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CONSULTATION BASIC ASSESSMENT REPORT FOR THE PROPOSED RENEWABLE ENERGY GENERATION PROJECT ON THE REMAINING EXTENT OF THE FARM N'ROUGAS ZUID, 121, REGISTRATION DIVISION KENHARDT RD, KAI! GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY

Short name: New Hope 3 Solar Park

May 2021

Commissioned by: Delphinus Energy (Pty) Ltd
Document version 1.0 – Consultation
Compiled by HP Jannasch & EA Grobler

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Short name: New Hope 3 Solar Park

May 2021

PROJECT APPLICANT

Company name:	**Delphinus Energy (Proprietary) Limited (Reg. No. 2020/534197/07)**
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Postal Address:	P.O. BOX 5, BRITS, 0250 - South Africa
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ENVIRONMENTAL ASSESSMENT PRACTITIONER

Company Name:	AGES Limpopo (Pty) Ltd (Reg: 2006/020831/07)
Contact Persons:	Mr. Johan Botha / Ms. Engela Grobler
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Consultation BA Report:

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REPORT DISTRIBUTION LIST

Name	Institution
Mr Ernst Jordaan Burger	Delphinus Energy (Pty) Ltd
	National Department Forestry, Fisheries and the Environment, (DFFE)
	Department of Water and Sanitation (DWS)
Head of the Department	Department of Agriculture, Environmental Affairs, Land Reform and Rural Development (DEALRRD): Northern Cape Province
Mr J. Gilbert Lategan Municipal Manager	ZF Macawu District Municipality
Mr. Mac Kay Municipal Manager	KAI! GARIB Local Municipality
	South African Heritage Resources Agency (SAHRA)
Mr. J Geeringh	Eskom Land & Rights
Dr Adrian Tiplady	Square Kilometre Array (SKA)
	Registered Interested and Affected Parties (I&AP's)

DOCUMENT HISTORY

Report No	Date	Version	Status
	May 2021	1.0	Consultation BA Report

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

GENERAL SITE INFORMATION

Site location and Property details	
Farm	**N'Rougas Zuid**
Portion	**Part of Portion 121 (Remaining Extent)**
LPI code	C03600000000012100000
Overall Extent	5206.6975 hectares
Proposed project area:	230 Hectares
Land Owner	LAURIE LOURENS FAMILY TRUST Registration Nr: IT3105/97
Diagram number	SG 2167/1955
Title deed number	T9210/1998CTN
Registration date	1998/02/05
Current land use	Grazing

Site data	
Latitude (centre point)	29° 09' 09" S
Longitude (centre point)	21° 11' 34" E

Adjacent properties	
Farm	**Dwaal Geest 123**
Portion	**0 (Remainder)**
LPI code	C03600000000012300000
Land Owner	LE ROUX ANNA MAGDALENA
Current land use	Grazing
Farm	**Dwaal Geest 123**
Portion	**2**
LPI code	C03600000000012300002
Land Owner	ALLEENSTAAN TRUST
Current land use	Grazing
Farm	**Wolf Kop 122**
Portion	**3**
LPI code	C03600000000012200003
Land Owner	PYPKLIP TRUST
Current land use	Grazing
Farm	**N'Rougas Noord 108**
Portion	**1 (Remainder)**
LPI code	C03600000000010800001
Land Owner	RORICH STRAUSS FAMILY TRUST
Current land use	Grazing
Farm	**N'Rougas Noord 108**
Portion	**2**
LPI code	C03600000000010800002
Land Owner	ALLEENSTAAN TRUST
Current land use	Grazing

Farm Portion LPI code Land Owner Current land use	**N'Rougas Zuid 121** **2 (Remainder)** C03600000000012100002 VAN DER MERWE HENDRIK JACOBUS Grazing
Farm Portion LPI code Land Owner Current land use	**N'Rougas Zuid 121** **4** C03600000000012100004 VAN DER MERWE HENDRIK JACOBUS Grazing
Farm Portion LPI code Land Owner Current land use	**Farm 420** **0 (Remainder)** C03600000000042000000 LINTVELT ALBERTUS JOHANNES Grazing

PV POWER PLANT DESIGN SPECIFICATIONS AND CONNECTION TO THE ESKOM GRID

Project data	
Project name	**NEW HOPE 3 SOLAR PARK**
Technology	**Photovoltaic power plant**
Number of phases (if necessary)	1
Maximum generating capacity at the delivery point (Export Capacity)	up to 100MW
Type of PV modules	Mono/Polycrystalline, mono-facial or bi-facial
Type of mounting system	fixed or horizontal single-axis trackers (SAT)
Expected annual energy production	up to 160 GWh/year with fixed mounting system
Expected Load factor	up to 190 GWh/year with trackers
Expected Full net equivalent hours (EOH)	0.223 with fixed mounting system

Technical specifications	
Installed power capacity - AC side	**up to 86.3 MWp**
Installed power capacity - DC side	**up to 638,900 thin film modules of 135 Wp** **up to 287,500 mono/polycrystalline modules vvof 300 Wp**
Minimum structure height above ground level	1.0 m
Maximum structure height above ground level	4.5 m

Other technical information	
Footprint, including internal roads	Up to 230 hectares
PV power plant lifetime	approximately 30 years
Construction site (temporary)	approximately 10 hectares
Construction timeframe	15 to 24 months

Connection solution	
Delphinus Energy (Pty) Ltd is the applicant for the proposed **New Hope 3 Solar Park**, **which will be connected to the Eskom Nieuwehoop Main Transmission Substation (MTS).** The connection to the Eskom grid will be done according to the Eskom connection solution which may require: • One on-site high-voltage substation with high-voltage power transformers, stepping up voltage to 400 kV (or 132kV), and one high-voltage busbar with metering and protection devices; and • Up to two (2) x 400 kV (or 132 kV) circuits, approximately 15 km to 20 km long (depending on the selected location of the project footprints), for the connection of the on-site substation to the **Eskom Nieuwehoop Main Transmission Substation (MTS)** located on Portion 3 of the Farm GEMSBOK BULT 120, Kenhardt RD • The connection solution may also entail intervention on the Eskom grid.	
Delivery point: voltage level	100MW
New HV substation inside property - footprint	Approximately 4,000 m^2

Technical details of the proposed facility	
Component	**Description/Dimensions**
Height of PV structures	1.0 - 4.5 m above ground
Surface area to be covered (including associated infrastructure like roads)	Project footprint / fenced area is up to 230 ha. Surface area (within the project footprint) covered by PV modules, internal roads, MV stations, HV substation and BESS is up to 230 ha (cover ratio up to 0.5)
Number of overhead power lines required	2 (two) overhead power lines (approximately 15 km to 20 km long (depending on the selected location of the project footprints), from the HV substation and switching station of the New Hope 3 Solar Plant to the Eskom Nieuwehoop Main Transmission Substation (MTS)
Voltage of overhead power lines	400 kV or 132kV
Height of the power line	up to 30m above the ground level
Capacity of the facility	Maximum Export Capacity (point of connection): up to 100MW
Area occupied by both permanent and construction laydown areas	Project footprint / fenced area is up to 230ha. The construction camp (temporary) will be up to 10ha in extent, within the project footprint
Additional infrastructure	Battery Energy Storage System (BESS) up to 10ha within the Project footprint / fenced area
Access roads	Farm N'Rougas Zuid 121 is crossed by the regional road R27, which bisects the farm (N'Rougas Zuid 121) and runs in a north-south direction, linking Kenhardt and Upington. There is a 6.5km road frontage on the property (N'Rougas Zuid 121). The proposed solar park area lies to the east of the R27 and will be accessed by a new internal access road to be built for the project. The access road to the project site will be up to 8.0m wide, with a road reserve up to 13.5m. – During construction phase, access roads will have a road reserve wider than 13.5m (up to 16.0m) to allow the transportation of abnormal goods (e.g. power transformers, etc.).

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- Site Layout Plan
- Medium-voltage stations
- Control building and medium voltage receiving station
- On-site high-voltage substation and switching station
- Warehouse / Workshop

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

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Annexure J Visual Impact Assessment

Annexure K Environmental Screening Report

Annexure L1 Aviation Theme documents
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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_2	Carbon Dioxide
CSP	Concentrating Solar Power
DALRRD	Department of Agriculture, Land Reform and Rural Development
DFFE	National Department of Forestry, Fisheries and the Environment,
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environment Impact Assessment Report
EMPr	Environmental Management Programme
ESS	Environmental Scoping Study
GHG	Green House Gases
GIS	Geographic Information Systems
GN	Government Notice
GWh	Giga Watt hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IPP	Independent Power Producer
kV	kilovolt
MW	Mega Watt
MWp	Mega Watt peak
NEMA	National Environmental Management Act - Act no. 107 of 1998
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act - Act no. 25 of 1999
DEALRRD	Department of Agriculture, Environmental Affairs, Land Reform and Rural Development (DEALRRD): Northern Cape Province
NWA	National Water Act - Act no. 36 of 1998
PoS	Plan of Study
Property	The Remaining Extent of the farm N'Rougas Zuid 121, Kenhardt RD (!Kai Garib Local Municipality, ZF Macawu District Municipality, Northern Cape Province)
Project site	Part (approx. 230ha) of the Remaining Extent of the farm N'Rougas Zuid 121, Kenhardt RD (!Kai Garib Local Municipality, ZF Macawu District Municipality, Northern Cape 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
Delphinus Energy	Delphinus Energy (Pty) Ltd (applicant)

1 OBJECTIVE OF THE EIA PROCESS

According to Regulation No R 982 of 4 December 2014, of the EIA Regulations, 2014, as amended, the objective of the EIA 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 th 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 – Engela Grobler and Johan Botha
Contact details of EAP:

Physical Address: 120 Marshall Street,
Polokwane, 0699
Telephone number: 015 291 1577
Fax number: 015 291 1577

Expertise of EAP: A Master's Degree in Environmental Management/Nature Conservation and 12 years of experience with the management and conducting of EIA's. A number of renewable energy projects which participated in the IPP Programme, issued 3rd August 2011 by the Department of Energy have been awarded Preferred Bidder Status and are currently operating. Curriculum Vitae of EAP is included in Annexure P.

3 LOCATION OF ACTIVITY

3.1 SURVEYOR GENERAL 21-DIGIT CODES OF DEVELOPMENT AREAS

The project site is **the Remaining Extent of the farm N'Rougas Zuid, 121, Registration Division Kenhardt RD**, 5206.6975 Hectares in extent, located within the **Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.**

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

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

3.2 PHYSICAL ADDRESS AND FARM NAME

DELPHINUS ENERGY (PTY) LTD (Reg. No. 2020 / 534197 / 07) is proposing the establishment of a **renewable energy generation facility (Photovoltaic Power Plant)** with associated infrastructure and structures on:

- **A part of the Remainder of the farm N'Rougas Zuid, 121, Registration Division Kenhardt RD**, **Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.**

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

The name of the facility will be **NEW HOPE 3 SOLAR PARK.**

The **footprint (fenced area)** of the proposed development is approximately **230 ha in extent**, as detailed in the table below:

Table 1. Property including the Project Site and Project footprint

Property	**Project footprint [ha]**	**Overall extent [ha]**
The Remaining Extent of the farm N'Rougas Zuid 121	230 ha	5206.6975 ha
TOTAL EXTENT	**230 ha**	**5206.69**75 ha

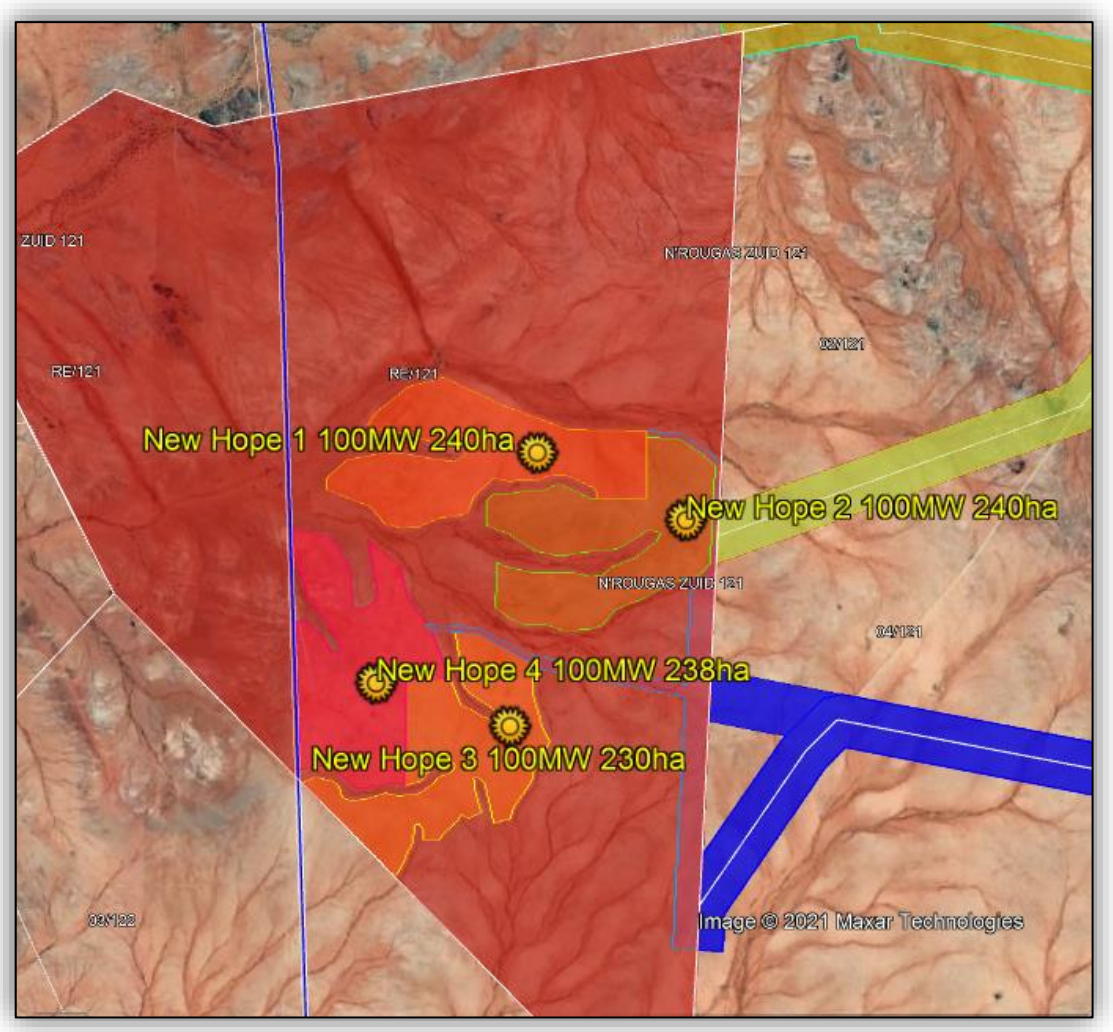

Figure 1 Locality map – Four solar parks in relation to each other

Access to the New Hope 3 Solar Park will be from the regional road R27, which crosses the property (north-south direction) and lies to the west of the project site.

The project site is located approximately 22km north of the town Kenhardt, east of the regional road R27**.** The regional centre, Upington town, lies approximately 106km to the north (along the R27) from the project site.

Delphinus Energy intends to include New Hope 3 Solar Park in a **submission to BID Window 5 of the Renewable Energy Independent Power Producers Procurement Programme (REIPPP)**, published on 13 April 2021 by the **Department of Mineral Resources and Energy** ("**DMRE**").

In order to develop the facility, Delphinus Energy must undertake an Environmental Impact Assessment (EIA) process and acquire environmental authorization from the *National Department of Forestry, Fisheries and the Environment, (DFFE)*, in consultation with the *Northern Cape Province Department of Agriculture, Environmental Affairs, Land Reform and Rural Development DEALRRD,* 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 (NEMA, Act No. 107 of 1998).

Delphinus Energy is the applicant for the New Hope 3 Solar Park (the proposed project), which will be connected to the Eskom Nieuwehoop Main Transmission Substation (MTS) located ±13 km East of the project 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 Delphinus 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 New Hope 3 Solar Park is defined and evaluated in this EIA Report and its annexures.

4 PLAN OF THE PROPOSED ACTIVITY

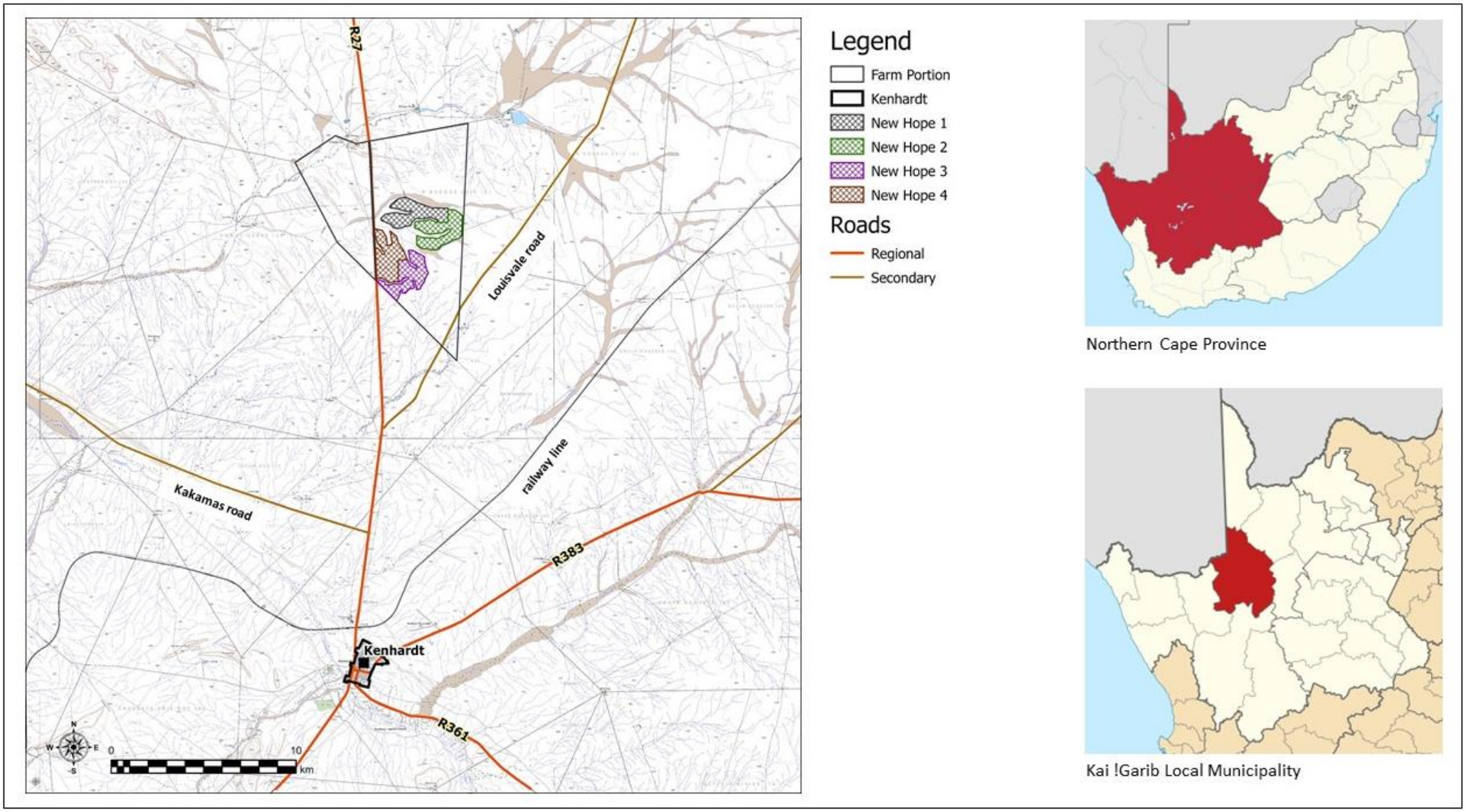

Figure 2 Locality map

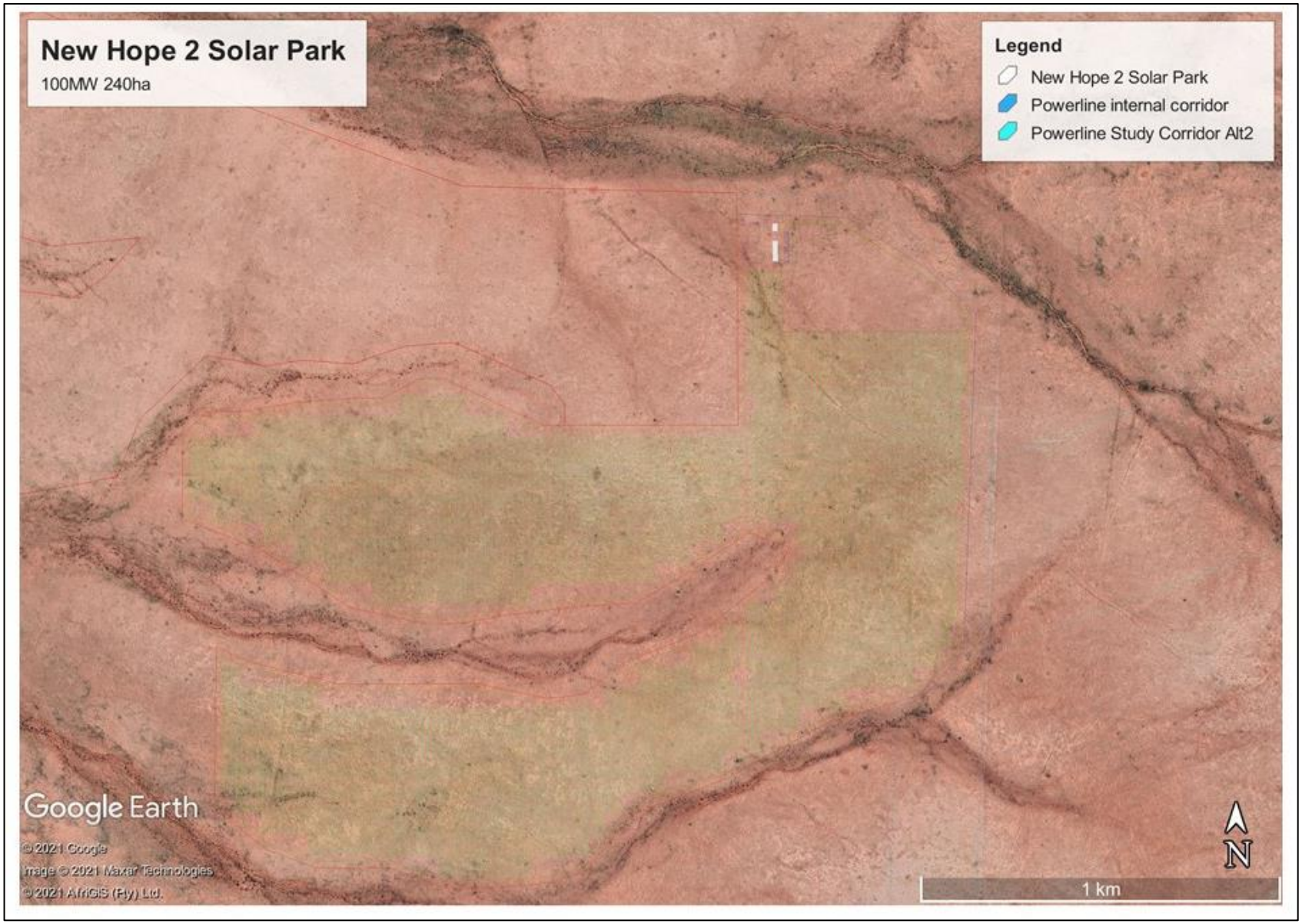

Figure 3 New Hope 3 – Site Lay Out – Development Footprint

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 (or potentially involved) in the proposed development, are detailed in table below.

