environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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File Reference Number:	
Application Number:	
Date Received:	

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014, 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, 2014 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. This report format is current as of **08 December 2014**. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. 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.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. 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.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. 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.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

14. Two (2) colour hard copies and one (1) electronic copy of the report must be submitted to the competent authority.
15. Shape files (.shp) for maps must be included in the electronic copy of the report submitted to the competent authority.

SECTION A: ACTIVITY INFORMATION

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" for the specialist appointed and attach in Appendix I.

Several specialists were consulted as part of this application. Details of specialists and declarations of interest are included as part of the respective specialists' reports as per Appendix D.

1. PROJECT DESCRIPTION

a) Describe the project associated with the listed activities applied for

Activity Overview

The project is the establishment of an array of crystalline solar photovoltaic (PV) modules grouped into tables or panels of 20 modules each, together with associated infrastructure for the generation of 5MW of electricity. The PV tables would form an array covering an area of 20ha, surrounded by a perimeter fire access road and fence. The PV tables will be raised approximately 500mm above ground level and have single axis tracking systems allowing maximisation of solar energy harvesting for conversion to electrical energy. A similar solar PV array is depicted in Figure 1 below.

Figure 1: Single axis solar PV module tables raised 500mm above ground level

Proposed associated infrastructure includes a fenced construction staging area, a maintenance shed, three inverter-transformer stations on concrete pads, one to two office buildings on the 20ha site, a switch panel for connection to the power grid, as well as a three-phase powerline connection from the solar PV array to feed electricity from the proposed development to Eskom's Taaiput substation which is located about a kilometre from the site. Figure 2 below indicates the position of the proposed solar PV array with the nearby Taaiput substation.

Application Rationale

In March 2011, the Department of Energy's (DoE's) Integrated Resource Plan (IRP) 2010-2030 was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, as well as environmental and social responsibilities and economic policies. The study horizon for the IRP is the period from 2010 to 2030.

The short to medium term intentions of the IRP 2010 -2030 are to ascertain the most cost-effective electricity supply option for the country, speak to the opportunities for investment into new power generation projects and determine security of electricity supply.

Figure 2 insert

The IRP's long-term electricity planning goal is to consider social, technical, environmental and economic constraints, as well as other externalities while ensuring sustainable development in the country.

To this end, within the IRP, the DoE set a target electricity supply of 17.8 GW from renewable energy sources by 2030. This target renewable energy capacity would be produced primarily by solar, wind, biomass and small-scale hydro electricity generation (with the bulk being met by wind and solar energy supplies). In addition, the 2030 target ensures that approximately 42% of the country's total estimated electricity generation capacity would be met by renewable energy sources. This application is in response to the DoE's target and IRP 2010-2030 strategy to expand the South African renewable energy electricity generation capacity.

Activity Description

The proponent, Keren Energy Kakamas (Pty) Ltd, plans to establish a 'solar farm' which harvests light energy from the sun using solar PV panels and converts the light energy into electrical energy to be fed into the national (Eskom's) electricity grid. The development footprint is an area not exceeding 20ha on Erf. 1654 Kakamas, within the Kai! Garib Local Municipality, District Siyanda, Northern Cape Province. This solar farm is, in essence, a solar power station which will form part of the country's renewable energy electricity generation capacity. The solar PV farm is proposed to be established on a site located at 28°47'14.71''S, 20°36'18.90''E which can be accessed from the N14 or from Hofmeyer road, an existing secondary road coming from within Kakamas. However, additional temporary access roads will have to be established on site. (see Figure 3 - Potential cumulative impact radius for proposed solar PV development site relative to other approved renewable energy projects in the region. The proposed site is at centre of green circle as indicated on map. Although this is a reapplication, the original proposed development site which was authorised, was included on the map provided by the DEA on the renewable energy application website at https://dea.maps.arcgis.com/apps/webappviewer.

After considering an area of about 500ha on Erf. 1654, Kakamas, the most suitable 20ha portion in terms of solar energy harvest potential, topography, accessibility, tie-in to the Eskom grid and minimisation of environmental impact, was chosen on which to establish the facility. The proposed development is an array of 18540 poly-crystalline solar photovoltaic (PV) modules grouped into tables or panels of 20 modules each. The PV panels form an array within the total footprint area of 20ha, surrounded by a perimeter fire access road and fence. The actual array of PV panels will not completely fill the 20ha footprint which also needs to cater for infrastructural requirements.

As per Figure 1 above, the PV tables will be raised approximately 500mm above ground level and will have single axis tracking systems allowing the generation of approximately 5MW of direct current which will be alternating current. Proposed associated infrastructure to be built on the 20ha footprint site includes a fenced construction staging area, a 3m x 6m maintenance shed, three inverter-transformer stations on concrete pads, a switch panel for connection to the power grid and an office with septic tank ablutions, as well as a 22kV powerline from the development site to connect to Eskom's Taaiput substation near to the proposed development site.

The powerline feeding into Eskom's Taaiput substation will be three-phase powerlines which may be overhead powerlines for a portion of the connection as well as subsurface (underground) powerlines to the Taaiput substation. The maximum generation capacity of the facility is approximately 5MW. Solar PV farms produce electricity in direct current which must be converted into alternating current and transformed into the correct voltage before it can be fed into the national grid. This conversion is done by inverters and transformers which are part of the abovementioned infrastructural development of the project.

Description of Development Phases

Equipment/Material Deliver and Site Preparation:
The proposed development can be accessed from the N14 or from Hofmeyer road (travelling from within Kakamas). However, additional temporary access roads will have to be established on site. PV modules and steel structures will be transported to site using four interlink trucks. The main transformer, one grader and a 20 ton roller will be delivered to site using abnormal load vehicles. In addition to these vehicles, two drill rigs, two $10m^3$ tipper trucks, six tractors and trailers, one waste transport truck, 8 site bakkies, one water tanker truck, a TLB and a trenching machine will also be used on site.
The area will be graded and levelled using a 20 ton roller. Water spray from the water tanker truck will be used to control excessive duct blow off. About three to four internal temporary access roads will have to be established on site, in addition to the long term perimeter fire access road. These internal access roads will enable vehicular access to each solar panel system within the site. All roads created as part of the solar facility will be untarred / unpaved.

Construction:
Each drilling machine which will be used for drilling the substructure post holes is equipped with a dust control system. The system extracts the dust away from the hole while drilling using vacuum. The collected dust can then be removed in a controlled manner from the back end of the machine once a certain amount is reached.
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
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.
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.

Operation:
The 5MW solar facility is based on the single axis tracking system for adjustment of the panels or tables carrying the solar PV modules. One of the reasons for selecting this tracking system is the configuration flexibility which facilitates good utilisation of the available land and maximises the "pitch" or distance between tables. This minimises the shading effects tables have on each other. Each table is equipped with a bow or curved component which carries a ring gear. The horizontal shafts have short worm gears which run against the ring gears to effect table adjustment. Tracking of the sun in a single axis solar PV system is usually aligned roughly along the north to south axes. The PV farm tracking system can be operated either automatically or remotely. The tracker adjustment range is -50 to +50 degrees. The pitch between tables would be 6m. The tracker controllers are an integral part of the tracking system and they provide backtracking functionality in order to minimise the effects of shadowing.
Twenty solar polycrystalline PV modules will be grouped together in a panel or table. Each table would carry 20 modules, which would be mounted with the long edges perpendicular to the tracking axis. All 20 modules of a table would be electrically interconnected to form a string.
An array of 309 such tables would be connected to 2 x 1000kVA, 1000V Inverters, the rating being selected to allow for the Reactive Power requirements of the South African Grid Code. The two inverters of each array would be connected to the Low Voltage windings of a common inverter transformer, and the medium voltage windings of these transformers would be rated at 22kV. Grid connection would also be at 22kV, so that no further stepping-up of the voltage is required.
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).
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:
Periodic maintenance activities involve replacing non-functioning cells or other mechanical parts essential to the operation of the arrays. Trips to the solar PV farm to undertake maintenance would occur on an as-needed basis. Maintenance visits may not occur immediately after a module ceases to function or a part becomes damaged – the Project Applicant would determine whether the benefit of the maintenance trip outweighs 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 1800m^3 of water will be used during construction. During operation and maintenance about 2000m^3 of water will be used per year would be required for cleaning the photovoltaic panels. During maintenance waste separation and recycling will take place as per the facilities environmental management programme.

