely in the area include larger predators such as 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](http://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, Variegated 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 6. Red data list of potential fauna for the study area

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

#### **10.6.7 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 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 flora 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. This can be done successfully with the careful placing of pylons. 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 and layout plans is consistent with the sensitivity map and all the mitigation measures are taken into consideration stipulated in this report, the planned development can be supported.

#### **10.6.8 AVIFAUNA**

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

The survey area covered a corridor of 500m in width along the entire length of the proposed route of 16.2km from the Blomskraal farm to the Theseus sub-station. The study also included a thorough desktop study which encompassed a wider geographical range than the field survey.

According to the second South African Bird Atlas Project (SABAP 2) the footprint area of the proposed power line falls within four pentad grid squares. Avian species lists of the area were thus compiled largely from the datasets for these pentads, from personal accounts received from reputable sources and from a two-day field survey conducted in early April 2021.

Based on data from the abovementioned sources, 181 bird species occur within the general area of the survey site. Of these, 156 are South African breeding residents while 11 are intra African breeding migrants and 14 are non-breeding Palearctic migrants. Based on the presence of suitable habitat and resources it is expected that at least 64 bird species breed within the proposed corridor. With regards to endemism, 14 species on the survey list are considered to be Southern African endemics.

Three bird species of conservation importance or “priority” species have been recorded within, and in the vicinity of the survey corridor including two red data listed species and one nationally protected species. Black Stork *Ciconia nigra* and Lanner Falcon *Falco biarmicus* fall under the threat classification of „Vulnerable“. Both species have been recorded sporadically in the wider Virginia area of the Free State Province and neither is expected to breed in the vicinity of the proposed corridor. The nationally protected Lesser Kestrel *Falco naumanniis* is a non-breeding, nomadic summer visitor to the plains of the Free State Province.

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

This study was carried out in accordance with the best practice guidelines for assessing bird related threats associated with the development of power utility infrastructure. As such the main impacts of - bird habitat destruction and the disturbance to birds during the construction phases along with bird collisions and electrocution were assessed.

The risk assessments revealed that the majority of these impacts fall within the „moderate“ risk categories but should down scale to the „low“ risk levels 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 (Blomskraal - Theseus) power line can proceed with low to zero levels of impact on the area's avifauna with the proviso that the conservation, management and preventative recommendations in this report are implemented.

#### **10.6.9 VISUAL**

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.

## 10.7 AGRICULTURAL POTENTIAL

An Agricultural Potential Impact Assessment on soils potential (Annexure F) was conducted by Dr BJ Henning.

Based on Part 1 of the Regulation of Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983), the proposed area, earmarked for the development of the Virginia powerlines, will have a Low Impact on the soil potential and land capability from an Agricultural Potential point of view due to the following:

- The layout plan of the proposed Virginia powerline developments considered all reasonable factors through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities.
- The application is for a linear activity for which impacts on the agricultural resource are temporary and the land in the opinion of the soil scientist or agricultural specialist, based on the mitigation and remedial measures, can be returned to the current land capability within two years of the completion of the construction phase.
- The impact on agricultural resources is from an electricity pylon.
- The proposed development of the powerline will still allow crop cultivation and grazing underneath the powerline corridor.
- The proposed development footprint area of the linear powerline development can be returned to the current state within two years of completion of the construction phase through effective rehabilitation.

Provided that the proposed development of the powerline take all the mitigation measures into consideration stipulated in this report, the planned development can be supported, and the Agricultural Compliance Statement is considered as sufficient for the proposed development to go ahead.

## 10.8 CULTURAL AND HERITAGE RESOURCES

An Archaeological Impact Assessment (Annexure H) was conducted by Exigo Sustainability (Mr N Kruger) to ascertain whether there are any remains of significance in the area that will be affected by the proposed powerline development.

### 10.8.1 RECOMMENDATIONS BY THE ARCHAEOLOGIST

An examination of historical aerial imagery and archive maps indicate that the properties, crossed by the powerline corridor, had been utilized for intensive agriculture during the last century and much of the project area have been altered and transformed in the last century. This inference was confirmed during an archaeological site assessment which identified single receptors of heritage potential and the following recommendations are made based on general observations in the proposed Virginia Power Line Corridor, in terms of heritage resources management.

- The remains of a later Historical Period settlement were found – probably a compound of farmworkers houses - in the power line corridor (**Site Exigo-VSPL-HP01**). The site is poorly preserved, of medium-low significance and an application should be submitted for a destruction permit from Heritage Resources Authorities should the site, or parts thereof be impacted on by monopoles, pylons or other infrastructure. Should the site be retained, it is advised to observe a 20m conservation buffer around the site. The site must be monitored by an informed ECO to avoid the destruction of previously undetected heritage remains and potential human burials which might occur.
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended, and the archaeological specialist must be notified immediately.
- It is likely that further undetected archaeological remains might occur elsewhere in the Study Area along water sources and drainage lines, fountains and pans would often have attracted human activity in the past. Also, since Stone Age material seems to originate from below present soil surfaces in eroded areas, the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (cf. NHRA (Act No. 25 of 1999), Section 36 (6)).