Table 2. Listed Activities in terms of EIA Regulations 2014, as amended on 7 April 2017 potentially involved in the proposed development

Relevant notice	Activity No.	Description
R.325, 07 April 2017	**1**	***The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more:*** The project will consist of construction, operation and maintenance of a Photovoltaic (PV) Power Plant with a generating capacity up to 100 MW with associated infrastructure and structures. New Hope 3 Solar Park will be established on the Remaining Extent of the farm N'Rougas Zuid, 121, Kenhardt RD, measuring 5206.67ha. The project will participate in the next IPP Procurement Programme, issued by the Department of Energy. The connection may also entail interventions on the Eskom grid according to Eskom's connection requirements/ solution.
R.325, 07 April 2017	**15**	***The clearance of an area of 20 hectares or more of indigenous vegetation.*** The PV Power Plant with associated infrastructure and structures will be constructed and operated on a footprint of 230ha.
R.325, 07 April 2017	**9**	***Development of facilities or infrastructure for transmission and distribution of electricity with a capacity of 275 kV or more, outside urban areas or industrial complex*** The connection to the Eskom grid will be done according to the Eskom connection solution, which may require: (i) One on-site high-voltage substation with high-voltage power transformers, stepping up the voltage to 400 kV, and one high-voltage busbar with metering and protection devices. On-site high-voltage substation will be equipped with a control building and one busbar with metering and protection devices ("switching station"). (ii) Up to two (2) x 400kV) circuits, approximately 15 km-20km long (depending on location of project footprints), for the connection of the on-site substation to the Eskom Nieuwehoop Main Transmission Substation (MTS) located on Ptn 3 of Farm GEMSBOK BULT 120, Kenhardt RD
R.327, 07 April 2017	**11**	***The development of facilities or infrastructure for the transmission and distribution of electricity:*** ***Outside urban areas or industrial complexes with a capacity of more than 33 kilovolts but less than 275 kilovolts: or*** The connection to the Eskom grid will be done according to the Eskom connection solution, which may require:

		(i) One on-site high-voltage substation with high-voltage power transformers, stepping up voltage to 132kV and one high-voltage busbar with metering and protection devices. Furthermore, the on-site high-voltage substation will be equipped with a control building and one busbar with metering and protection devices (also called "switching station"). (ii) Up to two (2) 132 kV circuits, approximately 15 - 20km long (depending on location of project footprint), for the connection of on-site substation to Eskom Nieuwehoop Main Transmission Substation (MTS) located on Ptn 3 of GEMSBOK BULT 120, Kenhardt RD The connection may also entail interventions on the Eskom grid according to Eskom's connection requirements/solution.
R.327, 07 April 2017	**12**	***The development of –*** ***(ii) infrastructure or structures with a physical footprint of 100sq.m. or more;*** ***(c) within 32m of a watercourse, measured from the edge of a watercourse,*** The proposed New Hope 3 Solar Park will be located within 32m from the edge of watercourses.
R.327, 07 April 2017	**19**	***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;*** The proposed New Hope 3 Solar Park will be located near the edge of watercourses and some of the watercourses (drainage lines) will have to be crossed to gain access to the site and this will lead to the removal of material from the watercourse.
R.327, 07 April 2017	**24**	***The development of a road –*** ***(ii) with a reserve wider than 13,5 metres or where no reserve exists where the road is wider than 8 metres,*** An access road wider than 8 meters or with a reserve wider than 13.5 meters may be constructed. Some sections of internal roads may be wider than 8 meters.

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 project (New Hope 3) envisages the establishment of a Photovoltaic (PV) solar power plant with a maximum generation capacity at the delivery point (Maximum Export Capacity) of up to 100MW.

The construction timeframe is estimated to be approximately 15 months.

The preferred technical solutions envisage:

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

The energy generated by the New Hope 3 Solar Park will reduce the quantity of pollutants and greenhouse gases emitted into the atmosphere. The reduced amount of CO_2 will be the emissions that would have been generated by a thermal power plant using fossil fuels for producing the same quantity of energy that it is produced by the New Hope 3 Solar Park.

The detailed description of the characteristic and functioning of the PV plant and its connection is given in the following paragraphs.

5.3 LAYOUT OF INFRASTRUCTURE AND STRUCTURES ON SITE

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

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

The footprint (fenced area) of the New Hope 3 Solar Park will be up to 230ha.

The main drives of the proposed layout are:

- to maximize the energy production and the reliability of the PV plant, by choosing proven solar technologies; mono or bi-facial mono/polycrystalline solar modules mounted on single-axis horizontal trackers (SAT) or on fixed mounting systems;
- to develop the PV power plant on the area East of the regional road R27, on areas identified with low ecological sensitivity;
- to avoid drainage areas that were identified on the property;

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

The required footprint - corresponding on the fenced area - will be up to 230 ha.

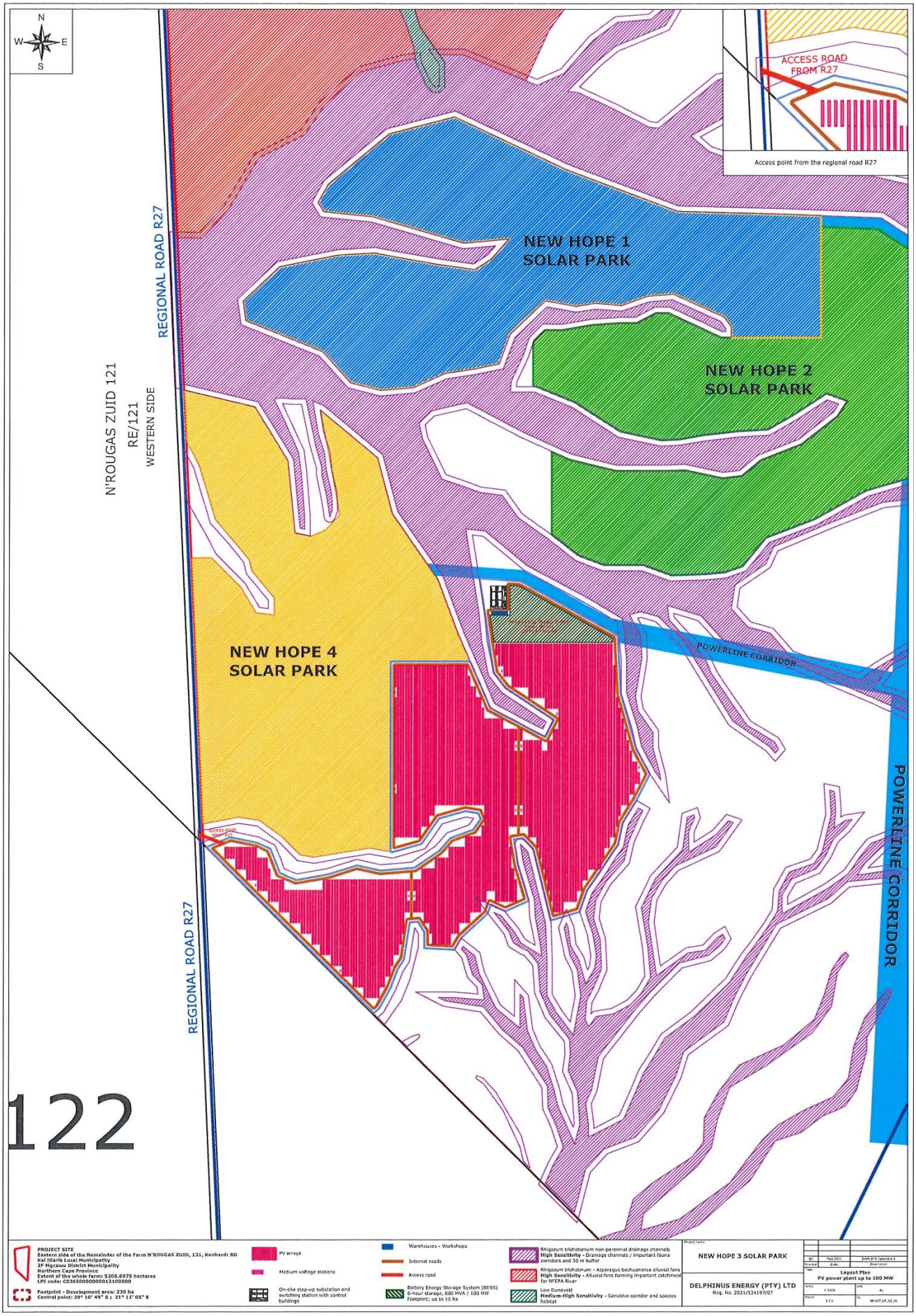

Figure 4 Proposed Layout Plan of the New Hope 3 Solar Park

5.4 PRIMARY COMPONENTS

Proposed development (PV Power Plant and connection infrastructure) consists of installation of the following equipment:

- Photovoltaic modules (mono-crystalline, poly-crystalline or bi-facial modules)
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations
- Internal cabling and string boxes
- DC/AC inverters
- Medium voltage stations, hosting LV/MV power transformers
- Medium voltage receiving station(s)
- Workshops & warehouses
- One on-site high-voltage substation with high-voltage power transformers, stepping up voltage to 132/400kV and one high-voltage busbar with metering and protection devices
- Up to two (2) x 132/400 kV circuits, ± 15-20 km long (depending on selected location of footprints), for connection of on-site substation to Eskom Nieuwehoop Main Transmission Substation (MTS) on Ptn 3 of GEMSBOK BULT 120 Kenhardt RD
- Battery Energy Storage Systems (BESS) with a Maximum Export Capacity up to 100 MW and a 5-hour storage capacity up to 1250 MWh, with a footprint up to 10 ha, next to on-site high-voltage substation, within the PV plant footprint / fenced areas.
- Electrical system and UPS (Uninterruptible Power Supply) devices
- Lighting system
- Grounding system
- Internal roads
- Fencing of the site and alarm and video-surveillance system
- Water access point, water supply pipelines, water treatment facilities
- Sewage system

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

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

to be removed at the end of construction.

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

5.4.1 PROJECT FUNCTIONING

Solar energy facilities using PV technology convert sun energy to generate electricity through a process known as Photovoltaic Effect, which consists of generation of electrons by photons of sunlight to create electrical energy. Preferred technical solutions are:

- Mono / bi-facial mono / polycrystalline modules, mounted on:
- fixed mounting systems or mounted on horizontal 1-axis trackers,

which at present represent the best performing options in terms of reliability and costs/efficiency.

The PV technology is in constant and rapid evolution, this means that the final choice of the type of solar modules (mono-crystalline or polycrystalline, mono or bi-facial) and mounting system (fixed or tracker) can be taken at the time of the commission date, on the basis of the availability of PV modules and mounting systems, of the worldwide market and of the cost-efficiency curve.

The required footprint - corresponding with the fenced area - will not exceed 230 ha, and the maximum height of the structures (PV modules and support frames) will be approximately 4.5m above the ground level.

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

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

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

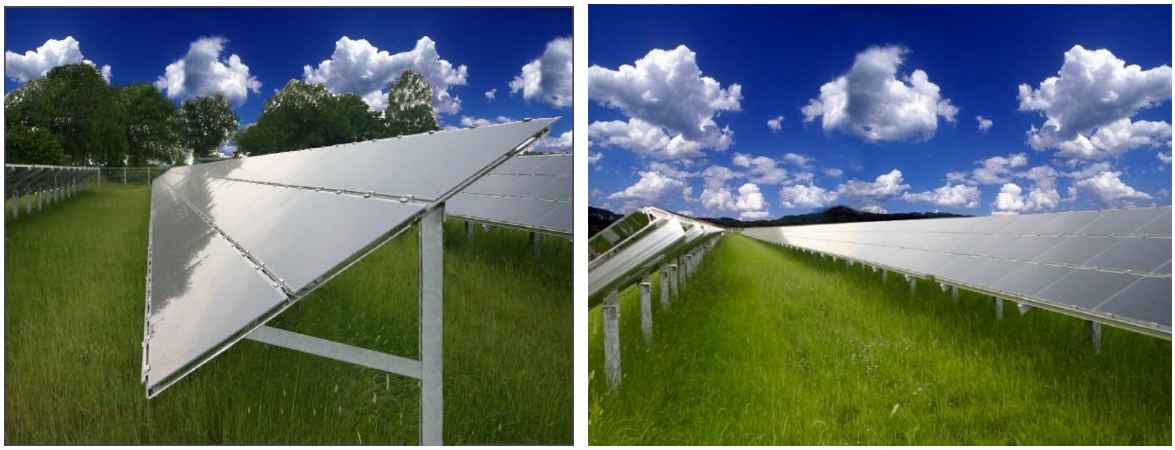

Figure 5 Lateral views of PV arrays mounted on fixed mounting systems

Figure 6 Frontal view of PV arrays mounted on fixed mounting systems

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

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

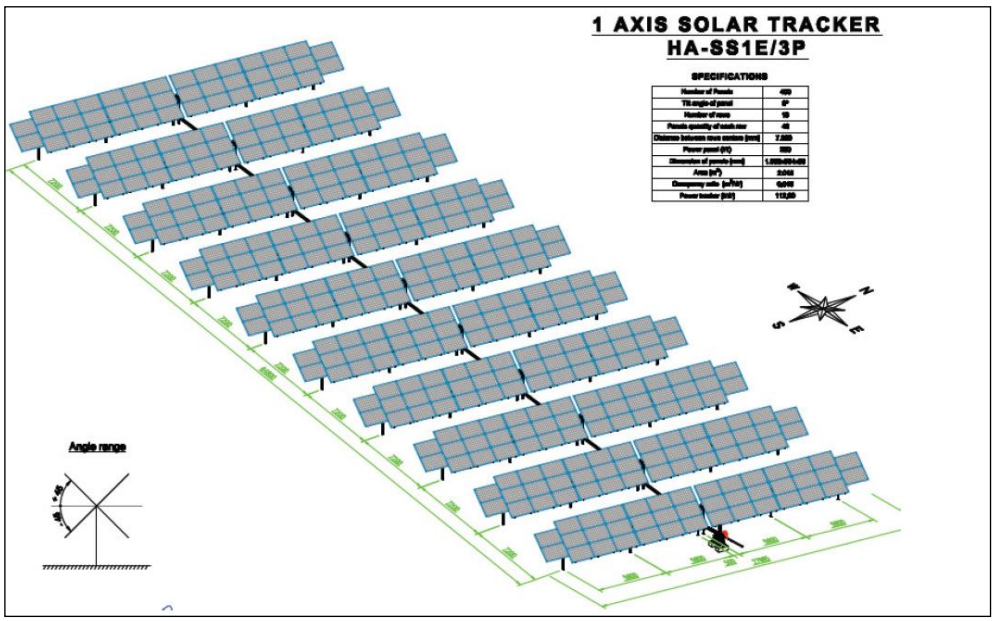

Figure 7 . Simulation views of the PV arrays mounted on 1-axis horizontal tracker

Figure 8 Front views of the PV arrays mounted on horizontal 1-axis tracker

C) In both cases:

PV modules are series-connected outlining PV strings made of several modules, so that the PV string voltage fits into the voltage range of the inverters. PV strings are set up in order to be connected to DC-connection boxes. Each String Box allows the parallel connection of several PV strings (also called “PV sub-field”).

String Boxes monitor the currents in photovoltaic modules and can promptly diagnose faults. String boxes are also designed with a circuit breaker in order to disconnect the photovoltaic sub-fields from the inverters.

The PV sub-fields are thought to be linked to central inverters, located in medium voltage stations. Each station comprises prefabricate buildings designed to host DC/AC inverters and a medium voltage power transformer. The DC/AC inverters are deemed to convert direct current (DC) into alternate current (AC) at low voltage (270 V); subsequently the AC will pass through a medium-voltage transformer in order to increase the voltage up to 22kV (or 11 kV).

The energy delivered from the medium voltage stations will be collected into one (or more) medium voltage receiving station(s), parallel connecting all the PV fields of the PV generator. From the medium voltage receiving station, the energy will be delivered to two high-voltage power transformers (250 MVA each, plus one as spare), which will step up the electric energy from the medium voltage level (11kV or 22kV) to the required connecting voltage (i.e. to 400 kV or 132kV).

The power transformers will be connected to an on-site 400 kV or 132kV busbar (the so-called “switching station”), to be equipped with protection and metering devices.

The new on-site HV substation will need to be equipped with circuit breakers upstream and downstream, in order to disconnect the PV power plant and/or the power line in case of failure or grid problems.
The power generation capacity at the delivery point (Maximum Export Capacity) will be up to 100MW.

5.4.2 BATTERY ENERGY STORAGE SYSTEM (BESS)

A Battery Energy Storage System (BEES) with an output capacity up to 100 MWac and a storage capacity up to 1250 MWh (5-hour storage) will be installed next to the on-site step-up substation and switching station, within a footprint up to 10 ha, next to the on-site high-voltage substation, within the PV plant footprint / fenced area.

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

The Battery Storage Facility will have a footprint of **up to 10 hectares** and will comprise of the following equipment:

- Up to 400 containers (each up to 40 m^2), each with a storage capacity of up to 5 MWh and on a concrete platform. These will house the batteries, management system and auxiliaries.
- Up to 200 transformer stations (up to 35 m^2 each).
- Up to an additional 10 m^2 per container for cooling units.
- Internal access roads up to 8.0 m wide between rows of containers.

- BESS will be connected:
  - to the PV plant by means of DC/DC inverters, and
  - to the 33kV bus-bay of the on-site step-up substation by means of kiosk transformers, medium-voltage overhead lines and/or underground cables;
- Temporary infrastructure including a site camp and a laydown area.

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

There will be no need for any additional clearance of vegetation for a new area for the battery storage facility as it will be located inside the already authorised PV plant footprint area.

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

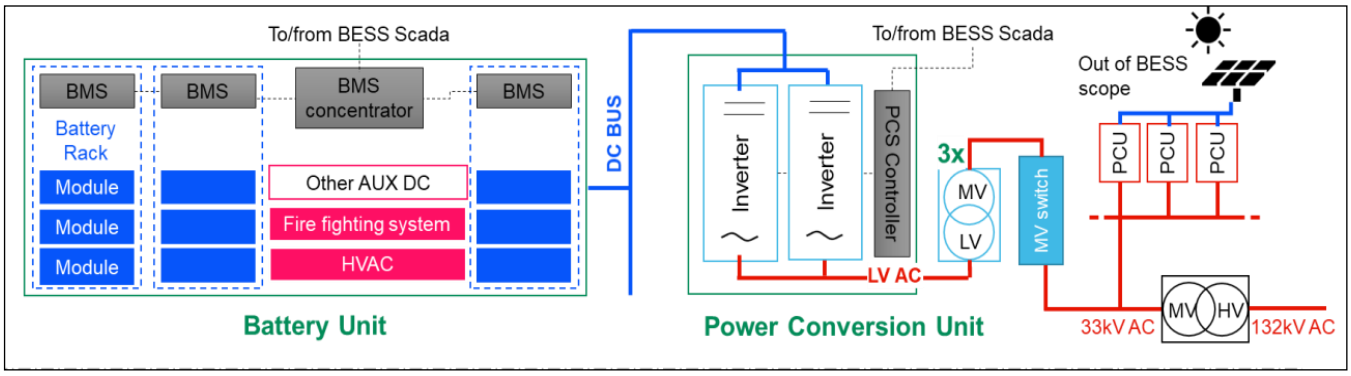

Figure 9 Battery Energy Storage System (BESS)

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

5.4.3 ACCESS ROAD AND INTERNAL ROADS

The project site is located approximately 22km north of the town Kenhardt. The regional centre, Upington town, lies approximately 106km to the north (along the K27) from the project site.