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.

Note: Throughout all phases of the development lifecycle i.e. site preparation, plant construction, operation, maintenance and final decommissioning, waste management in line with the project's environmental management programme includes waste separation, timely periodic waste removal to registered waste sites and recycling where possible.

b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN 734, 735 and 736	Description of project activity
GN. R. 327 Item 1(ii): The development of facilities or infrastructure for the generation of electricity from a renewable resource where the output is 10 megawatts (MW) or less but the total extent of the facility covers an area in excess of 1 hectare (ha) excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area	The development of a solar photovoltaic array with an electricity output of less than 10MW and with a footprint not exceeding 20ha will be developed on Erf. 1654 Kakamas, within the Kai! Garib Local Municipality, District Siyanda, Northern Cape Province. The development's actual contracted electricity generation capacity is 5.75MW.
GN. R. 327 Item 27: The clearance of more than 1ha but less than 20ha of indigenous vegetation	The proposed development involves clearance of part of the 20ha area for which an EA is being applied i.e. less than 20ha will be cleared. The developmental area contains both indigenous as well as alien species of vegetation. Approximately 10ha will be used for the actual solar PV array.

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 as required by Appendix 1 (3)(h), Regulation 2014. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) 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.

The identification of alternatives should be in line with the Integrated Environmental Assessment Guideline Series 11, published by the DEA in 2004. Should the alternatives include different locations and lay-outs, the co-ordinates of the different alternatives must be provided. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

a) Site alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
The proposed development footprint, for which landowner consent use has been granted, is an area not exceeding 20ha on Erf. 1654, Kakamas, within the Kai! Garib Local Municipality, District Siyanda, Northern Cape Province.	28°47'14.71''S	20°36'18.90''E
Erf 1654, Kakamas was identified as a suitable option for the proposed development. This investigation area is depicted in Figure 2 above. The property belongs to the Kai! Garib Municipality and comprises of just under 500ha 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 approximately 500ha of Erf 1654, Kakamas was taken into account and the most suitable portion of 20 Ha was identified in regards to the following specifications: • **Size**: 20 ha area required • **Landowner consent**: Kai! Garib Municipality has provided consent • **Available access**: The site can be accessed from the N14 or from Hofmeyer road (within		

Kakamas), using existing secondary roads. However, additional temporary access roads will have to be established on site.

- **Locality to nearest electricity grid for power evacuation:** Kakamas sub-station is located approximately 1km 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.

Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Approximately the entire 500ha of Erf. 1654, Kakamas, was considered in terms of whether there was potential to establish a solar PV site. However, in terms of the return on investment relative to the sites' solar energy harvest potential, topography, accessibility, tie-in to the Eskom grid and minimisation of environmental impact, no alternative 20ha sites (within the 500ha) were identified as appropriate for development.		

Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

In the case of linear activities: **Not Applicable**

Alternative:	**Latitude (S):**	**Longitude (E):**
Alternative S1 (preferred)		
• Starting point of the activity		
• Middle/Additional point of the activity		
• End point of the activity		
Alternative S2 (if any)		
• Starting point of the activity		
• Middle/Additional point of the activity		
• End point of the activity		
Alternative S3 (if any)		
• Starting point of the activity		
• Middle/Additional point of the activity		
• End point of the activity		

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A-1 of this form.

b) Lay-out alternatives

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
This post application BAR addresses the reapplication process for an EA granted by the Department but which expired before construction could commence. The preferred 20ha site originally authorised and currently being applied for, allows some variation in the layout of the solar PV array but this is also largely constrained by proximity to the substation and accessibility parameters in terms of the return on investment.	Northern corner: 28°47'6.600"S Western corner: 28°47'18.690"S Southern corner: 28°47'22.050"S Eastern corner: 28°47'8.416"S	Northern corner: 20°36'11.326''E Western corner: 20°36'8.242''E Southern corner: 20°36'26.707''E Eastern corner: 20°36'30.233''E
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Within the 20ha site, the layout of the PV panels could be moved slightly since this application is for a solar PV farm with a maximum output capacity of 5MW. An estimate of the area needed to produce one MW of electricity from a solar PV array in South Africa i.e. the ha/MW, may be found below in Table 1 – Comparison of Alternate Solar PV technologies (Space efficiency comparison). With the preferred technology alternative proposed in this post application BAR, approximately 2ha/MW are required. Thus, for a 5MW plant, 10ha will be required excluding infrastructure spatial needs within the site. In addition, the single axis tracking, ground mounted solar PV arrays proposed in this application, require a fairly flat terrain which further limits layout alternatives unless major earthworks are undertaken which is not ideal.	Northern corner: 28°47'6.600"S Western corner: 28°47'18.690"S Southern corner: 28°47'22.050"S Eastern corner: 28°47'8.416"S	Northern corner: 20°36'11.326''E Western corner: 20°36'8.242''E Southern corner: 20°36'26.707''E Eastern corner: 20°36'30.233''E
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

c) Technology alternatives

Alternative 1 (preferred alternative)
The preferred technology in this application is the solar poly-crystalline PV module, on a ground mounted, single axis tracking system. The crystalline PV module technology was also the preferred option in the initial application as amended and authorised. Refer to Table 1 – Comparison of Alternate Solar PV technologies
Alternative 2
The solar PV technology initially assessed due to its high output during direct normal irradiation (DNI) was the concentrated PV system (CPV). While this was the original preferred technology in the initial application and was assessed in detail, the amended application for which authorisation was granted, proposed the solar crystalline PV system primarily due to a reduction in the cost of PV when compared to CPV. In addition, the proponent's experience was that financiers were more comfortable with investing in the more established solar poly-crystalline PV system than in CPV. Refer to Table 1 – Comparison of Alternate Solar PV technologies
Alternative 3
The least preferred technology considered was thin film PV cells. Refer to Table 1 – Comparison of Alternate Solar PV technologies

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives)

Alternative 1 (preferred alternative)		
No alternatives other than those discussed above, apply.		
Alternative 2		
Alternative 3		

e) No-go alternative

The No-Go alternative always exists and would result in the purpose and need of the proposed activity not being met i.e. the generation of renewable energy electricity and provision of electricity in terms of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) would not take place.

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

Due to the information required in paragraphs 3 – 13 being identical for each alternative mentioned above (except the no-go alternative) and only the visual impact of CPV being medium instead of low as it is for the crystalline PV system and thin film PV cells, paragraphs 3 – 13 have been completed only for the preferred alternative. However, an analysis of the three alternate technologies is presented below and is further summarised in details in Table 1 - Comparison of Alternate Solar PV technologies:

Analysis of solar PV technology alternatives for Keren Energy Kakamas (Pty) Ltd.

Solar PV systems and solar CPV systems differ only in the mechanics by which the cells making up the respective systems, capture and convert sunlight into direct current (DC) electricity.
PV systems come in three broad categories of cell type: mono-crystalline, poly-crystalline and thin film. The active panels are large and virtually the whole surface area is made up of PV cells.
In contrast, in CPV systems, the so-called 'multi-junction' cells are small (10mm x 10mm or smaller) and sunlight is focused onto these cells by some form of lens. The active 'multi-junction' cell material thus only constitutes a small fraction of the surface area of the CPV system.

Mono- and ploy-crystalline systems differ only in the manufacture of the silicon wafers used as the basic building blocks of the PV cell. In the case of mono-crystalline cells, as the name suggests, large single crystals of quartz are grown and then cut into thin quartz wafers. In the case of poly-crystalline cells, multiple interlocking quartz crystals are grown and then cut into thin wafers, with each wafer having multiple (poly = many) quartz crystals.