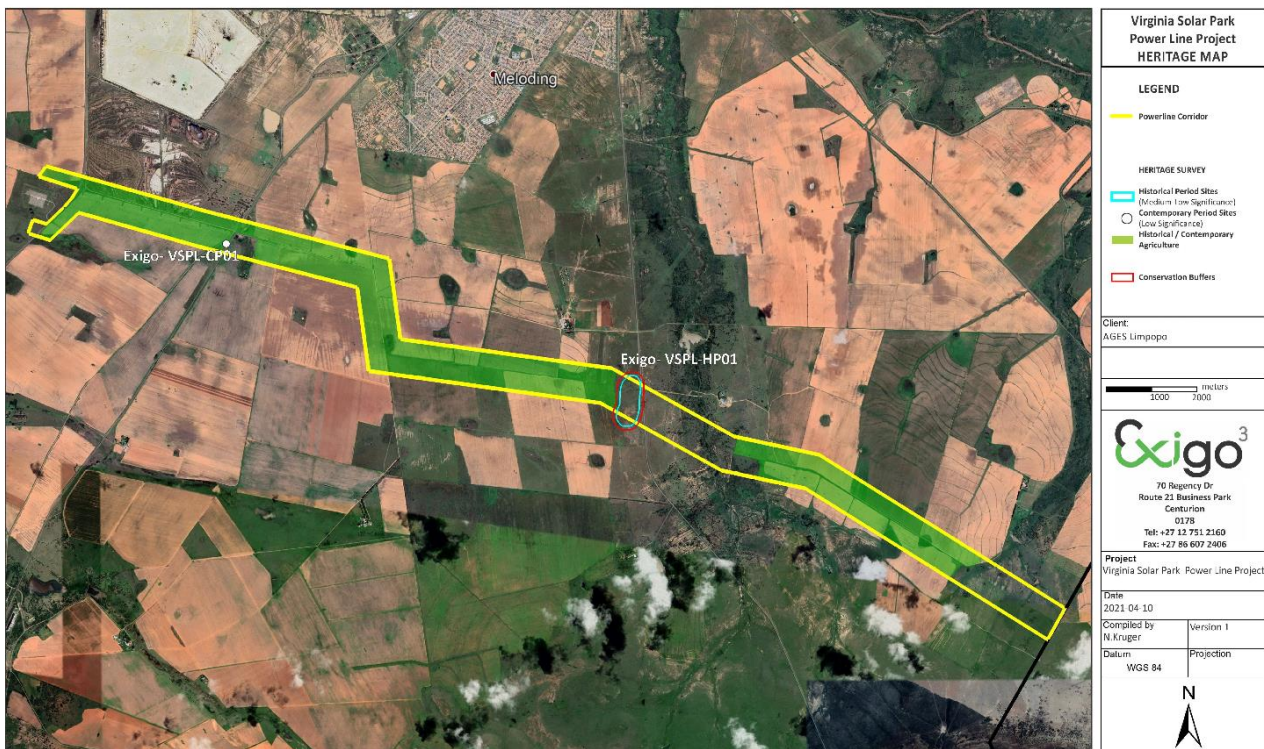


Figure 9. Site plan indicating the proposed heritage conservation buffers for the archaeological sites located within the Virginia Solar Parks EIA Project area

## **10.9 PALAEOLOGICAL RESOURCES**

A Palaeontological Impact Assessment (Annexure I) was conducted by Prof. Bruce Rubidge.

The proposed development along the Power Line Corridor is underlain by Late Permian sedimentary and potentially fossil bearing rocks but is overlain by deep Quaternary alluvial deposits (soil). Irrigated cropland covers almost the entire study area. There are three regions of natural vegetation: around the Merriespruit and Steenbokspruit Rivers, and immediately West of the R73. The Merriespruit River exposes some alluvium and isolated scattered sandstone boulders. The natural vegetation immediately West of the R73, exposes a small region of dolerite. No Permian or Quaternary fossils were found during the onsite inspection.

### **10.9.1 RECOMMENDATIONS OF THE PALAEOLOGICAL SPECIALIST**

It is recommended that, from a palaeontological perspective, the proposed Power Line Corridor development may proceed in the study area, primarily irrigated cropland, and that caution be used when constructing in the three regions of natural vegetation. Development should not take place in the Merriespruit and Steenbokspruit Rivers, since alluvium is exposed, and near the Merriespruit River where isolated sandstone boulders are exposed.

It is unlikely that fossils will be exposed as a result of the proposed development. If rocks are exposed by development this will create an opportunity to find fossils in an area which has delivered very few Karoo fossils.

Should fossils be uncovered in superficial Quaternary deposits or in the underlying Karoo sedimentary rocks during the course of development activities, the developer must immediately contact a qualified palaeontologist to assess the exposure for fossils so that the necessary rescue operations are implemented. The Chance Find Protocol is included in Appendix A of the Palaeontological Impact Assessment Report.

## **10.10 BASELINE TRAFFIC IMPACT ASSESSMENT**

### **10.11.1 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.

### **10.10.2 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.

### **10.11.3 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.

### **10.11 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.



## 10.12 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 Free State in the vicinity of Welkom Airport (FAWM), Harmony Mine Airport (FAHA) and Beatrix Mine Airport (FABX). There are no Military installations in the vicinity of the 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 and FABX airports are Visual Flight Rules airports so only the Approach/Departure Surfaces were assessed see Annexure L1.

The Virginia Solar Parks & Power Lines 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.

## 10.13 IMPACTS AND RISKS IDENTIFIED

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

Construction activities for the establishment of the proposed power line include:

- limited land clearing activities necessary for preparation of the site;
- limited excavation and filling activities;
- construction of three 132 kV power lines, for the connection to the on-site substations of each of the Virginia PV power plants.

### EXTENT

The extent of most of the construction activities is localized and impacts will only occur in the powerline corridor.

### DURATION

The impact of construction activities will only be for the duration of the construction phase, after which it will cease completely.

### PROBABILITY

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

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
  - Probability: Low
  - Significance: Low
  
- **Geological, soil and erosion impacts;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project
  - Probability: Low
  - Significance: Low
  
- **Impacts on avifauna;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project
  - Probability: Low
  - Significance: Low
  
- **Impacts on vegetation;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project
  - Probability: Low
  - Significance: Medium
  
- **Impacts on heritage resources;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project
  - Probability: Low
  - Significance: Low
  
- **Impacts on tourism;**
  - Extent: Regional
  - Duration: Life of the project
  - Probability: Unknown
  - Significance: Unknown
  
- **Visual impacts.**
  - Extent: Locally at the proposed site
  - Duration: Life of the project
  - Probability: Definite
  - Significance: to be determined

#### **10.13.1 DEGREE TO WHICH THE IMPACTS CAN BE REVERSED**

- The visual impact is resident for a long time. It can be reversed during decommissioning and rehabilitation of the area.
- Biodiversity impacts can be reversed at the decommissioning stage of the development.
- Careful placement of pylons and distancing will reverse impacts which occurred during the construction phase.

- Impacts on soil (erosion) can be reversed by careful handling of storm water on site.
- Agricultural resources will again become available after decommissioning of the facility.
- Impacts on Heritage resources could be permanent without mitigation.
- The potential impacts on river systems, drainage channels and wetlands will be minimal. Impacts on these resources can be reversed successfully.

#### **10.13.2 DEGREE TO WHICH IMPACTS MAY CAUSE IRREPLACEBLE LOSS OF RESOURCES**

The only impact which can cause an irreplaceable loss of resources is an impact on the heritage resources where heritage sources are destroyed. This should not happen as the heritage resources are well surveyed and will be either protected from development impacts or well-studied and documented and heritage resources can be avoided by careful placing of pylons and routing of powerlines.

#### **10.13.3 DEGREE TO WHICH IMPACTS CAN BE AVOIDED, MANAGED OR MITIGATED**

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

Negative impacts can mostly be avoided by careful placing of pylons and thorough planning of the powerline routes within the powerline corridor.

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

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

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

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

The consequence matrix uses parameters like severity, duration and extent of impact as well as compliance to standards. Values of 1-5 are assigned to the parameters that are added and averaged to determine the overall consequence. The same process is followed with the likelihood that consists of two parameters namely frequency and probability. The overall consequence and the overall likelihood are then multiplied to give values ranging from 1 to 25. These values as shown in the following table are then used to rank the significance. It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified.

