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

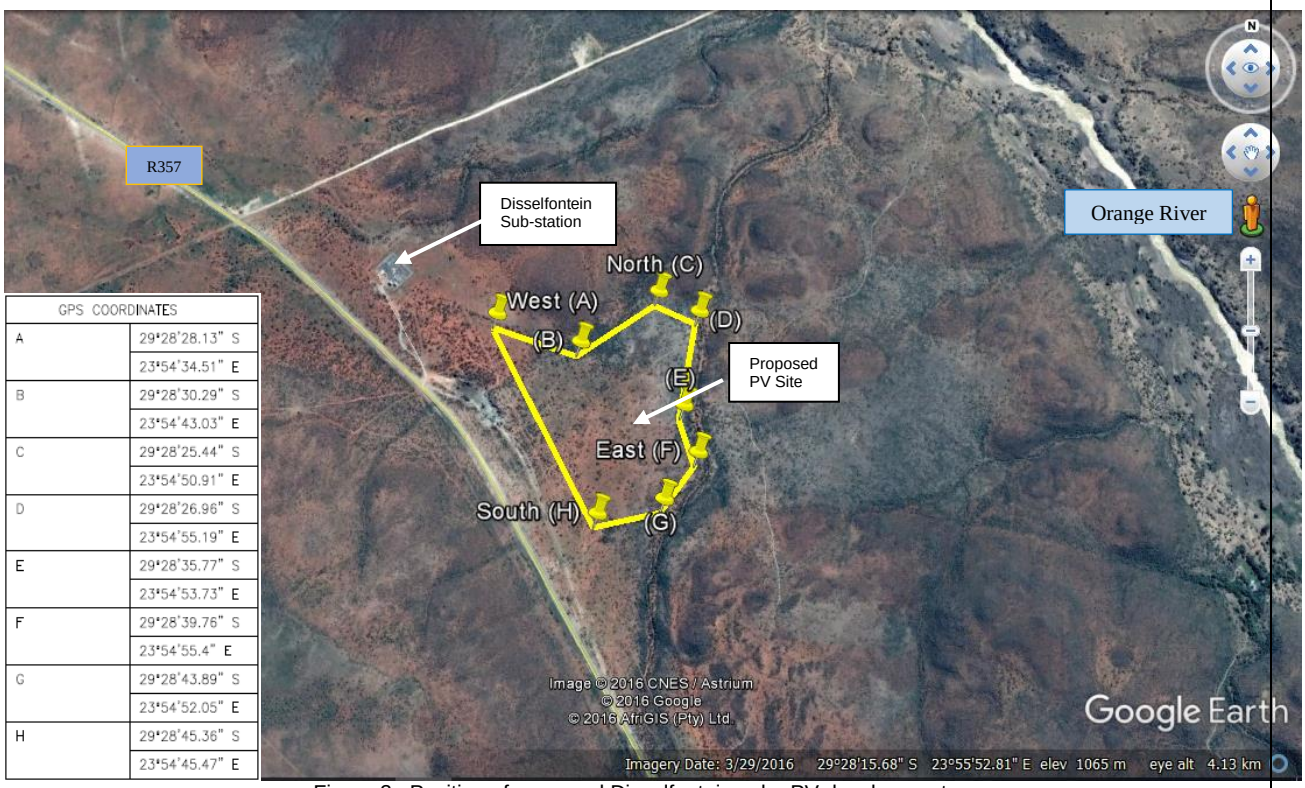
Proposed associated infrastructure includes a fenced construction staging area, a maintenance shed, three inverter-transformer stations on concrete pads, one to two office buildings on the 20ha site, a switch panel for connection to the power grid, as well as about 1,0km of 22kV overhead powerline from the southern section of the PV array and approximately 0,9km of 22kV underground powerline to connect or tie-in the proposed development to Eskom's Disselfontein substation. Figure 2 below indicates the position of the proposed solar PV array with the nearby Disselfontein 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 was 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.

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.



GPS COORDINATES	
A	29°28'28.13" S
	23°54'34.51" E
B	29°28'30.29" S
	23°54'43.03" E
C	29°28'25.44" S
	23°54'50.91" E
D	29°28'26.96" S
	23°54'55.19" E
E	29°28'35.77" S
	23°54'53.73" E
F	29°28'39.76" S
	23°54'55.4" E
G	29°28'43.89" S
	23°54'52.05" E
H	29°28'45.36" S
	23°54'45.47" E

Figure 2: Position of proposed Disselfontein solar PV development

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 Disselfontein (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 portion 8 of the remainder of Farm Disselfontein 77, Hope Town, Thembelihle Local Municipality, Pixley ka Seme District Municipality, 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 29°28'36.86''S, 23°54'47.44''E, 21km west of Hope Town, along the R357 road which roughly follows the Orange River.
Figure 3 indicates the potential cumulative impact radius for proposed solar PV development site relative to other approved renewable energy projects in the region. 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, is incorrectly indicated on the DEA renewable energy application map as farm 78. The area allocated to the development is also much larger than the 20ha applied for. Refer to DEA website at https://dea.maps.arcgis.com/apps/webappviewer).

