

KEIMOES KEREN ENERGY SOLAR PLANT

(Erf 666 Keimoes)



FINAL BASIC ASSESSMENT REPORT

DEA Ref no: 12/12/20/2518 (DEA/EIA/0000599/2011)

May 2012

KEREN ENERGY KEIMOES SOLAR PLANT

ERF 666 KEIMOES

APPLICATION FORM FOR AUTHORIZATION IN TERMS OF THE NATIONAL
ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998), AS
AMENDED AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS,
2010

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DEA Ref no: 12/12/20/2518 (DEA/EIA/0000599/2011)



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

REPORT: KEREN KEIMOES: FINAL

(For official use only)

File Reference Number:

Application Number:

Date Received:

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
3. Where applicable **tick** the boxes that are applicable in the report.
4. An incomplete report may be returned to the applicant for revision.
5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
6. This report must be handed in at offices of the relevant competent authority as determined by each authority.
7. No faxed or e-mailed reports will be accepted.
8. The report must be compiled by an independent environmental assessment practitioner.
9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

YES	
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If YES, please complete the form entitled "Details of specialist and declaration of interest" for appointment of a specialist for each specialist thus appointed:

See Individual Declarations within each Specialist Assessments/Reports attached in Appendix D

Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail:

Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

1.1 REASON FOR APPLICATION

This application has been made in terms of the need to expand electricity generation capacity in South Africa, based on national policy and is informed by on-going strategic planning undertaken by the Department of Energy (DoE).

The DoE commissioned a National Integrated Resource Plan (IRP) in order to provide a long-term, cost-effective resource plan for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social, and economic policies in response to the National Energy Policy's objective relating to affordable energy services,. The planning horizon for the study was from 2010 to 2030.

The objective of the IRP is to determine the least-cost supply option for the country, provide information on the opportunities for investment into new power generating projects, and evaluate the security of supply. The long-term electricity planning goal is to ensure sustainable development considering technical constraints, economic constraints, social constraints, and externalities.

A target of 17,8 GW of renewables by 2030 has been set by the DoE within the Integrated Resource Plan (IRP) 2010, to be produced mainly from wind, solar, biomass and smallscale hydro (with wind and solar comprising the bulk of the power generation capacity). This amounts to approximately 42% of the total estimated electricity generation capacity by 2030 being from renewables. This translates to approximately 9% of the power generated being produced by renewable energy. This is however dependent on the assumed learning rates and associated cost reductions for renewable options.

Keren Energy Keimoes (Pty) Ltd is proposing the establishment of a Concentrating Photovoltaic (CPV) facility for the purpose of commercial electricity generation on an identified site located in the north-eastern part of Keimoes in the Northern Cape Province (refer to Figures 1 and 2). The proposed project will have a maximum generating capacity of 10 MW which will be evacuated into the national electricity grid as part of a power purchase agreement with Eskom and the South African Treasury. The 20 Ha site could also be used for conventional PV electricity generation, but for a reduced supply of ~5 MW.

The Northern Cape region is preferred for solar energy development by virtue of its annual direct solar irradiation values. From a local perspective, the site is preferred due to its suitable topography (i.e. in terms of slope),

proximity to a grid connection point (i.e. for the purpose of electricity evacuation), site access (i.e. to facilitate the movement of machinery during the construction phase), and by the extent of the site (a large area of >1000 Ha was available for the eventual choosing of the 20 Ha site).

The potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Basic Assessment Report.

This report has been compiled in accordance with the requirements of the EIA Regulations and includes details of the activity description; the site, area and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner.

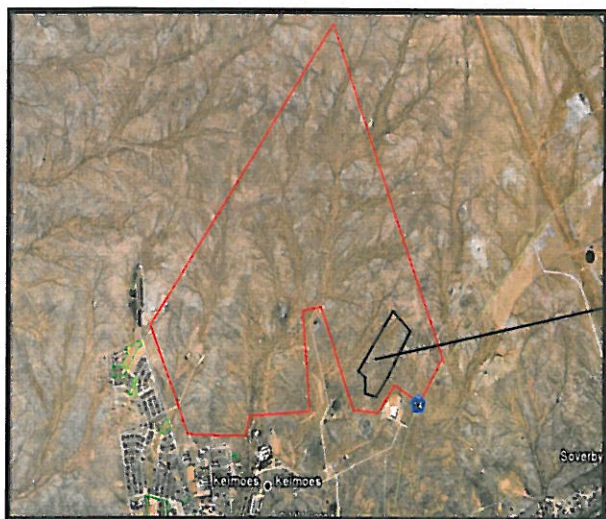


Figure 1 Investigation Area in NE Keimoes (red lines) With Site marked with black lines

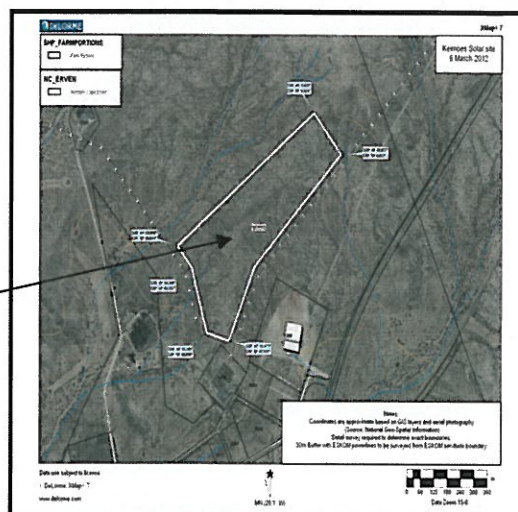
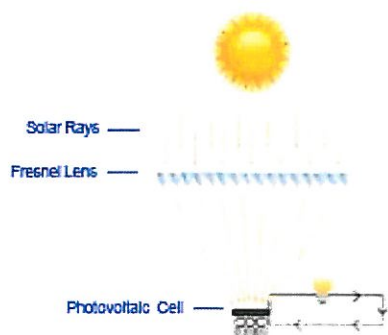


Figure 2 Site Location inside Investigation Area (white lines)

1.2 PROJECT DESCRIPTION

Concentrating photovoltaic (CPV) systems convert light energy into electricity in the same way conventional PV technology does. The difference lies in the addition of an optical system that focuses a large area of sunlight onto each cell for providing reduced energy costs and improved manufacturability and reliability.



Concentrated Photovoltaic (CPV) Figure illustrating CPV methodology

Optical System:

CPV technology utilizes an optical element to collect the sun's light, and concentrate it at between 250-1000 suns (times) onto high efficiency solar cells that are 1 square centimeter in size. The basic concept is to replace expensive solar cell material with optical elements created from less expensive, readily available materials such as glass. In the example to the left SolFocus uses a primary mirror to collect the sunlight, focuses it on a secondary mirror, and then down the optical rod onto the high efficiency III-V cell.

High Efficiency Cells:

The cells used in CPV systems are over twice the efficiency of traditional silicon-based PV cells, approaching 40% compared with 15% - 19% for traditional silicon. The use of these cells provides much higher energy yield with less photovoltaic material.

Tracking System:

CPV systems must track the sun in order to ensure the focusing of sunlight on the multi-junction cells.

CPV stands for concentrator photovoltaics. A concentrating photovoltaic (CPV) system converts light energy into electrical energy in the same way that conventional photovoltaic technology does. The difference in the technologies lies in the addition of an optical system that focuses a large area of sunlight onto each cell.

Solar concentrators of all varieties may be used with the base technology either being refractive or reflective. The other primary difference is in the cells. Traditional PV systems utilize large amounts of silicon solar cells. In contrast, CPV systems utilize a small amount of high efficiency solar cell material. These cells used in high concentration CPV systems are referred to as multijunction or III-V cells. The CPV panels are mounted on to keep the focal point on the cell as the sun moves across the sky. CPV is sometimes confused with CSP – Concentrating Solar Power.

Whereas PV converts light energy directly to electricity, CSP systems utilize heat from the system to generate power in a traditional steam engine power plant environment.