**Significance ratings (Plomp 2004)**

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

**Description of the parameters used in the matrixes**

**Severity:**

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

**Duration:**

- Low Up to one month
- Low-medium One month to three months
- Medium Three months to one year
- Medium-high One to ten years
- High Beyond ten years

**Extent:**

- Low Within footprint area
- Low-medium Whole of site
- Medium Adjacent properties
- Medium-high Communities around site area
- High Matjhabeng Municipality area

**Frequency:**

Low	Once/more a year or once/more during operation
Low-medium	Once/more in 6 months
Medium	Once/more a month
Medium-high	Once/more a week
High	Daily

**Probability:**

Low	Almost never/almost impossible
Low-medium	Very seldom/highly unlikely
Medium	Infrequent/unlikely/seldom
Medium-high	Often/Regularly/Likely/Possible
High	Daily/Highly likely/definitely

**Compliance:**

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

**10.15 ASSESSMENT CRITERIA**

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 7. Impact Assessment Criteria

<b>Nature of impact</b> 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.		
<b>Extent</b> The physical and spatial size of the impact.	<b>Site</b>	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
	<b>Local</b>	The impacted area extends only as far as the activity, e.g. a footprint.
	<b>Regional</b>	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
<b>Duration</b> The lifetime of the impact; this is measured in the context of the lifetime of the proposed base.	<b>Short term</b>	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the phases.



	<b>Medium term</b>	The impact will last up to the end of the phases, where after it will be entirely negated.
	<b>Long term</b>	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.
	<b>Permanent</b>	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.
<b>Intensity</b>	<b>Low</b>	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
	<b>Medium</b>	The affected environment is altered, but function and process continue, albeit in a modified way.
	<b>High</b>	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
<b>Probability</b> 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.	<b>Improbable</b>	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
	<b>Probable</b>	There is a possibility that the impact will occur to the extent that provisions must be made therefore.
	<b>Highly probable</b>	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.
	<b>Definite</b>	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.
<b>Determination of significance.</b> 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.	<b>No significance</b>	The impact is not substantial and does not require any mitigation action.
	<b>Low</b>	The impact is of little importance but may require limited mitigation.
	<b>Medium</b>	The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
	<b>High</b>	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.

## 10.16 CUMULATIVE IMPACTS

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

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

The principles of the IEM require:

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

### **Proposed Solar PV Facilities in the area**

Similar projects within a 30km radius of the proposed development site include the following:

- 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.
- 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.
- The proposed development of co-generation facility at the Beatrix Gold Mine Shaft 4, located between Theunissed and Virginia, within Masionvana Local Municipality, Free State.
- 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.
- Proposed 75MW Oryx solar energy facility near Virginia, Free State.
- Proposed construction of Hennenman 5MW solar energy facility, near Hennenman, Free State.

### **10.17 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY**

- The positive impact that the development will have on the environment and community is a Socio-economic impact. It will create temporary jobs during construction phase.
- The proposed power line with the connection from the PV Solar Parks to the Eskom grid will help to reduce the pressure on the Eskom grid in the country with fewer negative impacts on the natural resources of the area than in the case of power generation using other sources like coal, gas, water and nuclear energy.
- During the operational phase the powerline may have a negative impact on the visual environment and biodiversity (avifauna).

### **10.18 POSSIBLE MITIGATION MEASURES AND RESIDUAL RISK**

- To mitigate the visual impact, screening of the facility can be done with vegetation.
- No clearance of vegetation will be allowed during the construction phase. Holes will be made for the **monopole structures** supporting the electrical cables.
- Use monopole structures for the powerlines and bird flappers as deterrents on lines to limit impact on birds in the area.
- Domestic waste must be removed from the site on a regular basis not to impact on the soils or water bodies in the area.

### **10.19 MOTIVATION FOR NOT INVESTIGATING ALTERNATIVES**

There are no location alternatives. There is only one powerline corridor because the proposed Virginia Photovoltaic Power Plants must be connected to the Eskom grid in the area from the approved locality, specifically to the Theseus MTS which is the closest available point of connection.

The proposed Virginia PV Power Plants are already located outside ecological sensitive areas, which limits space for alternative powerline corridors.

The shortest powerline route is always cheaper and it has less visual impact and less potential impact on birds, as less monopole structures and overhead cables will be used.

**11 DESCRIPTION OF THE PROPOSED PROCESS TO IDENTIFY AND RANK ENVIRONMENTAL IMPACTS THAT THE ACTIVITY, ASSOCIATED STRUCTURES AND INFRASTRUCTURE WILL IMPOSE ON THE PREFERRED LOCATION THROUGH THE LIFE OF THE ACITIVITY**

An environmental impact is defined as a change in the environment, be it the physical/chemical, biological, cultural and or socio-economic environment. Any impact can be related to certain aspects of human activities in this environment and this impact can be either positive or negative. It could also affect the environment directly or indirectly and the effect of it can be cumulative.

**11.1 DESCRIPTION OF ENVIRONMENTAL ISSUES AND RISKS IDENTIFIED DURING THE EIA PROCESS**

The potential aspects to assess during the Basic Assessment process may include:

- Soils & agricultural potential;
- Avifauna aspects;
- Vegetation aspects;
- Heritage resources aspects;
- Traffic impacts.

The following possible Key environmental impacts were identified:

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
<b>Air Pollution and noise</b>		
Dust	<ul style="list-style-type: none"> <li>• Construction machines and vehicles during clearing and construction of the powerline.</li> </ul>	<ul style="list-style-type: none"> <li>• Health problems</li> <li>• Air pollution</li> <li>• Public nuisance</li> </ul>
Emissions	<ul style="list-style-type: none"> <li>• During operation of construction equipment.</li> <li>• During veld fires.</li> </ul>	
Noise	<ul style="list-style-type: none"> <li>• Construction noise.</li> </ul>	
<b>Water quality</b>		
Pollution of water sources  Pollution by <i>E.coli</i>	<ul style="list-style-type: none"> <li>• Spillages of fuel &amp; oil from vehicles during construction.</li> <li>• Pollution from solid general.</li> <li>• By using insecticides and herbicides.</li> <li>• Poorly planned and managed sanitation facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Pollution of surface and groundwater</li> <li>• Health risk</li> <li>• Lower water quality</li> <li>• Soil degradation</li> </ul>
<b>Water quantity</b>		
Impact on amount of water resources available  Over-use of water	<ul style="list-style-type: none"> <li>• Use of water during construction of the powerline.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of a scarce resource</li> <li>• Increased pressure on water supply sources</li> </ul>
<b>Land/Soil degradation</b>		
Soil contamination and degradation	<ul style="list-style-type: none"> <li>• Spillages of oil, chemicals from machinery and vehicles during construction</li> <li>• Site clearing during construction</li> <li>• Use of Pesticides and Fertilizers</li> <li>• Erosion on site</li> </ul>	<ul style="list-style-type: none"> <li>• Pollution of soil</li> <li>• Soil degradation</li> <li>• Loss of topsoil</li> <li>• Effect soil characteristics, ecology &amp; groundwater</li> </ul>