After considering approximately 4470ha of the Farm Disselfontein 77, 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.

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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 Disselfontein substation to the north-west of the proposed development site, on the same side of the R357.

The powerline feeding into Eskom's Disselfontein substation will be a three-phase powerline which will have an overhead and sub-surface component as it leads from the development site to tie-in to the sub-station. 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 and Material Delivery; Site Preparation:
The proposed development site is accessible from the R357 using secondary roads, although additional access roads will need to be established. 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 temporary access roads will have to be established on site in addition to the long-term perimeter fire and main access road. The main access road 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 and during operation and maintenance about 2000m^3 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	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 the Farm Disselfontein 77, 21km

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	west of Hope Town in the Northern Cape. The development's actual maximum contracted electricity generation capacity is 5MW with a maximum electricity generation nameplate capacity of 5.75MW.
GN. R. 327 Item 27: The clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation	Partial clearance of the 20ha site will be required.

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 development footprint is an area not exceeding 20ha on portion 8 of the remainder of Farm Disselfontein 77, Hope Town, Thembelihle Local Municipality, Pixley ka Seme District Municipality, Northern Cape Province. The preferred development site for which landowner consent use has been granted is located along the R357 road, travelling 21km out of Hope Town, in a westerly direction	29°28'36.86''S	23°54'47.44''E

Remainder of the Farm Disselfontein, No. 77, Hopetown was identified as a suitable option for the proposed development. The site area is depicted in Figure 1 above. Approximately 4470ha of Farm Disselfontein 77 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**: JD Ferreira Family Trust has provided consent
- **Available access**: The site can be accessed from an existing secondary leading north-north-west from Hopetown following the Orange River which eventually connects to the R357. However, additional temporary access roads will have to be established on site.
- **Locality to nearest electricity grid for power evacuation/tie-in to the national grid:** Disselfontein rural sub-station is located on site.
- **Topography**: The proposed site is located on an almost level area on a slightly undulating landscape.
- **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 has concluded that with mitigation no significant impacts are foreseen.
- **Archaeological**: The site was specifically chosen with minimal impact on Archaeological artefacts, no further archaeological mitigation is necessary before the development can take place.
- **Visual:** The proposed site is situated in the rural area adjacent to the Orange River corridor. The proposed solar farm is however on the site of an existing ESKOM substation with HV power lines. The area display a rural character with low intensity farming, game farming and natural areas.

Alternative 2

Description	Lat (DDMMSS)	Long (DDMMSS)
Approximately 4470ha of the Farm Disselfontein 77 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 4470ha) 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 DBAR 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. The current and preferred layout of the proposed solar farm / PV array, is closest to the R357 road.	Northern corner: 29°28'25.44''S Western corner: 29°28'28.13''S Southern corner: 29°28'45.36''S Eastern corner: 29°28'39.76''S	Northern corner: 23°54'50.91''E Western corner: 23°54'34.51''E Southern corner: 23°54'45.57''E Eastern corner: 23°54'55.4''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 DBAR, 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: 29°28'25.44''S Western corner: 29°28'28.13''S Southern corner: 29°28'45.36''S Eastern corner: 29°28'39.76''S	Northern corner: 23°54'50.91''E Western corner: 23°54'34.51''E Southern corner: 23°54'45.57''E Eastern corner: 23°54'55.4''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 Disselfontein (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 Possible	Yes	Yes	Yes, essential	Dual axis tracking is essential for CPV systems. It is also available for 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)	Just 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)	Just under 200 000 m^2
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

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

Describe the type of access road planned:

The main access road to the site is the existing R357. The main gate to the proposed site is just off the R357 and a gravel/dirt road approximately 4m in width but not wider than 8m and less than 50m in length will be graded to allow access to the existing gate in the fence surrounding the proposed area for the solar PV farm. Within the site there will be graded fire service and access roads to the panels for maintenance (also approximately 4m in width but not wider than 8m).

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.

Refer to specific specialist reports as attached in Appendix D for relevant sensitivity maps.

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.

Refer to Appendix A for facility illustration as depicted in the layout plan.