The performance of both mono- and poly-crystalline PV panels is very similar with actual performance output linked more to the quality of the quartz and the manufacturing process than to whether they are mono- or poly-crystalline. Both versions of crystalline PV are currently the most widely deployed and tested PV systems, globally.

There are a number of different varieties of thin film PV cells available. In all cases, various thin layers of material are coated on an appropriate substrate that is often glass. The main variants include amorphous silica (a-Si), Cadmium telluride (CdTe) or Copper Indium Gallium Selenide (CIGS). Thin film PV is generally less efficient at converting sunlight into electricity than crystalline PV but is it also generally less expensive to manufacture. In addition, it has a lower temperature degradation efficiency than crystalline PV.

In both PV and CPV systems, once sunlight has been converted into dc electricity, the so-called 'balance-of-systems' are essentially identical. Inverters convert the electricity from DC to alternating current (AC) and step-up transformers increase the voltage to the appropriate level to facilitate connection, or tie-in, to the national grid (typically, 11-22kVA).

In choosing which solar PV technology is most appropriate for a particular site or project, a number of factors come into play, many of which have as much to do with external socio-economic benefits, as they do with technical efficiencies. EIA studies on potential solar sites should, as a matter of course, look at the impacts of all variants of solar PV technologies as the eventual choice of technology is very often driven by the external factor of funder risk-preference/perception.

Table 1 below, outlines some of the factors that must be considered when making the final decision as to which of the solar PV technologies to use on a specific site, for a specific project.

Factor	Thin film PV	Crystalline PV	CPV	Comments
Direct Normal Irradiation (DNI)	Less appropriate	Less appropriate	More appropriate	CPV systems rely on DNI. There is a requirement for the system to be at right angles to the incoming radiation in order to focus the energy on the multi-junction cell.
Global Horizontal Irradiation (GHI)	More appropriate	More appropriate	Not appropriate	GHI is more appropriate to PV systems as they are able to make use of both direct, as well as scattered and reflected sunlight (no focussing is required).
Cloud Cover	Reduced output	Reduced output	Major reduction in output	CPV systems are far more sensitive to cloud cover than PV systems and output is severely reduced.
Temperature	Lower drop-off in performance with increasing temperature than crystalline PV	Significant drop-off in performance with increasing temperature	Lowest drop-off in performance with increasing temperature than crystalline PV	Electricity output may decrease by as much as 10% in high temperature environments for PV systems. Thin film systems perform better than crystalline systems at high temperature and CPV systems perform the best (least reduction in output).
Space Efficiency	> 2ha/MW	+- 2ha/MW	< 2ha/MW	Space requirements per MW are thin film PV > crystalline PV > CPV.
Fixed Tilt Possible	Yes	Yes	Yes	PV systems are most commonly installed as fixed-tilt systems, with the optimum tilt angle a function of latitude. CPV systems have to have two-axis tracking in order to remain at right angles to the incident radiation.
Single Axis Tracking Possible	Yes	Yes	No	PV systems are frequently installed on single axis tracking systems, particularly when space is at a premium. As above, CPV cannot operate other than with a dual axis tracking system.
Dual Axis Tracking	Yes	Yes	Yes, essential	Dual axis tracking is essential for CPV systems. It is also available for

Possible				PV systems but is not essential and is not as common as fixed-tilt or single axis tracking. When used for PV systems, the economics of the added efficiency need to be weighed up against the additional cost and the increased operating and maintenance costs and complexity.
Output per Installed MW	Function of cell efficiency and GHI	Function of cell efficiency and GHI	Function of cell efficiency and DNI	Output for CPV in high DNI areas (i.e. few cloudy days) is generally much higher (+ 30%) than for fixed-tilt PV. This difference is obviously less pronounced when comparing CPV to dual axis tracking PV. However, dual axis tracking PV is not common and is often an 'add-on', whereas in CPV systems it is integral to the system
Cost per Installed MW (AC)	$1.60-$2.10	$1.80-$2.10	$2.40-$3.00	These are indicative prices for full turnkey costs including grid connections costs in the current South African market. These prices are for AC MW delivered to the national grid buzz bars.
Solar Market Share	< 5%	> 95%	> 0.1%	PV, with CPV representing about 0.1%, dominates the current world market share. This is likely to change in the future and the figure to watch is the new-market share, rather than basing figures on the existing installed base.
Ease of Financing	Less easy	Easy	Difficult	PV is extremely well established and has a proven track record. It is thus easy to finance, both from a debt and equity perspective. CPV, on the other hand, is an emerging technology, with a shorter track record and is accordingly generally more difficult to finance.
Job Creation	Reasonable during construction, low during operation	Reasonable during construction, low during operation	Reasonable during construction, low during operation	Both PV and CPV will create a fair number of jobs during the construction phase, with PV most likely creating more jobs than CPV, albeit of a lower-skilled nature. Neither PV nor CPV will create many operational jobs, with the jobs created by CPV exceeding those created by PV (more complex systems requiring more maintenance).
Local Manufacturing Job Creation	Limited, unless large pipeline of MW available to single manufacturer	Limited, unless large pipeline of MW available to single manufacturer	Good potential	The nature of CPV systems more or less dictate a large component of local manufacture. The lenses that focus the sunlight are located some distance from the multi-junction cells and are installed in a metallic box-like structure that is neither practical nor economic to transport long distances. CPV manufacturing facilities can be

				economically justified on modest production pipelines that are an order of magnitude less than the equivalent PV pipelines required to localise manufacture.
Ground Cover and Shading	Extensive, fixed	Extensive, fixed	Minimum, variable	Fixed-tilt, ground-mounted PV systems feature blanket ground cover and shading with some relief from spacing between rows of panels. CPV systems are generally pedestal-mounted and have moving shading patterns as they track the sun. CPV systems thus have a very small ground footprint.
Topographic Conditions	Flat ground preferred	Flat ground preferred	Flat ground preferred	Both PV and CPV systems are most easily constructed on flat ground. CPV systems are, however, more easily adapted to gently undulating topography than PV systems due to their pedestal versus rack mounting.
Visual Impacts	Low	Low	Medium	Ground-mounted fixed-tilt PV systems have a low visual impact and if necessary can be hidden by suitable screens or walls. Most CPV systems are visually more conspicuous (generally much higher structures).

Table 1 – Comparison of Alternative Solar PV technologies

3. PHYSICAL SIZE OF THE ACTIVITY

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

Alternative:	**Size of the activity:**
Alternative A1[1] (preferred activity alternative)	Under 200 000 m^2
Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

or, for linear activities: **N/A**

Alternative:	**Length of the activity:**
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

b) 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)	Under 200 000 m^2

[1] "Alternative A.." refer to activity, process, technology or other alternatives.

Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

4. SITE ACCESS

Does ready access to the site exist?	YES ✓	NO
If NO, what is the distance over which a new access road will be built		m

Describe the type of access road planned:

The main access road to the site is from the N14 or from Hofmeyer road, an existing secondary road coming from within Kakamas. However, additional temporary access roads will have to be established on site. Within the site there will be graded fire service and access roads to the panels for maintenance (approximately 4m in width but not wider than 8m). All access internal access roads will be unpaved/untarred.

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.

5. LOCALITY MAP

An A3 locality map must be attached to the back of this document, as Appendix A-1. 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 accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s;)
- 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).

6. LAYOUT/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:

- the property boundaries and numbers of all the properties within 50 metres of the site;

- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

7. SENSITIVITY MAP

The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWS);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in Appendix A.

8. SITE PHOTOGRAPHS

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 report**.** It must be supplemented with additional photographs of relevant features on the site, if applicable.

9. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of at least 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.

10. ACTIVITY MOTIVATION

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

1. Is the activity permitted in terms of the property's existing land use rights?	YES	NO ✓	Please explain
The property's current zoning is Agricultural Zone 1. The proposed site is on Municipal commonage and is surrounded by mixed land uses which includes industrial land use. Application for rezoning of the land is currently being undertaken by a separate town planning consultancy. Enviro Africa has been informed that the application process is underway.			