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
<b>Biodiversity</b>		
Decline in fauna and flora diversity	<ul style="list-style-type: none"> <li>• Clearing of site for construction</li> <li>• Loss of habitat due to construction of powerline</li> <li>• Electrocutation/ collisions by/with powerlines</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of biodiversity</li> <li>• Loss of habitat</li> <li>• Negative impact on biodiversity</li> <li>• Negative impact on rare / endangered/ endemic species and habitats</li> <li>• Bird mortalities</li> </ul>
<b>Cultural/Heritage</b>		
Possible loss of heritage sites Damage to palaeontological resources	<ul style="list-style-type: none"> <li>• Damage during construction</li> </ul>	<ul style="list-style-type: none"> <li>• Possible loss of cultural heritage sites paleo-resources</li> </ul>
<b>Visual impact</b>		
Change in the visual characteristics of the site	<ul style="list-style-type: none"> <li>• Clearing of vegetation</li> <li>• Presence of powerlines</li> </ul>	<ul style="list-style-type: none"> <li>• Visual intrusion</li> </ul>

## 11.2 IMPACTS & MITIGATION MEASURES OF CONSTRUCTION PHASE

All the possible impacts that can be predicted in both the construction and operational phases of the Virginia powerlines are addressed. Specific mitigation measures are proposed, and the significance of these impacts is described with and without the mitigation measures.

Furthermore, considering that the proposed Virginia powerlines may be owned and/or operated by Eskom, the mitigation measures described in the following paragraphs and in particular in the attached Environmental Management Plan can be the responsibility of Eskom or of the developer.

### 11.2.1 ATMOSPHERIC POLLUTION AND NOISE

#### Construction Phase

During this phase there will be a concentration of earthmoving equipment and construction vehicles that will clear vegetation for the installation of the **steel or aluminium monopole structures** to be installed approximately 200 - 260m apart, with supporting electrical cables, and will create dust and exhaust smoke that will impact on air quality, in the process. There will also be more noise created by the vehicles during this phase. Burning of waste and fires at the temporary construction sites may also create smoke.

#### Operational phase

The operation of the powerline only requires periodical inspections in order to inspect the poles and to ensure that vegetation does not affect the cables. Therefore, no impact on air quality is expected in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Impact Atmospheric Pollution and Noise							Significance	
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation
								Low-medium	Medium
Construction	Earthworks and Vegetation clearance	Air pollution Dust	Low	Low-Medium	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Air pollution: Smoke	Low	Low-Medium	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Air pollution: Dust	Low	Low-Medium	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Vehicle movement	Noise pollution	Low-medium	Low-Medium	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Burning of cleared vegetation, solid waste & veld fires	Air pollution by excessive smoke	Low-medium	Low	Low-medium	Low-Medium	Low-Medium	Low	Low-Medium
	Cooking fires of workers	Air pollution: Smoke	Low	Low-Medium	Low-medium	Medium-high	Medium	Low	Medium
Cumulative impacts	Pollution & Noise	Increase in release of smoke and increase in noise levels	Low	Low-Medium	Low-medium	Medium-high	Medium	Low	Low-Medium

**Mitigation measures - Construction Phase**

- Vehicles must be well serviced so that it does not produce excessive smoke and noise.
- Refuelling shouldn't be allowed on site.
- Vehicle maintenance shouldn't be allowed on site.
- Speed of construction vehicles should be kept as low as possible to reduce the generation of dust and noise.
- No clearance of vegetation will be allowed during the construction phase. Holes will be made for the **monopole structures** supporting the electrical cables.
- Construction should only take place during the hours between sunrise and sunset on weekdays and Saturdays.
- Contractors must comply with provincial noise regulations. The construction machinery must be fitted with noise mufflers and be maintained properly.
- Vegetation cleared from the site and solid waste generated by the construction team (10 - 15 people) may not be burned on site or the surrounding areas.
- Solid waste must be regularly removed to the municipal waste disposal site.
- The cleared vegetation must be stock-piled and should be removed to a composting facility.

**11.2.2 GROUNDWATER AND SURFACE WATER POLLUTION**

**Construction phase**

Spillage of fuel and lubricants from construction vehicles could occur. Storm water contamination by solid waste could lead to groundwater and surface water pollution.

In this phase the vegetation is removed and storm water over the area could cause erosion as well as siltation of watercourses. Road construction within the powerline servitude will also increase the possibility of erosion although the area is almost flat.



**Operational Phase**

The operation of the powerline only requires periodical inspections in order to inspect the poles and to ensure that vegetation does not affect the cables. Therefore, no impact on groundwater is expected in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Impact: Groundwater and Surface Water Pollution							Significance	
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation
								Low	Medium
Construction	Spillage of fuel and lubricants from construction vehicles	Groundwater Pollution	Medium	Medium	Low-medium	Medium	Medium	Low	Medium
	Clearing of vegetation	Erosion	Low	Low-Medium	Low-medium	Medium	Low-Medium	Low	Low-Medium
	Solid waste disposal water resources	Pollution of freshwater resources	Low	Low-Medium	Low-medium	Medium-high	Medium	Low	Low-Medium
	Sanitation seepage from chemical toilets	Water Pollution	Low-Medium	Low-Medium	Low-medium	Medium	Low-Medium	Low	Low-Medium
Cumulative impacts	Water pollution	Increased potential for water pollution	Low-Medium	Low-Medium	Low-medium	Medium	Low-Medium	Low	Low-Medium

**Mitigation measures – Construction phases**

The following precautionary measures are recommended to prevent any surface or groundwater pollution:

- No clearance of vegetation will be allowed during the construction phase. Holes will be made for the **monopole structures** supporting the electrical cables.
- Construction activities should be restricted to the powerline servitude and pylon positions.
- Refuelling will not be allowed in on site.
- Vehicle maintenance shouldn't be allowed on site.
- Chemical sanitation facilities near construction site must be serviced regularly s to ensure no spills or leaks to surface and groundwater take place.
- Solid waste must be kept in adequate waste bins. Building rubble and various waste products should be removed on a regular basis to a licensed landfill site.
- If all possible water pollution is restricted and prevented, there will be no cumulative impacts as a result of the establishment of the Virginia 3 x 132kV Powerlines.

**11.2.3 WATER USE / WATER QUANTITY**

**Construction phase**

During this phase, a small amount of water may be utilized for casting of the foundations for the steel monopole structures. The water needed for the construction activities will be provided from the Matjhabeng Local Municipality.

**Operational phase**

The operation of the powerline only requires periodical inspections in order to inspect the poles and to ensure that vegetation does not affect the cables. Water use is not envisaged in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Impact: Water Use							Significance	
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation
								Low	Low-Medium
Construction	Construction process	Overuse of a scarce resource	Low-medium	Medium	Medium	Medium-high	Low	Low	Low-Medium
Cumulative impacts	Water use	Increased pressure on local water resources	Low-medium	Medium	Medium	Medium-high	Low	Low	Low-Medium

**Mitigation measures – Construction Phase**

- Water should be used sparingly, and it should be ensured that no water is wasted.
- Vehicle maintenance(washing) shouldn't be allowed on site.
- An eradication and rehabilitation plan should be compiled for exotic invasive plant species within the powerline servitude. An ecologist should be consulted to assist in this regard.