Description of Facilities to be constructed

The proposed facilities include an array of integrated high concentration photovoltaic (IHCPV) systems, which would generate approximately 10 megawatts (MW). The site would include approximately 140 units. Each system includes a 6m-tall vertical pedestal with five 15m-long, 3.2m-wide photovoltaic (PV) modules, which are mounted across a 17m-wide horizontal tube installed at the top of the pedestal. Each system typically has a 30m tracker clearance zone.

The solar arrays would be circumscribed by a perimeter fire access road. In addition to the solar arrays, the project proposes two to four concrete transformer pads, a fenced construction staging area, a maintenance shed, and a switch panel for connection to the power grid. The project site would be accessed via an existing access road.

Construction of Transport Infrastructure (access roads etc)

Access is to be taken off the existing road to the Red Sun Dried Fruit packing store

Description of Construction, Operation and Maintenance

Construction

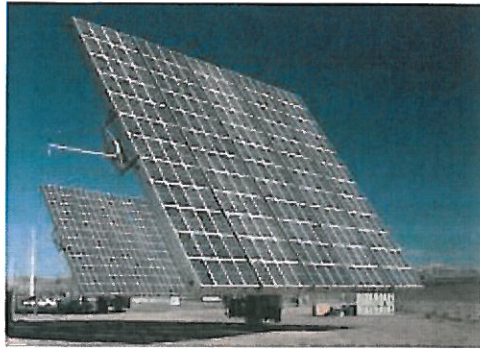


Fig 3 A Single CPV Unit



Fig 4 Typical CPV Facility Layout

Pedestals

The pedestals are a 1 metre diameter hollow steel tube supports for the solar equipment that is embedded into the ground. The height of the pedestal would be approximately 6 metres above ground level. The embedment depth of the pedestal would depend on the quality of the site soils. A drilling company would excavate a one to one and a half-metre hole typically ranging from six to seven metres in depth and place 20cm of compacted gravel beneath the pedestal. The hole would be backfilled with concrete around the pedestal to hold it in place. A concrete footing holder would be installed above the hole and imbedded 20cm in the ground. A 1 metre diameter plate would be welded to the bottom. The ground surrounding the pedestal would be leveled and any excess dirt would be removed.

Depending on site soils, a reinforced steel cage may be installed for additional support. After drilling, the pedestal is positioned in the hole and concrete is poured around it to hold it in place.






Excavate & Install Pedestal	Install Drive Head	Add Service Cage	Lift MegaModules	Completed Unit
				
Foundation for Unit	Allows Motion to Follow Sun	Electrical & Hydraulic	CPV Modules Added	Ready to Produce Power

Figure 5 Illustrations of Unit components

Ground Assembly

Materials for the solar arrays would be individually delivered to the site for assembly. The solar panels are attached to a large structural support, called a torque tube, which is horizontally positioned to the drive head that in turn is assembled on top of the pedestal. Smaller attachment pieces, called outriggers, on which the solar panels connect, must be installed on the torque tube before it can be placed on the pedestal; this operation would include ground pre-assembly of the outriggers onto the torque tube.

Install Drive Head

The drive head is a mechanical subassembly installed on top of the pedestal. The drive head provides the ability to maneuver the solar panels laterally (side-to-side) and vertically so that they are always perpendicular to the sun's rays. The drive head weighs approximately 3000 kgs and would be set in place using a rough terrain crane or boom forklift. Laborers in man-lifts would align and bolt the drive head to the pedestal. The elevation actuator can be installed at this point of the installation or at a later date before the installation of the torque tube by lifting and placing the elevation actuator onto the elevation actuator mounting blocks.

Install Torque Tube

The torque tube is a 1m-diameter hollow steel tube that is placed horizontally on the drive head. The tube measures 17 metres in length. Three to four torque tubes can arrive on a single truck. It includes the outriggers on which the solar panels attach. The torque tube weighs in excess of 7000 kgs and will be set in place using a rough terrain crane. It will be set on top of the pedestal and welded in place. The tube has two pin connections to the drive head and one to an elevation actuator, which is the hydraulic component on the drive head.

Solar Panels

The solar panels fasten to the outriggers. There are seven modules per system and their approximate dimensions are 3.2 metres wide by 15 metres long. Each module weighs 1700 kgs and is connected to the supports (outriggers) on the torque tube via four bolt connections per outrigger. The solar panels would be "flown" in place using a crane and attached by labourers in man lifts. These modules would arrive by truck. Four modules can be transported per truck.

Install Cages and Encoders

The main infrastructure to the solar unit is complete after the panels are installed on the torque tube; the remaining installation includes connection of the inverter, hydraulic system, and support caging. The support caging, also called the service module, consists of a steel lattice that supports from the drive head and nearly extends to the ground. The hydraulic system, which includes an encoder that controls module movement, and the inverter are installed on the service module. A small labour crew using a forklift and a man lift would install the service module and ancillary components. The support caging would be installed at the base of the pedestal. Multiple cages can be transported on a single truck.

Site Electrical System

Development of the electrical systems would take place in conjunction with installation of the rest of the structures. In brief terms, it includes all electrical cabling and trenching (field trenching in and around the entire site where the units will be installed should take place after the installing the pedestals) that connects all solar units, collects the energy from them, and then routes it to a point of connection with the utility infrastructure system.

Access Road and Accessory Structures

This solar facility would include an unpaved road with vehicular access to each individual system. In addition, concrete transformer pads for each row of solar panels, a switch panel for connection to the power grid, and a 3m x 6m control shed would be constructed on site.

Personnel

Approximately 30 people are envisaged to be required during the construction phase, which is expected to last for 6-8 months. Positions will be filled by mostly local labour from the area where possible and are not to be housed onsite.

Operations

The proposed solar arrays would track the sun and be operated either automatically or remotely. During periods of high wind or when undergoing maintenance, the solar arrays would be shifted to a stand-by mode, where the panels are placed in a horizontal position (facing upward and parallel to the ground).

Personnel

Approximately 10 workers (7 direct and 3 indirect) are envisaged to be required during the operational phase of the proposed solar development. The lifespan of the development is expected to last for +25 years. Positions will be filled by mostly local labour from the area and are not to be housed onsite.

Maintenance

Maintenance activities may entail replacing non-functioning cells or other mechanical parts essential to the operation of the arrays. However, these trips would occur on an as-needed basis. Maintenance visits may not occur immediately after a cell ceases to function or a lense becomes damaged, but rather the Project Applicant would determine whether the benefit of the maintenance trip outweighed the cost of that additional trip. It is assumed, however, that maintenance visits would occur four to six times per year. Individuals responsible for maintenance activities would most likely commute from regional offices or nearby operating facilities.

Since sunlight can be absorbed by dust and other impurities on the surface of the photovoltaic panels, washings would periodically be needed. An estimated 1000 cubic metres of water per year would be required for cleaning the photovoltaic panels.

Decommissioning:

The solar energy facility is expected to have a lifespan of +25 years. The facility would only be decommissioned and the site rehabilitated once it has reached the end of its economic life. It would most likely be due to the enhancement of technology/infrastructure in the future of renewable energy. Recycling will be done as far as possible.

2. FEASIBLE AND REASONABLE ALTERNATIVES

“**alternatives**”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) the design or layout of the activity;
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Paragraphs 3 – 13 below should be completed for each alternative.

SITE ALTERNATIVE S1

Erf 666, Keimoos was identified as a suitable option for the proposed development. This investigation area is depicted in Figure 1. The property belongs to the Kai! Garib Municipality and comprises of just under 500 ha in total. The nature of the site required for renewable energy generation projects often means that assessment of site alternatives is not possible. The whole Erf 666 Keimoos was taken into account and the most suitable portion of 20 Ha was identified in regards to the following specifications:

- **Size:** 20 ha
- **Landowner consent:** Kai! Garib Municipality has provided consent
- **Available access:** The site can be accessed from an existing road to the Red Sun Fruit Packshed and Oasis Substation. However, additional temporary access roads will have to be established on site.
- **Locality to nearest electricity grid for power evacuation:** Keimoos sub-station is located approximately 100m from the site.
- **Topography:** The proposed site is located on a relative flat, slightly undulating natural area.
- **Agricultural Potential:** The site was specifically chosen due to an area with low Agricultural Potential.
- **Biodiversity:** The site itself was chosen for least environmental impact: primarily the Biodiversity Assessment, which shows the site to avoid sensitive or protected species such as *Acacia erioloba*.
- **Archaeological:** The site was specifically chosen with minimal impact on Archaeological artefacts
- **Visual:** Due to the remoteness and site location away from residents and other the visual impact of the development will be minimal.