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 about 500m away from 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 Thembelihle 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 Thembelihle 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 Thembelihle 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.			
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 (primarily R357). The development is also in line with the local municipality's aim to further develop the area. The site's close proximity to the point of tie-in with the national electricity grid at the local Eskom (Disselfontein) 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
The development has negative impacts in terms of the indigenous trees currently growing on it although the land is zoned as Agriculture 1. Despite the current land use zoning, the site is not particularly arable due to soil type and the natural grasses make it more suited to grazing. The rocky soil type also makes it less prone to erosion which is a benefit for this type of development. In addition, 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 Management Waste Act No.	Domestic (and potentially hazardous) waste generation	Thembelihle Local Municipality	2008

59 of 2008	and removal from site to applicably registered waste disposal site.		

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)?

No solid waste will be produced as part of the actual operation of the array during 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:

N/A

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.

See individual declarations for each specialist in respective specialist reports found in Appendix D.

Property description/physical address:

Province	Northern Cape Province
District Municipality	Pixley ka Seme District Municipality
Local Municipality	Thembelihle Local Municipality
Ward Number(s)	N/A
Farm name and number	Farm Disselfontein 77
Portion number	8
SG Code	C03300000000007700008 **(to be confirmed)**

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 DBAR, original site assessment information will be presented. Information from revisited site assessments as conducted in February and March 2017, will be presented in the final BAR.

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, Appendix D2.

Figure 4 – *Google image showing the difference in elevation from the NE towards the SW corner of the proposed location (from Figure 5 of Original Biodiversity Assessment; Appendix D2).*

Refer to Original Biodiversity Assessment, Appendix D2:
The solar site is located on an almost level area on a slightly undulating landscape, just west of the Orange River (north-north-west of Hopetown). Elevation data shows that the site slopes very slightly from the north-east towards the south-west (towards the Orange River). Elevation varies from 1083 m (north-west corner) towards the south-east at 1071 m with an average slope of 1.0% and an elevation loss of approximately 9.8 m

2. LOCATION IN LANDSCAPE

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

2.1 Ridgeline		2.4 Closed valley		2.7 Undulating plain / low hills	
2.2 Plateau		2.5 Open valley		2.8 Dune	
2.3 Side slope of hill/mountain		2.6 Plain	✓	2.9 Seafront	
2.10 At sea					

From the original Visual Impact Assessment (VIA), Appendix D3c: The proposed site is situated in the rural area adjacent to the Orange River corridor. The Orange River corridor represent a production landscape, which in the immediate surrounds of the site has a lower level of irrigation farming and more extensive farming due to the topography.

Figure 5 *– Photograph indicating relatively flat landscape*

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

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

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

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

GEOLOGY AND SOIL: Original Agricultural Assessment, Appendix D1

Land Type Soil Data: The site falls into the **Fb398** land type (Land Type Survey Staff, 1972 - 2006). Fb land types denote areas that are dominated by shallow and rocky soils with lime occurring in valley bottom positions. The soils in the land type are shallow, rocky and predominantly red, of high base

status, and often with a regular occurrence of lime in lower landscape positions. Rock outcrops and surface rock occur frequently (Figure 6).

Figure 6 *– Land cover of the site with high voltage power lines also in view*

Site survey soil data:
The soil survey revealed that the site is dominated by shallow rocky soils of the Mispah (Orthic A-horizon / Hard Rock), Glenrosa (Orthic A-horizon / Lithocutanic B-horizon) and shallow Hutton (Orthic A-horizon / Red Apedal B-horizon) forms (Figures 6 and 7).

In drainage depressions, deeper soils of the Hutton (Orthic A-horizon / Red Apedal B-horizon / Unspecified – usually hard or weathering rock), Oakleaf (Orthic A-horizon / Neocutanic B-horizon / Unspecified - usually hard or weathering rock) and occasionally Augrabies (Orthic A-horizon / Neocarbonate B-horizon / Unspecified - usually hard or weathering rock) forms occur (Figures 10). The soils in these depressions show no morphological sign of wetness (as required for wetland delineation) as the rainfall is low and the soils are well drained. The following abbreviations apply: R – Rock; Ms – Mispah; Gs – Glenrosa; Hu – Hutton; Oa – Oakleaf; Ag – Augrabies.

Figure 7 *– Deeper red soils in drainage depressions with lime accumulation at depth*

<u>RIVERS AND DRAINAGE</u>: Biodiversity Assessment: Appendix D2

Two dry watercourses or upper drainage lines were observed on the general site area and surrounds (indicated in red in Figure 8) - one draining from west to east in the north-western portion of the proposed solar location and one draining from the middle of the area towards the south-south-west. Although they are not considered major watercourses they are well established and support denser woody riparian vegetation (defining the watercourse). Both of these drainage lines drain towards the Orange River, east of the proposed site location.

Figure 8 *– A Google overview of the general proposed site location and surrounding area, indicating the drainage lines encountered on site*

AGRICULTURAL POTENTIAL: Original Agricultural Assessment, Appendix D1

The agricultural potential of the site is **LOW** due to climatic constraints as well as the dominance of shallow soils. Extensive grazing can be practiced (and probably is – although livestock was not observed) but the grazing potential is relatively low and highly dependent on rainfall as the soils are well drained without significant water holding properties. The grazing will often be limited to livestock that can utilise leaves from thorny Acacia shrubs.