Access to the New Hope 3 Solar Park will be from the regional road R27, which crosses the property (north-south direction). The project area lies to the east of the R27 and will be linked to the R27 via a proposed new internal link road that will traverse the property.

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

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

Internal roads will consist of gravel roads designed in accordance with engineering standards. The roads will have a width of 4.0m allowing for slow-moving heavy vehicles. Once the solar farm is in operation, the internal roads will mainly be used for maintenance and inspections.

The vertical alignment of the roads will not present significant challenges due to the flatness of the terrain. The entire development will be contained inside a fenced area and the roads are not intended for public use.

5.4.4 TRAFFIC IMPACT OF THE PROPOSED DEVELOPMENT

5.4.4.1 Traffic impact – construction phase

Approximately 100 people are expected to be employed during the construction period, although this number can increase to 150 for short spaces of time during peak periods.

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

5.4.4.2 Traffic impact – operation phase

Approximately 35/40 people will be employed during the operation phase of the PV power plant, which will have a lifetime of 25 - 30 years.

The New Hope 3 Solar Park will be in operation 7 days per week; therefore personnel will operate according to shifts. The surveillance team will be ensured during day-time, night-time and weekends.
The operational team will consist of the following people:

- 1 person as plant manager
- 1 person for administration
- 4 people as technicians / plant operators
- 9/12 people for electric and generic maintenance
- 20/22 people as guards

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

More detail is included in Section 9.8 of this report and in the Traffic Impact Assessment included in Annexure M.

5.4.5 LIGHTING SYSTEM

The lighting system will consist of the following equipment:

- Floodlight-towers: maximum10 meters high, with 6x400W directional lamps, installed around the HV loop-in loop-out substation. Normal lighting: 15 lux; up to 40 lux in case of emergency.
- Street lighting along internal roads, for the stretch from the access point up to the HV substation inside the property: 1 streetlamp, maximum 5.5 meters high, every 20 meters, having a metal-haloids lamp of 400 W.
- 2x400 W spotlights (SAP type) mounted on the top of medium-voltage stations.

The lighting of the MV stations and of the on-site HV substation will be on only in case of intrusion/emergency or necessity to reach the MV stations / HV substation during the night.

During the night, the video-surveillance system will use infra-red (or micro-wave) video-cameras, which do not need a lighting system (which could reduce the functioning). Only streetlamps along internal roads, for the stretch from the main access up to the HV substation inside the property, may be switched on at night.

5.4.6 STORMWATER COLLECTION SYSTEM

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

A Stormwater Management Plan is included in the EMPR as an attachment.

5.4.7 WATER REQUIREMENTS

The construction phase will last approximately **15 months**.

A) Construction of internal gravel roads

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

B) Workers

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

C) Concrete production

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

D) Vehicle cleaning

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

Table 3 Water consumption during the construction phase of the project

WATER REQUIREMENT DURING THE CONSTRUCTION PHASE OF THE PROJECT		
DESCRIPTION	**UNIT**	**TOTAL**
Timeframe of the construction activities	*months*	15
Timeframe of the construction activities - calendar days	*days*	450
Overall water consumption for internal roads	m^3	6,850
Overall water consumption for sanitary use	m^3	1,650
Overall water consumption for concrete production	m^3	3,000
OVERALL WATER CONSUMPTION	***m^3***	**11,500**
Daily water consumption (average over 450 calendar days)	***m^3/day***	**25.5**

Storage tanks will be sized in order to provide a reserve of water approximately **200 cubic meters**.

5.4.7.1 Water requirements during the operational phase

Water requirements for a PV solar Park are extremely low and during operation, water is only required for the operational team on site (sanitary use), as well as for the cleaning of the solar panels. Further water consumption may be only for routine washing of vehicles and other similar uses.

A) Water for sanitary use

Approximately 35/40 people will be employed during the operation phase of the PV power plant, which will have a lifetime of 25 - 30 years.

The New Hope 3 Solar Park will be in operation 7 days per week; therefore personnel will operate according to shifts. The surveillance team will be present during day-time, night-time and weekends. The average number of people working at the site on the same time will be of **14 people daytime and 6 people at night**.

The average daily water consumption for sanitary use is estimated to be**150 litres / day / person** per **20 people** (14 people daytime and 6 people at night), The daily water consumption will be approximately **3,000 litres/day.**

B) Water consumption to clean the PV modules

The cleaning activities of the solar panels will take place **twice per year**.

It is assumed that up to 1.0 liters per m^2 of PV panel surface will be needed.
Therefore, the amount of water for cleaning is up to **850 m^3 per cleaning cycle and 1,700 m^3per year**.

PV modules cleaning activity can last less than 1 month. If the cleaning activity lasts approximately 2 weeks (12 working days), the daily water consumption will be approximately **71,000 liters/day**, **over 12 days**.

Conclusion

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

The water consumption will increase up to **74,000 liters/day** during the cleaning of the solar modules (71,000 liters/day for cleaning activity and 3,000 for sanitary use), which will last less than a month and will occur twice per year during the dry period. Indeed PV modules are conceived as self-cleaning with the rain.

It is further proposed that **90,000 l** of water will be stored in **storage tanks** for fire, emergency and washing of panels twice a year.
The overall and average water consumption during operation is detailed in the table below.

Table 4 Water consumption during the operational phase of the project

WATER REQUIREMENT DURING THE OPERATIONAL PHASE		
DESCRIPTION	**UNIT**	**TOTAL**
Average daily water consumption for sanitary use	*l/day*	3,000
Average daily water consumption during cleaning activity (*)	*l/day*	74,000
Average monthly water consumption for sanitary use (over 30 days)	*l/month*	90,000
Annual water consumption for sanitary use	***m^3/year***	**1,095**
Annual water consumption for PV modules cleaning activities (twice/year)	***m^3/year***	**1,700**
ANNUAL WATER CONSUMPTION DURING OPERATION	***m^3/year***	**2,795**
DAILY WATER CONSUMPTION DURING OPERATION (average over 365 day)	***m^3/day***	**7.66**

(*) over 12 working days, twice per year

5.4.7.2 Water provision during construction and operation

The property is located on the **Quaternary Catchment Area D53C.** The proposed development site falls within the (**Lower Orange River Water Management Area**).

5.4.8 SEWERAGE

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

The sewer system will consist of an installation to serve the offices of the control building. The system will be installed in line with the requirements of the manufacturer. Typical systems consist of a conservancy tank (built underground on site), and a patented digester. Most systems require electricity to power the pumps and fans used in aeration process, although some systems use wind power (whirlybird). The system could require chlorine tablets available commercially. The effluent from the wastewater treatment system will be suitable for irrigation of lawns, or re-use in the dwellings as water for the flushing of toilets, or for fire-fighting purposes. This could reduce the overall water requirement of the development substantially.

5.4.9 REFUSE REMOVAL

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

During the operational phase (± 30 years), solid waste will mainly consist of household waste from the operational team. Other types of solid waste will come from maintenance activities in case of failure of some components. At the end of the project lifetime, the PV plant will be decommissioned. Silicon of PV modules and cables (copper and/or aluminium conductor) will be recycled, as well as the aluminium (or zinced steel) frames and piles of the mounting systems. Delphinus Energy will enter into an agreement with the KaI !Garib Local Municipality for the PV plant's refuse at a nearby municipal refuse site. No refuse will be buried or incinerated on site. Measures to manage waste are included in the Draft EMPr, to be submitted with the Draft and Final Basic Assessment Reports.

5.5 TEMPORARY CONSTRUCTION CAMP

A construction camp (± 10ha) will be located within the planned development area, close to the new on-site substation. The construction site area will be gradually reduced at the completion of the last PV fields, and at the end of the works the construction area will be converted into the last PV arrays. The optimal location of the construction site is important during the planning phase to minimize impacts on the surrounding environment. The site's location has been dictated by the nature of the works to be undertaken, specialist studies, site restrictions, town planning intended uses and access.

The area identified for the construction site had to meet the following requirements:

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

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

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

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

5.5.1 PHASE I

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

5.5.2 PHASE II

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

5.5.3 PHASE III

At completion of the works defined in Phases I and II, the following step will be the site clearing and the construction of internal roads. The internal road network should ensure a two-way traffic of heavy goods vehicles in order to minimize trips. The road system is planned for a width of 8 meters for access roads and 4 meters for internal roads. Roads will be of dry and compacted materials.
The facility will require constant access control, a weigh-house for heavy trucks, removable structures for the storage of yard tools and temporary storage areas. During Phase III, the installation of MV/LV transformers connected to the Eskom grid is also planned, as well as the laying of underground electrical cables.

5.5.4 PHASE IV

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

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

5.5.5 EARTHWORKS

Clearing activity is required to remove shrubs and trees from the planned footprint (±230ha).

Due to the flatness of the development area, no earthworks are envisaged for the installation of the PV module mounting systems. The mounting systems will consist of metallic frames to be assembled on-site, supported by pre-bored cast-in-situ concrete piles. Concrete ballasted footing foundations are also possible.

Earthworks will be required during the construction of internal roads and access road. The vertical alignment of the roads will not present any significant challenges due to the flatness of the terrain so that no deep cuts or fills will be required. Considering a road pavement thickness of 300 mm and an overall road surface approximately 300 000 m², the amount of cut or fill is estimated to be approximately 90 000 m³.

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

Small earthworks will be required for the installation of the medium-voltage stations and of the Battery Energy Storage System (BESS). None of these activities should require earthworks in excess of 500 mm cut or fill except for the foundation plate for the small high-voltage substation with a footprint of up to 11 000m².

The topsoil stripping will result in temporary spoils heaps which must be spread over the site upon completion of the project.

Underground cables will be laid down along the internal roads.

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

Gravel necessary for the construction of internal roads may be provided from the commercial sources in the vicinity of the development.

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 Northern Cape Department: Department of Agriculture, Environmental Affairs, Land Reform and Rural Development (DEALRRD); 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 Northern Cape Province, Municipalities and District Municipalities are involved in various aspects of planning and the environment related to solar energy facilities development. The Local Municipality is the *Kai Garib Local Municipality* which is part of the *ZF Macawu 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 5 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)	• Bill of Rights (S2) • Rights to freedom of movement and residence (S22) • Environmental Rights (S24) • Property Rights (S25) • Access to information (S32) • Right to just administrative action (S33)
Fencing Act (Act no. 31 of 1963)	• Notice in respect of a boundary fence (S7) • Clearing bush for boundary fencing (S17) • Access to land for boundary fencing (S18)
Conservation of Agricultural Resources Act (Act no. 43 of 1983)	• Prohibition of the spreading of weeds (S5)

	• Classification of categories of weeds & invader plants and restrictions in terms of where these species may occur (Regulation 15 of GN R0148) • Requirement and methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R0148)
Environment Conservation Act (Act no. 73 of 1989)	• National Noise Control Regulations (GN R154 dated 10 January 1992)
National Water Act (Act no. 36 of 1998)	• Entrustment of the National Government to the protection of water resources (S3) • Entitlement to use water (S4) - Schedule 1 provides the purposes which entitle a person to use water (reasonable domestic use, domestic gardening, animal watering, fire-fighting and recreational use) • Duty of Care to prevent and remedy the effects of water pollution (S19) • Procedures to be followed in the event of an emergency incident which may impact on water resources (S20) • Definition of water use (S21) • Requirements for registration of water use (S26 and S34) • Definition of offences in terms of the Act (S151)
National Forests Act (Act no. 84 of 1998)	• Protected trees
National Environmental Management Act (Act no. 107 of 1998)	• Definition of National environmental principles (S2): strategic environmental management goals and objectives of the government applicable within the entire RSA to the actions of all organs of state, which may significantly affect the environment • **NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 985 of 4 December 2014), as Amended** • Requirement for potential impact on the environment of listed activities to be considered, investigated, assessed and reported on to the competent authority (S24 - Environmental Authorisations) • Duty of Care (S28): requirement that all reasonable measures are taken in order to prevent pollution or degradation from occurring, continuing and recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment • Procedures to be followed in the event of an emergency incident which may impact on the environment (S30)
National Heritage Resources Act (Act no. 25 of 1999)	• SAHRA, in consultation with the Minister and the MEC of every province must establish a system of grading places and objects which form part of the national estate (S7)

	• Provision for the protection of all archaeological objects, paleontological sites and material and meteorites entrusted to the provincial heritage resources authority (S35) • Provision for the conservation and care of cemeteries and graves by SAHRA, where this is not responsibility of any other authority (S36) • List of activities which require notification from the developer to the responsible heritage resources authority, with details regarding location, nature, extent of the proposed development (S38) • Requirement for compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites for promotion of tourism (S44)
National Environmental Management: Biodiversity Act (Act no. 10 of 2004)	• Provision for the MEC for Environmental Affairs/Minister to publish a list of threatened ecosystems and in need of protection (S52) • Provision for the MEC for Environmental Affairs/Minister to identify any process or activity which may threaten a listed ecosystem (S53) Provision for the Member of the Executive Council for Environmental Affairs/Minister to publish a list of: critical endangered species, endangered species, vulnerable species and protected species (S56(1) - see Government Gazette 29657 • Three government notices have been published up to date: GN R150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R151 (Lists of critically endangered, vulnerable and protected species) and GN R152 (Threatened Protected Species Regulations)
National Environmental Management: Air Quality Act (Act no. 39 of 2004)	• Provision for measures for dust control (S32) • Provision for measures to control noise (S34)
National Environmental Management: Waste Management Act (Act no. 59 of 2008)	• Waste management measures • Regulations and schedules • Listed activities which require a waste licence
Occupational Health and Safety Act (Act No. 85 of 1993)	• Health and safety of all involved before and after construction must be protected.

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

Integrated Resource Plan (IRP1) Integrated Resources Plan 2010-2030 (IRP 2010).	• The first Integrated Resource Plan (IRP1) was released in late 2009. Subsequently the DoE decided to undertake a detailed process to determine South Africa's 20-year electricity plan, called Integrated Resources Plan 2010-2030 (IRP 2010). • The IRP1 and the IRP 2010 outline the Government's vision, policy and strategy in matter of the use of energy resources and the current status of energy policies in South Africa. • **In particular, the IRP 2010 highlights the necessity of commissioning 1 200 MW with solar PV technology by the end of 2015.**
Request For Qualification and Proposals For New Generation Capacity under the IPP Procurement Programme (3 August 2011)	• The IPP Procurement Programme, issued on 3rd August 2011 by the DoE, envisages the commissioning of **3 725 MW** of renewable projects (**1 450 MW with Solar photovoltaic technology**) **capable of beginning commercial operation before the end of 2020**.
Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP)	• The **IRP 2019**, published in October 2019, indicated that there is a short-term electricity supply gap of approximately **2 000 MW** between 2019 and 2022. In order to procure this energy supply, the **Department of Mineral Resources and Energy** ("**DMRE**") launched a **Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP)** on the 23rd of August 2020. The objective of the RMIPPPP is "*to fill the current short-term supply gap, alleviate the current electricity supply constraints and reduce the extensive utilisation of diesel-based peaking electrical generators*". The Determination for the RMIPPPP was gazetted on the 7th of July 2020.
Equator Principles (July 2006)	• The Equator Principles provide that future developments with total project capital costs of US$10 million or more shall be financed only if socially and environmentally sustainable

7 NEED/DESIRABILITY OF THE PROJECT

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

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

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

The development of clean, green and renewable energy has been qualified as a priority by the Government of South Africa with a target for 2013 of 10 000 GWh, as planned in the Integrated Resource Plan 1 (IRP1) and with the Kyoto Protocol. Subsequently the Department of Energy of South Africa (DoE) decided to undertake a detailed process to determine South Africa's 20-year electricity plan, called Integrated Resources Plan 2010-2030 (IRP 2010). The IRP1 (2009) and the IRP 2010 (2011, updated in March 2014 and in October 2019) outline the Government's vision, policy and strategy in matter of the use of energy resources and the current status of energy policies in South Africa.

In order to achieve this goal, the DoE announced a Renewable Energy IPP (Independent Power Producers) Procurement Programme. The Renewable Energy IPP Procurement Programme (REIPPPP), issued on 3rd of August 2011, envisaged the commissioning of 3725 MW of renewable projects (1450 MW with solar photovoltaic technology) capable of beginning commercial operation before the end of 2017. This goal has not been fully fulfilled. On 2014, the Department of Energy announced the intention to procure an additional 3 600 MW of renewable energy projects by 2020 (DOE Media Statement, 12 December 2014).

The IRP 2019, published in October 2019, indicated that there is a short-term electricity supply gap of approximately 2 000 MW between 2019 and 2022.

The Department of Mineral Resources and Energy furthermore invited Requests or Qualifications and Proposals (RFPs) under a further BID Window 5 of the Renewable Energy Independent Power Producers Procurement Programme (REIPPP) on 13 April 2021.This procurement bid window is the first to be released in line with the Ministerial Determination, promulgated on 25th September 2020, which seeks to procure 11 813 MW of power from various sources including renewable energy, storage, gas and coal.

The purpose of the proposed New Hope 3 Solar Photovoltaic Plant 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 Northern Cape 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 activities conducted in the Kenhardt area. Furthermore, being renewable energy projects, which doesn’t generate greenhouse gases - it will assist to compensate the greenhouse gas emissions arising from these industrial activities.

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

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

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

In the assessment of cumulative impacts, the relative scarceness of water and the possibility of erosion in the area as a result of clearance of vegetation was determined as possible negative impacts while the creation of jobs in the area was noted as a positive impact of the proposed project. Although there are these negative impacts the positive impact of job creation and the higher security of power availability in the area and the country, the project certainly is desirable.

7.1 FUTURE NEED AND DESIRABILITY

In 20-30 years' time certain of the infrastructure of the solar facility will probably be not be functioning with the same effectivity as when newly constructed. The energy requirements of the country will certainly not become less, but instead will become more dependent on renewable sources like solar and wind energy. It will be the same in this case. New Hope 3 Solar Park will most probably never decommission completely as the country and area around it will be dependent on its energy generation. It will rather upgrade then or constantly go through a process of upgrading of technology so that the facility stays abreast of technology and energy needs and requirements in the area.

8 MOTIVATION FOR PREFERRED DEVELOPMENT FOOTPRINT ON THE PREFERRED SITE

8.1 THE CHOICE OF THE NORTHERN CAPE PROVINCE AND SITE LOCATION

The New Hope 3 Solar Park will be located in the Northern Cape Province. The Northern Cape Province has been identified by Delphinus Energy (Pty) Ltd as an ideal macro area for establishing a solar PV plant on the basis of several important considerations:

- there are several renewable energy projects currently under development in the Northern Cape, because of the high solar resources and the availability of desolate lands with low ecological and agricultural value;
- The Northern Cape Province, Local Municipalities and communities are eager to continue establishing an eco-green image in consideration of the burden of CO_2 emissions they have to bear.

The project site is located ±18 km North of Kenhardt, within the Renewable Energy Development Zone 7 (also known as “Upington REDZ”), published under Government Notice No. 114 in Government Gazette No. 41445 of 16 February 2018.

Renewable Energy Development Zones (REDZs) are compiled in terms of section 24(3) of the National Environmental Management Act, 1998 and the applicability of Upington REDZ for purposes of the Notice, is that large scale solar photovoltaic energy facilities located within this REDZ are subject to a Basic Assessment process in terms of the EIA Regulation 2014, as amended.

In the Upington area there are a number of solar (including the Photovoltaic CSP) projects selected by the Department of Minerals and Energy (DMRE), under the REIPP Procurement Programme, have been developed or are under development, due to the exceptionally high solar irradiation (the highest in the world) and due to the presence of the Orange River, which can supply water for the CSP projects. These projects include amongst others the following:

- 8.9 MW Upington PV project, currently under construction at the Upington airport;
- 100 MW Karoshoek Consortium CSP project, selected by the DoE under the Window 3 of the REIPPPP;
- 50 MW Bokpoort CSP project;
- 50 MW !Khi Solar One CSP project.

The Upington area, as well as the Kenhardt area where three 75MW Solar Projects have recently been selected as preferred bidders under the RMIPPP, are some of the best locations for solar projects (PV and CSP), because of the exceptionally high solar resource and the low environmental impacts. Most of the areas are desolated and the agricultural potential is high only in the proximity of the Orange River. With the construction of the new Eskom Upington transmission substation, which will allow the connection of several solar projects in addition to the existing ones, the wider Upington area will become one of the biggest renewable energy hubs of the world.