**11.2.4 LAND & SOILS**

**Construction phase**

During construction, the vehicles used have the potential to spill diesel and lubricants that can pollute the soil. The storage of solid waste before it can be disposed of has the potential to pollute the soil and becomes a nuisance.

**Operational phase**

The operation of the powerline only requires periodical inspections to inspect the poles and to ensure that vegetation does not affect the cables. Therefore, no impact on land and soils is expected in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Impact: Land and Soils							Significance	
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation
								Low	Low-Medium
Construction	Spilling of oil/diesel by construction machines	Contamination of soil	Medium	Low-Medium	Low-medium	Medium	Medium	Low	Medium
	Solid waste disposal	Soil pollution + nuisance	Low	Low-Medium	Low-medium	Medium-high	Medium	Low	Low-Medium
	Storm water over roads and cleared areas	Erosion	Low	Medium	Low-medium	Medium	Low-Medium	Low	Low-Medium
Cumulative impacts	Water pollution	Increased potential for water pollution	Low-Medium	Low-Medium	Low-medium	Medium	Low-Medium	Low	Low-Medium

**Mitigation measures - Construction Phase**

- No clearance of vegetation will be allowed during the construction phase. Holes will be made for the **monopole structures** supporting the electrical cables.
- Clearing of powerline servitude must not entail removal of vegetation except for foundations and access road.
- Construction activities must be restricted to the proposed powerline servitude.

- Refuelling will not be allowed at the site.
- Vehicle maintenance shouldn't be allowed at the site.
- Construction vehicles must be well maintained and serviced to minimise leaks and spills.
- Solid waste must be kept in containers and disposed of regularly at licensed dumping site.
- Building rubble must be removed regularly to a licensed disposal site during construction.
- Slopes produced by removing soil must be kept to a minimum to reduce erosion damage.

**11.2.5 ARCHAEOLOGICAL, CULTURAL AND SOCIAL FEATURES**

**Construction phase**

The clearing of the site may have a negative impact on the archaeological features of the site. Care must be taken in the excavations and moving of soil to observe any other archaeological, previously undetected, features of importance, which must be left and reported to the archaeological consultant for comments and actions.

The remains of a later Historical Period settlement – probably a compound of farmworkers houses – was found on the farm Florida within the power line corridor (**Site Exigo-VSPL-HP01**). The site is poorly preserved, of medium-low significance.

**Operational phase**

The operation of the powerline only requires periodical inspections to inspect the poles and to ensure that vegetation does not affect the cables. Therefore, no impact on heritage or palaeontological sites is expected in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Impact: Loss of Archaeological, Cultural and Social Features								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earth moving and soil clearance	Destroy archaeological evidence and heritage resources	Low-medium	High	Low	Low	Low	Low	Low-Medium
	Earth moving and soil clearance	Destroy fossils	Low-Medium	High	Low	Low	Low-medium	Low-Medium	Low-Medium
Cumulative impacts	Activities on site during construction and operational	Increase in potential to unearth archaeological and fossils	Low-medium	High	Low	Low	Low-medium	Low	Low-Medium

**Mitigation measures – Construction and operational phases**

- Care must be taken during the construction process that anything of archaeological and/or palaeontological value that is unearthed must be recorded.
- The archaeologist and SAHRA must be notified if anything of importance is discovered.

- The Fossil Finds Procedure included as Appendix 2 of the Palaeontological Impact Assessment provides guidelines to be followed in the event of fossil finds in the excavations.
- If a significant occurrence of fossil bones is discovered, a professional palaeontologist must be appointed to collect them and to record their contexts.
- Implement a site management plan in terms of site access and general conservation measures.
- Care must be taken during the construction process that anything else of archaeological value that is unearthed must be recorded. Please refer to the Heritage Impact Assessment (Annexure H). The archaeologist or SAHRA must be notified whenever anything of importance is discovered.
- An application should be made for the necessary destruction permit from the relevant Heritage Resources Authorities should the Site Exigo-VSPL-HP01, or parts thereof be impacted on by the construction of monopoles, pylons or other infrastructure. Should the site be retained, a 20m conservation buffer around the site must be implemented.
- Monitoring of development progress by an ECO or heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended, and the archaeological specialist should be notified immediately

## **11.2.6 IMPACT OF THE DEVELOPMENT ON ECOLOGY (FAUNA & FLORA) OF THE AREA**

### **Planning and construction phase**

The removal of natural vegetation and destruction of habitat will have a negative effect on the biodiversity. The specific mitigation measures included in the Ecological and Avifauna Impact Assessment (Annexures C & E) should be adhered to.

### **Operational phase**

The operation of the powerlines only requires periodical inspections to inspect the poles and to ensure that vegetation does not affect the cables.

Operational phase botanical impacts of the powerline are likely to be of minor significance. The primary operational phase impact of these components is the likely proliferation of invasive alien plants in the areas around the disturbed construction footprints, facilitated by the soil disturbance during construction. Loss of ecological connectivity and habitat fragmentation is not considered to be a significant impact as the vegetation will be undisturbed along most of the routes. The disturbed corridor will recover to some degree. There are not likely to be any significant differences between the route alternatives in terms of the operational phase botanical impacts, although if vehicular traffic (e.g. for service) is a feature of the operational phase in the Applicants Preferred Corridor route this could have a negative impact on vegetation in the Medium and High sensitivity areas, but the likelihood of this is low (servicing likely to be infrequent), with high uncertainty.

The impacts on Avifauna, during the operational phase, at both alternatives will be Medium before mitigation and Low after mitigation measures are implemented and refers mostly to electrocutions and collisions of birds with powerlines.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earthworks and vegetation clearance at construction site	Loss of indigenous plant species & disturbance to sensitive habitat	Low-Medium	Medium	Low	Low-Medium	High	Low	Low-Medium
	Vegetation clearance	The spread of exotic invasive plant species	Low-Medium	Medium	Low-Medium	Low-Medium	Medium	Low	Low-Medium
	The occurrence of veldt fires on site	Destruction of flora/habitats Loss of indigenous fauna	Medium	Low-Medium	Low-Medium	Low	Low	Low	Medium
	Littering (e.g. cans and plastics) along access road and at construction site	Public nuisance and loss/death of indigenous fauna	Low	Low-Medium	Low-Medium	Medium-High	Medium	Low	Low-Medium
	The control of animals on site Killing, poisoning or hunting of animals	Loss of indigenous fauna to the area	Medium	Medium	Low-Medium	Low-Medium	Low-Medium	Low	Low-Medium
Operation	Increased potential of negative impacts on ecology of the area	Increase in natural vegetation to be removed	Medium	High	Medium	Low-Medium	Low-Medium	Low	Medium
	Birds colliding with powerline & electrocution	Killing of birds	Medium-High	High	Medium	Low-Medium	Low-Medium	Low	Medium
Cumulative Impacts	Increased potential of negative impacts on ecology of the area	Increase in natural vegetation to be removed Electrocution of birds	Medium-High	High	Low-Medium	Low-Medium	Low	Low	Low-Medium