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.

VEGETATION: Biodiversity Assessment: Appendix D2

The study area is situated on an almost level area in a slightly undulating landscape on the farm Disselfontein, adjacent and to the west of the Orange River or (north-north-west of Hope Town). The property zoned as agriculture and used for stock grazing. Smaller game species is still expected in the larger area

In accordance with the 2006 Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) only one broad vegetation type is expected in the proposed area and its immediate vicinity, namely Vaalbos Rocky Shrubland (Figure 9). Vaalbos Rocky Shrubland was classified as "Least Threatened" during the 2004 National Spatial Biodiversity Assessment (NSBA).

Vaalbos Rocky Shrubland is described as occurring on slopes and elevated hills and ridges within plains of mainly Kimberley Thornveld, but also in the vicinity of Northern Upper Karoo (Mucina & Rutherford, 2006). It is described as evergreen shrub communities dominated by *Tarchonanthus camphoratus*, *Olea europaea* subsp. *africana*, *Euclea crispa*, *Diospyros lycioides*, *Rhus burchelli* and *Buddleja saligna*. On the foot slopes of dolerite hills, where calcium rich soils occur, shrub and small trees of *Acacia tortilis* and *Ziziphus mucronata* can be dominant. Figure 10 gives an indication of the vegetation found on site.

Figure 10 – Natural veld in the study area, note *Acacia mellifera* in the foreground and the rocky soils

The vegetation encountered conforms to that of Vaalbos Rocky Shrubland and supported an open shrubland with two layers normally present, namely a lower shrub layer up to 0.5 m and a sparse woody shrub/small tree top layer (varying between 1-2 m in height) with open patches in between. A third layer (reaching up to 4 m) in the form of *Boscia albitrunca* or *Acacia tortilis* was also occasionally encountered.

Where the soils are rockier, grasses are almost absent and the two vegetation layers consisted mainly of a shrub bottom layer with a woody/shrub top layer. In the sandier areas (seemingly slightly deeper red soils) grasses were more common and *Boscia albitrunca* was also sometimes present (Figure 11). Note that *Boscia albitrunca* was only observed along the western boundary of the site (associated with the slightly deeper less rocky soils), west of the Eskom substation. The differences in soil/soil depth led to variations in vegetation composition. Vegetation cover in general was between 50-65%.

Figure 11 – *The vegetation encountered on slightly deeper soils (note Boscia albitrunca in the background)*

Endemic or Protected Species:
According to Mucina & Rutherford (2006), there is no endemic taxon associated with this vegetation type. 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: *Acacia erioloba, Acacia haematoxylon and Boscia albitrunca.* All trees encountered were marked with GPS coordinates and can be found in the original Biodiversity Impact Assessment (BIA) in Appendix D2.

Invasive Alien Species:
Most probably because of the aridity of the area, invasive alien rates are generally very low for most of this area and no problem plants were observed within the study area (apart from some bush encroachment by the indigenous *Acacia mellifera*).

FAUNA: Original Biodiversity Assessment, Appendix D2

The farm is zoned agriculture and used for livestock grazing. However, it is expected that the property still supports a number of game species, birds and other fauna. It was noted that the area in which the final proposed site is to be located seems to have been grazed over a long period of time. However, viewed in the larger context of the farm, the 20 ha solar facility will not pose a significant loss of grazing and the proposed solar site facility is not expected to have a major impact on regional biodiversity and with mitigating and good environmental control during construction the impact could be minimised.

According to the Sanparks website (www.sanparks.org.za/parks/mokala), the nearby Mokala National Park is host to a varied spectrum of birds which adapted to the transition zone between Kalahari and Karoo biomes. Birds that can be spotted are the Kalahari species, black-chested prinia and its Karoo equivalent rufous-eared warbler as well as melodious lark. In rocky hillocks attract species such as freckled nightjar (vocal at night), short-toed rock thrush and cinnamon-breasted bunting. There are also a number of birds making use of the artificial man-made habitat around accommodations, such as mousebirds, martins, robin-chats, thrushes, canaries and flycatchers. Animal species such as Black Rhino, White Rhino, Buffalo, Tsessebe, Roan Antelope, Mountain Reedbuck, Giraffe, Gemsbok, Eland, Zebra, Red Hartebeest, Blue Wildebeest, Black Wildebeest, Kudu, Ostrich, Steenbok, Duiker and Springbok are also present in the Mokala National Park. The trees associated with the riverbeds provide locally rare nesting and roosting habitat to birds.

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.