The proposed New Hope 3 Solar Park is situated approximately 85km south-west of Upington and approximately 18km north of Kenhardt. The area has very favourable characteristics in terms of desirability of renewable solar energy projects. The New Hope 3 Solar Park site has been chosen by Delphinus Energy on the grounds of several considerations, in particular:

- the availability of a suitable connection solution, due to the presence of Eskom Nieuwehoop Main Transmission Substation (MTS), located ±13 km East of the project site;
- the high solar irradiation of the site;
- the flatness (topography) of the proposed project site;
- the low ecological sensitivity and agricultural value of the proposed development area.

Furthermore, in the light of the IPP procurement Programme requirements, the New Hope 3 Solar Park has been developed according to the following main characteristics:

- the installed capacity is within the “eligible capacity” defined by the rules of the RFP (from 1 MW to 75 MW);
- the construction phase will last approximately 15 months.

With specific reference to New Hope 3 Solar Park, Eskom has indicated that the project does not interfere with Eskom’s present and future developments and do not affect the voltage in the area negatively. Eskom, as an interested and affected party, recognized the positive outcome of the project in terms of the possibility of meeting the local growth of the energy consumption that is expected.

8.2 COMPLIANCE OF SITE LOCATION IN TERMS OF LOCAL SPATIAL DEVELOPMENT FRAMEWORKS

8.2.1 THE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK FOR THE NORTHERN CAPE (OFFICE OF PREMIER – NORTHERN CAPE, 2012)

The Provincial Spatial Development Framework (PSDF) identified a Solar Corridor where solar projects will be given priority. According to the PSDF, this Solar Corridor “centres around Upington and extends from roughly Kakamas in the north to De Aar in the east”. The spatial vision for the Northern Cape constitutes a coherently structured matrix of sustainable land-use zones that supports a dynamic provincial economy vested in the primary economic sectors, in particular, mining, agriculture, tourism, and the energy industry. Thus, the proposed project falls in line with the spatial development vision for the province.

It is important to note that new opportunities have opened up for Kai !Garib municipal area since the need to facilitate the generation of sustainable energy was introduced in South Africa by Eskom and the South African government. According to SDF, Kai !Garib Municipality immediately became a hotspot for Solar Energy developments and numerous developments are currently in process and the resulting economic spin-offs are eagerly anticipated.

Although the Solar Corridor, as identified by the PGDS and NCPSDF, does not include the N14 between Upington and Kakamas, current developments indicate that this area will form the centre of solar developments. This seen in the recent awarding of the preferred bidder status for the proposed Avondale 1 Solar Park situated adjacent to the N14 near Upington.

8.2.2 ZF MGCAWU SPATIAL DEVELOPMENT FRAMEWORK (SIYANDA DM 2012)

The ZF Mgcawu SDF acknowledges the Solar Corridor following the main routes from Prieska to Upington and further along the N10. It reiterates that South Africa has embarked in a process of diversifying its energy-mix to enhance energy security while also lowering green-house gas emissions. Referring to the Department of Energy's (DOE) Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) that was a driving force behind the installation of close to 7GW of RE from the year 2012.

The Northern Cape has attracted 66% of the total IPPPP investments to date and has secured a substantial share of the equity for local communities with benefits materialising over the project life.

Up to 46% of the total project value 1 in the Northern Cape has been allocated for local procurement, with the intent of stimulating the development of localised industries and the 'green' economy. By this reporting quarter, 68% of the committed local spend had already been realised.

The development of local enterprises will further be directly supported with an allocation earmarked for enterprise development over the projected portfolio development and operations horizon. The commitment made towards local enterprise development in the province is large compared to other provinces at R3.5billion. This contribution will accrue over the operational life of the projects. At this early stage of the 20-year portfolio operational life, only a small percentage of the contribution has been realised.

IPP projects in the Northern Cape that have been procured in BW1 to BW4, 1S2 and 2S2 have made a combined socio-economic development commitment 1 of R13.2 billion over the 20- year planned project operational life. This represents 64% of total SED commitments under the overall REIPPPP. Of this SED contribution, R11.5billion has been committed to local communities located within the vicinity of the IPP projects in the Northern Cape.

In the Northern Cape, the expenditure on SED and ED initiatives to date under the IPPPP have been focused on five categories, namely; education and skills development, social welfare, health care, general administration, and enterprise development. The major challenges faced by the Northern Cape Province include access to basic services, volatile economic growth and high unemployment rates particularly amongst the youth. The targeted SED focus areas are therefore generally well aligned with the provincial priorities.

8.2.3 !KAI GARIB MUNICIPALITY IDP 2020/2021

The wider Kenhardt areas is characterised as typical agricultural region. It is a particularly scenic environment with prominent cultural heritage over the larger area.

The economy of Kai Garib LM is small in size and is dominated by agriculture and agro-industry which has substantial linkages with other sectors such as trade, transport, logistics, construction and financial services. The agricultural sector is highly dependent on the availability of water from the Orange River, and the management of such a source is therefore an important factor in future economic growth. Economic diversification is therefore required, and promising opportunity lies in the field of power generation using the area's natural resources, renewable energy sources such as the sun, wind and water.

The !Kai Garib Municipality is supportive of Renewable (Solar) Energy Development in the wider !Kai Garib Municipal area and the Municipal IDP also confirms that the local climate is very favourable to solar as an environmental friendly source of energy.

The SDF also reiterates that the Northern Cape is a regional solar hub of energy in Southern Africa. A social pact is therefore required to create a prosperous energy sector in the Province through a negotiated resolution where the private sector commits to investing in new areas; where labour and business work together with government to address the inhibiting factors and identifying opportunities; and developing partnerships with civil society to ensure that our people benefit from the natural resources of our beautiful Province.

According to Reports of the Northern Cape Government it will appear as if they remain committed to setting the province on a path of radical economic transformation in order to accelerate the onslaught on socio-economic challenges. This has been a consistent theme throughout the economic blueprint, the National Development Plan and it is an urgent need to focus on decisive action to grow the economy and create employment. This cannot be done by Government alone and therefore the need to mobilise partners in the Private Sector to join hands within pursuit of this goal. The Green economy has much to offer in terms of job creation, infrastructure development and general economic development.

The municipality is currently only distributing electricity within the three main towns. The smaller settlements around the three main towns are served by Eskom directly. The challenge however still exists that some of the households within the settlements do not have any access to electricity or electrified.

The informal areas within the municipality are posing a great challenge in terms of providing electricity. Households without access to electricity usually make use of wood for fire and candles and paraffin for lighting. All informal settlements are not full electrified. The need of bulk electricity services also poses a challenge to areas such as Kakamas, Keimoes and to a lesser extends Kenhardt.

The municipality is very optimistic about the renewable energy future due to the rise of Solar Energy Developments in the municipal area. The climate of the municipal area is favourable to this environmentally friendly source of energy.

Alternative sources of electricity generation can address supply-side capacity issues. The rapid growth of the renewable energy sector in South Africa has seen an increase in supply to the national grid from solar PV, solar CSP, wind and hydro-electricity technologies. This as part of the Department of Energy's Renewable Energy Independent Power Producers Procurement Programme which was established in 2011. The South African government argues that the signing demonstrates government's commitment to renewable energy and to partner with the private sector. "A partnership with the private sector, labour and civil society, that support each other in different roles, is of a really great benefit to our economy". The following six Independent Power Producers have been awarded projects in the Kai !Garib Municipality.

Khi Solar One	Solar CSP	Fully operational	50 MW	Abengoa
Aries Solar	Solar PV	Fully operational	9.7 MW	BioTherm Renewable Energy
Neusberg Hydro Electric Project A	Hydro	Fully operational	10 MW	Hydro-SA & Hydro - Tasmania
Dayson's Klip 1	Solar PV	Approvals, planning and finance	75 MW	Scatec Solar
Dayson's Klip 2	Solar PV	Approvals, planning and finance	75 MV	Scatec Solar
Sirius Solar PV Project One	Solar PV	Approvals, planning and finance	75 MW	Scatec Solar
"Gemsbok" PV Projects	Solar PV	Approvals, planning and finance	75MW X 3	Mulilo

The Municipality supports Green Energy (Renewable energy / Solar Power) and promote development policies in support of IPPs; support of SMME's to provide services to the IPP's and procurement initiatives for SMME's for local beneficiation.

There is potential for further IPPs to become operational in the municipality, several are in the planning stages. Kai !Garib Municipality is also a participant in the ZF Mgcawu Development Forum, an initiative coordinated by the IDC which aims to ensure that integrated development planning and implementation of regional projects take place. This includes the renewable energy and mining plants, together with other industry stakeholders such as agricultural, business and civil society stakeholders. Kai !Garib Municipality recognises the importance of participating in this forum to provide a platform for partnerships for regional socio-economic growth.

9 CONSIDERATION OF ALTERNATIVES

9.1 DETAILS OF ALTERNATIVES CONSIDERED

The EIA Regulations, 2014, as amended, Section 28(1)(c) and NEMA, Section 24(4), require investigation and consideration of feasible and reasonable alternatives for any proposed development as part of the environmental impact assessment process. Therefore, a number of possible alternatives for accomplishing the same objectives must be identified and investigated.

In particular:

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

9.1.1 SITE ALTERNATIVES

Several sites have been inspected in order to find out the best solution for the PV power plant. The following selection criteria were applied:

- Connection availability and proximity
- Land availability
- Proper land surface area (±700 ha)
- Current land use
- Low environmental impact (low biodiversity)
- Low agricultural potential
- High solar radiance
- Socio-economic issues (land cost and local community unemployment)

The surrounding farms were investigated.

The following properties were selected during the feasibility assessment, due to the flatness of the areas, the low-to-moderate ecological sensitivity and the proximity to Eskom Nieuwehoop Main Transmission Substation (MTS) to the project site:

- The Remaining Extent of Portion 1 of the farm Onder Rugzeer, 168, Kenhardt RD, Northern Cape Province;
- The Remaining Extent of the farm Middelpos, 393, Kenhardt RD, Northern Cape Province;
- The farm Witdorp, 394, Kenhardt RD, Northern Cape Province;
- The farm Klip Bakken, 110, Kenhardt RD, Northern Cape Province.

The following outcomes resulted from the preliminary assessment:

- **The Remaining Extent of Portion 1 of the farm Onder Rugzeer, 168, Kenhardt RD** (blue in the map below) was available and a Basic Assessment Process commenced, but, after liaisons with the wider family the owners decided to withdraw, and the project had to be halted;

- **The Remaining Extent of the farm Middelpos, 393, Kenhardt RD** (red in the map below) was available for development but the owners received an alternative offer on the land which resulted them to opt for the alternative transaction.

- **The farm Witdorp, 394, Kenhardt RD, Northern Cape Province** (pink in the map below) was available but due to the long distance of the interconnection to the Eskom Nieuwehoop Main Transmission Substation (MTS), being more than 25km, it was resolved not to continue with the property.

The location of the alternative sites is indicated in the Figure 7 below. The selected project site / PV plant footprint is depicted in yellow and it includes the following properties:

- **The Remaining Extent of the farm N'Rougas Zuid 121, Kenhardt RD (!Kai Garib Local Municipality, ZF Macawu District Municipality, Northern Cape Province)**

Table 4. Project Site and Footprint

Property	**Project footprint [ha]**	**Overall extent [ha]**
the Remaining Extent of the farm N'Rougas Zuid 121	230 ha	5206.6975 ha
TOTAL EXTENT	**230 ha**	**5206.69**75 ha

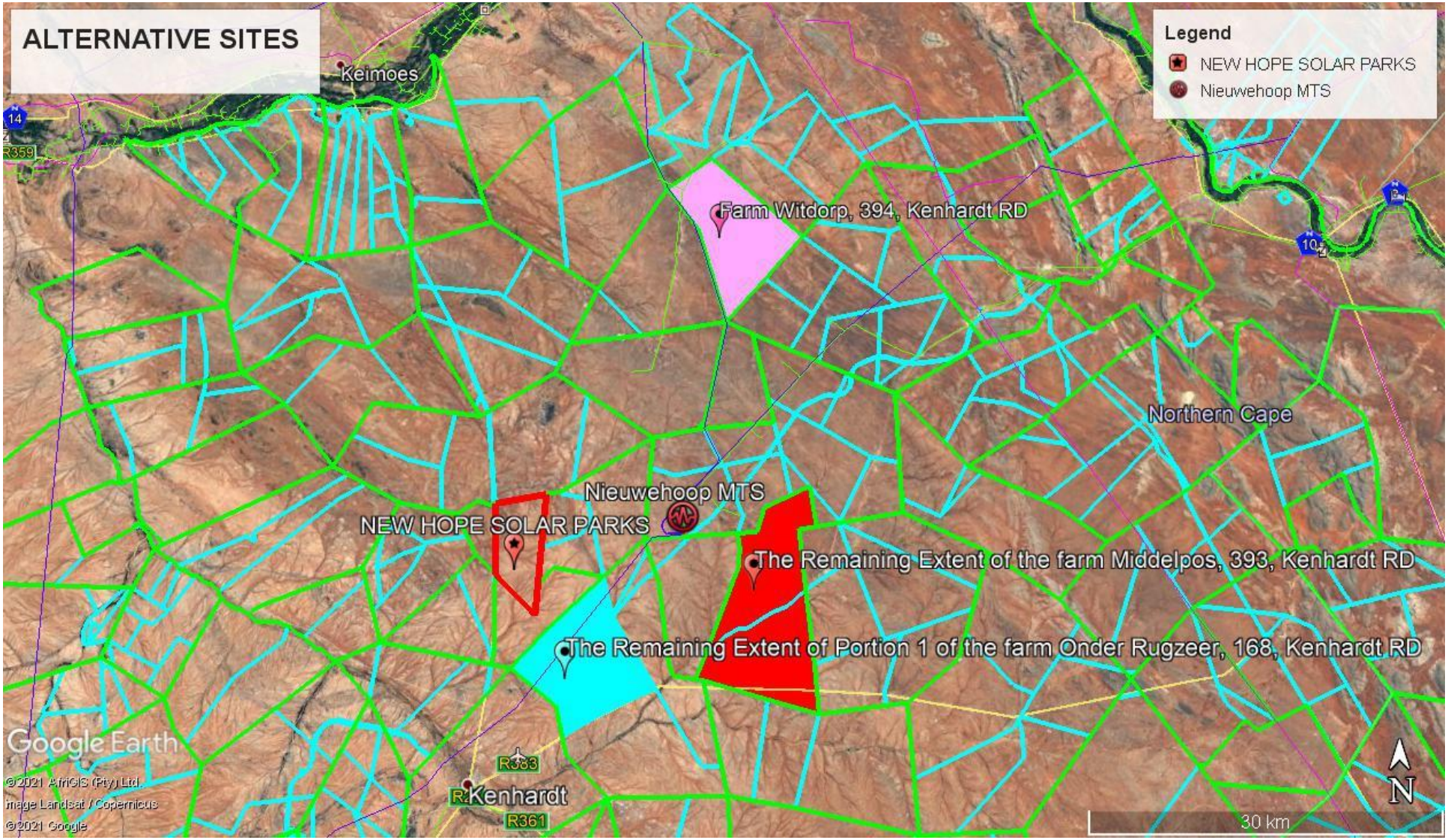

Figure 10 Location of the alternative sites

9.1.2 TECHNOLOGY ALTERNATIVES

PV Plant and Solar Thermal Power Plant

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

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

Wind Power Plant

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

Alternatives for the Mounting System of the PV Modules

Preferred technical solutions for the proposed solar park entail PV modules mounted on fixed mounting systems (alternative 1) or horizontal single-axis trackers (alternative 2). The tracking solution is the best performing in terms of efficiency, because its energy production is approximately 20% more if compared with fixed systems. This type of technology is characterized by higher technical complexity and deeper installing and maintenance costs, if compared with the fixed mounting solution.

The selected tracking system is the horizontal single-axis tracker (SAT), which does not differ from the fixed system, except for the presence of the tracking devices and the orientation of the rows of the PV arrays (north - south instead of west – east direction). The technology of mounting systems is under continuous evolution. Consequently, the final decision about the mounting system technology will be taken at commissioning.

The selection of fixed mounting system or horizontal single-axis trackers will not affect the layout of the PV power plant or imply any additional visual or environmental impacts that will necessitate specific or different mitigation measures. The development will not exceed the currently planned footprint (700 ha) and the height of the structures (PV modules and support frames) will be maximum 4.5 m above the ground level.

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

9.1.3 NO-GO ALTERNATIVE

The no-go alternative is the option of not establishing a Photovoltaic Power Plant on the site, or any of its alternatives. The environment will remain in its current state (status quo). This will not create any new employment opportunities, and therefore the anticipated economic benefits of the project will accrue to the study area (see the paragraph 6.4 Socio-Economic Environment).

Should this alternative be selected the socio-economic and environmental benefits related to the use of renewable energy resources will not be realised with prejudice to the development of the area. The benefits related to the establishment of a renewable energy power plant are for example analysed in detail in the REFIT Regulatory Guideline published by NERSA (March 2009):

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

9.2 DETAILS OF PUBLIC PARTICIPATION PROCESS UNDERTAKEN

All relevant I&AP's have been identified and involved in the public participation process from the beginning of the project as per sections 54, 55, 56 and 57 of the EIA regulations 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 Scoping and to the EIA Reports are submitted and evaluated in a reasonable timeframe and in predetermined terms.

The initial stage of the public participation was conducted from 12 March 2021 until 13 April 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 12 March 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 12 March 2021 edition of the Gemsbok, 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) is now made available for a 30-day commenting period for comments and is also provided as hard copy on request.

9.2.1 FURTHER STEPS IN PUBLIC PARTICIPATION PROCESS

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

- The availability of the Draft Basic Assessment Report (BAR), for public comment will be advertised in the local newspaper, poster notifications will be put up, on site and all adjacent landowners, applicable government departments and potential I&APs will be sent notification letters.
- The Draft BAR will be made available for a commenting period of 30 days.
- Registered I&APs and governmental organizations will be notified about the final decision of the DFFE (Environmental Authorisation granted or not).

9.3 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PROPOSED PV SOLAR PARK

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

9.3.1 PROPERTY DESCRIPTION AND CURRENT LAND USE

The project site is the Remaining Extent of the farm N'Rougas Zuid, 121, Registration Division Kenhardt RD, 5206.6975ha extent, located within the Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

The project site is located ±18 km North of Kenhardt, within the Renewable Energy Development Zone 7 (also known as "Upington REDZ"), published under Government Notice No. 114 in Government Gazette No. 41445 of 16 February 2018.

Table 5. Site location and Property details

Site location and Property details	
Farm	**N'Rougas Zuid**
Portion	**Part of Portion 121 (Remaining Extent)**
LPI code	C03600000000012100000
Overall Extent	5206.6975 hectares
Proposed project area:	230 Hectares
Land Owner	LAURIE LOURENS FAMILY TRUST Registration Nr: IT3105/97
Diagram number	SG 2167/1955
Title deed number	T9210/1998CTN
Registration date	1998/02/05
Current land use	Grazing

9.3.2 ENVIRONMENTAL FEATURES

Environmental Screening Report

Table 6 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					No wetland features located within the proposed development area. (NFEPA, 2011)
Archaeological and Cultural Heritage				X	X	Annexure H
Avian		X			X	Annexure E
Bats theme				X		No limestone outcrops in project area
Civil Aviation				X	X	An application for approval will be submitted to the Civil Aviation Authority. Annexure L
Defence				X		
Paleonthology			X		X	Annexure I
Plant species			X		X	Annexure C
RFI	X				X	Annexure L
Terrestrial Biodiversity	X				X	Annexure C

The following environmental sensitivities are identified for the project area:

- **Agriculture Theme**

  Sensitivity - Medium.

  The agricultural compliance statement (Annexure F) indicates that the agricultural potential of soils on the proposed development area is low (shallow or very sandy soils with low rainfall) and is not suitable for arable agriculture. Grazing capacity is very limited, and grazing can still be available underneath solar panels.

- **Animal species Theme**

  Sensitivity - High in natural vegetation (birds) and medium in disturbed areas

  The solar park will be in an area where Neotis ludwigii (Ludwig's Bustard) – (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.

- **Avian Species Theme**

  Sensitivity - High

  The avifaunal assessment conducted (Annexure E) concluded that no significant bird flight paths, migratory routes or roosting sites were identified but the modified farmland habitats do attract nomadic species for transitory feeding and breeding purposes. Sensitive avian habitats occur to the north of the project site but will be excluded from the development footprint.

- **Bats Theme**

  Sensitivity - Low

  Bat species that might occur in the area is cave dependent and there are no caves on the project site – Annexure C.

- **Civil Aviation Theme**

  Sensitivity - Low

  New Hope 3 Solar Park and 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 for impacts on aviation activities on the proposed development.

- **Paleontological Theme**

  Sensitivity - Medium

  The palaeontologist concluded that It is extremely unlikely that fossils will be exposed as a result of the development – Annexure I.

- **Plant Species Theme**

  Sensitivity - Medium

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

- **RFI Theme**

  Sensitivity - Very High.