2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	YES ✓	NO	Please explain
According to the Northern Cape (NC) Provincial Spatial Development Framework (PSDF) Policy and Strategy Report, Energy Objectives listed under point C8.2.3 lists the promotion of renewable energy supply schemes since "Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimising detrimental environmental impacts." The NC Provincial Spatial Development Strategy stated that: i. Economies of emerging growth centres i.e. Upington and Springbok, are diversified (balancing downscaling of export grape and copper mines industries with growth prospects in non-traditional sectors i.e. energy generation) ii. 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 iii. 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 which enhance the economic potential of development corridor. iv. 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.			
(b) Urban edge / Edge of Built environment for the area	YES ✓	NO	Please explain
Even though the site is located on town commonage, it is situated near other industrial uses such as the Eskom substation/HV yard near to the proposed site. This type of land use is typically found outside the "urban edge".			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES ✓	NO	Please explain
The proposed development is in line with the Kai! Garib Local Municipality IDP and SDP in that it enhances local economic development (LED) and promotes sustainable industry which is part of the local Municipality's LED strategy. This application would add to the integrity of the existing IDP and SDF.			
(d) Approved Structure Plan of the Municipality	YES ✓	NO	Please explain
The proposed development site is outside the "urban edge" and the site was previously approved for a renewable energy development (solar PV farm) before the authorisation expired prompting this reapplication.			

(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES ✓	NO	Please explain
The proposed development does not compromise existing environmental management priorities. The proposed renewable energy farm actually enhances provincial and local municipality achievement of priority objectives.			
(f) Any other Plans (e.g. Guide Plan)	YES ✓	NO	Please explain
Besides the NCPSDF and Kai! Garib IDP and SDF, the proposed development is in line with the national DoE's IRP 2010-2030 which was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, as well as environmental and social responsibilities and economic policies. Furthermore, the proposed renewable energy development is in line with the national REIPPPP strategy.			
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES ✓	NO	Please explain
The planning horizon for the DoE's IRP 2010-2030 comes to an end in 2030 and the proposed development falls within this timeframe. In addition, it is in line with the Kai! Garib IDP and SDP which are part of the NCPSDF. The original EA was granted for the project which has an estimated lifespan of approximately 25 years.			
4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES ✓	NO	Please explain
The promotion or renewable energy developments in the NC province is listed as a priority for the local Municipality.			
5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)	YES ✓	NO	Please explain
The main service required is an access road to the site which already exists and the provision of water for cleaning of the panels four to six time a year.			

6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix I.)	YES	NO ✓	Please explain
This development was not provided for in the Municipality's infrastructure planning but the proposed solar PV farm does not require provision of infrastructure services by the Municipality expect for the occasional emptying of solids from the on-site septic tank. Water allocation for the development and subsequent operation and maintenance of the solar PV panels was approved by the Municipality as per Appendix J-1.			
7. Is this project part of a national programme to address an issue of national concern or importance?	YES ✓	NO	Please explain
The issue of long term electricity supply from renewable source is of national concern and forms part of the DoE's IRP 2010-2030 which was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, as well as environmental and social responsibilities and economic policies. The proposed renewable energy development also aligns with the national REIPPPP strategy.			
8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES ✓	NO	Please explain
Location factors favour this land use since the NC is well suited for solar based renewable energy harvesting. The area is currently zoned as Agriculture 1 and is a Municipal commonage with other industrial uses surrounding the proposed site. In addition, the proposed site is easily accessible using existing roads i.e. the site can be accessed from the N14 or from Hofmeyer road, an existing secondary road coming from within Kakamas. The development is also in line with the local municipality's aim to further develop the region. The site's close proximity to the point of tie-in with the national electricity grid at the local Eskom (Taaiput) substation also makes the proposed land use the best practicable environmental option suited for this development.			
9. Is the development the best practicable environmental option for this land/site?	YES ✓	NO	Please explain
Although the proposed development is on land zoned as Agriculture 1, due to the site's accessibility on existing roads, as well as its proximity to the point of tie-in with the national electricity grid, actual and potential environmental impacts from the possible provision of these infrastructure requirements will be minimal. The site, therefore, is the best practicable environmental option suited for this development.			
10. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES ✓	NO	Please explain
When the practical environmental benefits of increasing national renewable energy generation capacity and meeting the Northern Cape Provincial Spatial Development Strategy are considered against the option of the no-go alternative, then the benefits of the proposed development outweigh the negative impacts from the development which can be mitigated.			

11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES	NO ✓	Please explain
Similar renewable energy sites have been authorised by the local municipality already and several exist within the local and district municipal areas. This DBAR is a reapplication since the original application had been authorised in 2013 but the proponent did not commence construction before the original authorisation lapsed.			
12. Will any person's rights be negatively affected by the proposed activity/ies?	YES	NO ✓	Please explain
Previous socio-economic and recently re-examined preliminary socio-economic assessments for the proposed development did not indicate that any person's rights would be negatively affected by the development. There were no rights related issues from the previous public participation process (PPP). The current PPP is in progress and for this DBAR and any issues raised will be reported.			
13. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	YES	NO ✓	Please explain
Developments of this nature usually fall outside the urban edge. This land use falls on the municipal commonage where there is an industrial node.			
14. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES ✓	NO	Please explain
The proposed renewable energy solar PV development will contribute directly to SIPS 8 and 9 i.e. Green Energy in support of the South African economy and Electricity Generation to support socio-economic development, respectively.			

15. What will the benefits be to society in general and to the local communities?	Please explain

This application is in response to the DoE's target and IRP 2010-2030 strategy to expand the South African renewable energy electricity generation capacity. The issue of long term electricity supply from renewable sources is of national concern and forms part of the DoE's IRP 2010-2030 which was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, as well as environmental and social responsibilities and economic policies.

There will also be benefits, albeit to a much lesser degree, to local communities in the form of:

i. limited local businesses will benefit when construction and maintenance teams visit the Solar PV farm site
ii. a local business will supply security services for the site
iii. a small amount of training/skills transfer for operational and maintenance staff.

16. Any other need and desirability considerations related to the proposed activity?	Please explain

The proposed solar PV development is in direct response to the DoE's target and IRP 2010-2030 strategy to expand the South African renewable energy electricity generation capacity. The issue of long term electricity supply from renewable sources is of national concern and forms part of the DoE's IRP 2010-2030 which was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa.

The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, as well as with the national REIPPPP strategy, increasing public-private partnership.

The proposed renewable energy solar PV development will contribute directly to SIPS 8 and 9 i.e. Green Energy in support of the South African economy and Electricity Generation to support socio-economic development, respectively.

17. How does the project fit into the National Development Plan for 2030?	Please explain

The proposed solar PV farm development fits into the National Development Plan (NDP) for 2030 to greater or lesser degrees, depending on the specific NDP goal. A summary of the directly relevant NDP commitments and goals are provided below with the specific project 'fit' indicated in brackets:

Some of the NDP milestones for the are to:

i. increase employment (to a smaller extent employment opportunities for the local community will exist during construction and operation/maintenance of the proposed development),

ii. ensure skilled posts reflect the country's racial, gender and disability makeup (socio-economic input will involve training and development of operational employees albeit at a lower skill-set level),

iii. broaden ownership of assets to historically disadvantaged groups (where possible, community share-holding in the development will be established),

iv. produce sufficient energy to support industry at competitive prices and ensuring access for poor households while reducing carbon emissions per unit of power by about one-third (the solar PV farm's production of electricity has significantly less carbon emissions implications than the conventional coal-fired electricity supply currently dominating the South African economy.