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 ✓ (Farm – some grazing takes place)
Retail commercial & warehousing	Old age home	River, stream or wetland ✓
Light industrial ✓ (Disselfontein substation to the North)	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)

Refer to original VIA in appendix D3c attached.

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:

N/A

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		

From Original ARCHAEOLOGICAL IMPACT ASSESSMENT (APPENDIX D3a)

Significance:
Thirty-two archaeological occurrences were recorded with a hand held GPS device. The majority of the remains occur in, and alongside the Eskom servitudes that cross the footprint area of the property in a number of places. These include a low density scatter of flakes and chunks west of the small stream (209 & 210), and several low density scatters to the east of the stream that cuts through the central portion of the site (211-22 & 222). Most of the archaeological remains were documented in this central area, on patches of stony ground and red sands, covered in grassland vegetation either side of a large Eskom servitude.

Apart from a few chalcedony/chert flakes, that included a very low density scatter of tools on a patch of orange sand in the eastern portion of the footprint area (238), more than 98% of the tools are in fine grained quartzite and weathered indurated shale. This is in stark contrast to several other proposed solar farms that were recently assessed by the archaeologist in the northern and western parts of the province, where the majority of the tools were almost exclusively in banded ironstone.

Frequencies of formal tools are low, and include a few bifacial pointed flakes, and partially retouched blades and points, including a large blade with step/adze retouch. It is assumed that most of the pointed flakes were hafted onto shafts of wood and used as spears or stabbing tools. No scrapers were found, but several side retouched flakes were noted, that could have been used as scraping tools.

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 relatively small numbers isolated and dispersed context in which they were found mean that the remains have been rated as having low (Grade 3C) significance. In the case of the proposed Disselfontein Solar Energy Plant near Hopetown it is expected that the overall impact on important archaeological remains will be **LOW**.

Conclusions:
It is maintained that development of the proposed Keren Energy Disselfontein Solar Energy Plant on Remainder Farm 77 will have a limited impact on archaeological heritage resources.

The AIA has captured most of the archaeological heritage that is present on the site, although it should be remembered that a large portion of the footprint area is covered in dense Swarthok vegetation.

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

PALEONTOLOGICAL IMPACT ASSESSMENT (APPENDIX D3b)

Significance:
The site of the proposed Disselfontein Keren Solar Plant is largely blanketed by superficial sands of Quaternary age and low palaeontological sensitivity. The thickness of the cover sands is unclear, and may be low. The geological map and literature suggests that these sands may be underlain at shallow depths by ancient alluvial gravels of the Orange River and / or post-glacial mudrocks of the Prince Albert Formation (Ecca Group), both of which may contain important fossil remains. The last two units might also be exposed at surface along the margins of the study area (*e.g.* in stream gullies).

Conclusions:
It is therefore recommended that a brief Phase 1 palaeontological field assessment of the Disselfontein Solar Plant study site near Hopetown be undertaken:
(a) to determine whether or not potentially fossiliferous beds of the Prince Albert Formation and / or ancient Orange River alluvial gravels are present here, and
(b) to make appropriate recommendations for any necessary mitigation measures during the construction phase. The Phase 1 palaeontological field report should be submitted to SAHRA.

From original VISUAL IMPACT ASSESSMENTS (APPENDIX D3c)

Receiving Environment:
The proposed site is situated in the rural area adjacent to the Orange River corridor. The Orange River corridor represents a production landscape, which in the immediate surrounds of the site has a lower level of irrigation farming and more extensive farming due to the topography. The proposed solar farm is however on the site of an existing ESKOM substation with HV power lines. The area displays a rural character with low intensity farming, game farming and natural areas.

The area is characterized by a flowing topography of low rises just outside the valley corridor. More hills and ridges occur closer to the river. The plain area however display such a level of gradient that present a fairly high level of absorption and view is on average restricted to the immediate environment and seldom more than 5km. The human eye can observe the horizon on a perfectly flat surface up to 30km. The Disselfontein area however displays sufficient gradient variations to restrict this view significantly.

Findings:
The R369 will be exposed to the site, but the impact is of short duration and linked to existing similar infrastructure namely the substation and HV lines. The short duration of view reduce the significance of impact.

As the PV units are planned next to the substation, the transmission lines will be on-site and not add any additional off-site visual impact to the development

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

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:

Refer to Appendix D4: Socio-economic Impact Assessment

Economic profile of local municipality:

Refer to Appendix D4: Socio-economic Impact Assessment

Level of education:

Refer to Appendix D4: Socio-economic Impact Assessment

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%**	**Refer to Specialist report attached.**
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 Environmental Management: Biodiversity Act (Act No. 10 of 2004)	Critical	Wetland (including rivers, depressions, channelled and unchanneled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline	
	Endangered							
	Vulnerable							
	Least Threatened ✓	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: Original Biodiversity Assessment: Appendix D2

The study area is situated in a shallow north-south valley within the northern portion of the Kuruman hills (north-west of Kuruman). The property and its immediate surroundings are used primarily as a game camp. Various game species have been re-introduced to the site and have been observed. Natural vegetation forms a medium-dense cover over the entire property, varying in composition from pockets encroached by dense stands of *Acacia mellifera* to areas dominated by a more open woodland with *Tarchonanthus camphoratus*, *Ziziphus mucronata*, *Grewia flava* and *Acacia erioloba* forming bush patches.