  The evaluation done has shown that this project will fall within restricted zones and areas. The act provides that declared activities listed in section 23(1) may be restricted or may only be conducted according to standards and conditions prescribed through regulations. See Annexure L2 for an assessment on any Radio Frequency Interference by the proposed development.

- **Terrestrial Biodiversity Theme**

  Sensitivity - Very High because of CBA and ESA areas

  The project area has been selected outside the CBA and ESA areas except for a very small ESA 1 area in the northern section of the farm and outside the development footprint – Annexure C.

9.3.3 SOLAR 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 7. List of Solar developments with Environmental Authorisation within 30 km of proposed area

DFFE Ref No.	Project Title	Applicant	MW
14/12/16/3/3/2/1072	The 75 MW Amda Charlie PV SEF North of Kenhardt within the Kai !Garib Lm in the Northern Cape Province	AMDA Charlie (Pty) Ltd	75
14/12/16/3/3/2/1073	The 75 MW Amda Alpha PV SEF North of Kenhardt within the Kai !Garib Lm in the Northern Cape Province	AMDA Charlie (Pty) Ltd	75
14/12/16/3/3/2/847	75mw Solar Photovoltaic Facility (Boven 4) on the remaining extent of Boven Rugzeer Farm 169, North East of Kenhardt in the Northern Cape Province	Boven Solar PV5 (Pty) Ltd - Mulilo Renewable Project Developments	75
14/12/16/3/3/2/842	75MW solar energy facility (Gemsbok PV5) on Portion 3 of Gemsbok Bult farm 120 near Kenhardt within the Kheis Local Municipality in the Northern Cape Province	Gemsbok Solar PV3 (Pty) Ltd - Mulilo Renewable Project Developments	75
14/12/16/3/3/2/843	75MW solar energy facility (Gemsbok PV5) on Portion 8 of Gemsbok Bult farm 120 near Kenhardt within the Kheis Local Municipality in the Northern Cape Province	Gemsbok Solar PV3 (Pty) Ltd - Mulilo Renewable Project Developments	75
14/12/16/3/3/2/1035	The 100MW Skeerhok 3 PV SEF north-east of Kenhardt within the Kheis Local Municipality, Northern Cape Province	Juwi Renewable Energies (Pty)	100
14/12/16/3/3/2/710	Proposed construction of Gemsbok PV1 75MW in Kenhardt, Northern Cape	Mulilo Renewable Project Developments	75
14/12/16/3/3/2/711	Proposed construction of Gemsbok PV2 75MW in Kenhardt, Northern Cape	Mulilo Renewable Project Developments	75
14/12/16/3/3/2/712	Proposed construction of the Boven PV1 75MW in Kenhardt, Northern Cape	Mulilo Renewable Project Developments	75
14/12/16/3/3/2/837	Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 1) on the remaining extent of Onder Rugzeer Farm 168, northeast of Kenhardt, Northern Cape	Scatec Solar	75
14/12/16/3/3/2/838	Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 2) on the remaining extent of Onder Rugzeer Farm 168, northeast of Kenhardt, Northern Cape	Scatec Solar	75
14/12/16/3/3/2/836	Proposed development of a 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, northeast of Kenhardt, Northern Cape	Scatec Solar	75
14/12/16/3/3/1/1546	Proposed development of a Transmission Line (i.e. Kenhardt PV 1 – Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 1) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape	Scatec Solar	
14/12/16/3/3/1/1546	Proposed development of a Transmission Line (i.e. Kenhardt PV 2 – Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 2) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape	Scatec Solar	
14/12/16/3/3/1/1545	Proposed development of a Transmission Line (i.e. Kenhardt PV 3 – Transmission Line to connect to the proposed 75 MW Solar PV Facility (Kenhardt PV 3) on the remaining extent of Onder Rugzeer Farm 168, and the remaining extent of Portion 3 of Gemsbok Bult Farm 120, north-east of Kenhardt, Northern Cape.	Scatec Solar	

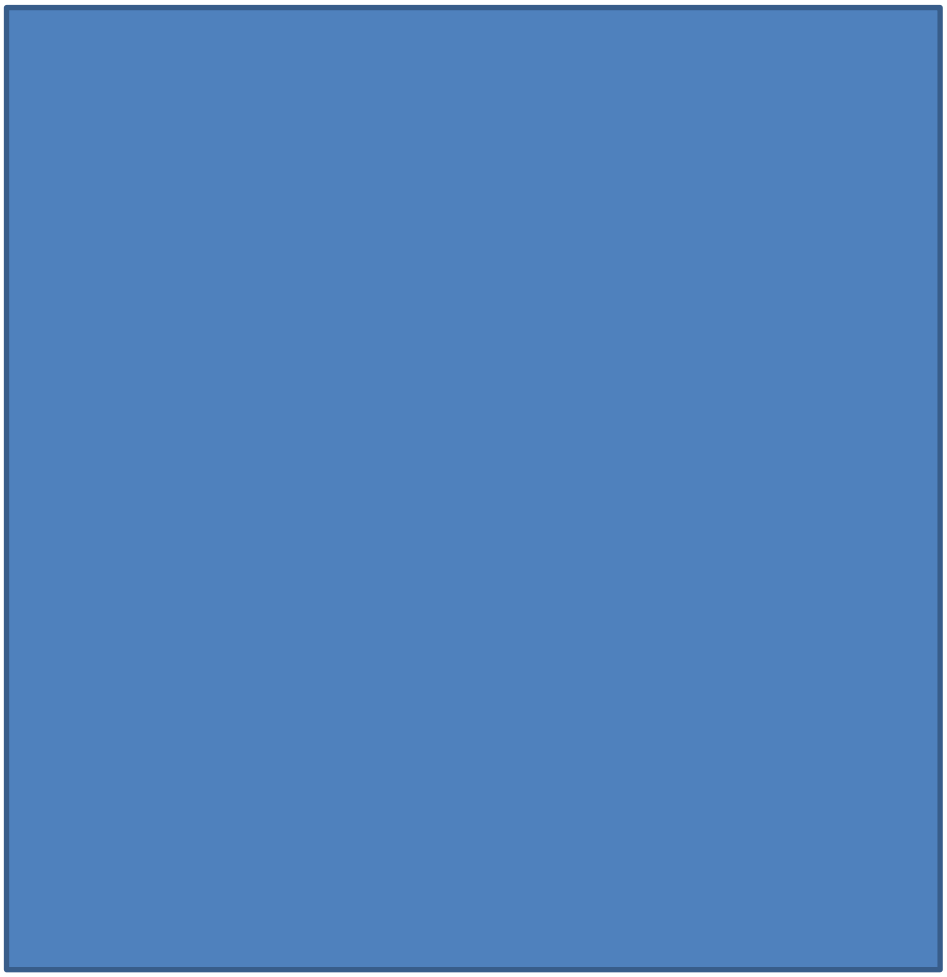

Figure 8 Map of Wind and Solar developments with Environmental Authorisation or applications under consideration within 30 km of the proposed area

9.3.4 CLIMATE

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 spatial and temporal distribution of rainfall is very complex and has great effects on the productivity, distribution and life forms of the major terrestrial biomes (Barbour et al. 1987). The mean annual precipitation varies between 120 and 260mm. The mean monthly maximum and minimum temperatures for the area are 40.6°C and -3.7°C, for January and July, respectively.

9.3.5 TOPOGRAPHY AND DRAINAGE

The topography of the region is flat with gentle, open undulations (West-East elevations ranging between 936 m and 1000 m, and North-South elevations ranging between 895 m and 1018 m(Holland, 2015). The underlying geology of the sites represents supracrustal rocks (sediments which have undergone several episodes of metamorphism and deformation) of the Kakamas Terrane. Erosion resistant rocks of this suite form distinctive low rocky hills that are often visible in the distance, although none occur in the study area.

Vegetation consists of low shrubs and grassland with occasional quiver trees (kokerboom) and produces a mottled background to most views which is effective at making some development types such as power lines and pylons blend in with the background (Holland, 2015).

Shallow depressions are also evident arising from the variable sandy ridges that overlie the granitic basement. Slopes across the site are almost entirely less than 2% with slightly steeper relief in some isolated spots. The Kenhardt landscape is arid with brown sand occurring widely being occasionally interspersed with black boulders. Because of the lack of trees in the area, a large number of weaver birds make use of the telegraph poles along the road to build their community nests (GEOSS, 2015).

Drainage occurs as sheet-wash towards first order tributaries the N'Rourgas se Loop.
More detailed is included in the Geo-technical report in Annexure G.

9.3.6 SOILS AND GEOLOGY

A Geo-technical desktop study was conducted in April 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 (2920 - Kenhardt). The entire area is underlain at depth by a variety of Precambrian basement rocks (c. 2 billion years old) assigned to the Namaqua-Natal Province. These ancient igneous and high-grade metamorphic rocks (mainly granites and gneisses) crop out at surface as small patches and are entirely unfossiliferous.

The Precambrian crustal rocks are transected by a NW-SE trending fault zone and lie to the north of the major Wolfkop Fault. A large proportion of the basement rocks are mantled by a range of superficial sediments of Late Caenozoic age, some of which are included within the Kalahari Group. These predominantly thin, unconsolidated deposits include small patches of calcretes (soil limestones), gravelly to sandy river alluvium, pan sediments along certain watercourses, surface gravels, colluvium (scree) as well as – especially – Quaternary to Recent aeolian (wind-blown) sands of the Gordonia Formation (Kalahari Group).

Most of these younger rock units are of widespread occurrence. The study area is underlain by Precambrian basement rocks of the Elsie se Goria Granite (Me). The basement rocks are largely mantled by aeolian sands of the Gordonia Formation (Qg) as well as Late Caenozoic alluvial deposits.

According to the classification presented by Weinert (1980) where the N value is above 10, disintegration is the major contributor to weathering. Disintegration is the process whereby the rock breaks down to progressively smaller sizes until eventually the individual minerals becomes separated. The end-product is usually a gravely sand composed of the unaltered primary mineral

Excavatability:

Excavatability is expected to be limited to less than 1m.

Due to the relative thin soil profile no foundation settlement or collapse settlement is expected below foundations. Differential settlement may occur where structures straddle hardpan calcrete lenses with softer nodular or powdery calcrete in-between. The expected excavatability of the upper 0.5m will is soft across the site. Below that level calcrete will be variable and the granite will be intermediate to hard. 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.

Land use:

The New Hope 3 Solar Park is regarded as **developable with precautions**.

The area is defined as developable with minor precautions due to the relative thin soil profile and the use of specialized foundations for the single axis tracker system. Excavatability is expected to be soft to intermediate to a depth of 1.0m allowing for the installation of pilled foundations for the tracker frames

Foundation solutions:

The project area is underlain by aeolian sand and calcrete, overlying granite bedrock with only a thin layer of weathered granite overlying competent rock. The soil profile is generally poorly developed but normal strip footing foundations founded in the soil or directly on bedrock will be acceptable for foundations of conventional structures. Solar panels should be founded in/on bedrock via piled foundations, which can either be bored or cast in-situ.

Conclusions:

Considering geotechnical aspects, the proposed development area is suitable for the proposed development of a PV solar facility if the recommendations in the Geo-technical Report (Annexure G) are adhered to as a minimum requirement.

9.3.7 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 site, 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.

9.3.7.1 Vegetation types

The development site lies in the Nama Karoo biome which occurs on the central plateau and western half of South Africa, at altitudes between 500-2000 m, with most of the biome consisting of grassy vegetation and dwarf shrubland. The site is classified as Bushmanland Arid Grassland, and drainage features on site are classified as Bushmanland Vloere.

Vegetation units are divided in terms of land-use, plant species composition, topographical and soil differences that had the most definitive influence on vegetation units. Each unit is described in terms of its characteristics and detailed descriptions of vegetation units are included in the specialist report in Annexure C, and detailed species lists for each unit.

The following vegetation units were documented on site:

- *Schmidtia kalahariensis – Enneapogon desvauxii* arid grassland (surveyed).
- *Rhigozum trichotomum – Asparagus bechuanensis* shrubveld (surveyed).
- *Rhigozum trichotomum* non-perennial drainage channels (surveyed).
- Low duneveld (not surveyed – outside footprint areas).
- Low ridges/outcrops (not surveyed – outside footprint areas).
- Alluvial fans (not surveyed – outside footprint areas).

9.3.7.2 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).

Only one plant species is included in the list of red data plant species previously recorded in the grid square in which the proposed development is planned, obtained from SANBI. The plant species found on site is *Acanthopsis hoffmannseggiana*, (type of “Spike Violet”) and its IUCN Status is DD (Data Deficient), but it is Indigenous and endemic to the area.

According to the EIA Screening Tool one species was identified, called Sensitive Species 144. This species occurs on north-facing rocky slopes (particularly dolomite) in the south of its range. and on any slopes and sandy flats in central and northern parts of its range. It is confirmed to occur on site, although at very low densities (widely scattered individuals).

9.3.7.3 Protected Plants

Plant species are also protected in the Northern Cape Province according to the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009). 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 *Aloidendron dichotomum* (Quiver Tree) was confirmed for the site. No eradication should be allowed without a permit.

9.3.7.4 Protected Trees Species (NFA)

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

Two tree species listed as protected under the national list of declared protected tree species as promulgated by the National Forest Act (NFA), 1998 (No. 84 of 1998) was observed in the project area. The trees species listed in National Forest Act protected tree species list (Table 7) have a wide distribution in Southern Africa, although these trees have an importance in terms of medicinal, cultural and heritage value to local communities.

The following protected tree species of concern occur in the area:
Boscia albitrunca (Sheperd's Tree) – Widespread
Vachellia erioloba (Camel Thorn) – Mostly along major drainage channels

9.3.7.5 Conclusions

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 arid grassland and shrubveld areas 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 trees or other fauna to be removed, permits should be obtained from the relevant authorities.
- The riparian woodland associated with the drainage channels have a high sensitivity and should be preserved as important fauna and flora habitats.
- Other sensitive habitats in the northern section of the site (outcrops, alluvial fans) will be avoided during the development.

The red listed plant species *Aloidendron dichotoma* occur on the site and specific mitigation measures (permit applications, avoidance, relocation) should be implemented to avoid negative impacts on the species.

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

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

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

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

Mitigation measures are provided that would reduce these impacts from a higher to a lower significance. The proposed layout plan of the development should be consistent with the sensitivity map and recommendations stipulated in this report, and the impact on the sensitive habitats on site should be kept to a minimum.

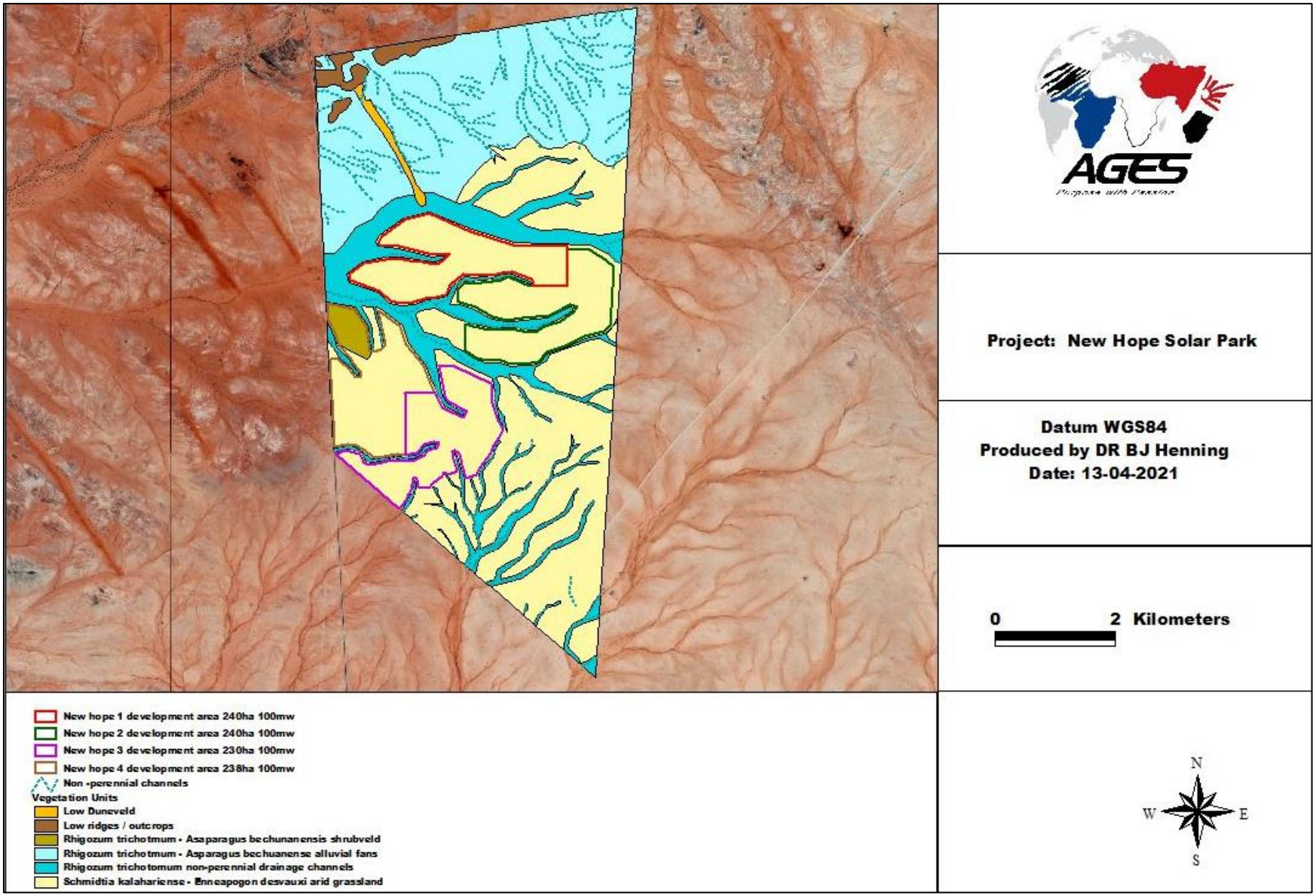

Figure 11. Vegetation Map

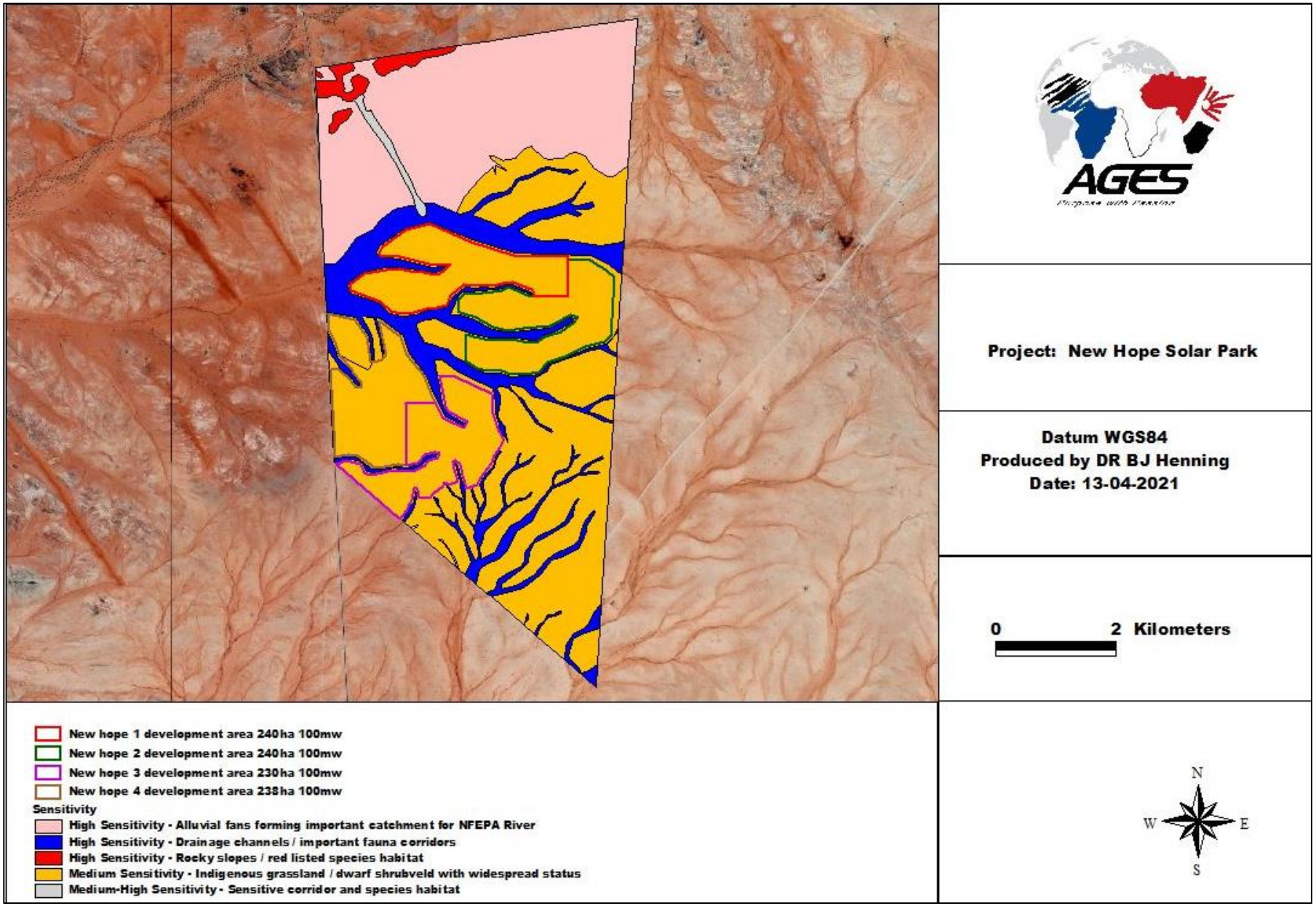

Figure 12. Sensitivity Map

9.3.7.6 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).