Several critical actions related to the NDP milestones have been identified such as:

i. a strategy to address poverty and its impacts by broadening access to employment strengthening the social wage, improving public transport and raising rural incomes (The proposed development falls out of the urban edge area and is positioned in a more rural environment. Provision of employment opportunities, albeit small, will thus contribute to raising rural incomes),

ii. public infrastructure development at 10% of the gross domestic product financed through tariffs, public-private partnerships, taxes and loans and focussed on transport, energy and water (The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, as well as with the national REIPPPP strategy, increasing public-private partnerships. Electricity produced by the solar PV farm will be fed into the national electricity grid and contribute towards the country's total electrical energy supply),

iii. interventions to ensure environmental sustainability and resilience to future shocks (The proposed solar PV development is in direct response to the DoE's target and IRP 2010-2030 strategy to expand the South African renewable energy electricity generation capacity. The issue of long term electricity supply from renewable sources is of national concern and forms part of the DoE's IRP 2010-2030 which was promulgated with the aim of providing a long-term, cost-effective strategy to meet the electricity demand in South Africa. The IRP 2010-2030 objectives align with Government's in terms of reliable electricity supply, environmental and social responsibilities, as well as economic policies and contribute directly to SIPS 8 and 9 i.e. Green Energy in support of the South African economy and Electricity Generation to support socio-economic development, respectively

18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.
Even though this DBAR is a reapplication for an EA which was granted in 2013, the precautionary principle and a risk adverse approach has been adopted. In line with NEMA s.23, two public participation interventions will take place before submission of the final BAR to the Authorities. All specialists have been reappointed to reassess and verify socio-economic, heritage, biodiversity, visual and land related impacts and opportunities which could result from this project. Additional potential impacts and opportunities from this activity have also been reassessed (with site revisited conducted in 2017). Reassessed specialist inputs and 2017 BAR site visit information will be presented for scrutiny in the final BAR during the second round of public participation. Environmental Management plans/programmes for site establishment, as well as the construction, operation, maintenance and decommissioning phases of the project will be redeveloped to ensure that the objectives of integrated environmental management set out in NEMA s.23 are taken into account.
19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.
Please refer to answer in point 18 above.

11. 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	Applicability to the project	Administering authority	Date
The National Environmental Management Act, No. 107 of 1998, as amended (NEMA)	Section 2 – precautionary principle and risk adverse approach to development; EIA Regulations No. 983 and 984 under respective Listing Notices 1 and 2, of 2014	Department (Dept.) of Environmental Affairs (National)	1998
The National Heritage Resources Act No. 25 of 1999	Section 35 dealing with archaeological or palaeontological objects or material, as well as meteorites	SA Heritage Resources Agency (SAHRA)	1999
Spatial Planning and Land Use Management Act, No. 16 of 2013	Northern Cape Provincial Spatial Development Framework, 2012	Dept of Environment and Nature Conservation(DEANC); Dept. Agriculture, land Reform and Rural Development (DALRRD)	2013
The Land Use Planning Ordinance No. 15 of 1985	Change in land use from Agriculture 1 to Industrial	Northern Cape Planning	1985
The National Environmental Management Biodiversity Act No. 10 of 2004	Section 53 (1) – potential for critical biodiversity areas as identified by the Minister	Dept. Environmental Affairs (National)	2004
Northern Cape Nature Conservation Act 9 of 2009 (NCNCA)	Provides for the sustainable utilisation of wild animals, plants and aquatic biota.	Dept. of Environment and Nature Conservation	2009
National Forests Act 84 of 1998 (as amended)	List of protected trees	DEA (National)	1998
The National Environmental	Domestic (and potentially	Kai! Garib Local	2008

Management Waste Act No. 59 of 2008	hazardous) waste generation and removal from site to applicably registered waste disposal site.	Municipality	

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES ✓	NO
If YES, what estimated quantity will be produced per month?	5 -10m^3	

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

General construction waste such as packaging, paper and domestic waste will be transported off site to a registered municipal waste disposal facility. Electrical waste will be separated from the general domestic waste and where possible, other waste separation will also take place prior to disposal. The engineering, procurement and construction (EPC) contractor will request a permit from the local municipality 90 days before construction starts to ensure correct permission to dispose waste at the registered municipal facility. The EPC contractor has also mentioned that a disposal slip will be obtained from the municipality each time waste is disposed to ensure safe disposal and for our records and auditing purposes.

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

The nearest available registered municipal solid waste disposal facility.

Will the activity produce solid waste during its operational phase?	YES	NO✓
If YES, what estimated quantity will be produced per month?		m^3

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

N/A

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

N/A

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

Note no solid waste will be produced as part of the regular operational phase but there may be small amounts of solid waste (primarily electrical and domestic) during the four to six times that cleaning/maintenance will take place in a year. Maintenance periods are on average, a maximum of one week long (if even) and if solid waste is produced during these maintenance times, it will be disposed of at the nearest local registered municipal solid waste site. It is expected that unless solar PV panels are damaged, most of the waste generated during maintenance periods will be domestic waste (paper, plastic and food) from the work team cleaning the panels.

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 NEM:WA?	YES	NO✓

If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

Is the activity that is being applied for a solid waste handling or treatment facility?	YES	NO✓

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. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	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?	YES	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?	YES	NO✓

If YES, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		**Cell:**	
E-mail:		**Fax:**	

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

Water will be brought to site in water tanker trucks which will be checked regularly so that the tanker valve does not leak. There is not much opportunity for reuse of water used for washing dust off the solar PV panels when this takes place during maintenance (four to six times a year) since the water is judiciously applied as the panels are cleaned.

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other that exhaust emissions and dust associated with construction phase activities?	YES	NO✓
If YES, is it controlled by any legislation of any sphere of government?	YES	NO✓

If YES, the applicant must 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:

Fugitive dust emission from site preparation will occur (e.g. dust blow off during grading of service roads and excavation to lay underground cables). The drilling machines used to drill substructure post holes will be equipped with a dust extraction vacuum system. There will be several diesel and some petrol vehicles on site: 2x drill rigs, 2x10m^3 tipper trucks, 6x tractor and trailers; 1 x waste transport truck; 8 x site bakkies; 1x grader, 1x 20 ton roller; 1x water truck; 1 x TLB; 1 x 20 ton excavator; 1 x trenching machine; 4x Interlinks trucks transporting modules and steel structures to site. Vehicle emissions will be managed by ensuring that vehicles undergo regular maintenance. The use of vehicles that are no longer needed will be reduced. Stationary/unused vehicles will be turned off and not left to idle. Daily inspections will be carried out and spot checks will also be carried out by the EPC's Health, Safety, Sustainability and Environmental Department to ensure compliance to site emission control. Generators used during construction and will be well maintained and switched off when not in use.

d) Waste permit

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?	YES	NO✓

If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

e) Generation of noise

Will the activity generate noise?	YES✓	NO
If YES, is it controlled by any legislation of any sphere of government?	YES	NO✓

Describe the noise in terms of type and level:

Initial vehicle noise from grader/earth moving equipment, trucks and vehicles delivering equipment to site during site preparation and construction. Generators used during construction will also generate noise. The area is zoned for agricultural use in an industrial node. The period and duration of noise generated is therefore, relatively low. Actual operational activity does not generate noise.

13. 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:	N/A litres	
Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs?	YES	NO✓

If YES, please provide proof that the application has been submitted to the Department of Water Affairs.

14. ENERGY EFFICIENCY

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

The activity is the harvesting of solar energy to provide electrical energy to the National grid. As such design energy efficiency is in terms of how well the plant harvests energy from the sun. The design uses Global Horizontal Irradiation (GHI) which is more appropriate to PV systems as they are able to make use of both direct, as well as scattered and reflected sunlight (no focussing is required). In addition, a single axis tracking system enables maximum utilisation of sunlight.

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

Once operational, the facility will supply its own electricity using solar PV energy.

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 B and indicate the area, which is covered by each copy No. on the Site Plan.

Section B 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" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Northern Cape Province
District Municipality	Siyanda District Municipality
Local Municipality	Kai! Garib Local Municipality
Ward Number(s)	N/A
Farm name and number	Erf. 1654
Portion number	N/A
SG Code	C02800000000165400000

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records:	Agricultural 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

Note: For purposes of this post application BAR, information from both original (2012) and revisited (2017) site assessments will be presented.