In accordance with the 2006 Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) two broad vegetation types is expected in the proposed area and its immediate vicinity, namely Kuruman Thornveld classified as least threatened. Kuruman Thornveld is described as occurring on flat rocky plains and slopping hills with a very well-developed, closed shrub layer and well-developed open tree stratum consisting of *Acacia erioloba* (Mucina & Rutherford, 2006) with *Tarchonanthus camphoratus* prominent in the shrub layer (Refer to Figure 10).

The vegetation encountered conforms (including that of the larger study area) to that of Kuruman Thornveld and supported a well-developed woody shrub/small tree layer (varying between 1-2.5 m in height) with open grassy patches in between (probably the result of continual grazing) with occasional individuals of both *Acacia erioloba* and *Boscia albitrunca* commonly present (reaching up to 4 m in height). In fact quite a number of both *Acacia erioloba* and *Boscia albitrunca* trees were observed within the larger study area (a trend which is supported throughout most of the immediate vicinity of the proposed solar site location. In other words moving the proposed solar site location within the larger study area will not lessen the impact on these tree species. The larger study area was fairly uniformly covered by the same vegetation composition. Vegetation cover was between 60-75%.

Figure 10 – *Natural veld in the study area note Tarchonanthus camphoratus and Acacia mellifera in the dense shrub layer*

Endemic or Protected Species:
According to Mucina & Rutherford (2006), the only endemic taxon which might be encountered is the herb *Gnaphalium englerianum*. This Asteraceae species was not encountered during the site visit and although it might be present within the area on which the solar site is to be located it is not expected to contribute significantly towards regional conservation targets. 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: *Acacia erioloba*, *Acacia haematoxylon and Boscia albitrunca.*

During the site visit, a number of single trees as well as clumps of both *Acacia erioloba* and *Boscia albitrunca* were encountered distributed throughout the proposed final solar site location. All trees and clumps encountered were marked with GPS coordinates and plotted on a map. Although a large number of both species was encountered, the same hold true for the surrounding area (the remainder of the farm in the immediate vicinity).

Moving the site within this portion of the farm will not make any sense since the same pattern of distribution holds true for the immediate surroundings. In addition, moving the sites might mean that some of the watercourses (expected to the east of the proposed final location) might be impacted.

Invasive Alien Species:
Most probably because of the aridity of the area, invasive alien rates are generally very low for most of this area and no problem plants were observed within the study area (apart from some bush encroachment by the indigenous *Acacia mellifera*).

FAUNA: Original Biodiversity Assessment: Appendix D2

The farm is managed as a game camp and it is clear that the property still supports a number of game species, birds and other fauna. It was noted that the area in which the final proposed site is to be located seems to have be heavily grazed over a long period of time. However, viewed in the larger context of the game reserve, the 20 ha solar facility will not pose a significant loss of grazing and the proposed solar site facility is not expected to have a major impact on regional biodiversity and with mitigating and good environmental control during construction the impact could be minimised.

According to the Sanparks website (www.sanparks.org.za/parks/mokala), the nearby Mokala National Park is host to a varied spectrum of birds which adapted to the transition zone between Kalahari and Karoo biomes. Birds that can be spotted are the Kalahari species, black-chested prinia and its Karoo equivalent rufous-eared warbler as well as melodious lark. In rocky hillocks attract species such as freckled nightjar (vocal at night), short-

toed rock thrush and cinnamon-breasted bunting. There are also a number of birds making use of the artificial man-made habitat around accommodations, such as mousebirds, martins, robin-chats, thrushes, canaries and flycatchers. Animal species such as Black Rhino, White Rhino, Buffalo, Tsessebe, Roan Antelope, Mountain Reedbuck, Giraffe, Gemsbok, Eland, Zebra, Red Hartebeest, Blue Wildebeest, Black Wildebeest, Kudu, Ostrich, Steenbok, Duiker and Springbok are also present in the Mokala National Park. The trees associated with the riverbeds provide locally rare nesting and roosting habitat to birds.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT AND NOTICE

Publication name	Express Northern Cape	
Date published	1st March 2017	
Site notice position (approximate)	**Latitude**	**Longitude**
	29°28'36.86''S	23°54'47.44''E
Date placed	27th February 2017	

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

Proof of placement and newspaper advertisement will be included with the POST-APPLICATION BAR. See Appendix E for proof of Notice. The public participation period is scheduled to start on the 10th March 2017.