**Mitigation measures – Construction phase**

- No clearance of vegetation will be allowed during the construction phase. Holes will be made for the **monopole structures** supporting the electrical cables.
- No driving between pylons should be undertaken within High and Medium High sensitivity areas, and any pylon positions in these areas should rather be accessed from lower sensitivity areas (such as roads, fallow fields and tracks) nearby. Tracks driven in should be used for the drive out, rather than creating additional tracks.
- Construction should ideally be undertaken during the dry season (November – April), to minimise impact on bulbs and annuals.
- Construction activities should be restricted to the proposed powerline servitude.
- Unnecessary clearance of vegetation should not take place.
- No protected plant species should be removed without authorisation from Free State Department of Economic, Small Business Development, Tourism & Environmental Affairs (DESTEA).
- Ongoing alien invasive plant management must be undertaken on an annual or biannual basis within the High and Medium botanical sensitivity areas of any corridor authorised. No spraying of herbicide should be undertaken in these areas as this kills numerous non-target species, and no further soil disturbance should be allowed.
- Fires should not be allowed, and extra care should be taken to prevent veldt fires of occurring.

- The cleared vegetation should not be burned on site. The cleared vegetation should be stockpiled and taken to a composting facility.
- Raptor friendly pole design that minimises electrocution risk must be used.
- Bird flight diverters (Flappers) must be installed along the entire length of the line in accordance with the latest Eskom Technical Standards.
- Where subsequent towers are located at equal elevation (so as not to create a wider collision band) and where practically possible, the double circuit parallel line's towers should be staggered to increase visibility of the lines.
- Long-term monitoring and management of potential and actual impacts by the developer and operator must be conducted in the construction and operational phases.
- Periodic post-construction surveys of the powerlines for bird fatalities. Given that the risk of mortalities can be affected by season, it is important that these be performed during both the wet and dry seasons. In addition, provision needs to be made for periodic checking and, when necessary, replacement of bird flight diverters.
- Maintenance must be conducted outside of the winter breeding season.
- Nests are not to be removed from pylons and that no maintenance activities may be conducted on pylons with nests without prior approval of the avifaunal specialist.
- Solid waste must be kept in adequate animal proof waste bins. Building rubble and various wastes should be removed regularly to an available landfill site.
- Regular clean-up programs should be put into effect along the servitude to limit the impact of littering caused by construction activities.
- The stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain.
- No animals may be killed, captured or hunted on site by construction workers. Do not feed any wild animals on site.
- Where excavations pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and being trapped and/or injured. This could be prevented by the constant excavating and backfilling of excavations during construction process.
- Cumulative impacts on the ecology of the area will be very low, provided that the mitigation measures are implemented.
- The EMPr will have to be adhered to during the construction phase and regular monitoring should be done to ensure that there is sound environmental practice at Virginia Powerlines.

### **Mitigation measures – Operational phase**

- Nests are not to be removed from pylons and that no maintenance activities may be conducted on pylons with nests without prior approval of the avifaunal specialist.
- No maintenance activities to be conducted on any pylons with nests without prior approval of an avifaunal specialist
- Long-term monitoring and management of potential and actual impacts by the developer and operator must be conducted in the operational phase.
- Periodic post-construction surveys of the powerlines for bird fatalities. Given that the risk of mortalities can be affected by season, it is important that these be performed during both the wet and dry seasons. In addition, provision needs to be made for periodic checking and, when necessary, replacement of bird flight diverters.



- Maintenance must be conducted outside of the winter breeding season.
- Ongoing alien invasive plant management must be undertaken annually in High and Medium botanical sensitivity areas. No spraying of herbicide should be undertaken in these areas and no further soil disturbance should be allowed. The focus should be on removing (using CapeNature approved methodology) all alien invasive shrubs and large herbs, although in some cases also remove invasive alien grasses such as kikuyu or ryegrass.

**11.2.7 VISUAL IMPACTS**

**Construction phase**

The natural aesthetic character of the site will be changed. However, the local communities will be informed of the development stages and impacts on them during the construction phase.

**Operational phase**

Powerlines will have a visual impact on surrounding properties.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project Phase	Impact: Visual disturbance							Significance	
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation
								Low-Medium	Medium
Construction	Construction vehicles and dust	Visual	Low	High	Low-Medium	High	High	Low-Medium	Medium
	Electrical lines	Visual	Low	High	Low	High	High	Low-Medium	Low-Medium
Cumulative Impacts	Increased visibility of more powerlines in the area	Increased visual intrusion and nuisance	Medium-High	Medium	Medium	Low-Medium	High	Low-Medium	Medium

**Mitigation measures**

- The powerline will have a visual impact on the surrounding receptors in the area, but the significance of the impact was rated as medium for all VSRs during all three phases of the project.

**11.2.8 SAFETY, SECURITY AND FIRE HAZARDS**

**Construction phase**

Construction activities such as movement of construction vehicles and the use of equipment further increases the risk of injury.

**Operational phase**

The operation of the powerline only requires periodical inspections in order to inspect poles to ensure that vegetation does not affect the cables. Therefore, no impact on safety is expected in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project phase	Impact: Safety, security, and fire hazards							Significance	
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	With Mitigation	Without Mitigation
								Low	Low-Medium
Construction	Construction activities – erection of powerline structures	Loss or injury to human life	High	Low-Medium	Low	Low	Low	Low	Low-Medium
	Security	Crime	Medium	Low-Medium	Low-medium	Low	Medium	Low	Low-Medium
	Fire hazards	Loss of human life and construction equipment etc.	High	Medium	Low-Medium	Low	Low	Low	Low-Medium
Cumulative Impacts	Higher number of people in the area increases safety risks	Potential for an increase in criminal activity	High	Medium	Medium	Low	Low	Low	Low-Medium

**Mitigation measures**

- Contractor shall conform to the Occupational Health and Safety act, 1993 (Act No. 85 of 1993) and regulations.
- Access to the powerline servitude should be monitored and allowed only to the workers of the construction team (10-15 people).
- No construction activities should be allowed during the night. Workers should not be allowed to stay on site during the night.
- Open excavations must be marked with danger tape.
- No solid waste or vegetation may be burnt on the premises or surrounding areas.
- Fire extinguishers must be available.
- Fires will not be allowed, and extra care should be taken to prevent veldt fires occurring.
- It must be ensured that the development complies with the requirements of the National Veld and Forest Fire Act, 1998 (Chapter 2: Fire Protection Associations and Chapter 4: Duty to Prepare and maintain firebreaks).
- Refuelling shouldn't be allowed at the site.
- Vehicle maintenance shouldn't be allowed at the site.