ACTIVITY ALTERNATIVE: USE OF THE 20 HA SITE FOR PV FACILITY

If the 20 Ha site is to utilise the conventional PV technology (for ~7 MW), the overall required components will be the same (arrays, inverters etc), but the units will be close to the ground and on fixed supports.

CPV is therefore more favourable over PV by means of its higher improved efficiency of 10 MW.

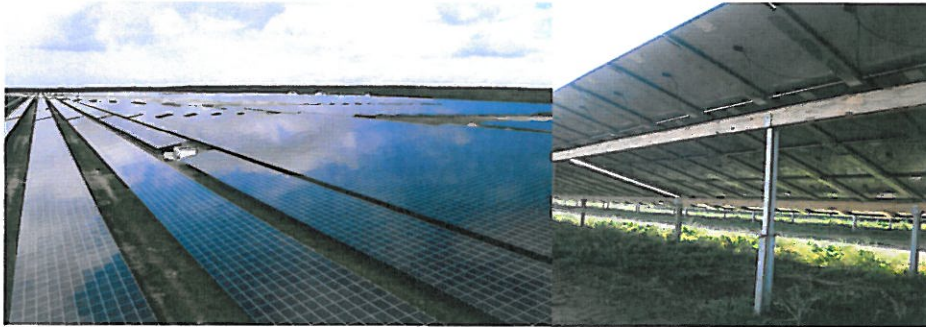


Fig 6 Illustration of conventional PV arrays, low to the ground on fixed supports

LAYOUT ALTERNATIVES:

The preferred layout as discussed throughout this report has considered environmental sensitivities. As such the primary preferred layout has avoided these areas as far as possible.

OPERATIONAL ALTERNATIVES:

No feasible operating alternatives are applicable to the proposed solar energy facility.

3. ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

List alternative sites, if applicable.

	Latitude (S):		Longitude (E):	
Alternative:				
Alternative S1 ¹ (preferred or only site alternative)	28°	41'	20°	59'
Alternative S2 (if any)	o	'	o	'
Alternative S3 (if any)	o	'	o	'

Alternative S1 is the same 20 Ha site for both technological alternatives

In the case of linear activities: NOT APPLICABLE

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	Size of the activity:
Alternative A1 ² (preferred activity alternative)	17 Ha
Alternative A2 (if any)	17Ha
Alternative A3 (if any)	m ²

Alternative A1 is for a Concentrating Photovoltaic (CPV) facility generating 10 MW

Alternative A2 is for a Photovoltaic (PV) facility generating ~5 MW

or, for linear activities: NOT APPLICABLE

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	Size of the site/servitude:
Alternative A1 (preferred activity alternative)	20 Ha
Alternative A2 (if any)	20 Ha
Alternative A3 (if any)	m ²

5. SITE ACCESS

Does ready access to the site exist?

If NO, what is the distance over which a new access road will be built

YES	
m	

¹ "Alternative S.." refer to site alternatives.

² "Alternative A.." refer to activity, process, technology or other alternatives.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as **Appendix A** to this document.

The site or route plans must indicate the following:

- 6.1 the scale of the plan which must be at least a scale of 1:500;
- 6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 the exact position of each element of the application as well as any other structures on the site;
- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all trees and shrubs taller than 1.8 metres;
- 6.7 walls and fencing including details of the height and construction material;
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
 - rivers;
 - the 1:100 year flood line (where available or where it is required by DWA);
 - ridges;
 - cultural and historical features;
 - areas with indigenous vegetation (even if it is degraded or invested with alien species);
- 6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 6.11 the positions from where photographs of the site were taken.

7. SITE PHOTOGRAPHS See Appendix B

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

8. FACILITY ILLUSTRATION See Appendix C

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

9. ACTIVITY MOTIVATION

(see Socio-Economic Assessment, Appendix 4)

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R308.8 million
What is the expected yearly income that will be generated by or as a result of the activity?	R65 million pa
Will the activity contribute to service infrastructure?	NO
Is the activity a public amenity? (*no, but impact of facility is for public good)	NO*
How many new employment opportunities will be created in the development phase of the activity?	30 over 6-8 months
What is the expected value of the employment opportunities during the development phase?	R3 million (R2 million for 8 months)
What percentage of this will accrue to previously disadvantaged individuals?	40-45%
How many permanent new employment opportunities will be created during the operational phase of the activity?	10 7 direct 3 indirect
What is the expected current value of the employment opportunities during the first 10 years?	R8.7 million to R5,2
What percentage of this will accrue to previously disadvantaged individuals?	56% (R4.9 million)

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

NEED:		
1.	Was the relevant provincial planning department involved in the application? By means of the Land Use application	YES X
2.	Does the proposed land use fall within the relevant provincial planning framework? Refer to Desirability no 2 below.	YES X
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation: N/a	

DESIRABILITY:		
1.	Does the proposed land use / development fit the surrounding area? Yes, although site is located on town commonage it is amongst other industrial uses.	YES X
2.	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	YES X

<u>Northern Cape Provincial Spatial Development Strategy (NCSDS)</u>		
<ul style="list-style-type: none"> • Economies of emerging growth centres, i.e. Upington & Springbok, are diversified (balancing downscaling of export grapes and copper mines industries with growth prospects in non-traditional sectors i.e. energy generation) • Proximity of land reform sites to economic activities should be ideal as economic potential of land reform sites are inadequate as a source of economic livelihoods. Alternative energy generation enhances economic activity. 		

- Development Corridors and Special Resource Areas i.e. Orange River corridor (from Springbok through Upington to Kimberley) link the major economic centers in the province through established transport infrastructure. Alternative energy projects are examples of flagship economic development projects along transport/ development corridors and within special resource areas enhancing economic potential of development corridors.
- Stagnating Small Towns will lead to reconsideration of future service provision levels. Alternative energy generation can contribute to the local economy, making the provision of services worthwhile.

Kai !Garib Local Economic Development Plan (LED), 2008

- The Kai !Garib LED aims to alleviate poverty and reduce unemployment. A potential internal economic driver is the exploitation of the climate of the area for energy generation (sunshine), i.e. solar farming to enhance the economy and reduce unemployment.

3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it? Yes, impacts can be mitigated.	YES X
4.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation: N/a	
5.	Will the proposed land use / development impact on the sense of place? Not according to visual impact assessment. Land uses in surroundings are mixed and mainly industrial.	NO X
6.	Will the proposed land use / development set a precedent?	NO X
7.	Will any person's rights be affected by the proposed land use / development? No, not as far as can be established in preliminary socio economic assessment. Public participation is in progress for this DBAR: results will be reported	NO X
8.	Will the proposed land use / development compromise the "urban edge"? This type of land use is usually found outside an urban edge. In this specific case it is on the municipal commonage where there is an industrial node.	NO X
9.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation. N/a	

BENEFITS:

1.	Will the land use / development have any benefits for society in general?	YES X
2.	Explain: Carbon footprint will be reduced. People in general expect that the price of electricity will drop.	
3.	Will the land use / development have any benefits for the local communities where it will be located?	YES X
4.	Explain: Yes, but limited as local business will benefit when maintenance team visit Keimoos and local business will supply security services.	

10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
National Environmental Management Act (NEMA) (Act 107 of 1998, as amended)	Dept of Environmental Affairs (DEA) (National)	1998
National Heritage Resources Act (Act 84 of 1999)	SA Heritage Resources Agency (SAHRA)	1999
Land Use Planning Ordinance 15 of 1985	Northern Cape Planning	1985
Environmental Impact Assessment Guidelines	DEA	2010
NEM: Biodiversity Act (Act 10 of 2004)	DEA	2004

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES	
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If yes, what estimated quantity will be produced per month?

5-10 m ³

How will the construction solid waste be disposed of (describe)?

Packaging, paper, 'domestic' waste

Where will the construction solid waste be disposed of (describe)?

Registered municipal solid waste disposal facility
--

Will the activity produce solid waste during its operational phase?