Four major fauna habitats were observed in the area namely:

- Arid grassland.
- Rocky habitats.
- Shrubveld.
- Riparian zones and drainage channels.

The fauna habitats are described and discussed in the Terrestrial Biodiversity Impact Assessment (Annexure C). It was concluded that 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, alluvial fans and the northern outcrops that will link to other sensitive areas to the north of the site.

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. The 500 meters of adjoining properties were scanned for important fauna habitats.

The general habitat type for reptiles consists of shrubveld with limited available habitat for diurnally active and sit-and-wait predators, such as terrestrial skinks and other reptiles. The amphibians appear to be poorly represented on site and the temporal pools in the drainage channels represent the most suitable habitat for the few amphibian species that could occur in the area. No threatened herpetofauna occur in the area.

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 9. List of potential Red data fauna for the study area

English Name	Conservation Status	Probability of occurrence on site
BIRDS		
Bustard, Kori	Near Threatened	Moderate
Korhaan, Karoo	Near Threatened	Moderate
Bustard, Ludwig's	Endangered	Moderate
MAMMALS		
Brown Hyena	Near Threatened (2015)	Moderate
Shortridge's Thallomys	Data Deficient (2016)	Moderate
Littledale's Whistling Rat	Near Threatened (2016)	Low
Leopard	Vulnerable (2016)	Low

Recommendations and mitigating measures need to be implemented to ensure the survival of these species other fauna habitats and feeding grounds. The impact of the proposed development on the red data and other mammal species will mostly have a medium to low probability if the following management measures are implemented:

- The importance to preserve the riparian habitat should still be considered a high priority
- The removal of vegetation should be confined to the footprints of the proposed development site
- The protection of different habitat types in the area is important to ensure the survival of the different animals due to each species' individual needs and requirements. Sufficient natural corridor sections should be protected around the proposed development footprints to allow fauna to move freely between the different vegetation units on the property. The drainage channels and sections of natural vegetation will be preserved as corridors in the area and mitigation measures should be implemented to ensure that the habitats are protected.
- These larger trees should be protected as far as possible and be incorporated into the proposed development. The removal of large dead trees is also not advised as these trees also provide smaller habitats for the mentioned bat species as well as rodents. The grass layer also provides a valuable food source (insects, reptiles, small mammals that occur in/on the grass layer) for fauna.
- A monitoring programme needs to be implemented by a specialist if any rare species are confirmed on the property.

If the following general mitigation and management actions are 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;
- 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;
- Walkways and roads should be designed without vertical 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.

Table 10. Listed fauna species for the project area according to the EIA screening tool, status and habitat

Species	Conservation status	Sensitivity	Habitat	Probable on site?
Neotis ludwigii (Ludwig's bustard)	Endangered	High	Semi-arid shrublands of the Karoo, Namib Desert and Nama Karoo, occasionally visiting cultivated land and the southern Kalahari	Yes

The following can be concluded:

- According to Birdlife South Africa, the study area falls outside of any Important Bird Areas (IBA), identified within South Africa (www.birdlife.org.za).
- However, the Ludwig's Bustard (as identified by the Screening Tool) could be found on site but probability of occurrence on site is Moderate. The moderate probability of occurrence is due to large home ranges and very low populations densities, which give rise to widely scattered individuals.
- The amphibians appear to be poorly represented on site and the temporal pools in the drainage channels represent the most suitable habitat for the few amphibian species that could occur in the area. No threatened herpetofauna occur in the area.

9.3.7.7 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.

The development will have a moderate impact on the vegetation and general ecology of the area.

Considering the results from the field surveys, mitigation needs to be implemented to prevent any negative impacts on the ecosystem, since the area is traversed by several drainage lines. The vegetation in these areas is mostly in a natural state and is very sensitive to any impacts. Buffers were implemented along drainage lines to prevent edge effect impacts. A sensitivity analyses was conducted to identify the most suitable site for the development.

Several ecological potential impacts were identified and assessed (results are included in the Impact Assessment Matrix included in the report in Annexure C). 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;
- Topsoil and subsoil stripping leading to increased soil erosion and sedimentation;
- Road mortalities as a result of increased vehicle movement;
- Establishment and spreading of declared weeds and alien invader plants;
- Soil and water pollution due to spillages of harmful substances;

- Air pollution as a result of dust;
- Negative effect of human activities on fauna and flora.

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 site will potentially have a medium to low impact on the natural vegetation and faunal habitats of the project area, although the herbaceous layer will be preserved below the solar panels. The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the development phase should be considered a high priority.

According to the Ecological Specialist, provided that the proposed development is consistent with the sensitivity map, and if all the mitigation measures are taken into consideration as stipulated in this report, the planned development can be supported.

9.3.8 AVIFAUNA

An Avifauna Impact Assessment (Annexure E) was conducted by Dr. Tony Williams, a qualified Ornithologist, to determine whether the proposed development will have negative impacts on avifauna.

There was no open water source on the property. Both on-site reservoirs were dry as were adjacent water troughs. Formerly there was an earthen dam across the main drainage line in the northwest of the farm, but the dam has been breached. The area of the dam floor was partly covered by vegetation indicative of a higher water table earlier in the current summer.

There are very few, mainly well isolated, trees on the development site and include some scattered quiver trees, and a few ancient evergreens. There were few raised vantage points for birds. Scattered low bushes occurred along dried drainage lines. The greater part of the property was flat ground with a veneer of red sand. Bunches of seasonal grasses grew on the sand with largely open ground in between.

There were no topographic features that would induce bird movement routes or corridors and no sensitive areas that require avoidance, except for Sociable Weaver nests on roadside poles, which should be avoided. However, no roosting areas were recorded.

The diversity, and number, of birds on the property were both extremely low. Only 20 bird species were recorded across >16 hours of observations on the property. The list of species is given in the Avifaunal Assessment Report in Annexure E. Only two species of birds of prey were recorded. At least two pairs of Greater Kestrels were seen on the property. These kestrels will feed on grasshoppers and their numbers were probably higher than usual because of the seasonal flush of grasshoppers. A pair of adult Pale Chanting Goshawks were seen along the Louisvale Road just outside the southern boundary of the farm.

The Ludwig's Bustards (as identified by the Screening Tool) is a globally endangered species which was observed twice, over the northern sector of the farm (*i.e*. north of the development footprint area). This is a nomadic species and they will have been attracted by the abundance of grasshoppers, which is currently in the area. It is likely that this species is only transient on the farm.

Apart from the widespread Capped Wheatears, and parties of Ant-eating Chats, Rufous-eared Warbler, Red-headed Finch, Acacia Pied Barbet were only seen on single occasions, usually in association with the lines of bushes along shallow drainage lines.

The only species of special conservation concern seen at the site was Ludwig's Bustard. This species, which is near endemic to South Africa, is rated as globally endangered. The current regional population is estimated at less than 10,000 mature individuals (Taylor et al. 2015). The greatest risk to this species is collision with power lines (Williams 2021). It is a common nomad and partial migrant in the Nama karoo. Additional raised power lines from this and other proposed regional solar farms will impose raised concern.

Three species of Near-Threatened status may occur on the proposed development site and include Karoo Korhaan, Sclater's Lark, and Red Lark. None of these species were observed during the survey

Most birds observed were singletons or small parties and no groups of more than ten individuals were seen. **Because of the low avian biodiversity, and low number of birds seen, this property can be rated as of low avifaunal sensitivity.**

The four (4) New Hope solar parks are being established in the Upington Renewable Energy Development Zone (REDZ). Four other solar farms have been proposed with 30 km of the proposed development site, but their status is unknown. Because of the REDZ classification of the area it is likely that more will be proposed.

Assuming that several solar farms are developed there will be a cumulative loss of habitat for birds. However, this region supports a low diversity and number of birds and there are very extensive areas of similar habitat in the region. **Unless there is very extensive further development of solar farms, the cumulative loss of habitat cannot be considered serious from an avifaunal perspective.**

The main cumulative concern is the increase in power lines and the collision risk these impose on the endangered Ludwig's Bustard. This threat can be mitigated by careful siting of lines and especially by provision of bird diverters on the lines.

The development of the solar parks, though largely negative, will have some positive benefits for the local avifauna. The solar panels will provide shade and raised vantage points both features in short supply under natural conditions. The panels will be raised off the ground so there will be continued access to foraging areas for passerines, especially on the ground between solar rows.

From an avifaunal perspective, the proposed PV solar parks can be given approval for development.

This assessment is based on the:

- Extensive surrounding (regional) cover of similar, untransformed, Nama karoo habitats.
- Low biodiversity, and extremely low number, of birds seen, despite the richness of grasshoppers available.
- Very small number of threatened species known to occur on the development site.
- The low cumulative effect if powerlines are marked with bird diverters.

9.3.9 VISUAL

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

The study area is located within a rocky, arid semi-desert landscape is characterised by red-brown sands, sparsely covered with grassland vegetation and low shrubs. This landscape character is broken by black dolerite boulders and a few small clusters of koppies. The combination of the extensive plains and slightly sloping plateau's with the low and sparse vegetation cover result in a very low visual absorption capacity for the study area.

The proposed project components portray a high degree of contrast with the receiving landscape.

Visually Sensitive Receptors within the study area with a high sensitivity included the residential town of Kenhardt with its associated agricultural holdings (located in the far south), various farmsteads with associated workers housing dispersed throughout the study area as well as the R27 (bisecting the study area in a north-south direction) that forms part of the Quiver Tree Tourist Route and the Kenhardt Golf Club (located in the outer southern edge of the study area).

Proposed mitigation measures did not have a significant effect on the duration, extent, frequency, probability and compliance of the visual impacts, rather it would add to good practice found in an Environmental Management Programme.

The Relevance of the anticipated visual impact from the implementation of New Hope 3 Solar Park in general, was rated as insubstantial for Residential VSRs and slight for Travelling VSRs in general. However, for the R27, forming part of the Quiver Tree tourist route, the Relevance was rated ranging from insubstantial to extreme. Business / Occupational and Industrial VSRs were rated as insubstantial and Open Space Users / Recreational VSRs as slight. The Significance of the impact was rated as medium for all VSRs during all three phases of the project.

The S*ignificance* of the impact was rated as *medium* for all VSRs during construction, operational and decommissioning phases of the project.

9.4 SOCIO-ECONOMIC ENVIRONMENT

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

- The project will contribute up to 100 MW to a constrained national grid, thereby reducing the need for load shedding with its negative consequences for economic production, growth and job creation and maintenance of equipment.
- Capital investment of approximately R6 - 12bn will be required of which a substantial proportion is likely to be foreign capital as indicated by the REIPPPP projects that have been procured to date.
- Every new solar project that is developed in South Africa makes the establishment of an industry to support local manufacturing of components more viable.
- Permanent job creation on each proposed project could be 50 people, or 200 if all projects proceed. More jobs will emerge within the value chain for the manufacturing of components. An important new range of renewable energy industry skills will be acquired, which are essential for the local competitiveness of this industry.
- In terms of REIPPPP prescriptions, developers are expected to contribute 1.5% of turnover to community development in the vicinity of the project. This commitment should be structured in a way that will contribute meaningfully to the quality of life of a local community who could be identified, probably in Kenhardt, and engaged in consultation with the local municipality.
- Approximately 400 construction and panel installation jobs are expected to be created for the combined 400 MW project, for a period that is unlikely to exceed 15 months.
- Skills development, especially for panel installation, will contribute meaningfully to the viability of other potential solar project developments in the Northern Cape.
- Construction projects are associated with increased levels of crime and disruption to established local social relationships. The risk of an increase in Covid-19 infections could also arise when contractors are recruited from a different location. This impact could be negative, albeit low. The significance can be further reduced by way of mitigation measures that should include an appropriate security and workplace safety protocols that the main contractor and all subcontractors should adhere to.
- The socio-economic impact of the proposed New Hope 3 solar project is considered positive, and the application is supported, provided that all the mitigation measures proposed by specialist consultants are implemented.
- The project is consistent with development policies at the national, provincial and local government levels, which is indicative of an essential component of institutional readiness for a project of this nature.
- Most of the above-mentioned impacts are positive with a high significance.

9.5 AGRICULTURAL POTENTIAL

According to the national web-based environmental screening tool in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998), (NEMA), the site has a Medium Sensitivity or Low Sensitivity from an Agricultural perspective. A site visit was conducted to determine if a compliance statement would be sufficient.

After the site visit the following was concluded:

The areas for the proposed New Hope 3 Solar Park, have a Low Sensitivity from an Agricultural perspective due to the climatic conditions (< 300mm rainfall annually) and sandy, often shallow soils having limited potential for arable agriculture or grazing.

The impacts associated with the proposed development on the soils and land capability will occur on slightly undulating terrain and therefore the impacts will be lower with only marginal erosion risks that can be managed though proper mitigation measures. The mitigation of the overall impacts on soils (compaction, erosion) will be easier on these flatter areas.

The following list of impacts is anticipated with the proposed renewable energy development on the soils and land capability in the area during the construction and operational phases:

- Disturbance of soils (Soil compaction, erosion and crusting).
- Soil contamination due to leaching of soluble chemical pollutants.

Mitigation measures are provided in the Compliance Statement attached in Annexure F compiled by Dr BJ Henning that would reduce the impacts from a higher to a lower significance. Furthermore, the proposed layout plan of the PV plant should be consistent with the agro-ecosystem maps and recommendations stipulated in his report.

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

9.6 CULTURAL AND HERITAGE RESOURCES

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

The field assessment subject to this study noted that the farm N'Rougas Zuid holds a rich heritage legacy. For example, it was noted that Hunter-Gatherer shelters occurred in a series of hills on the farm, and it is said that conflicts related to the Anglo-Boer War occurred around these hills. In addition, a historically significant farmhouse building constructed in 1894 occur on the farm. **However, these occurrences are all situated away from the project footprint areas.**

The following general observations were made in the proposed New Hope 3 Solar Park area:

- Wide-spread scatters of Stone Age artefacts were documented across the project footprint areas in medium to low densities, often along eroded calcrete surfaces and around quartzite outcrops. Most of the artefacts are probably Middle Stone Age (MSA) lithics such as blades, scrapers, chunks and cores produced on quartzite.
- Single possible Later Stone Age (LSA) microlithic tools were noted. Similar MSA occurrences were noted at various localities around Kenhardt during other Heritage Impact Assessments and the bulk of these studies indicate limited archaeological value of MSA scatters due to the absence of associated organic material, the lack of discrete individual sites as well as the fact that thousands of square kilometers of Bushmanland are covered by these artefacts scatters.
- In addition, other studies point to a pattern where sensitive Stone Age localities are commonly clustered around existing and ancient drainage lines, pans, and ridges with rocky outcrops in this landscape. The footprint areas for the New Hope 3 Solar Park project is situated around drainage lines and pans, with buffer areas, mostly over sandy surface sediments and this implies that areas of potential high heritage sensitivity have potentially been avoided.
- MSA localities occurring within the footprints are regarded to be of a low-medium significance and, even though it is almost certain that additional Stone Age materials will occur in affected areas, these will probably be of similar provenance and of lesser importance.

No human burial sites were located within the project area and no impact on such resources are anticipated.

9.6.1 RECOMMENDATIONS BY THE ARCHAEOLOGIST

The following recommendations are made based on general observations in the proposed New Hope 3 Solar Park area:

- An application should be made for a permit to excavate and destroy (to SAHRA), prior to the destruction of archaeological material.
- The sites must be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains.
- Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

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)).

9.7 PALAEONTOLOGICAL RESOURCES

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

Considerations of palaeontological heritage do not usually influence the Design Phase when there are no known or designated fossil sites in the Project Area. However, in general, designs which involve the least subsurface disturbance (excavation volumes) are favoured. Palaeontological impacts do not occur during the Operational Phase or the Decommissioning Phase.

The proposed New Hope 3 Solar Park development is situated in the Namaqua-Natal Metamorphic Province comprising Precambrian igneous and metamorphic rocks of the Keimoes suite and Jacomyns Pan Group which are exposed in places but are mostly overlain by Quaternary alluvial deposits of the Gordonia Formation of the Kalahari Group.

It is extremely unlikely that the proposed development will have any effect on palaeontological heritage. However, if fossils are exposed in the Quaternary overburden, it will create a unique opportunity to explore the area for fossils. It is thus recommended that, in the unlikely event that fossils are exposed through construction activities, a qualified palaeontologist must be contacted to assess the exposure for fossils before further development takes place so that the necessary rescue operations are implemented (See Appendix A; of the Palaeontological Assessment included in Annexure I).

9.7.1 RECOMMENDATIONS OF THE PALAEONTOLOGICAL SPECIALIST

From a palaeontological perspective, the proposed solar park development should proceed but, if fossils are uncovered in the unconsolidated deposits of the Gordonia Formation in the course of construction activities, the developer must immediately call in a qualified palaeontologist to assess the situation and, if necessary, undertake excavation of the fossils.

9.8 TRAFFIC IMPACT ASSESSMENT

The proposed access from and to the proposed development from Road R27 is a proposed intersection with no existing other formal road intersections within the vicinity of the proposed development. Therefore, there are no mitigating measures required without the proposed development.

owing to the type and nature of the proposed development, it is expected that the activities as part of the construction and operational phases of the proposed development, regardless of whether only one facility is constructed and operational, or all four facilities are constructed and operational at the same time, will have a manageable impact on vehicle traffic during the construction and operational phases, as long as road infrastructure improvements are implemented as indicated in Section 3.2.

In conclusion of the findings as part of the investigations, Siyazi Limpopo Consulting Services (Pty) Ltd is of the opinion that the proposed development would have a manageable impact on the relevant road network during all phases and regardless of whether only one facility is constructed and operational or all facilities are constructed and operational at the same time, as long as the mitigation measures are implemented as recommended in Section 3.2 of this report. In this case, it is therefore recommended that authorisation be granted.

9.8.1 RECOMMENDATIONS BY TRAFFIC ENGINEER

At the intersection of Road R27 and Proposed Access Road the following should be implemented:

a) Provide 90 meters dedicated right turn lane on the southern approach of Road R27.
b) Provide 60 meters dedicated left turn taper on the northern approach of Road R27.
c) Provide reflective road studs as part of the proposed intersection to improve visibility of the intersection geometry when it is dark.

As part of the construction phase, a dedicated loading and off-loading area on site should be established where workers can safely be loaded and off-loaded by public transport or arranged transport. and b) From a road safety perspective, dust suppression on the proposed access road (if gravel road) should be conducted when required to avoid road visibility issues caused by dust from vehicles making use of the road, which could lead to vehicle accidents. Approval for the position and geometric layout for the proposed access intersection from and to Road R27 should be obtained from the South African National Roads Agency SOC Ltd.

9.9 IMPACTS AND RISKS IDENTIFIED

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

As previously described, construction activities for the establishment of the New Hope 3 Solar Park include:

- the land clearing activities necessary for preparation of the site and access routes;
- the excavation and filling activities;
- the transportation of various materials;
- the preparation of the temporary worksite;
- the installation of the PV modules and construction of associated structures and infrastructure; and

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

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

The identification of impacts will be based on:

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

Potential impacts may include:

- Impacts on soils & agricultural potential;
- Impacts on ground water;
- Impacts on the road system and traffic;
- Impacts on archaeological artefacts and finds (heritage resources);
- Geological, soil and erosion impacts;
- Impacts on avifauna;
- Impacts on vegetation;
- Social impacts; and
- Visual impacts.

Potential impacts identified include:

- **Impacts on soils & agricultural potential;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- **Impacts on ground water;**
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- **Impacts on the road system and traffic;**
  - Extent: Surrounding and adjacent land
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- **Geological, soil and erosion impacts;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- **Impacts on avifauna;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- **Impacts on vegetation;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: Medium
- **Impacts on heritage resources;**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Low
  - Significance: Low
- **Socio-Economic impacts;**
  - Extent: Regional & Locally
  - Duration: Life of the project (approx. 30 years)
  - Probability: High
  - Significance: High - Positive
- **Visual impacts.**
  - Extent: Locally at the proposed site
  - Duration: Life of the project (approx. 30 years)
  - Probability: Definite
  - Significance: to be determined

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

9.9.1 DEGREE TO WHICH THE IMPACTS CAN BE REVERSED

- The visual impact is resident for a long time (25-30 years). It can be reversed during decommissioning and rehabilitation of the area.
- Biodiversity impacts can be reversed at the decommissioning stage of the development. Plants can be replanted, and animals will return to the project area.
- Impacts on soil (erosion) can be reversed by careful handling of storm water on site.
- Impacts on water quality and quantity can be reversed at the decommissioning stage.
- Agricultural resources will again become available after decommissioning of the facility.
- Impacts on Heritage resources could be permanent without mitigation.
- The potential impacts on river systems, drainage channels and wetlands will be minimal. Impacts on these resources can be reversed successfully.
- Socio-economic impacts can be reversed at the decommissioning phase, though this will have a nett negative effect on the area.