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

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

Alternative S2 (if any):

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

Alternative S3 (if any):

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

TOPOGRAPHY: Biodiversity Assessment and Botanical Scans (Appendix D2)

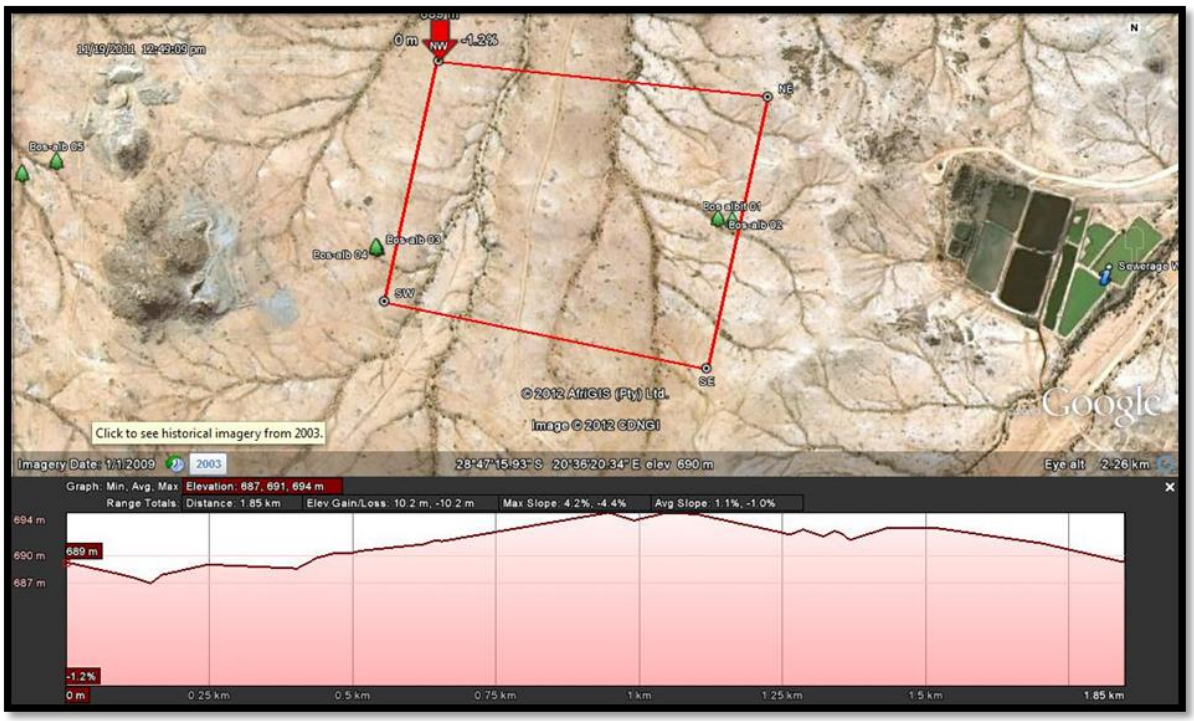

Figure 4 – Google image indicating the slope following the boundary of the site (direction NW-NE-SE-SW). From Fig 5 of Biodiversity Assessment; Appendix D2.

The proposed final site is located on a relative flat, slightly undulating natural area. The elevation data indicates an average slope of only 1.1%. It also shows that the site slopes slightly from the highest point (the south-east corner) to the north-west (the lowest corner) in the direction of the Orange River.

Alternative S2 (if any):

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

Alternative S3 (if any):

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

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 5 – Photograph across the site looking north, showing minimal slope

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

GEOLOGY AND SOIL: Soil, Land Use, Land Capability and Agricultural Potential Survey (Appendix D1)

Land Type Soil Data:
The site falls into the Ag2 land type (Land Type Survey Staff, 1972 - 2006). Ag2 can be described as having Shallow apedal (structureless) with regular occurrences of rock outcrops and lime in the soil profiles. The soils are typical of arid environment soils in that distinct soil formation is lacking and the soils exhibit only signs of physical weathering processes of parent materials. In drainage features varying thickness layers of sand have accumulated that are altered after every heavy rainfall event.

Figure 6 – Shallow and rocky soils on the site

Site survey soil data:
The soil survey revealed that the site consists of shallow rocky soils dominantly of the Mispah (Orthic A-horizon / Hard Rock) and Glenrosa (Orthic A-horizon / Lithocutanic B-horizon) forms. The classification of these soil forms is general as a range of other soil forms can occur on the site. These soils, however, occur sporadically due to nuances in the topography and differences in the rock outcrops and underlying rock topography. The soils that occur with the Mispah and Glenrosa forms include shallow Hutton (Orthic A-horizon / Red Apedal B-horizon / Unspecified – usually hard or weathering rock on this site), Dundee (Orthic A-horizon /Stratified Alluvium), Brandvlei (Orthic A-horizon / Soft Carbonate B-Horizon), Coega (Orthic A-horizon / Hardpan Carbonate Horizon) and Knersvlakte (Orthic A-horizon / Dorbank Horizon) forms. These soils are typical of arid environments and predominantly exhibit signs of physical weathering processes. Chemical weathering processes are not very pronounced but these are probably best exhibited in the accumulation of lime in a number of different subsoil horizons and weathering rock. The soils on the entire site are covered with pebbles (often quartz) and rocks leading to the near impossibility of auguring of holes with a hand soil auger (Figure 6).

Figure 7 – Physically weathered and transported material in alluvial features on the site

Erosion channels occur throughout the site and these are filled with recently transported soil material (Dundee soil form) as per Figure 7, above.

RIVERS AND DRAINAGE: Biodiversity Assessment and Botanical Scan (Appendix D2)

Natural vegetation forms a sparse cover over the entire remainder of the Erf. Various non-perennial or dry watercourses and drainage lines have been observed, criss-crossing most of Erf 1654 (Kakamas), which include the portion of the Erf chosen for the location of the solar site. Unfortunately, due to the distribution of these watercourses and drainage lines it would be impossible to locate a single 20 ha block within the larger Erf without encountering any such watercourse (Figure 8). As a result, the final location was chosen to minimise the impact on the major water courses and to con-inside with the flattest terrain. By being sensitive with the placement of the access roads and pylons for the solar panels, significant impact on these features can be further minimised.

Figure 8 – Google image giving indicating the drainage lines found within the site

AGRICULTURAL POTENTIAL: Soil, Land Use, Land Capability and Agricultural Potential Survey (Appendix D1)

The agricultural use of the soils is very limited due to their physical limitations. In order to establish vineyards these soils have to be ripped and the surface levelled – leading to massive establishment costs.
Therefore, the agricultural potential of the site is very low due to climatic constraints as well as the shallow and rocky soils. The improvement of the agricultural potential is dependent on extensive soil preparation and establishment of irrigation infrastructure – a very intensive and costly exercise. During the current economic climate, many of the farmers or farming enterprises along the Gariep River have faced financial ruin. Under such conditions the investment into additional irrigated agriculture in this area is considered unsound.

4. GROUNDCOVER

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[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.