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

See Appendix E for I&AP list (including key stakeholders) as identified during original application process.

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 will be included with the POST-APPLICATION BAR. The public participation period is scheduled to start on the 10th March 2017.

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP

No issues raised by I&APs during original application process. Proof of I&APS issue trail for re-application process will be included with the POST-APPLICATION BAR. The public participation period is scheduled to start on the 10th March 2017.

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.

This is a re-application process for an expired authorisation which was granted in 2013. No comment and response sheet is available at this stage since the public participation process is officially scheduled to start on the 10th March 2017. All comments received from I&APs related to this re-application and the required responses, will be included with the POST-APPLICATION BAR.

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 E1 for I&AP list (including authorities and Organs of State) as identified during original application process.

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.

A list of registered I&APs will be included with the POST-APPLICATION BAR.

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

Copy of email correspondence and minutes of meeting held with DEA (National) will be attached in the POST-APPLICATION BAR as 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 – **LOW** – Mitigation: Plan and implement adequate erosion control measures, with adequate soil stabilization
- Mismanagement of removed topsoil – LOW – Mitigation: Ensure a plan for the sound management of topsoil (should the site be cleared using grading) is included in the EMP and implemented.

Operational related activities:

Physical degradation of the surface due to:

- 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

Due to construction and operational activities there will be:

- Direct loss of vegetation type and associated habitat
- 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

Even if the entire 20ha site 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 = 40% Significance rating and Development with mitigation = 16% Significance (Where values of ≤15% indicate an insignificant environmental impact and values >15% constitute ever increasing environmental impact).

Mitigation measures:

- Consider moving the final layout of the proposed solar site, e.g. shifting the solar infrastructure slightly east in the specific area populated by *Boscia albitrunca* trees to avoid these trees.
- A botanist or suitably experienced ECO must be appointed to oversee the initial layout of the construction site, with the aim to identify and minimise the impact on any protected trees. The placement of roads and solar structures should endeavour to avoid any of these tree species.
- If any of these trees must be removed, permit approval must be obtained beforehand.
- It is also proposed that at least two plants of the same species be replanted for every single tree removed.
- 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

In the case of the proposed Disselfontein Solar Energy Plant near Hopetown it is expected that the overall impact on important archaeological remains will be **LOW**.

Apart from trenches for underground cables, limited bedrock excavations are envisaged. The solar panels will be raised about 2 m above ground and mounted on small footings drilled and set into the ground. The excavations for the footings are about 1.5 m in diameter and so the actual ground disturbance will be quite limited and contained

Mitigation measures:
- No further archaeological mitigation is required.
- Should any unmarked human burials/remains or ostrich eggshell 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 site of the proposed Disselfontein Keren Solar Plant is largely blanketed by superficial sands of Quaternary age and **LOW** palaeontological sensitivity. The thickness of the cover sands is unclear, and may be low. The geological map and literature suggests that these sands may be underlain at shallow depths by ancient alluvial gravels of the Orange River and / or post-glacial mudrocks of the Prince Albert Formation (Ecca Group), both of which may contain important fossil remains. The last two units might also be exposed at surface along the margins of the study area (*e.g.* in stream gullies).

Mitigation measures:
It is therefore recommended that a brief Phase 1 palaeontological field assessment of the Disselfontein Solar Plant study site near Hopetown be undertaken:
(a) to determine whether or not potentially fossiliferous beds of the Prince Albert Formation and / or ancient Orange River alluvial gravels are present here, and
(b) to make appropriate recommendations for any necessary mitigation measures during the construction phase. The Phase 1 palaeontological field report should be submitted to SAHRA.

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 activity, if it contributes to the infrastructure of the area. Rating: **LOW**

Operational Phase:
The site is situated in an area with a rural character. The immediate area however does host an electrical substation and HV lines. The solar farm will thus change the character of the immediate environment. The view catchment is however small due to topographical variations. The landscape has a medium absorption rate which reduces the significance of land use change.

The R369 will be exposed to the site, but the impact is of short duration and linked to existing similar infrastructure namely the substation and HV lines. The short duration of view reduce the significance of impact.

As the CPV units are planned next to the substation, the transmission lines will be on-site and not add any additional off-site visual impact to the development

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

Mitigation measures:
The nature of the development is such that very little mitigation measures is possible, but the level of impact does not necesitate any mitigations measures.