	NO
--	----

If yes, what estimated quantity will be produced per month?

m ³

How will the solid waste be disposed of (describe)?

--

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

--

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?

	NO
--	----

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?

	NO
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If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

	NO
--	----

If yes, what estimated quantity will be produced per month?

m ³

Will the activity produce any effluent that will be treated and/or disposed of on site?

	NO
--	----

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?

	NO
--	----

If yes, provide the particulars of the facility:

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

--

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

	NO
--	----

If yes, is it controlled by any legislation of any sphere of government?

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

--

11(d) Generation of noise

Will the activity generate noise?

	NO
--	----

If yes, is it controlled by any legislation of any sphere of government?

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the noise in terms of type and level:

--

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

municipal	water board	groundwater	river, stream, dam or lake	other	the activity will not use water
------------------	-------------	-------------	----------------------------	-------	---------------------------------

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate

the volume that will be extracted per month:

75 000litres

Does the activity require a water use permit from the Department of Water Affairs?

	NO
--	----

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

13. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

NOT APPLICABLE: ENERGY GENERATION FACILITY
--

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No.
(e.g. A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

YES	NO
-----	----

If YES, please complete the form entitled "Details of specialist and declaration of interest"

SEE INDIVIDUAL DECLARATIONS IN SPECIALIST REPORTS IN APPENDIX D

for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

Property description/physical address:

KEIMOES ERF 666, on north eastern side of Keimoes west of the N14 national road

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

KEIMOES ERF 666

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:

Agriculture 1

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required?

YES	NO
-----	----

Must a building plan be submitted to the local authority?

YES	NO
-----	----

Locality map:

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site. (see Fig 5 of Biodiversity Assessment; Appendix D)

Alternative S1:

Flat	1:50	-	1:20	-	1:15 – 1:10	1:10	-	1:7,5 – 1:5	Steeper than
	1:20		1:15			1:7,5			1:5

TOPOGRAPHY: Biodiversity Assessment; Appendix D2

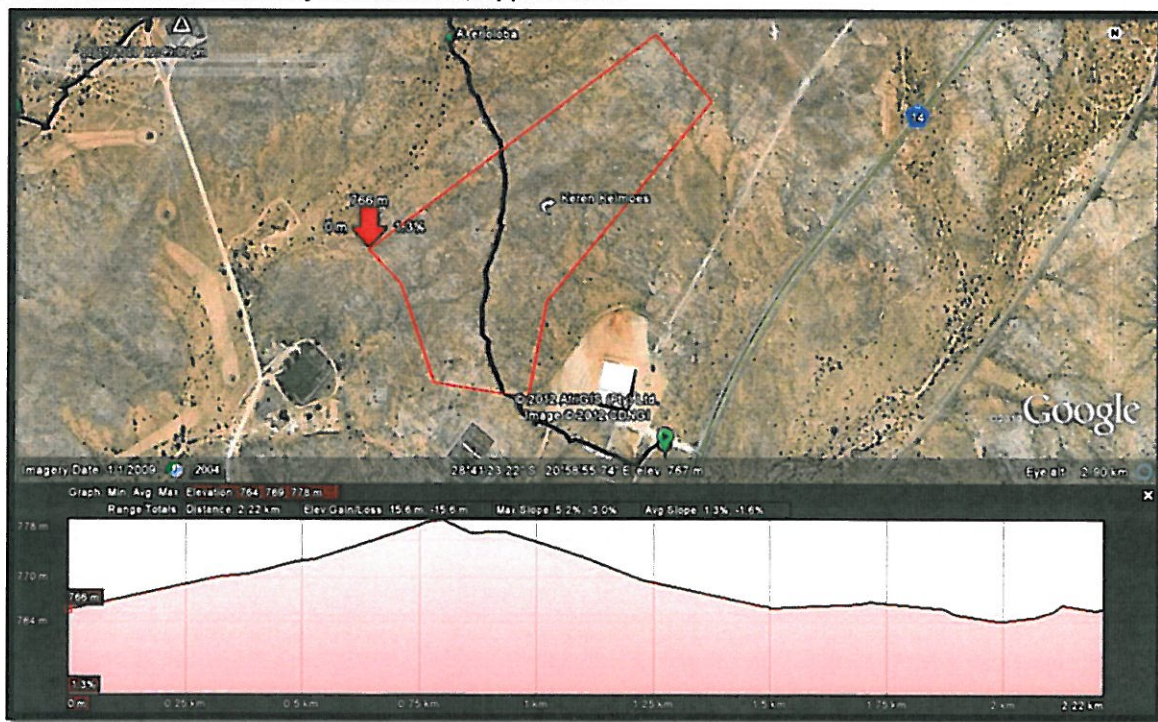


Figure 7: Google image indicating the slope following the boundary of the site (direction NW-NE-SE-SW etc).

Refer to: Biodiversity Assessment; Appendix D2.

The proposed final site is located on a relative flat area. The elevation data indicates an average slope of only 1.3% (with its highest point the north-east corner and its lowest point the south-west corner).

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline

2.2 Plateau

2.3 Side slope of hill/mountain

2.4 Closed valley

2.5 Open valley

2.6 Plain

2.7 Undulating plain / low hills

2.8 Dune

2.9 Seafront



Figure 8

Photograph across the site looking eastwards, showing minimal slope

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

GEOLOGY AND SOIL: Agricultural Assessment, Appendix D1

Land Type Soil Data:

The site falls into the Ag1 land type (Land Type Survey Staff, 1972 - 2006). Ag1 can be described as having predominantly shallow to moderately deep eutrophic soils (mainly red in colour) with extensive rock outcrops and rocky areas with occasional calcrete outcrops.

The land capability and land use of soils is exclusively extensive grazing due to climatic and soil constraints.

The agricultural potential of soils is very low potential due to the low rainfall (less than 100 mm per year) and shallow soils.



Figure 9 – Shallow and rocky soils on the site

Site survey soil data:

The soil survey confirmed the land type data. A soil map of the site was not produced as the soils on the site are very homogenous and distinct soil units could therefore not be delineated meaningfully. The soils on the site are predominantly rocky with rock outcrops occurring throughout.

Soils in drainage depressions are slightly deeper but the distribution is very limited. Due to the limitation of the soils and the climate the only land use is extensive grazing. Distinction between the soil zones is visible where the drainage features (thin) follow water flow paths through areas with rocky soils and outcrops. The pattern is typical dendritic as water that flows off exposed areas transports sediment into lower lying depressions. The soils in the depressions do not exhibit any signs of wetness but do exhibit signs of episodic deposition in the form of coarser and finer material stratification. Additionally, the soils do not exhibit distinct signs of illuviation of clays (therefore they are considered pedologically young soils) and are therefore consistent with soils of arid environments.



Figure 10 Alluvial soils in depressions

RIVERS AND DRAINAGE: Biodiversity Assessment: Appendix D2

Rivers maintain unique biotic resources and provide critical water supplies to people. South Africa's limited supplies of fresh water and irreplaceable biodiversity are very vulnerable to human mismanagement. Multiple environmental stressors, such as agricultural runoff, pollution and invasive species, threaten rivers that serve the world's population. River corridors are important channels for plant and animal species movement, because they link different valleys and mountain ranges. They are also important as a source of water for human use. Vegetation on riverbanks needs to be maintained in order for rivers themselves to remain healthy, thus the focus is not just on rivers themselves but on riverine corridors.

Various non-perennial or dry watercourses and drainage lines have been observed, especially to the north of the final solar site location (which has been chosen specifically to avoid these features). Towards the south-eastern side of the final proposed site location a small stream is still present, but the activities are not expected to irreversibly impact on these drainage channels. With care permanent impact could be fully negated.

AGRICULTURAL POTENTIAL: Agricultural Assessment, Appendix D1

The agricultural potential of the site is determined mainly by the climate in that the rainfall effectively excludes any form of crop production. Additionally, the soils are not suited to crop production under irrigation in their current state and will require significant physical preparation before irrigated land uses are considered. The costs of these physical measures vary between R 150 000 and R 250 000 per hectare depending the extent of blasting required to break large boulders and rock. The site is therefore only suited to extensive grazing with a very low carrying capacity.