9.9.2 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.

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

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

9.10 HIGH LEVEL RISK ASSESSMENT FOR BESS TECHNOLOGY

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

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

- The Battery Management System should include an approved device to preclude, detect, and control thermal runaway.
- The BESS should incorporate appropriately certified inverters/inverter systems and must comply with other recognised safety standards which address risk assessment and controls.

- The BESS must be well away from critical buildings or equipment and located in a non-combustible enclosure. Sufficient clearance should be maintained around the installation to provide for fire service access.
- Clear signage should be visible to include warnings of a possible fire hazard.
- An approved, monitored, automatic smoke detection system must be installed at the BESS. A fire suppression system must be designed and installed at the BESS.
- Regular inspections must be undertaken to ensure the battery systems are not overheating.
- Portable fire extinguishers must be provided at the BESS.
- Installations should have emergency power disconnects to ensure manual, remote, and local disconnect is possible adjacent to the BESS.
- The BESS must have an online condition monitoring system. The system should be fitted with temperature monitoring which incorporates a high temperature alarm for the battery room and container. Temperatures should be monitored at a constantly attended location.

9.11 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	Ka !Garib 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

9.12 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 11. Impact Assessment Criteria

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

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

9.13 CUMULATIVE IMPACTS

Cumulative impacts will be assessed in relation to other renewable energy developments in the proximity from the proposed New Hope 3 Solar Park. Mitigation measures will be proposed, in order to mitigate the impacts that may result from the establishment of the New Hope Solar 3 Park 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.

9.14 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 PV Solar Park 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 PV Solar Park might have a negative impact on the visual environment and biodiversity (avifauna) in the area of the powerline.

9.15 POSSIBLE MITIGATION MEASURES AND RESIDUAL RISK

- To mitigate the visual impact, screening of the facility can be done with vegetation
- Panels must be washed with methods that can save on water use. Employees living/sleeping at the site must be educated on the saving of water.
- Water used for domestic purposes (sanitation) must be treated before release to comply with standards for effluent release.
- The storm water must be managed so that erosion is not caused on the site
- Domestic waste must be removed from the site on a regular basis not to impact on the soils or water bodies in the area.

9.16 MOTIVATION FOR NOT INVESTIGATING ALTERNATIVES

N/A

9.17 CONCLUDING STATEMENT INDICATING THE PREFERRED ALTERNATIVE AND LOCATION OF ACTIVITY

The location of the preferred alternative is based primarily on the location of the Upington REDZ.

The preferred alternative was selected based on the fact that it will have the smallest impact on the environment being located on the least sensitive area, avoiding potentially sensitive drainage line areas and will be in line with Eskom requirements.

The negative impacts including the cumulative impacts can be effectively mitigated and managed to reduce the negative effect the impacts would have on the environment, so that the development with the positive effect of the socio-economic impact and the positive impact of renewable energy generation will have a positive effect on the environment that would offset the negative effects of the development.

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

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

10.1 DESCRIPTION OF ENVIRONMENTAL ISSUES AND RISKS IDENTIFIED DURING THE EIA PROCESS

The potential aspects to assess during the EIA process may include:

- Soils & agricultural potential;
- Avifauna aspects;
- Vegetation aspects;
- Heritage resources aspects;
- Socio-economic aspects;
- Visual aspects;
- Traffic impacts

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

The identification of impacts will be based on:

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

Potential impacts may include:

- Impacts on soils & agricultural potential;
- Impacts on avifauna;
- Impacts on vegetation;
- Impacts on heritage resources;
- Social impacts;
- Traffic impacts and
- Visual impacts.

The following possible Key environmental impacts were identified:

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Air Pollution and noise		
Dust	• Construction machines and vehicles during clearing and construction of the PV Solar facility	• Health problems • Air pollution • Public nuisance
Emissions	• During operation of construction equipment. • Spraying of insecticides and herbicides during operation • During veld fires	
Noise	• Construction noise	
Water quality		
Pollution of water sources Pollution by *E.coli*	• Spillages of fuel & oil from vehicles during construction • Pollution from solid general waste if not removed regularly • By using insecticides and herbicides • Poorly planned and managed sanitation facilities	• Pollution of surface and groundwater • Health risk • Lower water quality • Soil degradation
Water quantity		
Impact on amount of water resources available Over-use of water	• Use of water during construction of the PV solar facility • Water use during operation	• Loss of a scarce resource • Increased pressure on water supply sources
Land/Soil degradation		
Soil contamination and degradation	• Spillages of oil, chemicals from machinery and vehicles during construction • Site clearing during construction • Use of Pesticides and Fertilizers • Loss of Agricultural potential of soil • Erosion if storm water is not correctly managed	• Pollution of soil • Soil degradation • Loss of topsoil • Effect soil characteristics, ecology & groundwater • Loss of topsoil
Biodiversity		
Decline in fauna and flora diversity	• Clearing of site for construction • Loss of habitat due to construction of panels • Power lines to Eskom power lines	• Loss of biodiversity • Loss of habitat • Negative impact on biodiversity • Negative impact on rare / endangered/ endemic species and habitats • Animal deaths.

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Cultural/Heritage		
Possible loss of heritage sites Damage to palaeontological resources	• Damage during construction or operation	• Possible loss of cultural heritage sites paleo-resources
Visual impact		
Change in the visual characteristics of the site	• Clearing of vegetation for panels • Presence of Solar facility	• Visual intrusion
Socio-economic impacts		
Job creation	• Increase in temporary and permanent work opportunities during the construction and operational phases. • Loss of land available for substance farming without fair compensation.	• Socio- economic benefit

10.2 IMPACTS & MITIGATION MEASURES OF CONSTRUCTION PHASE

All the possible impacts that can be predicted in both the construction and operational (limited) phase of the PV Solar Park are addressed. Specific mitigation measures are proposed, and the significance of these impacts is described with and without the mitigation measures. Furthermore, considering that all or part of the construction infrastructure may be owned and/or operated by Eskom, the mitigation measures described in the following paragraphs and in particular in the attached Environmental Management Programme (EMPr) can be the responsibility of Eskom or of the developer.

10.2.1 ATMOSPHERIC POLLUTION AND NOISE

Construction Phase

During this phase there will be a concentration of earthmoving equipment and construction vehicles that will level the area, clear vegetation for construction purposes and in the process, will create dust and exhaust smoke that will impact on air quality. There will also be more noise created by the vehicles during this phase. Burning of waste and fires at construction sites may also create smoke.

Operational phase

The increased traffic volumes and people will lead to increased levels of air pollution and noise. Smoke from burning of waste can cause air pollution.

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

Mitigation measures - Construction Phase

- Vehicles must be well serviced to prevent excessive smoke and noise.
- Speed of construction vehicles should be kept as low as possible(20-30km/h) to reduce generation of dust and noise.
- Construction areas must be dampened/treated to prevent excessive dust formation.
- The clearing of the site should be done in phases as the construction progresses.
- Construction should only take place during the hours between sunrise and sunset on weekdays and Saturdays.
- Contractors must comply with Provincial noise regulations. The construction machinery must be fitted with noise mufflers and be maintained properly.
- Solid waste generated by the construction teams may not be burned on site or the surrounding areas but be regularly removed to the municipal waste disposal site.
- Fire belts must be made around the development according to the regulations of the Veld and Forest Fire Act.
- Cleared vegetation must be stock-piled and should be removed regularly and be distributed amongst the local community members. Cleared vegetation may not be burned on site.
- Cooking on construction site may not be done on open fires. Gas stoves can be used.

Mitigation Measures - Operational Phase

- Speed of vehicles on roads should be controlled e.g. speed bumps and speed restrictions (20-30km/h), with visible signage.
- All roads should preferably be sealed to eliminate dust formation caused by strong winds and vehicle movement.
- Solid waste may not be burned on the project area.

- Fire belts around the development must be made according to the regulations of the Veld and Forest Fire Act.
- Vegetation underneath the panels must be kept short
- Vegetation refuse should be composted if possible and re-used.

10.2.2 LAND AND SOILS

Construction phase

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

Operational phase

Solid waste can be a nuisance and has the potential to pollute the soil if not managed correctly. The use of conventional herbicides and insecticides should be limited as far as possible. Wastewater from activities can pollute the soil.

Project Phase	Impact: Land and soils								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Spilling of oil/diesel by construction machines or tanks	Contaminate soil	Low-medium	Medium-high	Low	Medium	Medium-high	Low	Low-Medium
	Spilling of chemicals/se-wage	Contaminate soil	Low-medium	Medium-high	Low	Medium	Medium-high	Low	Low-Medium
	Solid waste disposal	Soil pollution & nuisance	Low	Medium-high	Low-medium	Medium-high	Medium-high	Low	Low-Medium
	Storm water over roads and cleared areas	Erosion	Low-medium	Medium-high	Low-medium	Low-Medium	Medium-high	Low	Low-Medium
	Trenches for electric cables and water and sewerage pipes	Erosion	Low-Medium	Medium-high	Low	Low-Medium	Medium	Low	Low-Medium
	Moving of equipment over soils	Compaction of soils	Low-Medium	Medium-high	Low-Medium	High	Medium-high	Low-Medium	Medium
	Using land for solar facility	Sterilising of Medium-Low potential soil	Low	Medium-high	Low-Medium	High	Medium	Low	Low-Medium
Operation	Solid waste	Soil pollution + nuisance	Low	High	Low-Medium	Low-Medium	Medium	Low	Low-Medium
	Storm water from paved areas and solar panels	Erosion	Low-medium	High	Low-medium	Low-Medium	Medium	Low	Low-Medium
	Storm water over roads and cleared areas	Erosion	Medium	Medium-high	Low-medium	Low-Medium	Medium-high	Low	Low-Medium
	Use of insecticides and herbicides	Pollution	Low-Medium	High	Medium	Low-Medium	Medium	Low	Low-Medium
Cumulative impacts	Increased potential for negative impacts on soil resource	Increased potential for erosion and soil pollution	Medium	High	Low-medium	Low-Medium	Medium-high	Low	Medium

Mitigation measures - Construction Phase

- Clearance of vegetation should be restricted to the footprint area and access road.
- Construction activities should be restricted to the proposed development footprint.
- Construction vehicles must be well maintained and serviced to minimise leaks and spills.
- Spill trays must be used during refuelling of vehicles on site.
- Temporary diesel storage must not exceed 30 000 litres at construction camp. Diesel tanks and other harmful chemicals and oils must be within a bunded area and water from this bunding must be channelled through an oil/water separator.
- Solid waste must be kept in containers and disposed of regularly at licensed dumping site.
- Building rubble must be removed to a licensed disposal site regularly during construction.
- Trenches that are dug for the supply of services and electrical cables must be filled up and compacted well and slightly higher than the areas around it.
- The clearing of the site should be done in phases as the construction progresses.
- Slopes produced by removing soil must be kept to a minimum to reduce the chances of erosion damage to the area.
- Soil should be handled when dry, to reduce compaction risk.
- During construction, sensitive soils with high risk of compaction (e.g. clayey soils) must be avoided by construction vehicles and equipment, wherever possible, in order to reduce potential impacts
- Institute a storm water management plan including temporary and permanent erosion control plans.
- Minimise bare areas-revegetate as soon as possible to prevent soil erosion

Mitigation measures - Operational Phase

- Solid waste must be kept in adequate waste bins and removed on a weekly basis to the waste disposal site.
- The surface drainage system should be monitored after storms and storm water damage should be repaired. The maintenance of the roads must be kept up to standard to prevent and reduce the incident of erosion next to the roads.
- The use of eco-friendly products e.g., organic compost, herbicides and insecticides should be promoted and should only be used according to the specifications
- Revegetate bare areas to minimise soil pollution during wind- and rainstorms.

10.2.3 GROUNDWATER AND SURFACE WATER POLLUTION

Construction phase

- Lack of sanitation facilities could result in ground water pollution and associated health risks.
- Construction vehicles will be refuelled at the construction camp.
- Spillage of fuel and lubricants from construction vehicles could occur. Storm water contamination by solid waste could lead to groundwater and surface water pollution.
- Soil cover and vegetation is removed and storm water in the area can cause erosion. Road construction will increase a possibility of erosion, because of increased storm water run-off.

Operational Phase

- Pollution by sanitation leakages, solid waste and erosion may lead to water pollution. Storm water run-off over open areas can cause erosion.
- Storm water flowing over polluted areas can lead to ground and surface water pollution.
- Pesticides and herbicides used at the project during operation can create pollution if not handled and applied correctly.

Project Phase	Impact: Groundwater and Surface water Pollution								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Spillage of fuel and lubricants from construction vehicles	Groundwater Pollution	Low-Medium	Medium-high	Medium	Medium	Medium-high	Low	Medium
	Spillage of fuel and fuel tanks	Groundwater Pollution	Low-Medium	Medium-high	Medium	Medium	Medium-high	Low	Medium
	Clearing of vegetation	Erosion & siltation of streams	Medium	Medium-high	Medium	Low-Medium	Medium-high	Low-medium	Medium
	Solid waste disposal water resources	Pollution of freshwater resources	Low	Medium-high	Medium	Medium	Medium	Low-medium	Low-Medium
	Sanitation seepage from chemical toilets and/or from temporary sanitation system	Groundwater Pollution	Medium	Medium-high	Low-medium	Low-medium	Medium	Low	Low-Medium
Operation	Spillage of fuel and lubricants from vehicles	Groundwater Pollution	Low-Medium	High	Low-medium	Medium-high	Medium-high	Low-medium	Medium
	Solid waste disposal-freshwater resources	Groundwater Pollution	Low	High	Low-medium	Low-Medium	Low-medium	Low	Low-Medium
	Leakage from the permanent Sanitation system	Groundwater Pollution	Medium-high	High	Low-Medium	Low	Low-Medium	Low-medium	Medium
	Use of insecticides and herbicides	Pollution of streams & rivers	Low-Medium	High	Medium	Low	Medium	Low	Low-Medium
	Storm water runoff	Erosion & siltation of streams	Low-medium	High	Medium	Low-medium	Medium-high	Low	Medium
Cumulative impacts	Water pollution and increased water run-off	Increased potential for water pollution and increased water run-off	Low-Medium	High	Medium	Low-Medium	Medium	Low	Low-Medium

Mitigation measures – Construction phases

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

- Clearance of vegetation should be restricted to footprint area and access road.
- Construction activities should be restricted to the proposed footprint area.
- Cleared areas must be rehabilitated by reintroducing a grass layer to limit soil erosion.
- Berms to limit water flow over cleared areas, to limit erosion.
- Drip pans should be used during re-fuelling and servicing of construction vehicles. Used parts like filters should be contained and disposed of at a site licensed for dumping of these waste products.
- Oil traps must be installed in the vehicle wash bay to prevent pollution. Oil traps must be serviced on a regular basis by an approved service agent.
- Diesel storage must not exceed 30 000 litres at construction camps. Diesel tanks and other harmful chemicals and oils must be within a bunded area. Any water from out of this bunding must flow through an oil/water skimmer.

- Vehicle maintenance yard and construction storage area should have bund walls and lined with impermeable material to prevent ground and surface water pollution.
- Chemical/temporary sanitation facilities at construction site must be regularly serviced to ensure no spills or leaks to surface and/or groundwater.
- Solid waste must be kept in adequate waste bins. Building/construction waste and various waste products must be removed regularly to a licensed landfill site.

Mitigation measures - operational phase

- Solid waste must be kept in adequate waste bins and removed on a weekly basis to a licensed landfill site.
- The use of eco-friendly products e.g. Organic Compost, herbicides and insecticides should be promoted.
- A permanent closed, sewage treatment system to treat effluent to the required standards of the DWS must be installed at the solar facility.
- The permanent sanitation system should be regularly inspected to ensure that no spills or leaks from sanitation system to groundwater take place.

10.2.4 WATER USE / WATER QUANTITY

Construction phase

During this phase, water consumption will be high because it will be utilized for roads and building construction. Water needed for construction activities will be provided by contractor.

Operational phase

Water use will be limited except for short periods when the PV modules are cleaned. The water needed for the operational phase will be provided from groundwater (boreholes).

Project Phase	Impact: Water use								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Construction process	Water consumption	Low-medium	Low	Medium	Medium	High	Low-Medium	Medium
Operational	Water use & cleaning of panels	Water consumption	Low	High	Medium-High	Low-medium	High	Low-Medium	Medium
Cumulative impacts	Water use	Increased pressure on local water resources	Medium	High	Medium-high	Low-Medium	Medium	Low-Medium	Medium

Mitigation measures – Construction Phase

- Water should be used sparingly, and it should be ensured that no water is wasted.
- Roads must be treated with chemicals to lower water use for dust suppression.
- Washing of construction vehicles should be limited to once or twice a month and must be done with high-pressure sprayers to reduce water consumption.

Mitigation measures - Operational Phase

- Cleaning of panels should be done only when necessary.
- Roads should be treated with chemicals to lower the use of water for dust suppression.
- Washing of vehicles should be limited to once a week and must be done with high-pressure sprayers to reduce water consumption.

- Care must be taken not to waste any water. In the offices, half-flush systems in the toilets as well as water aerators in all taps must be installed to reduce water consumption.
- Workers must be educated on the value of water and how to use it sparingly.

10.2.5 ARCHAEOLOGICAL, CULTURAL AND SOCIAL FEATURES

Construction phase

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

Operational phase

The operational phase will not have any negative impact on the archaeological features of the site if the recommendations of the Heritage Impact Assessment and Palaeontological assessment are strictly adhered to.

Project Phase	Impact: Loss of Archaeological, Cultural and social features								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earth moving and soil clearance	Destroy archaeological evidence and heritage and graves	Low-medium	Medium-high	Low	Low	Low-medium	Low	Medium
	Earth moving and soil clearance	Impact on Palaeontological resources	Low	Medium	Low	Low	Low	Low	Low
	Earth moving and soil clearance	Impact of Palaeontological resources	Medium	Medium	Low	Low	Low	Low	Medium
Operation	Operational activities of development	Destroy archaeological evidence and heritage and graves	Low-medium	High	Low	Low	Low-medium	Low	Low
Cumulative impacts	Activities on site during construction and operation	Increase in potential to unearth archaeological evidence and graves	Low-medium	High	Low	Low	Low-medium	Low	Medium

Mitigation measures – Construction and operational phases

- Application for a permit from the relevant heritage authorities prior to destruction of the heritage resources.
- Site Monitoring must be done by means of regular examination of trenches and excavations
- A Fossil Finds Procedure must be in place (included in the Palaeontological Assessment).
- ECO must contact palaeontologist or archaeologist to be on standby in case of finds. The latter will liaise with SAHRA on nature of find and suitable actions, must be taken, such as an immediate site inspection and/or application for collection permit.

- Care must be taken during the construction process that anything else of archaeological value that is unearthed must be recorded. Please refer to the Heritage Impact Assessment (Annexure H). The archaeologist or SAHRA must be notified whenever anything of importance is discovered.

10.2.6 IMPACT OF THE DEVELOPMENT ON ECOLOGY (FAUNA & FLORA) OF THE AREA

Planning and construction phase

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

Operational phase

Operation of the development can have a negative impact on biodiversity if not managed correctly. Exotic invasive plant species can have negative impacts on indigenous vegetation.