SOCIO-ECONOMIC IMPACTS (APPENDIX D4)

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

- Job creation
- Skills development
- Increase in Sales volume
- Increase in GGP
- 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:

- Increased traffic
- Increased demand for Health, Safety
- Increase demand for Housing and Municipal services
- 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:

- Increased dust and noise
- Deterioration of bio-physical environment
- Trespassing & crime
- 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
Vaalbos Rocky Shrubland was classified as "Least Threatened", thus the vegetation itself is not considered to belong to a threatened or protected ecosystem. No special habitats were encountered on site (e.g. quartz patches or broken veld), which could sustain significant smaller ecosystems. In addition, by placing the proposed final site location within an area already degraded by bush encroachment (*Acacia mellifera*) and away from the watercourse and protected tree species associated with the deeper red soils in the valley bottom the impact is further reduced.

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 the "No-Go alternative" **does not signify significant** biodiversity gain or loss especially on a regional basis. In this case the no-go options will only ensure that the *status quo* remains, but it is expected that urban creep will anyway impact on the proposed final solar site location over time.

The site visit and desktop studies described and evaluated in this document led to the conclusion that the "No-Go" alternative **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, biodiversity friendly, and more sustainable long term option for electricity production.

A complete impact assessment in terms of Regulation 19(3) of GN 733 must be included as Appendix F.
The complete environmental impact assessment will be included with the POST-APPLICATION BAR.

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.

Alternative A (preferred alternative)

This section provides a summary of the assessment and conclusions drawn for the proposed Disselfontein solar energy facility. There are no significant negative impacts associated with the solar PV 5MW proposal 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 of **LOW** significance with the implementation of appropriate mitigation measures. From the information discussed in the BAR it is clear to see that the Disselfontein final location was 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 **LOW** significance rating. Development without mitigation = 36% Significance rating and Development with mitigation = 7% 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. It is however recommended that a brief Phase 1 palaeontological field assessment of the Disselfontein Solar Plant study site near Hopetown be undertaken: (a) to determine whether or not potentially fossiliferous beds of the Prince Albert Formation and / or ancient Orange River alluvial gravels are present here, and (b) to make appropriate recommendations for any necessary mitigation measures during the construction phase. The Phase 1 palaeontological field report should be submitted to SAHRA. 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 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 site is situated in an area with a rural character. The immediate are however do host an electrical substation and HV lines. The solar farm will thus change the character of the immediate environment. The view catchment is however small due to topographical variations. The landscape has a medium absorption rate which reduces the significance of land use change. The R369 will be exposed to the site, but the impact is of short duration and linked to existing similar infrastructure namely the substation and HV lines. The short duration of view reduce the significance of impact. As the CPV units are planned next to the substation, the transmission lines will be on-site and not add any additional off-site visual impact to the development. The proposal does not present an unacceptable level of change to the visual environment and therefore the development can be recommended. Furthermore, 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 Disselfontein 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 (EMPr) included within Appendix G.

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

Alternative B

Alternative C

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 5MW 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 recent 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 Disselfontein 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

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 MITIGATIONS

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

General

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

Site specific Mitigations

- Pylons should be placed at least 32 m away from any of the main watercourses on the property. Care should also be taken to protect drainage lines (by controlling the pylon placement).
- All significant plant species should be identified (e.g. *Acacia erioloba*) and all efforts made to avoid damage to such species.
- Only existing access roads should be used for access to the terrain (solar site).
- The internal network of service roads (if needed) must be carefully planned to minimise the impact on the remaining natural veld on the site. The number of roads should be kept to the minimum and should be only two-track/ twee-spoor roads (if possible). If possible the construction of hard surfaces should be avoided.
- Access roads and the internal road system must be clearly demarcated and access must be tightly controlled (deviations must not be allowed).
- Indiscriminate clearing of areas must be avoided, only pylon sites and sites where associated infrastructure needs to be placed must be cleared (all remaining areas to remain as natural as possible).
- 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.
- It is therefore recommended that a brief Phase 1 palaeontological field assessment of the Disselfontein Solar Plant study site near Hopetown be undertaken: (a) to determine whether or not potentially fossiliferous beds of the Prince Albert Formation and / or ancient Orange River alluvial gravels are present here, and (b) to make appropriate recommendations for any necessary mitigation measures during the construction phase. The Phase 1 palaeontological field report should be submitted to SAHRA.
- 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.
- **All mitigations and recommendations from the <u>specialists</u> (Section D2 above) must be adhered to.**

Is an EMPr attached?	YES	NO✓

The EMPr must be attached as Appendix G.

This is a re-application process for an expired authorisation which was granted in 2013. The complete updated EMPr will be included with the POST-APPLICATION BAR.

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.

Details of the EAP who compiled the DBAR and the expertise of the EAP to perform the assessment will be included with the POST-APPLICATION BAR.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.
Specialists' declarations of interest and reports based on the reassessment of the site will be included with the POST-APPLICATION BAR. Original Specialist reports are included as part of this DBAR.

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