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:	Alternative S2 (if any):	Alternative S3 (if any):
Shallow water table (less than 1.5m deep)	NO		
Dolomite, sinkhole or doline areas	NO		
Seasonally wet soils (often close to water bodies)	NO		
Unstable rocky slopes or steep slopes with loose soil	NO		
Dispersive soils (soils that dissolve in water)	NO		
Soils with high clay content (clay fraction more than 40%)	NO		
Any other unstable soil or geological feature	NO		
An area sensitive to erosion	NO		

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUND COVER

(See Biodiversity Assessment: Appendix D)

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition (sparse; grazed) ^E	Natural veld with scattered aliens ^E	Natural veld with heavy alien infestation ^E	Veld dominated by alien species ^E	Gardens
Sport field	Cultivated land	Paved surface	Building or other structure	Bare soil

If any of the boxes marked with an "E" is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

Botes (Appendix D) found that the vegetation of the site is grazed Bushmanland Arid Grassland, classified as "Least Threatened" in both the 2004 National Spatial Biodiversity Assessment (NSBA) and the National list of ecosystems that are threatened and in need of protection (2011, GN 1002, Dec 2011).

The sparse vegetation encountered conforms to that of Bushmanland Arid Grassland. Most of the larger study area was sparsely but fairly uniformly covered by the same vegetation composition and was also mostly associated with shallow soils in which rocky limestone outcrops were fairly frequently observed (Refer to Photo 1). The non-perennial streams, on the other hand, were mostly associated with deeper soils (red-yellow apedal soils) with denser, sometimes almost forming a thicket, stands of *Acacia mellifera*, in which *Acacia erioloba* was also frequently encountered (Refer to Photo 1).

The shallow soils (covering most of the proposed final location) support a distinct 2 stratum vegetation cover, with a grassy/shrub bottom layer and a short shrub/small tree over layer. The author did not spend time on the identification of the grass species (which include a number of *Stipagrostis* species etc.), but did make an effort to identify most of the shrub and tree species.

The grass bottom layer included a number of shrub species which includes: *Aptosimum sp.*, *Aloe sp.*, *Coton royenii*, *Erioccephalus cf. ambiguus*, *Euphorbia mauritanica*, *Thesium lineatum*, *Zygophyllum microphyllum*.

The top stratum was mostly dominated by *Acacia mellifera* (Swarthaak), and occasional individuals of *Boscia foetida subsp. foetida* and *Parkinsonia africana*, with mistletoe *Moquinella rubra* sometimes present in some of the trees or shrubs, while in the deeper sands along the dry river beds, *Acacia erioloba* are frequently (outside of the final proposed site). In some cases *Acacia mellifera* forms almost a thicket stand next to portions of the dry river beds. One individual of *Aloe cf pillansii* (Picture to the right) was also encountered to the north of final proposed solar site location (outside of the final proposed site).

Photo 1: General vegetation composition



Photo 2: Slightly denser vegetation next to stream



Endemic or Protected Species:

Endemic taxa which might be encountered include: *Dinteranthus pole-evansii*, *Larryleachia dinteri*, *L marlothii*, *Ruschia kenhardtensis*, *Lotononis oligocephala* and *Nemesia maxi*.

The following protected tree species in terms of the National Forest Act of 1998 (Act 84 of 1998) have a geographical distribution that may overlap with the broader study area.

SPECIES NAME	COMMON NAME	TREE NO.	DISTRIBUTION
<i>Acacia erioloba</i>	Camel Thorn Kameeldoring	168	In dry woodlands next to water courses, in arid areas with underground water and on deep Kalahari sand
<i>Acacia haematoxylon</i>	Grey Camel Thorn Vaalkameeldoring	169	In bushveld, usually on deep Kalahari sand between dunes or along dry watercourses.
<i>Boscia albitrunca</i>	Shepherds-tree Witgat/Matopie	130	Occurs in semi-desert and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils.

Invasive Alien Species:

Most probably because of the aridity of the area, invasive alien rates are generally very low for most of this area. Problem areas are usually associated with river systems and other wetland areas. None have been observed in the study area.

FAUNA: Biodiversity Assessment: Appendix D2

Mammal and bird species were not regarded, as the proposed activity should have very little permanent impact on these species. Small game is still expected and droppings have been observed. Some of the smaller game (e.g. klipspringers) found at the nearby Augrabies Falls National Park is also expected to still roam the larger area and surroundings of the proposed site.

At the nearby Augrabies Falls National Park, wildlife includes at least 46 mammal and 186 bird species, as well as a number of reptiles. Most show adaptations to the area's large temperature fluctuations – including smaller animals like slender mongooses, yellow mongooses, and rock dassies – which utilise what little shade there is, sheltering in burrows, rock crevices and fallen trees.

Larger mammals found at Augrabies include steenbok, springbok, gemsbok, kudu, eland and Hartmann's Mountain Zebra (*Equus hartmannae*). The giraffe found at Augrabies are said to be lighter in colour than those found in the regions to the east, allegedly as an adaptation to the extreme heat. One of the most common antelope is the klipspringer, pairs of which are often seen bounding across the rocks by keen-eyed walkers. The main mammalian predators found in Augrabies are black-backed jackals, caracals, bat-eared foxes, African wild cats and an elusive population of leopards.

One reptile here is of particular note: Broadley's flat lizard, locally known as the Augrabies flat lizard, is endemic to this area. It only occurs in an area that is within about 100km of the falls. This reptile is, however, not locally rare and on warm days, the brightly-coloured males can often be seen sparring and dancing for dominance.

Birds in the area includes: Augrabies the black stork and Verreaux's (black) eagles which both breed in the area, and also pygmy falcons. As is common in the Kalahari to the north, pale chanting goshawk is one of the more common raptors, whilst flocks of Namaqua sand grouse are also common. Other species includes peregrine and lanner falcons, and rock kestrels (www.sanparks.org.za/augrabies).

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area

- 5.2 Low density residential
- 5.3 Medium density residential
- 5.4 High density residential
- 5.5 Informal residential^A

5.6 Retail commercial & warehousing **Sun Fruit Packhouse** **no influence**

- 5.7 Light industrial
- 5.8 Medium industrial^{AN}
- 5.9 Heavy industrial^{AN}
- 5.10 Power station
- 5.11 Office/consulting room
- 5.12 Military or police base/station/compound
- 5.13 Spoil heap or slimes dam^A
- 5.14 Quarry, sand or borrow pit
- 5.15 Dam or reservoir
- 5.16 Hospital/medical centre
- 5.17 School
- 5.18 Tertiary education facility
- 5.19 Church
- 5.20 Old age home
- 5.21 Sewage treatment plant^A
- 5.22 Train station or shunting yard^N
- 5.23 Railway line^N
- 5.24 Major road (4 lanes or more)^N
- 5.25 Airport^N
- 5.26 Harbour
- 5.27 Sport facilities
- 5.28 Golf course no influence**
- 5.29 Polo fields
- 5.30 Filling station^H
- 5.31 Landfill or waste treatment site
- 5.32 Plantation
- 5.33 Agriculture
- 5.34 River, stream or wetland
- 5.35 Nature conservation area
- 5.36 Mountain, koppie or ridge
- 5.37 Museum
- 5.38 Historical building
- 5.39 Protected Area
- 5.40 Graveyard
- 5.41 Archaeological site
- 5.42 Other land uses (describe)

If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity?

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?

If YES, specify and explain:

If YES, specify:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.

If YES, specify and explain:

If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Refer to:
Appendix D3a: Archaeological Impact Assessment
Appendix D3b: Paleontological Impact Assessment
Appendix D3c: Visual Impact Assessments

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?

	NO
NO	

If YES,
 explain:

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:

ACRM (Archaeo.) found numerous tool artefacts on the site, but assesses the site as being of Low Significance
Almond (Palaeo.) gives a Low Significance assessment and recommends no further palaeontological studies
 (in addition, the Visual impact assessment gives only Low significances)

ARCHAEOLOGICAL IMPACT ASSESSMENT (Appendix D3a)

Significance:

Most of the stone implements documented during the study comprise isolated occurrences that are spread thinly and unevenly over the surrounding landscape, although one low density scatter of tools (105) was recorded in the western portion of the proposed footprint area. However, no evidence of any factory or workshop site, or the result of any human settlement was identified.