**11.2.9 TRAFFIC AND ROAD SAFETY**

**Construction phase**

Trip generation during the construction phase will be much higher than during operational phase. It is assumed that construction of the solar parks and associated powerlines will take 12 months. If 10% of the trips occur in the peak hour approximately 4 trucks will arrive and leave in the peak hour. Private vehicles will also be used by construction supervision and admin staff to access the site as well as the construction workers who will arrive via bus or taxi.

**Operational phase**

The operation of the powerlines only requires periodical inspections in order to inspect poles to ensure that vegetation does not affect the cables. Therefore, no impact on traffic is expected in this phase.

VIRGINIA 3 X 132kV POWER LINES PROPOSED ALIGNMENTS									
Project phase	Impact: Traffic and Road Safety								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Construction activities – Increase in traffic	Loss or injury to human life	Medium	Medium-high	Low	High	Medium	Low	Medium
	Road Safety	Increase in vehicle accidents	Medium	High	Low-medium	High	High	Low	Medium-High
	Physical impact on roads and surfaces	Damage to road surfaces	Low	Medium	Low	Low-Medium	Low-Medium	Low	Low-Medium
Cumulative Impacts	Road Safety	Increase in vehicle accidents	Medium	High	Low-medium	High	High	Low	Medium-High

**Mitigation measures**

- Intersection sight distances for access intersection need to be complied with.
- Construct access intersection with dedicated right-turn lane on southern approach and left-turn deceleration taper on northern approach.
- Provide a dedicated loading and off-loading area on site and ensure that contractors make use of it and not stop within Road R27 road reserve at the proposed access intersection to load and off-load workers.

**11.3 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS AND RISKS**

Impacts with a rating of Medium-high or High are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment, the following impacts were regarded as potentially significant impacts. None of the impacts rated Medium-high or High.

**11.3.1 CUMULATIVE IMPACTS**

**Proposed Solar PV Facilities in the area**

Similar projects within a 30km radius of the proposed development site include the following:

- 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.
- 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.
- The proposed development of co-generation facility at the Beatrix Gold Mine Shaft 4, located between Theunissed and Virginia, within Masilonvana Local Municipality, Free State.
- 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.

- Proposed 75MW Oryx solar energy facility near Virginia, Free State.
- Proposed construction of Hennenman 5MW solar energy facility, near Hennenman, Free State.

Cumulative impacts were assessed, and it was found that the cumulative impacts will be medium to low. The cumulative impacts were also addressed in the Specialist Studies completed for the project. Also, a number of mitigation measures are proposed which will lead to the impacts that may result from the construction of the proposed Virginia Power Lines. None of the impacts rated Medium-high or High.

#### **11.3.2 NATURE OF IMPACT**

None of the impacts rated Medium-high or High.

#### **11.3.3 EXTENT AND DURATION OF IMPACT**

None of the impacts rated Medium-high or High.

#### **11.3.4 PROBABILITY OF OCCURRENCE**

None of the impacts rated Medium-high or High.

#### **11.3.5 DEGREE TO WHICH IMPACT CAN BE REVERSED**

None of the impacts rated Medium-high or High.

#### **11.3.6 DEGREE TO WHICH IMPACT CAN CAUSE IRREPLACEABLE LOSS OF RESOURCE**

None of the impacts rated Medium-high or High.

#### **11.3.7 DEGREE TO WHICH IMPACT CAN BE MITIGATED**

None of the impacts rated Medium-high or High.

## **12 SUMMARY AND FINDINGS AND RECOMMENDATIONS OF SPECIALIST REPORTS AND HOW FINDINGS HAVE BEEN INCLUDED IN THE ASSESSMENT REPORT**

The main issues identified as a result of the specialist studies include the following:

### **Terrestrial Biodiversity impact assessment**

- The proposed development should avoid sensitive areas such as drainage 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.

### **Avifauna impact assessment**

- This study has shown that the area holds four priority bird species albeit at low densities. Blue Korhaan and Secretary bird are resident in the greater area, Lanner Falcon may visit the site occasionally and Lesser Kestrel is a fairly common summer visitor to the region. The assessment of impacts identified by Birdlife SA as significant for PV developments has revealed that the majority of these impacts fall within the „high to moderate“ risk categories but should drop down to „lower“ risk levels after mitigation and provided the recommended bird conservation protocols are employed.
- From an avifaunal perspective the proposed powerlines are acceptable provided they are at least provided with bird diverters from the time the lines are initiated.

### **Visual impact assessment**

- 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.

## Heritage impact assessment

- The larger landscape around the project area indicate a rich heritage horizon encompassing Iron Age Farmer and Colonial / Historical Period archaeology primarily related to farming, rural expansion and warfare of the past century.
- Locally, the project area has seen transformation by agriculture activities potentially sterilising surface and subsurface of heritage remains, especially those dating to pre-colonial and prehistorical times.
- Cognisance should nonetheless be taken of archaeological material that might be present in surface and sub-surface deposits along drainage lines and in pristine areas.

## Paleontological impact assessment

- Due to palaeontological sensitivity, 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 is not recommended.

## Radio Frequency Interference Assessment

- 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.

## Aviation Impact Assessment

- The Power Lines project will not interfere or affect Welkom Airport. The Welkom Airport reference point is 24.63 Km from the end of the power line This places the location of the powerlines outside the limitation of the Obstacle Limitation Surfaces or the Approach/Departure Surfaces of the Welkom Airport.
- For Harmony Mine Airport and Beatrix Mine Airport, the Approach/Departure Surfaces were assessed, and the Virginia powerlines will not interfere or affect either of these airports. The Approach/Departure Surfaces path of all the runways do not pass over the powerlines.
- The Harmony Mine Airport Approach/Departure Surface is the nearest to the powerlines with the closest distance of 5.63 km
- Beatrix Mine Airport's Approach/Departure Surface nearest distance to the powerlines is 8.84 km.

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.



## 13 ENVIRONMENTAL IMPACT STATEMENT

### 13.1 SUMMARY KEY FINDINGS OF THE BASIC ASSESSMENT

It can be concluded that there will be environmental impacts as a result of the proposed development of the Virginia Powerlines. However, all the impacts can be mitigated to some extent. Most of the impacts can be avoided and potential impacted areas will be demarcated as no-go areas, therefore limiting the possible negative environmental impacts to an acceptable level.

### 13.2 CUMULATIVE ENVIRONMENTAL IMPACT STATEMENT

Taking into account all the findings of the specialist assessments on the proposed construction of the powerlines and comparing the cumulative impact assessment the cumulative impacts all rated as Low-Medium or Medium.

- The botanist confirmed that the cumulative impacts on the flora of the area will be Low Negative, both during the construction and operational phases. Provided that the proposed development and layout plans are consistent with the sensitivity map and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.
- The avian specialist confirmed that the cumulative impacts will be Low with implemented mitigation at both alternatives during the construction and operational phases.
- The remains of a later Historical Period settlement – probably a compound of farmworkers houses – was found on the farm Florida within the power line corridor (**Site Exigo-VSPL-HP01**). The site is poorly preserved, of medium-low significance.
- The cumulative impacts on paleontology might even be positive if fossils are found, rescued, and preserved.