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Earthworks and vegetation clearance at construction site	Loss of indigenous plant species & disturbance to sensitive habitat	Medium	High	Low-Medium	Medium	High	Low-medium	Medium
	Vegetation clearance and movement of people on the site at different development areas	The spreading of exotic invasive plant species Loss of indigenous plant species	Medium	Medium	Medium	Medium	Medium-High	Low	Medium
	Topsoil & subsoil stripping, exposure of soils to wind and rain during construction causing erosion and sedimentation	Soil erosion	High	Medium	Low-Medium	Medium	High	Medium	Medium-high
	Exposure of soils to rainfall and wind during construction	Erosion and Dust pollution	Medium	Medium	Low-medium	Medium	High	Low	Medium
	Heavy machinery and vehicle movement on site	Spillages of harmful substances	Medium	High	Medium	Medium	Medium-High	Low	Medium
	Littering along access road and at construction site	Public nuisance and loss/death of indigenous fauna	Low-Medium	Medium	Medium	Medium-High	Medium	Low	Medium
	Control of animals on site Heavy machinery and vehicle movement on site	Disturbance to and loss of indigenous fauna to the area	Medium	Medium	Medium	Medium	Medium-High	Low	Medium
	The occurrence of veldt fires	The loss of indigenous fauna and flora	Medium-High	Medium	Medium	Low-Medium	Medium-High	Low	Medium
Operation	Rehabilitation of cleared areas	Spreading of exotic invasive plant species Loss of habitat and indigenous flora	Medium	High	Medium	Low-Medium	Medium	Low-Medium	Medium
	The occurrence of veldt fires	The loss of indigenous fauna and flora	Medium-High	Medium	Medium	Low-Medium	Medium-High	Low	Medium
	Disposal and storage of solid waste and littering	The death/loss of indigenous fauna e.g. raptors, mammals and reptiles	Medium-High	High	Medium-High	Medium-High	Medium	Low-Medium	Medium

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
	The control of pests and vermin	Killing and poisoning of fauna feeding on poisoned vermin / pest	Low-Medium	High	Low-Medium	Medium-High	Medium	Low	Medium
	The feeding of fauna e.g. birds &small mammals	Disturbance to bio-diversity and natural movement of animals through the site The death/loss of indigenous fauna	Low-Medium	High	Low-Medium	Medium-High	Low-Medium	Low	Medium
	Catching of wild animals e.g. reptiles, bids and small mammals as pets	Disturbance to bio-diversity and decline in indigenous faunal numbers	Medium-High	High	Low-Medium	Low-Medium	Low	Low	Medium
	Birds colliding with power line and panels	Electrocution of birds	Medium-High	High	Low-Medium	Low-Medium	Low	Low	Medium
	The erection of fences and road	Fragmentation of available habitat and restriction of movement of small mammals, reptiles and amphibians	Low-Medium	High	Low-Medium	High	Medium	Low	Medium
Cumulative Impacts	Increased potential negative impacts on ecology of the area	Increase in natural vegetation to be removed.	Medium-High	High	Medium	Medium	Medium	Low	Medium

Mitigation measures – Construction phase

- Clearance of vegetation should be restricted to footprint area and access roads.
- Construction activities should be restricted to the proposed development footprint.
- Construction must preferably take place after the bird breeding season
- Speed limit of 30 km/h must be enforced on the roads.
- Care must be taken that unnecessary clearance of vegetation does not take place. Where possible, natural vegetation must be retained.
- The herbaceous layer should be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project.
- Herbicides used to control invasive plant species should be chosen in consultation with an ecologist.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for all applications.
- Construct a single fence if possible.
- Report all incidences of collisions of birds with panels.
- Speed limit (30km/h) on site to avoid collisions with night birds and twilight active birds.
- Panels should be tilted towards the vertical when not in use
- All probable and high risk perching surfaces should be fitted with bird guards and perch guards as deterrents
- Only power lines structures that are considered safe for birds should be erected to avoid the electrocution of birds perching or attempting to perch

- Overhead transmission cables should be marked with bird diverters to make the lines as visible as possible to collision-susceptible species.
- No Fires should be allowed within the construction camp and extra care should be taken to prevent veldt fires of occurring.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to Prepare and maintain firebreaks).
- Cleared areas should be rehabilitated by reintroducing a vegetation layer as soon as possible to limit the occurrence of erosion.
- The cleared vegetation may not be burned on site. The cleared vegetation should be stockpiled and distributed to the local communities.
- Solid waste must be kept in adequate animal proof waste bins at the construction camp and construction sites. Building rubble and various wastes should be removed on a regular basis to the closest available landfill site.
- Regular clean-up programs should be put into effect along the access road and throughout the premises to limit the impact of littering caused by construction activities.
- The stockpiled topsoil and construction material should be managed in such a way that the material is not transported by wind or rain. This can be done by restricting the height of the stockpiles, sandbagging and avoiding steep slopes.
- No animals may be killed, captured or hunted on site by construction workers. Do not feed any wild animals on site.
- Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and trapped and/or injured. This can be prevented by constant excavating and backfilling of trenches during construction process.
- Cumulative impacts on the ecology of the area can be significant. However, with the mitigation measures in place, the potential is low for significant negative impacts on the ecology of the area.
- 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 the New Hope 3 Solar Park.

Mitigation measures – Operational phase

- The herbaceous layer should be revived after clearance of the vegetation and actively managed through slashing during the entire lifetime of the project.
- An ecologist should be consulted on the use of herbicides/eco-friendly products to control exotic tree and shrub species.
- Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for the raptors occurring in the area. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- The high-risk sections of the power line from the Solar Park should be marked with suitable anti-collision marking devices on earth wires as per Eskom guidelines.
- Report all incidences of collisions of birds with panels.
- Speed limit of 30 km/h on site to avoid collisions with night birds and twilight active birds.
- Panels should be tilted towards the vertical when not in use
- Regular monitoring of powerlines must be done to detect bird carcasses, to enable the identification of any areas of high impact to be marked with bird diverters.

- Solid waste must be kept in animal proof waste bins.
- A monitoring program should be compiled and implemented to ensure that the sewage treatment system is functioning properly and that the treated wastewater conforms to the standards set by the Department of Water and Sanitation.
- Staff members should be discouraged from attempting to catch or kill any wildlife for use as food, pets or to feed any wild animals.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998.
- Lighting at night should be kept to a minimum. Use downward directed lights.
- The impact on the flying invertebrates will be minimized through the use of sodium vapour (yellow) lights as outside lighting.

10.2.7 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

Buildings and the solar modules have a visual impact to surrounding properties and lights at night can be a nuisance.

Project Phase	Impact: Visual disturbance								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Buildings& panels	Visual	Low	High	Low-Medium	High	High	Low-Medium	Medium
	Lights	Visual	Low	Medium	Low-medium	Medium-high	High	Low-Medium	Medium
Operation	Buildings and panels	Visual	Medium	High	Medium	High	High	Low-Medium	Medium
	Lights	Nuisance	Low	High	Low-medium	Medium-High	High	Low-Medium	Medium
	Electrical lines	Visual	Low	High	Low	High	High	Low-Medium	Low-Medium
Cumulative Impacts	Increased visibility of another solar park in the area	Increased visual intrusion and nuisance	Medium-High	Medium	Medium	Low-Medium	High	Low-Medium	Medium

Mitigation measures

- Only the footprint and a small “construction buffer zone” around proposed components are exposed and natural occurring vegetation, should be retained.
- Revegetate bare areas with vegetation that occur naturally in the area.
- Ensuring that cut to fill areas (if any) are revegetated with indigenous fynbos species that relate to the original vegetation types, as soon as possible after the establishment of terraces/roads/parking areas.
- Structures should be painted to mimic the hues of existing vegetation, specifically the warehouses, workshops and control buildings associated with the substation.

- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond immediate surrounds of project site and aimed away from roads. Minimise lighting to security lighting.
- Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site.
- Ensure the perimeter fence is 'see through' and its colour blends in with the environment.
- Minimise number of light fixtures to the bare minimum and connecting these lights to motion sensors in order to limit light pollution.
- A video-surveillance system using infrared or microwave video cameras, which do not need a switched-on lighting system, is recommended.
- Construction camp areas should either be screened or positioned in areas where they would be less visible from human settlements and main roads.
- Cumulative impacts will be low-medium as it is possible to mitigate the visual impact at New Hope 3 Solar Park successfully as a result of the natural characteristics of the area.

10.2.8 SAFETY, SECURITY AND FIRE HAZARDS

Construction phase

Construction activities such as excavating of foundations and trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site further increases the risk of injury. The activities of construction personnel on site may contribute to an increase in the level of crime in the area and may also contribute to an increased fire risk.

Operational phase

Fires and criminal activities pose a significant risk during the operation of the development.

Project phase	Impact: Safety, security and fire hazards								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Construction activities – excavation of foundations, trenches etc.	Loss or injury to human life	Medium	Medium-high	Low	High	Medium	Low	Medium
	Security	Crime	Medium	Medium-high	Low-medium	Medium	Medium-high	Low - medium	Medium
	Fire hazards	Loss of human life and construction equipment etc.	High	Medium-high	Medium	Low	Low-Medium	Low-Medium	Medium
Operation	Security	Crime	Medium	High	Medium	Medium	Medium-high	Low-Medium	Medium
	Fire hazards	Loss of human life, bio-diversity, buildings, infrastructure etc.	High	High	Medium -High	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 -High	Low	Low	Low	Medium

Mitigation measures

- The Contractor shall conform to the Occupational Health and Safety act (Act 85 of 1993) and regulations applicable. The Act requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Open trenches or excavations must be marked with danger tape or safety netting and must be filled and compacted as soon as possible.
- Number of construction workers to stay on site should be limited to the minimum.
- Proper access control (I.D. cards) should be use to ensure no unauthorised entry.
- No solid waste or vegetation may be burnt on the premises or surrounding areas.
- Firebreaks should comply with the National Veldt and Forest Fire Act, 1998 (Chapter 4: Duty to prepare and maintain firebreaks).
- Fire extinguishers and fire-fighting equipment must be available.
- A fence should be constructed along the boundary of the development.
- Cumulative impacts of impact can be successfully mitigated if managed properly.

10.2.9 TRAFFIC AND ROAD SAFETY

Construction phase

Trip generation during the construction phase will be much higher than during operational phase. It is assumed that construction will take 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

During the operational phase, the facility will be managed by staff supported by admin and maintenance personnel. These are extremely low traffic volumes (<50vph) that will have an insignificant impact on the road network surrounding the proposed development. No road improvements will be required at the main road intersections.

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
Operation	Safety & Security	Crime	Medium	High	Medium	Medium	Medium-high	Low-Medium	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.

10.2.10 SOCIO-ECONOMIC IMPACT

Construction phase

The construction and operation phases of the development will have a positive impact on the socio-economic environment of beneficiary communities through employment opportunities and training and skills development.

Operational phase

A number of permanent jobs will be created for local people during this phase.

The local communities were identified for the purpose of entering into a partnership for the Project, as required by the rules of the REIPP Procurement programme.

Project phase	Impact: Job creation								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Construction	Promotion of Solar Energy Value Chain	Growth in local industry	Low-Medium +	Medium +	High-+	Low +	Medium +	N/A	Low-Medium +
	Job creation and skills development	Job Creation	Low +	Medium +	Medium-+	Low +	High +	N/A	Low +
Operation	Job creation and skills development	Job Creation and skills development	High +	High +	Medium-high +	High +	High +	N/A	High +
	Contribution to National Electricity grid	Reducing the need for load shedding	High +	High +	high +	High +	High +	N/A	High +
	Local Community development	Local Community development	High +	High +	high +	High +	High +	N/A	High +
	Capital Investment	Foreign investment	High +	High +	high +	High +	High +	N/A	High +
	Lower tariffs	Reduction in inflationary pressure	High +	High +	high +	High +	High +	N/A	High +
Cumulative impacts	Increased potential for job creation and skills development.	Increased potential for local Community development	High +	High +	high +	High +	High +	N/A	High +

Mitigation measures

- Risk of Vandalism is an impact which is potentially negative, considering the high value of solar PV panels. Mitigation measures will be required in the form of equipment design and on-site security.
- Appropriate security and workplace safety protocols that the main contractor and all subcontractors should adhere to, must be in place.
- Mitigation measures proposed by specialist consultants must be implemented.
- During the construction and operational phases, jobs must be created for unemployed local people and skills must be transferred to them.
- Where viable, the work must be executed in a labour-intensive manner to create as many jobs as possible.
- The cumulative impact of this impact can just be positive. As one of the poorest provinces in South Africa, the Northern Province is definitely in need of more job opportunities.

10.3 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS AND RISKS

Impacts with a rating of Medium-high or High are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment, the following impacts were regarded as potentially significant impacts:

i. Soil erosion
ii. Road Safety
iii. Job creation (Positive impact)

These impacts will now briefly be discussed.

10.3.1 CUMULATIVE IMPACTS

i. The area does not have a good cover of vegetation and erosion by wind and water can lead to cumulative losses of soil in the area.
ii. The vertical and horizontal road alignment could affect road safety in terms of intersection and stopping sight distances. These effects could result in vehicle accidents at intersections with an increase in vehicles to the area.
iii. Job creation will be cumulative once the project is implemented.

10.3.2 NATURE OF IMPACT

i. Impact could result in a loss of a natural resource (soils).
ii. Impact could endanger the safety of people living and walking in the area, as a result of sight distances at proposed access intersection.
iii. Local communities will benefit in various ways, including job opportunities, skills development and other projects.

10.3.3 EXTENT AND DURATION OF IMPACT

i. The extent is local, and the duration is permanent.
ii. The extent local at the proposed development access and duration is for the life of the development.
iii. Extent is local and regional, and the duration is for the life of the development.

10.3.4 PROBABILITY OF OCCURRENCE

i. The probability is possible.
ii. The probability is highly likely
iii. The probability of occurrence is high.

10.3.5 DEGREE TO WHICH IMPACT CAN BE REVERSED

i. Impact is non-reversible.
ii. Insufficient sight distances could lead to fatal accident
iii. Impact should not be reversed although reversible.

10.3.6 DEGREE TO WHICH IMPACT CAN CAUSE IRREPLACEABLE LOSS OF RESOURCE

i. If this impact is not mitigated, it can lead to an irreplaceable loss of a resource.
ii. If this impact is not mitigated, it can lead to an irreplaceable loss of a resources and human lives.
iii. This impact will not lead to an irreplaceable loss of any resources.

10.3.7 DEGREE TO WHICH IMPACT CAN BE MITIGATED

i. Successful mitigation is possible.
ii. Successful mitigation is possible if intersection sight distances for access at intersection is complied with.
iii. This impact will not lead to an irreplaceable loss of any resources.

11 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:

- Visual impacts
- Soil erosion (Wind and water)
- Impact on biodiversity (bird collisions)
- Agricultural land availability
- Archaeological sites
- Paleontological finds
- Safety at intersection at access

SPECIALIST	FINDINGS	RECOMMENDATIONS
Landscape Architect: Visual Impacts	The solar park 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.	1. Retain as much of the existing vegetation as possible. 2. Where vegetation is cleared, a rehabilitation plan should be implemented. This should be done in conjunction with the Vegetation, Visual Impact and any other relevant specialists. 3. Careful placement of new or transplanted vegetation should be planted in areas relevant to VSR site lines. 4. Refrain from causing 'light spillage' beyond the construction camp by installing light fixtures with directional illumination. 5. Keep lighting to a minimum by installing low-level bollard type lights instead of post top lights along walkways between buildings. 6. Where possible avoid high flood lights, and instead use lower locally lit installations. 7. In general, lighting should be carefully directed and only be used where absolutely necessary 8. Where possible use earthy tones to greys with a toned-down hue, instead of whites and creams, as such combinations are recessive to the eye and tend to be slightly less noticed. Do not keep to a uniform colour but break up the components with slightly different colour tone
Soil Specialist: Soil Potential assessment	Shallow and sandy nature of soils and arid climate makes the potential to cultivate crops under arable conditions basically impossible, considering the sandy soils' low water holding capacity, which is unsuitable for arable agriculture. The site is not suitable for arable agriculture due to its physical characteristics.	1. The area of disturbance should be kept to a minimum. 2. Construction will be immediately followed by rehabilitation and soils must be replaced in same sequence as excavated. 3. Soil surfaces will not be left open for lengthy periods to prevent erosion. 4. Storm water management measures will be implemented. 5. Where possible, construction will take place during the dry season. 6. Appropriate erosion and sediment control measures should be implemented. 7. Vegetation and soil should be retained in position for as long as possible. 8. Remove only the vegetation where essential for the continuation of construction of the solar plants. 9. Do not allow any disturbance to adjoining natural vegetation cover or soils. 10. Any alien invasive plants that have grown up on disturbed areas are to be removed before reinstating topsoil. 11. All compacted areas are to be ripped/scarified (along contour) to a depth of 150 mm prior to the replacement of topsoil.

Archaeologist: Archaeology and graves	The landscape around the project area is primarily well known for the occurrence of Earlier and Middle Stone Age occurrences as well as a Colonial Frontier. Wide-spread scatters of Stone Age artefacts were documented across the project footprint areas in medium to low densities, often along eroded calcrete surfaces and around quartzite outcrops. Most of the artefacts are probably Middle Stone Age (MSA) lithics such as blades, scrapers, chunks and cores produced on quartzite. Single possible Later Stone Age (LSA) microlithic tools were noted.	1. Monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. 2. Application for a permit from the relevant heritage authorities prior to destruction of the heritage resources. 3. It is also recommended that the general landscape at the site, be monitored by an informed ECO to avoid the destruction of previously undetected heritage remains.
Paleontological specialist	It is unlikely that fossils will be recovered as a result of the proposed development	1. If fossils are uncovered in the unconsolidated deposits of the Gordonia Formation during construction, the developer must immediately call a qualified paleontologist to assess the situation and, if necessary, undertake excavation of the fossils.
Avifauna specialist: Impact on biodiversity (bird collisions)	• From an avifaunal perspective, the proposed PV solar parks can be given approval for development. • This assessment is based on: • Extensive surrounding (regional) cover of similar, untransformed, Nama karoo habitats • Low biodiversity, and extremely low number, of birds seen, despite the richness of grasshoppers available • Very small number of threatened species known to occur on N'Rougaszuid • The low cumulative effect if powerlines are marked with bird diverters. • **The solar panels will provide shade and raised vantage points both features in short supply under natural conditions. The panels will be raised off the ground so there will be continued access to foraging areas for passerines, as well in the ground between solar rows**	1. Collision risks can be mitigated by careful siting of powerlines 2. Provision of bird diverters on the powerlines

Ecological specialist	• One red data species was documented during the surveys on site. No further monitoring or follow-up surveys is recommended. • Protected tree species occur in the area. • Alien invasive and exotic plant species were recorded on the study area. • Natural vegetation removal should be kept to a minimum during any future construction activities and only vegetation on the footprint areas should be removed. The unnecessary impact on the surrounding vegetation types should be avoided as far as possible. • The impact on the vegetation of the larger area would be medium. • The proposed development site is in ONA (Other natural Areas) and does not fall in any CBA of ESA's. • A number of fauna species included in the IUCN red data lists can potentially be found in the study area. Recommendations and mitigating measures need to be implemented to ensure the survival of these species other fauna habitats and feeding grounds. The impact of the proposed development on the red data and other mammal species will mostly have a medium to low probability • Provided that the proposed development is consistent with the sensitivity map, guidelines stipulated and provided by Cape Nature and take all the mitigation measures into consideration stipulated in this report, the planned development can be supported.	1. A permit should be obtained from the authorities before any protected plants are eradicated. These plants should form part of a rescue and relocation programme should the development activities impact on populations. 2. Detailed species rescue, relocation and re-introduction plan must be implemented by a qualified person before any disturbance commence. 3. Identify suitable translocation areas for the protected plants 4. Proper habitat suitability assessments before reintroductions to reduce the risk of mortalities in both source and destination populations; 5. Compile a Protected Plant policy for the project area. 6. Mitigation measures and bi-annual monitoring should be implemented should the development be approved. 7. Where trenches pose a safety risk, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. 8. No animals may be poached during the construction of the solar park. 9. Do not feed any wild animals on site; 10. Waste bins and foodstuffs should be made scavenger proof; 11. Roads in the area should be designed without pavements to allow for the movement of small mammals; 12. Monitoring of the environmental aspects should be done over the longer term to ensure that impacts are limited to a minimum during the construction and operational phases.

12 ENVIRONMENTAL IMPACT STATEMENT

12.1 SUMMARY KEY FINDINGS OF THE EIA

It can be concluded that there will be environmental impacts as a result of the proposed development of the New Hope 3 PV Solar facility. 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 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.

14 ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT BY THE EAP OR SPECIALISTS WHICH ARE TO BE INCLUDED AS CONDITIONS OF AUTHORISATION

- Archaeological discoveries:
  Destruction permits from SAHRA to be obtained before construction commences.
  If anything of archaeological/paleontological significance is found, the archaeologist as well as HWC must be notified immediately.
  Strict monitoring should be done during the construction phase.
- Eskom-approved; bird friendly devices must be attached to the powerlines to avoid bird collisions.
- Protected plants on site – permit applications must be in place for all protected plants from the various applicable authorities and departments.
- An ecologist should be appointed to assist with permit applications as well as assistance on site before construction commences during ground truthing.

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 time.

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 Impact Assessment Report.

Conditions to be included in the environmental authorization

- 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 though removal and destroying the plants.
- Only vegetation inside the development footprint may be removed for construction.
- The development must stay clear of the identified heritage features found on the proposed site.
- Should any previously undetected surface of subsurface paleontological or archaeological material be exposed during development activities, all activities should be suspended, and the archaeological specialist should be notified immediately.

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 New Hope 3 Solar Park 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…20/05/2021…….

19 BIBLIOGRAPHY

DEAT, 1998. *Guideline Document on the EIA Regulations implementation of sections 21, 22 and 26 of the Environment Act*, Government Printer, Pretoria.

DEAT, 1999. *Environmental Management Framework for the Northern Province.* University of Pretoria, Pretoria.

DEAT, 2002. *Impact Significance, Integrated Environmental Management, Information Series 5, Department of Environmental Affairs and Tourism,* Pretoria

DUINKER, P.N. and BEANLANDS, G.E. 1986. The significance of environmental impacts: and exploration of the concept, *Journal of Environmental Management*, 10(1), 1-10 in DEAT, (2002).

MIDGLEY, D.C. PITMAN, W.V. AND MIDDLETON, B.J.1994. First Edition *Surface water resources of South Africa 1990, Volume VI, Drainage regions U,V,W,X, Eastern Escarpment.* WRC Report No 298/6.2/94, Pretoria.

PLOMP, H. 2004. *A process for assessing and evaluating environmental management risk and significance in a gold mining company.* Conference Papers-Annual National Conference of the International Association for Impact Assessment: South African Affiliate.

THOMPSON, M.A., 1988. *The determination of Impact Significance in Environmental Impact Assessment*, Unpublished Master of Science Thesis, University of Manchester, UK.

THOMPSON, M.A., 1990. Determining Impact significance in EIA: a review of 24 methodologies, *Journal of Environmental Management*, 30, 235-250.