As archaeological sites are concerned, the occurrences are lacking in context as no organic remains such as bone, pottery or ostrich eggshell was found. There is no spatial patterning to the distribution of finds, but it was noted that some of the lithics tended to cluster around the south western portion of the proposed site near the Eskom servitude (refer to Figure 13). Overall, however, the fairly small numbers and isolated context in which they were found means that the archaeological remains on Erf 666 have been rated as having low archaeological (Grade 3C) significance.

Conclusions:

Development of the proposed Keren Energy Keimoes solar energy facility will have a very limited impact on archaeological heritage resources.

It is maintained that the study has captured good information on the archaeological heritage present and has identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to development activities commencing. The project should be allowed to proceed with no further archaeological input required.

Indications are that in terms of archaeological heritage, the proposed activity is viable and no fatal flaws have been identified.

PALEONTOLOGICAL IMPACT ASSESSMENT (Appendix D3b)

Significance:

The Precambrian metamorphic and igneous basement rocks in the study area are entirely unfossiliferous.

Alluvial gravels of the Orange River of Miocene and younger age are locally highly fossiliferous (e.g. Hendy 1984, Schneider & Marias 2004, Almond 2009 and extensive references therein) but, as argued above, these are *not* mapped within the study area.

The paleontological sensitivity of the Keimoes solar plant study area is assessed as **LOW**.

Conclusions:

The overall impact significance of the proposed Keimoes Keren solar plant development is considered to be **LOW** because:

- Most of the study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses etc) or mantled by superficial sediments of low palaeontological sensitivity;
- Extensive, deep excavations are unlikely to be involved in this sort of solar park project.

It is therefore recommended that exemption from further specialist paleontological studies and mitigation be granted for this solar plant development

Will any building or structure older than 60 years be affected in any way?
 Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

	NO
	NO

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

VISUAL IMPACT ASSESSMENTS (Appendix D3c)

Receiving Environment:

The proposed site is situated within the urban edge zone of Keimoes in an area characterized by little urban coherence nor rural, agricultural or wilderness sentiments. The larger area reflects the characteristics of a production to urban landscape and the site is situated within the land use continuum.

The valley area with its higher range of elements have a high visual absorption rate. The valley wall zones are not steep and therefore urban and infrastructure has developed on the areas. Due to their gradient they too reflect a high rate of visual absorption. Moving out of the valley area above the valley walls into the deep hinterland, the absorption rate reduces where the landscape is flat, but in areas with more gradient variation the absorption rate is still medium

Statement 1: The nature and extent of the proposed development is such that it would not change the nature of land use of the area it is situated in.

Statement 2: Due to the medium to high absorption capacity of the landscape, the development will easily be absorbed into the existing visual structure

Findings:

The site is situated in an area of little coherence and ad hoc position of a range of industrial and utility land uses. The site has a high absorption capacity due to the presence of existing land use and topographical variation.

The sensitive receptors namely the N14 and R359 is situated such that the exposure to the site and the intrusion is low.

SOCIO-ECONOMIC IMPACT ASSESSMENTS (APPENDIX D4)

Impacts that may cause changes to the economic and material wellbeing of the community are:

- (i) Job creation
- (ii) Skills development
- (iii) Increase in Sales volume
- (iv) Increase in GGP
- (v) Growth in Tourism

All the above impacts are **positive**, but because of their positive result these impacts causes secondary impacts that may be negative. The significance of these impacts and how the secondary impacts can be mitigated to amplify the significance of these impacts should be assessed in the socio-economic impact assessment.

Impacts that may cause changes in the living environment of the community are:

- (i) Increased traffic
- (ii) Increased demand for Health, Safety
- (iii) Increase demand for Housing and Municipal services
- (iv) Changing the sense of place

All the above impacts are **negative**, but mitigation can turn these impacts and their secondary impact to be **positive** as most of the impacts appear to be of **low or negligible significance**. These impacts and secondary impacts and how they can be mitigated have to be assessed particularly in the operational phase as the other impact of the other phases are short term.

Impacts that may cause changes in the health and social wellbeing of the community are

- (i) Increased dust and noise
- (ii) Deterioration of bio-physical environment

- (iii) Trespassing & crime
- (iv) Ceasing of farming activities

All the above impacts are negative however **negligible**. However as these impacts have long term effects, they should be assessed in the socio-economic impact assessment.

SECTION C: PUBLIC PARTICIPATION – SEE APPENDIX

1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
- (b) giving written notice to—
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority;
- (c) placing an advertisement in—
 - (i) one local newspaper; or
 - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and
- (e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
 - (i) illiteracy;
 - (ii) disability; or
 - (iii) any other disadvantage.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

- (a) indicate the details of the application which is subjected to public participation; and
- (b) state—
 - (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;

- (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
- (iii) the nature and location of the activity to which the application relates;
- (iv) where further information on the application or activity can be obtained; and
- (iv) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

**Summary of Public Participation Undertaken (See Appendix E for copies of material)
(E1 for Initial PP E2 for PP at D-BAR phase and E3 for current F-BAR phase)**

The application was advertised in Die Volksblad on 11 November, 2011, with commenting period to 12 December 2011.

An A2 on-site poster showing the application was affixed on the property fence as required.
A3 posters were placed on the electricity distribution DB board on a pole and at the Oranje Rivier Kelders

Maildrops were delivered to the closest residential area and businesses, (shown on Google image in Appendix E viii)

Invitations to comment on the application were sent to the list of I&APs and Authorities shown on Appendix E i)

No comments were received in the Initial PP, thus the Comments and Responses Report in Appendix E1/2/ is blank.

The Draft Basic Assessment Report (DBAR) was distributed to all registered I&APs and Authorities (See Appendix E2). This Final BAR is being distributed to all on the List in Appendix E3 A.

Two comments were received on the DBAR: Control measures put forward by Eskom have been included in the EMP and concerns of the DNC Dept of Agriculture are answered re process and setback lines in the Comments and Response report (Appendix E3 B2) .

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response

report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E. **(See Appendix E 3 B2)**

6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input.

List of authorities informed: (See Appendix E i) for contact details and proofs of letters sent

Kaigarib Municipality	Becker, L
Ward Councillor	Mapanka, JP
NC Dept Environmental & Nature Conservation	Jacobs, W
NC Dept Agriculture & Land Reform	The Head
DWA NC	Snyders, LJ
SAHRA NC	Provincial Manager
Eskom NW Region, Kimberley	Ferreira, P
Dept of Energy, Kimberley	Babuseng, E
SANRAL NC	Runkel, C
SA CAA	Stroh, L
SAHRA WC, Cape Town	Leslie, M
NC Dept Transport Roads & Public Works	Rooi, D
NC Dept Agriculture & Land Reform & Rural Development	Diteme, A
NC Dept of Economic Development	Seboko, P

List of authorities from whom comments have been received:

None

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority. Proof of any such agreement must be provided, where applicable.

Has any comment been received from stakeholders?

YES NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

No issues raised from Initial public participation (Advertising, posters, maildrops, letters)

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure E):

Comments on this DBAR will be addressed in the Final BAR (FBAR)

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Alternative 1 (preferred alternative)

DIRECT IMPACTS:

SOIL DEGRADATION – APPENDIX D1

Construction related activities: Physical degradation of the surface area due to:

- Solar Panel stands – **LOW** – Mitigation: Keep footprint to minimum
- Buildings and infrastructure – **LOW** – Mitigation: Keep footprint to minimum
- Roads – **LOW** – Mitigation: Keep footprint to minimum and stay on designated roads

- Erosion – Mitigation – Plan and implement adequate erosion control measures, with adequate soil stabilization

Operational related activities: Physical degradation of the surface

- Vehicle operations onsite – **LOW** – Mitigation: Stay on designated roads, prevent and contain spills
- Dust – **LOW** – Mitigation: Stay on designated roads and construct proper access roads

BIODIVERSITY IMPACTS – APPENDIX D2

Direct loss of vegetation type and associated habitat due to construction and operational activities.

- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species
- Loss of ecosystem connectivity
- Loss of vegetation and associated habitat

Even if all of the 20 ha is transformed (such as for intensive cultivation), the impact on the regional status of this vegetation type and associated biodiversity features would likely still be only medium-low. No irreversible species-loss, habitat-loss, connectivity or associated impact can be foreseen from locating and operating the solar facility on the final proposed solar site.

Finally, when quantifying the development options, the Van Schoor's formula for impact quantification still shows a significant difference between development **without** mitigation (28% impact rating) and development **with** mitigation (5% impact rating). As a result it is recommended that all mitigating measures must be implemented in order to further minimise the impact of the construction and operation of the facility. (Where values of $\leq 15\%$ indicate an insignificant environmental impact and values $> 15\%$ constitute ever increasing environmental impact).

- Pylons should be placed at least 32 m away from any of the main watercourses on the property. Care should also be taken to protect drainage lines (by controlling the pylon placement).
- All significant plant species should be identified (e.g. *Acacia erioloba*) and all efforts made to avoid damage to such species.
- Only existing access roads should be used for access to the terrain (solar site).
- The internal network of service roads (if needed) must be carefully planned to minimise the impact on the remaining natural veld on the site. The number of roads should be kept to the minimum and should be only two-track/ twee-spoor roads (if possible). If possible the construction of hard surfaces should be avoided.
- Access roads and the internal road system must be clearly demarcated and access must be tightly controlled (deviations must not be allowed).
- Indiscriminate clearing of areas must be avoided, only pylon sites and sites where associated infrastructure needs to be placed must be cleared (all remaining areas to remain as natural as possible).
- All topsoil (the top 15-20 cm at all excavation sites), must be removed and stored separately for re-use for rehabilitation purposes. The topsoil and vegetation should be replaced over the disturbed soil to provide a source of seed and a seed bed to encourage re-growth of the species removed during construction.
- Once the construction is completed all further movement must be confined to the access tracks to allow the vegetation to re-establish over the excavated areas.

ARCHAEOLOGICAL IMPACTS – APPENDIX D3a

Development of the proposed Keren Energy Keimoos solar energy facility on Erf 666 will have a **VERY LIMITED IMPACT** on archaeological heritage resources.

The study has identified **NO SIGNIFICANT IMPACTS** to pre-colonial archaeological material that will need to be mitigated prior to development activities commencing.

Mitigation measures:

- No further archaeological mitigation is required.
- Should any unmarked human burials/remains or ostrich eggshell water flask caches be uncovered, or exposed during construction activities, these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or the South African Heritage Resources Agency (SAHRA) (Att Ms Mariagrazia Galimberti 021 462 4502). Burials must not be removed or disturbed until inspected by the archaeologist.

PALEONTOLOGICAL IMPACT ASSESSMENT – APPENDIX D3b

The overall impact significance of the proposed Keimoos Keren solar plant development is considered to be **LOW** because:

- Most of the study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses etc) or mantled by superficial sediments of low palaeontological sensitivity;
- Extensive, deep excavations are unlikely to be involved in this sort of solar park project.

Mitigation measures:

- It is therefore recommended that exemption from further specialist paleontological studies and mitigation be granted for this solar plant development.

- Should any substantial fossil remains (e.g. vertebrate bones and teeth, shells, petrified wood) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist.

VISUAL IMPACT ASSESSMENTS – APPENDIX D3c

Construction Phase:

During construction, various large earth moving equipment and equipment will be transported to the site and work on the site. This will impact on the general experience of viewers. This impact is however temporary and not uncommon during construction of infrastructure. Communities have fairly high tolerance levels for such activities if it contributes to the infrastructure of the area. Rating: **LOW**

Operational Phase:

The sensitive receptors namely the N14 and R359 are situated such that the exposure to the site and the intrusion is **LOW**.

The alignment of transmission lines from the site to either of the two substations is not yet known. The type of lines are however of **LOW** impact.

The proposal does not present an unacceptable level of change to the visual environment and therefore the development can be recommended.

Mitigation measures:

- The level of visual impact is of such level that no mitigation to the proposed on-site development elements is recommended.
- The impact can however be used as a resource by providing a tourist interpretation centre/facility to raise awareness amongst local residents and visitors to the site. Such facility can also serve as a practical demonstration of the region's commitment to sustainable development and responsible tourism.

SOCIO-ECONOMIC IMPACTS (APPENDIX D4)

Impacts that may cause changes to the economic and material wellbeing of the community are:

- (vi) Job creation
- (vii) Skills development
- (viii) Increase in Sales volume
- (ix) Increase in GGP
- (x) Growth in Tourism

All the above impacts are **positive**, but because of their positive result these impacts causes secondary impacts that may be negative. The significance of these impacts and how the secondary impacts can be mitigated to amplify the significance of these impacts should be assessed in the socio-economic impact assessment.

Impacts that may cause changes in the living environment of the community are:

- (v) Increased traffic
- (vi) Increased demand for Health, Safety
- (vii) Increase demand for Housing and Municipal services
- (viii) Changing the sense of place

All the above impacts are **negative**, but mitigation can turn these impacts and their secondary impact to be **positive** as most of the impacts appear to be of **low or negligible significance**. These impacts and secondary impacts and how they can be mitigated have to be assessed particularly in the operational phase as the other impact of the other phases are short term.

Impacts that may cause changes in the health and social wellbeing of the community are

- (v) Increased dust and noise
- (vi) Deterioration of bio-physical environment

- (vii) Trespassing & crime
- (viii) Ceasing of farming activities

All the above impacts are negative however **negligible**. However as these impacts have long term effects, they should be assessed in the socio-economic impact assessment.

INDIRECT IMPACTS:

Very few indirect impacts are associated with the establishment of the solar facility (e.g. little water will be used, no waste material or pollution will be produced through the operation of the facility).

The only indirect impact resulting from the construction and use of the facility is a loss of movement from small game and other mammals, since the property will be fenced. However, it is not considered to result in any major or significant impact on the area as a whole. Rating: **LOW**

CUMULATIVE IMPACTS:

Biodiversity Impacts – Appendix D2

Even if all of the 20 ha is transformed (such as for intensive cultivation), the impact on the regional status of this vegetation type and associated biodiversity features would likely still be only **MEDIUM-LOW**. No irreversible species-loss, habitat-loss, connectivity or associated impact can be foreseen from locating and operating the solar facility on the final proposed solar site. However, all mitigation measures should still be implemented in order to further minimise the impact of the construction and operation of the facility.

NO-GO ALTERNATIVE

There will be none of the activity based impacts for the No-Go alternative, but neither any of the benefits

Biodiversity Impacts – Appendix D2

During the impact assessment only the final proposed site (which was identified after inputs from the various appointed specialists) as described in the DBAR, is discussed. From the above, the “No-Go alternative” **does not signify significant** biodiversity gain or loss especially on a regional basis. In this case the no-go options will only ensure that the status quo remains, but it is expected that urban creep will anyway impact on the proposed final solar site location over time.

The site visit and desktop studies described and evaluated in this document led to the conclusion that the “No-Go Alternative” alternative will not result in significant gain in regional conservation targets, the conservation of rare & endangered species or gain in connectivity. At the best the No-Go alternative will only support the “*status quo*” of the region. On the other hand the pressure on Eskom facilities, most of which are currently still dependant on fossil fuel electricity generation, will remain. Solar power is seemingly a much cleaner and more sustainable option for electricity production.

3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Alternative S1 (preferred alternative)

This section provides a summary of the assessment and conclusions drawn for the proposed Keimoos solar energy facility. There are no significant negative impacts associated with the CPV 10 MW or PV ~7 MW proposals for the 20 Ha site.

The overall impact on **soil and agricultural potential** is of **LOW significance** with the implementation of the recommended mitigation measures. The proposed development will not have large impacts due to the low agricultural potential of the site. The potential exists to increase the grazing potential of the site through additional shade provided by the solar panels as well as the harvesting of rainwater on the site through the use of dedicated storm water mitigation and management measures. However, erosion is considered to be a risk and it must be controlled through adequate mitigation and control structures. Furthermore impacts from vehicles, such as spillages of oil and hydrocarbons, should be prevented and mitigated. Lastly dust generation on site should be mitigated and minimised as the dust can negatively affect the quality the surrounding environment and can contribute to dust loads from surrounding land uses. Therefore, in perspective, the impacts of the proposed facility can be motivated as necessary in decreasing the impacts in areas where agricultural potential plays a more significant role.