The cumulative impacts are not of such a significance that it will prevent the development from taking place. It is proposed that the development can proceed.

### **13.3 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES**

#### **Positive impacts**

- Socio economic upliftment in the area. The Virginia 1, 2 and 3 Power Plants that rely on a powerline connection to the Eskom grid will bring needed jobs to the people of the communities of the development area. The powerline will also provide some jobs in the construction phase for an area that has a high number of jobless people.
- Electricity supply will be more secure for the farmers, businesses and communities in the greater Virginia and Ventersburg area.

#### **Negative impacts**

- The construction of the powerlines can have low negative impacts on the air quality, water quality, soil quality and safety of the area.
- The impacts on fauna and birds will be low negative.
- The impacts on flora will be low negative.
- Visual and heritage impacts will be low for the preferred route.
- The negative impacts of the development can however be mitigated effectively by application of the mitigation measures in this report and in the EMPr.

### **13.4 ASPECTS CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT BY THE EAP OR SPECIALISTS TO BE INCLUDED AS CONDITIONS OF AUTHORISATION**

- Permits are needed if any protected plants will be affected by the development and consequently have to be removed from the construction area.
- Raptor-friendly pole design (in line with latest Eskom technical Standards) that minimises electrocution risk must be used. These are designs that create separation between conductors of differing electric potentials, by placing insulation over conductors, and provide safe places for birds to perch.
- The entire powerline must be fitted with bird flight diverters.
- Long-term monitoring and management of potential and actual impacts by the developer and operator must be conducted in the construction and operational phases.
- Periodic post-construction surveys of powerlines for bird fatalities. Given that the risk of mortalities can be affected by season, it is important that these be performed during both the wet and dry seasons. In addition, provision needs to be made for periodic checking and, when necessary, replacement of bird flight diverters.
- Maintenance must be conducted outside of the winter breeding season.
- Nests are not to be removed from pylons and that no maintenance activities may be conducted on pylons with nests without prior approval of the avifaunal specialist.
- Pylons must be checked in advance of any major planned maintenance activities. Should nests be present, an avifaunal specialist must be contacted to identify the species and breeding status of the nest. Any planned major maintenance activities on pylons should be conducted outside of the winter breeding season (Oct - May).

- Only vegetation inside the powerline servitude and preferably only at the pylon's footprint areas may be removed.
- Minimise construction and vehicular disturbance footprint through Medium and High sensitivity areas.
- Minimise vehicular disturbance in High and Medium sensitivity areas during operation; ongoing alien invasive plant removal within High and Medium sensitivity parts of corridor
- An avifaunal walkthrough must be conducted by an avifaunal specialist within one month prior to the commencement of construction to identify breeding sites and ground-truth the final layout.
- Any management measures to protect the breeding sites recommended by the avifaunal specialist following the walkthrough must be implemented.
- Where subsequent towers are located at equal elevation (so as not to create a wider collision band) and where practically possible, the double circuit parallel line's towers should be staggered, to increase visibility of the double-circuit line.
- An application should be made for the necessary destruction permit from the relevant Heritage Resources Authorities should the **Site Exigo-VSPL-HP01**, or parts thereof be impacted on by the construction of monopoles, pylons or other infrastructure. Should the site be retained, it is advisable to observe a 20m conservation buffer around the site. Generally, the sites should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains and potential human burials which might occur at the site. Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended, and the archaeological specialist should be notified immediately.
- Inform staff of the need to watch for potential fossil occurrences.
- Inform staff of the procedures to be followed in the event of fossil occurrences.
- Monitor for presence of fossils, especially fossil bones.
- Obtain permit from SAHRA for collection of fossil finds.

## **14 FINAL PROPOSED ALTERNATIVES RESPONDING TO IMPACT MANAGEMENT MEASURES, AVOIDANCE AND MITIGATION MEASURES IDENTIFIED IN ASSESSMENT**

The preferred alternative was identified after all possible negative impacts were mapped and demarcated as no-go zones.

In order to minimize negative environmental impacts, there are areas that are not available for future developments of any kind. In order to mitigate for most of the negative impacts, avoidance seemed to be the best option in terms of the main issues, including:

- Visual impacts
- Bird collisions - limit occurrences
- Impacts on soils
- Impacts on biodiversity
- Degradation of archaeological sites/paleontology.

## **15 ASSUMPTIONS UNCERTAINTIES AND GAPS IN KNOWLEDGE**

Uncertainties could be limited by implementing a thorough ground-truthing process before construction commences.

It is assumed that the developer will always act responsibly towards the environment during the development and will comply with the conditions of the environmental authorization at all times.

## 16 REASONED OPINION FOR AUTHORISATION OF ACTIVITY AND CONDITIONS IN RESPECT OF THAT AUTHORISATION

It is the opinion of the EAP that the environmental impacts associated with the proposed development were identified and that the mitigation measures proposed to mitigate the negative impacts will decrease the environmental negative impacts to acceptable levels.

The EAP respectfully request comments from the competent authority to enable AGES to compile the Final Basic Assessment Report.

### Conditions to be included in the environmental authorisation

- Appoint an environmental control officer on site during construction of the development to monitor the development for compliance with the conditions of the environmental authorization.
- Permits are needed if any protected plants will be affected by the development and consequently have to be removed from the construction area.
- Invader plants must be controlled through removal and destroying the plants.
- Only vegetation inside the development footprint may be removed for construction.
- An application should be made for the necessary destruction permit from the relevant Heritage Resources Authorities should the **Site Exigo-VSPL-HP01**, or parts thereof be impacted on by the construction of monopoles, pylons or other infrastructure. Should the site be retained, a 20m conservation buffer around the site must be implemented.
- The site should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains and potential human burials which might occur at the site.
- Should any previously undetected surface or subsurface paleontological or archaeological material be exposed during development activities, all activities should be suspended, and the archaeological specialist should be notified immediately.



## **17 PERIOD OF ENVIRONMENTAL AUTHORISATION AND DATE OF CONCLUSION OF ACTIVITY**

The period for which the EA is required is for 10 Years from date of Environmental Authorisation.

The date on which the activity will be concluded is in 10 years from date of Environmental Authorisation. Post construction monitoring must be done for at least 2 Years after finalisation of construction.

## 18 UNDERTAKING UNDER OATH OR AFFIRMATION BY THE EAP

I, Engela Grobler, appointed EAP for the proposed Virginia 3 x 132kV Powerlines application for Environmental Authorization, hereby confirm:

- Correctness of the information provided in this report
- All comments and inputs and responses from stakeholders and I&APs are included here.
- All inputs and recommendations from the specialist reports where relevant, are included.
- Any information provided by the EAP to interested and affected parties and responses by the EAP to comments or inputs made by Interested and affected parties will form part of the Final report.



Signed .....

Date 30/09/2021

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