According to specialist biodiversity and botanical assessments as per Appendix D2:

MAIN VEGETATION TYPE(S)	**Bushmanland Arid Grassland** Described as an open, shrubby thornveld characterized by a dense shrub layer, often lacking a tree layer, with a sparse grass layer **Least Threatened:** But only 4% formally protected (Augrabies Falls National Park).
CRITICAL BIODIVERSITY AREAS	Fine scale maps are not yet defined for this Municipal area. In terms of possible future CBA's and ESA delineation the following was considered: • The site is still covered by natural veld (subject to grazing by livestock (cattle), which shows signs of impact as a result of grazing, some areas (notably along the south boundary) shows signs of disturbance; • The site does not fall in any Centre of Endemism; • Bushmanland Arid Grassland is classified as "*Least Threatened*" with more than 99% still remaining in its natural state, but only 4% of this vegetation type is formally protected; • The most significant biodiversity features associated with the site are two small seasonal watercourses going through the site and a few smallish *Boscia albitrunca* trees associated with these drainage lines. • A number of plant species protected in terms of the NCNCA was observed within the site. • The proposed is located near to the Kakamas sewerage works and waste disposal site (which are inherently degraded). The site still shows excellent connectivity with surrounding vegetation, but the location is also well chosen in that it will be in proximity of already disturbed areas and an access road exists. It is possible that the proposed footprint might be considered for future inclusion into a CBA or ESA on strength of its connectivity value, but there are likely better options available. On the other hand, the small size of the proposed development is unlikely to have any significant impact on connectivity within the larger area.
LAND USE AND COVER	The study area is situated on an Erf within the urban edge of Kakamas, but with little development or agricultural practices (apart from small Municipal works). Natural vegetation forms a sparse cover over the entire area of the study area. The Kakamas waste disposal site as well as sewerage works are located on the same property. Various non-perennial watercourses or drainage lines criss-cross the larger property.
SIGNIFICANT PLANT SPECIES	**No red list plant species were encountered**. **No species protected in terms of NEM: BA encountered**. One species protected in terms of the NFA was encountered, namely Sheppard's trees (*Boscia albitrunca*) associated with the watercourses (which will be excluded from the development). Seven species protected in terms of the NCNCA were encountered of which two are recommended for search & rescue.
IMPACT ASSESSMENT	**Significance before mitigation:** The impact assessment suggests that the proposed Kakamas development is expected to have a **Low cumulative** impact, with the most significant aspect being the potential impact on the protected species encountered within the site and to a lesser degree potential accidental veld fires. The evaluation is based the fact that the small watercourses and its associated vegetation will be protected by default. **Significance after mitigation:** Since the proposed development footprint needs only be approximately 50% of

	the 20ha, there is great potential for micro-adjustment of the final layout plans. Even though the impact is already considered low it will still be possible to reduce direct impacts on other features of significance through layout adjustments, search & rescue and topsoil management. The potential impact on the regional status of the vegetation type and associated biodiversity features (e.g. corridor function or special habitats) will also be minimised through the above mitigations. Apart from the potential impact on protected species no further irreversible species-loss, habitat-loss, connectivity or associated impact can be foreseen from locating and operating the solar facility on the proposed site. With mitigation, the impact on biodiversity features can be reduced but will stay **Low**.

5. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River	YES	NO✓	UNSURE
Non-Perennial River	YES	NO	UNSURE✓
Permanent Wetland	YES	NO✓	UNSURE
Seasonal Wetland	YES	NO	UNSURE✓
Artificial Wetland	YES	NO	UNSURE✓
Estuarine / Lagoonal wetland	YES	NO	UNSURE✓

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

The proposed site appears to lie in the floodplain of the Orange River.

6. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that 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:

Natural area ✓	Dam or reservoir	Polo fields
Low density residential	Hospital/medical centre	Filling station H
Medium density residential	School	Landfill or waste treatment site ✓
High density residential	Tertiary education facility	Plantation ✓
Informal residential A	Church	Agriculture ✓ (Erf is currently zoned for farming and some grazing occurs)
Retail commercial & warehousing	Old age home	River, stream or wetland ✓
Light industrial	Sewage treatment plant A ✓	Nature conservation area
Medium industrial AN	Train station or shunting yard N	Mountain, koppie or ridge
Heavy industrial AN	Railway line N	Museum
Power station	Major road (4 lanes or more) N ✓	Historical building
Office/consulting room	Airport N	Protected Area

Military or police base/station/compound	Harbour	Graveyard
Spoil heap or slimes dam[A]	Sport facilities	Archaeological site
Quarry, sand or borrow pit	Golf course	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? Specify and explain:

The nearby sewage treatment plant has no influence on the proposed development and *vice versa*. Although the N14 does not have four lanes within 500m of the proposed development, it is a major road which is four lanes wide in some areas. The N14 serves as one of the main thoroughfare roads in the Northern Cape and the site will be accessed from the N14 which will probably be the main access route for material and equipment delivery during construction phase. The visual impact of the panels will need to be investigated carefully as this may be a potential road safety issue.

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

N/A

If any of the boxes marked with an "[H]" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

N/A

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan)	YES	NO✓
Core area of a protected area?	YES	NO✓
Buffer area of a protected area?	YES	NO✓
Planned expansion area of an existing protected area?	YES	NO✓
Existing offset area associated with a previous Environmental Authorisation?	YES	NO✓
Buffer area of the SKA?	YES	NO✓

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

7. CULTURAL/HISTORICAL FEATURES

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 paleontological sites, on or close (within 20m) to the site? If YES, explain:	YES	NO
	Uncertain ✓	
N/A		

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

ARCHAEOLOGICAL IMPACT ASSESSMENT (Appendix D3a)

Significance:
All of the lithics documented during the study comprise isolated occurrences that are spread thinly and unevenly over the surrounding landscape, 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. The receiving environment is also degraded.

The relatively small numbers isolated and disturbed context in which they were found means that the archaeological remains have been rated as having low archaeological (Grade 3C) significance.

Conclusions:
Development of the proposed Keren Energy Kakamas solar energy facility on Erf 1654 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.

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 of the Namaqua-Natal Metamorphic Province 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 Kakamas solar plant study area is assessed as **LOW**.

Conclusions:
The overall impact significance of the proposed Kakamas 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?	YES	NO✓
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	NO✓

If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

8. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated.

Level of unemployment:

According to the specialist socio-economic assessment undertaken in 2011/2012 for the original EA application which was granted but subsequently expired, the unemployment rate for the Northern Cape, Kai!Garib Local Municipality and Kakamas are 26%, 15% and 22%, respectively. It was further indicated in the updated/revised specialist assessment undertaken for this current (2017) EA application that a comparison of the original assessment impacts on unemployment with those for the 2017 proposal remain overall positive.

Economic profile of local municipality:

In the Kai!Garib Municipal area and Kakamas, the majority of people work in un- and semi-skilled jobs in agriculture, fishing and forestry, followed by community services. While the unemployment rate in this municipal area is 15%, 88% of households earn R3,500.00 or less per month. However, Kakamas, 93% of households earn R3,500.00 or less per month. The Kakamas population with their low skill levels represents 17% of the Northern Cape population. Hence, the Northern Cape contributes about 2% to the National GDP.

Level of education:

The Kai!Garib population has relatively low levels of education: 15% of the population have no schooling, 70% of the population have less than 12 years of schooling of which 28% had at least 9 years of education and are functionally literate and numerate. The Kakamas specific comparison for the same categories are 10%, 73% and 21%, respectively. 15% of the Kai!Garib population have a qualification equal to matric or higher whilst for Kakamas specifically, the same percentage have a matric qualification.

b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 308.8 million	
What is the expected yearly income that will be generated by or as a result of the activity?	R 65 million	
Will the activity contribute to service infrastructure?	YES	NO✓
Is the activity a public amenity?	YES	NO✓
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	30 (over 6 to 8 months)	
What is the expected value of the employment opportunities during the development and construction phase?	Approximately R 3 million (R 2 million over 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 and 3 indirect)
What is the expected current value of the employment opportunities during the first 10 years?	R 8.7 million
What percentage of this will accrue to previously disadvantaged individuals?	56% (R 4.9 million)

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.

9. BIODIVERSITY

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult http://bgis.sanbi.org or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix D to this report.

a) Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)

Systematic Biodiversity Planning Category				**If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan**
Critical Biodiversity Area (CBA)	Ecological Support Area (ESA)	Other Natural Area (ONA) ✓	No Natural Area Remaining (NNR)	

b) Indicate and describe the habitat condition on site

Habitat Condition	**Percentage of habitat condition class (adding up to 100%)**	**Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).**
Natural	%	
Near Natural (includes areas with low to moderate level of alien invasive plants)	60-70%	The site is still covered by natural veld (subject to grazing by livestock (cattle), which shows signs of impact as a result of grazing, some areas (notably along the south boundary) shows signs of disturbance. The study area is situated on an Erf within the urban edge of Kakamas, but with little development or agricultural practices (apart from small Municipal works). Natural vegetation forms a sparse cover over the entire area of the study area. The Kakamas waste disposal site as well as sewerage works are located on the same property. Various non-perennial watercourses or drainage lines criss-cross the larger property.
Degraded (includes areas heavily invaded by alien plants)	%	
Transformed (includes cultivation, dams, urban, plantation, roads, etc)	%	

c) Complete the table to indicate:

(i) the type of vegetation, including its ecosystem status, present on the site; and

(ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems		**Aquatic Ecosystems**		
Ecosystem threat status as per the National	Critical	Wetland (including rivers, depressions, channelled and unchanneled wetlands, flats,	Estuary	Coastline
	Endangered			
	Vulnerable			

Terrestrial Ecosystems		Aquatic Ecosystems						
Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Least Threatened ✓	seeps pans, and artificial wetlands)						
		YES	NO	UNSURE✓	YES	NO✓	YES	NO✓

d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats).