The overall impact on **biodiversity** is likely to be of **VERY-LOW** significance with the implementation of appropriate mitigation measures. From the information discussed in the BAR it is clear to see that the Keimoos final location was relatively well chosen from a biodiversity viewpoint. Even if all of the 20 ha is transformed (such as for intensive cultivation), the impact on the specific vegetation type would most probably only be medium-low as a result of the status of the vegetation and the location of the final proposed solar location. However, with mitigation the impact can be much reduced to a **VERY-LOW** significance rating. Development without mitigation = 28% Significance rating and Development with mitigation = 5% Significance (Where values of $\leq 15\%$ indicate an insignificant environmental impact and values $>15\%$ constitute ever increasing environmental impact). No irreversible species-loss, habitat-loss, connectivity or associated impact can be foreseen from locating and operating the solar facility on the final proposed solar site. Developers should however take care to minimise disturbance along the drainage lines specifically and to keep overall footprints to a minimum.

The overall **heritage** impact is of **LOW significance** with the implementation of mitigation measures. The study has identified no significant impacts to pre-colonial archaeological material that will need to be mitigated prior to development activities commencing. No further archaeological mitigation is required. Should any unmarked human burials/remains or ostrich eggshell water flask caches however be uncovered, or exposed during construction activities, these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or the South African Heritage Resources Agency (SAHRA) (Att Ms Mariagrazia Galimberti 021 462 4502). Burials must not be removed or disturbed until inspected by the archaeologist.

The overall **visual** impact is of a predominantly **LOW significance** with the implementation of appropriate mitigation measures. The construction and operational phases will have a visual impact on the environment especially onsite, but limited. The sensitive receptors namely the N14 and 359 are situated such that the exposure to the site and the intrusion is **LOW**. The proposal does not present an unacceptable level of change to the visual environment and therefore the development can be recommended. The facility has an advantage over other more conventional power generating plants (e.g. coal-fired power stations). The facility utilises a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a more favourable light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks to observers

The establishment of the facility will have **positive benefits** as the integration of an additional 10 MW may alleviate the pressure on the local grid to a small extent and would contribute (albeit small) to the national target for renewable energy. Therefore, based on the findings of the studies undertaken, in terms of environmental constraints identified through the initial Environmental Basic Assessment process, no environmental fatal weaknesses were identified with the establishment of the proposed Keimoos Solar Energy Facility and associated

infrastructure.

It is therefore recommended that the project should be authorised. However, a number of issues requiring mitigation have been highlighted. Environmental specifications for the management of these issues / impacts are detailed within the draft Environmental Management Programme (EMP) included within Appendix F.

The following summary of impact ratings have been given in accordance to the specialist studies, as explained above compiled after mitigation:

NEGATIVE IMPACTS:

- **AGRICULTURE:** Low
- **BIODIVERSITY:** Low
- **ARCHAEOLOGICAL:** Low
- **PALAEONTOLOGICAL:** Low
- **VISUAL:** Low

POSITIVE IMPACTS:

- **SOCIO-ECONOMIC:** Positive

OVERALL IMPACT: LOW

NO-GO OPTION:

In this scenario the potential positive and negative environmental and social impacts as described in this Basic Assessment Report will not occur and the status quo will be maintained

Should the project not proceed, the contribution of up to 10 MW from this project towards the Government target for **renewable energy** will not be realised. As a result the potential local and regional socio-economic and environmental benefits expected to be associated with the proposed project would not be realised. These include:

- Increased energy security: The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses. In addition the proposed facility will increase electricity security for the local Keimoes town during the day.
- Exploitation of our significant renewable energy resource: At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
- Pollution reduction: The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.
- Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community
- Employment creation: The sale, development, installation, maintenance, and management of renewable energy facilities have significant potential for job creation in South Africa.
- Acceptability to society: Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human, and ecosystem health.
- Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy.

Within a policy framework, the development of renewable energy in South Africa is supported by

the White Paper on Renewable Energy (November 2003), which has set a target of 17MW renewable energy contributions to final energy generation mix by 2030. The target is to be achieved primarily through the development of solar, biomass, solar and small-scale hydro. The 'no-go' alternative will not assist the South African government in addressing climate change, in reaching the set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. The 'no-go' alternative is therefore not a viable alternative.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES	
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If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

RECOMMENDED MITIGATIONS

The mitigation, management measures and recommendations listed in this Basic Assessment Report for construction and operational phases should be implemented in order to minimise potential environmental impacts. The following additional mitigation measures should also be implemented.

General

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must be developed by a suitably experienced Environmental Assessment Practitioner.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase of the solar plant in terms of the EMP and the Biodiversity study recommendations as well as any other conditions which might be required by the Department of Environmental Affairs.
- An integrated waste management system must be implemented during the construction phase.
- All rubble and rubbish (if applicable) must be collected and removed from the site to a suitable registered waste disposal site.
- All alien vegetation should be removed from the property, as is legally required (if applicable)
- Adequate measures must be implemented to ensure against erosion.
- An application for all permits with respect to protected tree species or protected plant species need to be submitted to the relevant authority prior to the commencement of construction activities.
- All declared aliens must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.
- Before development can continue the regions need to be checked for the presence of bird nesting sites, particularly those of ground nesting species.
- Areas of prime reptile habitat (e.g. extensive areas of flat rock, boulders fields) should be avoided. Reptiles present on the study site could potentially also be trapped and translocated.
- Limit construction, maintenance, and inspection activities to dry periods.
- Develop emergency maintenance operational plan to deal with any event of contamination, pollution, or spillages, particularly in riparian areas.

Site specific Mitigations

- Pylons should be placed at least 32 m away from any of the main watercourses on the property. Care should also be taken to protect drainage lines (by controlling the pylon placement).
- All significant plant species should be identified (e.g. *Acacia erioloba*) and all efforts made to avoid damage to such species.
- Only existing access roads should be used for access to the terrain (solar site).
- The internal network of service roads (if needed) must be carefully planned to minimise the impact on the remaining natural veld on the site. The number of roads should be kept to the minimum and should be only two-track/ twee-spoor roads (if possible). If possible the construction of hard surfaces should be avoided.
- Access roads and the internal road system must be clearly demarcated and access must be tightly controlled (deviations must not be allowed).
- Indiscriminate clearing of areas must be avoided, only pylon sites and sites where associated infrastructure needs to be placed must be cleared (all remaining areas to remain as natural as possible).

BASIC ASSESSMENT REPORT: KEREN KEIMOES: FINAL

- All topsoil (the top 15-20 cm at all excavation sites), must be removed and stored separately for re-use for rehabilitation purposes. The topsoil and vegetation should be replaced over the disturbed soil to provide a source of seed and a seed bed to encourage re-growth of the species removed during construction.
- Once the construction is completed all further movement must be confined to the access tracks to allow the vegetation to re-establish over the excavated areas.
- Should any unmarked human burials/remains or ostrich eggshell water flask caches be uncovered, or exposed during construction activities, these must immediately be reported to the archaeologist (Jonathan Kaplan 082 321 0172), or the South African Heritage Resources Agency (SAHRA) (Att Ms Mariagrazia Galimberti 021 462 4502). Burials must not be removed or disturbed until inspected by the archaeologist.
- Should any substantial fossil remains (e.g. vertebrate bones and teeth) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist.

Is an EMPr attached?

YES	<input type="checkbox"/>
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The EMPr must be attached as Appendix F.

See Appendix F

SECTION F: APPENDICES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports

Appendix D1 Agricultural

Appendix D2 Biodiversity

Appendix D3 Heritage

Appendix D3a Archaeological

Appendix D3b Palaeontological

Appendix D3c Visual

Appendix D4 Socio-Economic

Appendix E: Public Participation Record

Appendix E1 Initial Public Participation

Appendix E2 Draft BAR Public Participation

Appendix E3 Final BAR Public Participation + Comments & Response Report

Appendix F: Environmental Management Programme (EMPr)