VEGETATION: Biodiversity Survey and Botanical Scan, (Appendix D2)

The sparse vegetation encountered conforms to that of Bushmanland Arid Grassland classified as least threatened. The dominant vegetation is a grassy, dwarf shrubland. Grasses tend to be more common in depressions and on sandy soils, and less abundant on clayey soils. Most of the larger study area was sparsely but fairly uniformly covered by the same vegetation composition and was mostly associated with shallow soils/rocky shales soils.

The non-perennial watercourses and drainage lines were mostly associated with slightly deeper soils with slightly denser riparian vegetation (Figure 12). Permanent drainage from the sewerage works into some of these water courses has led to significantly denser riparian vegetation in these areas (e.g. south-east of the works).

Figure 9 – Typical vegetation associated with the upper drainage lines (*Acacia mellifera* prominent)

The shallow soils (covering most of the proposed final location as well as the larger terrain) supports a very sparsely covered grassy/shrub bottom layer with shrub small tree top layer sometimes present (Figure 13).

Figure 10 – Vegetation overview on the proposed solar site location (*Euphorbia* sp and *Galenia africana* visible)

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*. None of these species was encountered.
However, 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 namely: *Acacia erioloba, Acacia haematoxylon and Boscia albitrunca*.

During the site visit, a number of *Boscia albitrunca* trees were encountered in the larger area of Erf 1654. All of these trees encountered were marked with GPS coordinates and plotted on a map as depicted in the appended specialist report. It was also very clear that the location of these trees almost always co-insides with the location of a watercourse or drainage lines. In other words, they were almost always only encountered next to a watercourse or drainage line. Please note, that by locating the solar pylons away from the major watercourses, the impact on any of these trees can be negated.

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, therefore, none were found onsite.

FAUNA ASSESSMENT: from Original 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).

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT AND NOTICE

Publication name	Kalahari Bulletin	
Date published	2nd March 2017 (1st round PPP); 15th June 2017 (2nd round PPP)	
Site notice position (approximate)	**Latitude**	**Longitude**
	To be confirmed	To be confirmed
Date placed	27th February 2017 (1st round PPP); 9th June 2017 (2nd round PPP)	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

Proof of Public Participation Notice, newspaper advertisement and photographs of site notice placement, from the first round of public participation (10 March 2017 to 10 April 2017) included in Appendix E1. The second full public participation process is scheduled to start on the 19 June 2017 until 20 July 2017. Proof of second round of Public Participation Notice also included.

2. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 733.

Key stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 733

See Appendix E5 for I&AP list (including key stakeholders) as identified during original application process and first round of full public participation undertaken from 10 March 2017 to 10 April 2017.

Measure taken to include all potential I&APs:

- **Advertisements placed in local newspaper.**
- **Maildrop information notices sent to various I&APs as identified from original public participation process.**
- **Posters placed on site boundary fence and along main access road/s to site.**
- **Maildrops delivered to surrounding settlements/neighbours.**
- **Posters and maildrops placed for public access at local shops in town.**
- **Posters and copy of DBAR placed at Local Municipal Offices for public viewing.**

- **DBAR and all appendices made available on EnviroAfrica's website for public viewing.**

Title, Name and Surname	Affiliation/Key stakeholder status	Contact details (Tel number or e-mail address)

Include proof that the key stakeholder received written notification of the proposed activities as Appendix E2. This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

Proof of key stakeholder notification of first round of public participation included in Appendix E2.

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
Registration as I&AP	I&APs registered as requested.
Query from Kakamas Hydro Electric Power regarding technical specifications related to overhead power line tie-in to Eskom substation.	Answers provided via email to I&AP. Further info requested from Applicant by EAP to include in either post application or FBAR.
Interest in possible business and/or developmental partnerships with proponent.	Referred I&AP either to website or directly to Applicant for more information.
Comments from DEA on FBAR requirements.	Corrections/additions made and post-application BAR circulated for second round of public participation before being sent to DEA.

No issues raised by I&APs during original application process in 2012.
Proof of I&APS issue trail from first round of public participation for current application process included under Appendix E3.
Second round of public participation, scheduled to run from 19 June 2017 to 20 July 2017, will be recorded and issues from both rounds of public participation will be included in the FBAR.

4. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR 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 the Final BAR as Appendix E3.

The first voluntary public participation process ran from 10 March 20127 to 10 April 2017. All comments and queries were captured and responded to as per the Comment and Response Trail attached in Appendix A3.

The second full round of public participation which now includes updated specialist reports and documents which were outstanding from the first round of public participation, is

schedules to run from 19 June 2017 to 20 July 2017. All comments received from I&APs related to this post-application BAR and the required responses, will be included with the FBAR before submission.

5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Authority/Organ of State	Contact person (Title, Name and Surname)	Tel No	Fax No	e-mail	Postal address

Include proof that the Authorities and Organs of State received written notification of the proposed activities as appendix E4.

In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

See Appendix E5 for I&AP list (including authorities and Organs of State) as identified during first round of public participation with issuing of DBAR.

6. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation 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. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as appendix E5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 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. 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

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts 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. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A(2) of this report.

Alternative S1 (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 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 an **INSIGNIFICANT** rating. Development without mitigation = 31% Significance rating and Development with mitigation = 5% Significance (Where values of ≤15% indicate an insignificant environmental impact and values >15% constitute ever increasing environmental impact).

Mitigation measures:
- Pylons should be placed at least 32 m away from the main watercourses on the property. Care should also be taken to protect drainage lines (by controlling the pylons placement).
- All *Boscia albitrunca* trees and its immediate surroundings (at least a 10 m radius) should be regarded as no-go areas. Any additional significant plant species that may be encountered must be identified and located (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). The construction of hard surfaces should be minimised or avoided.
- Access roads and the internal road system must be clearly demarcated and access must be tightly controlled (deviations may 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 (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 Kakamas solar energy facility on Erf 1654 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 Kakamas 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, R359 and residential areas 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.
- Once the alignment of power lines have been determined the impact should be assessed and if of significance.

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) Tresspassing & 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 discussed. From the above, the "No-Go alternative" d**oes 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.

A complete impact assessment in terms of Regulation 19(3) of GN 733 must be included as Appendix F.

2. 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.

This section provides a summary of the assessment and conclusions drawn for the proposed Kakamas solar energy facility. There are no significant negative impacts associated with the development proposals for the 20ha 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 Kakamas 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 = 31% Significance rating and Development with mitigation = 5% Significance (Where values of ≤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 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, R359 and residential areas 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 Kakamas 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 alternative (compulsory):

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 Kakamas 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.

Alternative B

Alternative C

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✓	NO

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 MITIGATION MEASURES:

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).
- 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 at 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	NO✓

The EMPr must be attached as Appendix G.

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.

Any other information relevant to this application and not previously included must be attached in Appendix J.

_____

NAME OF EAP

_____ _____

SIGNATURE OF EAP DATE

SECTION F: APPENDIXES

The following appendixes must be attached:

Appendix A: Maps

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports (including terms of reference)

Appendix E: Public Participation

Appendix F: Impact Assessment

Appendix G: Environmental Management Programme (EMPr)

Appendix H: Details of EAP and expertise

Appendix I: Specialist's declaration of interest

Appendix J: Additional Information