PROPOSED DEVELOPMENT OF A 19MW PHOTO-VOLTAIC SOLAR POWER GENERATION PLANT ON THE FARM ADAMS 328 NEAR HOTAZEL IN THE NORTHERN CAPE

ESCIENCE ASSOCIATES (PTY) LTD

POSTAL ADDRESS:
PO Box 2950
Saxonwold
2132

PHYSICAL ADDRESS:
9 Victoria Street
Oaklands
Johannesburg
2192

TEL:
+27 11 718 6380

FAX:
+27 86 610 6703

E-MAIL:
info@escience.co.za

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BASIC ASSESSMENT REPORT

NEAS Reference: DEA/EIA/0000734/2011
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June 2012

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COMPILED BY EAP:

EScience Associates (Pty) Ltd
PO Box 2950, Saxonwold, 2132
9 Victoria Street,
Oaklands,
Johannesburg,
2192

Tel: (011) 718 6380
Cell: 083 562 6455
Fax: 0865 994 687
E-mail: roelof@escience.co.za

ON BEHALF OF APPLICANT:

Aurora Power Solutions (Pty) Ltd
2D Nautica Building, Water Club Complex,
100 Beach Road, Moullie Point,
Cape Town, South Africa, 8001
SOUTH AFRICA

Tel: +27 21 421 9764
Fax +27 86 513 8648

PREPARED FOR APPROVAL BY COMPETENT AUTHORITY:

National Department of Environmental Affairs (DEA)
Director: Environmental Impact Management
4th Floor, South Tower,
Fedsure Forum Building
315 Pretorius Street
Pretoria
0001

Tel:(012) 395 1694/1768
Fax: (012) 320 7539

INCLUDING FURTHER REVIEW BY PUBLIC AND OTHER STAKEHOLDERS

June 2012

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT

Project applicant:	Aurora Power Solutions (APS)		
Trading name (if any):	Aurora Power Solutions (Pty) Ltd		
Business reg. no./ID. no.:	2006/038826/07		
Contact person:	Mr Simon Haw		
Physical address:	2D Nautica Building, Water Club Complex, 100 Beach Road, Moullie Point, Cape Town, South Africa, 8001		
Postal address:	2D Nautica Building, Water Club Complex, 100 Beach Road, Moullie Point, Cape Town, South Africa, 8001		
Postal code:	8001	Cell	079 3975378
Telephone:	021 421 9764	Telephone:	021 421 9764
E-mail:	simon@apsolutions.co.za	E-mail:	simon@apsolutions.co.za

Prepared by:

Environmental Assessment Practitioner/Firm:	Hanre Crous and Roelof Letter Company: EScience Associates (Pty) Ltd		
Business reg. no./ID. no.:	2009/014472/07		
Contact person:	Roelof Letter		
Postal address:	P.O. Box 2950, Saxonwold, Johannesburg, South Africa, 2132		
Telephone:	011 718 6380	Cell:	083 562 6455
E-mail:	hanre@escience.co.za roelof@escience.co.za	Fax:	086 512 2366

	(For official use only)
File Reference Number:	**NEAS Ref:** DEA/EIA/0000734/2011 **DEA Ref:** 12/12/20/2566
Application Number:	
Date Received:	

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

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.

2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

3. Where applicable **tick** the boxes that are applicable in the report.

4. An incomplete report may be returned to the applicant for revision.

5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.

6. This report must be handed in at offices of the relevant competent authority as determined by each authority.

7. No faxed or e-mailed reports will be accepted.

8. The report must be compiled by an independent environmental assessment practitioner.

9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

11. 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.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?		NO √

If YES, please complete the form entitled "Details of specialist and declaration of interest" for appointment of a specialist for each specialist thus appointed:
Any specialist reports must be contained in ~~Appendix D~~ Appendix G.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail[1]:

Background:

Aurora Power Solutions (APS) is proposing to develop a commercial photo-voltaic solar power plant on the farm, Adams, approximately 21 km south of the town of Hotazel on the R380, in the Northern Cape Province. The facility will be referred to as the Adams PV Solar Energy Facility and is proposed to be a 19 MW capacity facility not exceeding 20 hectares in size. The 21 digit Surveyor General code for the property is C0410000000003280000.

Aurora Power Solutions (APS) is a renewable energy and energy efficiency project development and management company. Their main focus is on delivering long-term alternative energy solutions for industrial and commercial customers, from concept to implementation. APS focuses on developing large scale grid connected Solar Power projects, up to financial closure and then onto commissioning, in sub-Saharan Africa. APS aims to de-risk the projects by performing several project development activities so as to maximise shareholder returns.

The proposed project involves the construction and operation of a photovoltaic solar power electricity generation facility. With populations in South Africa growing rapidly, and the need for "green" energy (such as solar power) becoming more prevalent, the project will provide a sustainable, green energy resource for present and future generations. The positive aspects of using solar power far outweigh the negative. This proposed project will add to the new generation capacity feeding into the national grid from renewable energy, and share a part of the 42% share targeted by the Department of Energy for renewable energy (Integrated Resource Plan, 2010-2030). In terms of this strategy, 8.4GW of power is proposed to be generated by PV solar sources over the next twenty years.

Photovoltaic (PV) and Concentrated Photovoltaic (CPV) Technology:

Photovoltaic's (PVs) are materials that convert solar radiation directly into electricity. Photo-voltaic solar cells are divided into two distinct groups:- Traditional crystalline silicon solar cells and thin film solar cells. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as photovoltaic effect. The crystalline silicon solar cells are made from monocrystalline silicon or polycrystalline silicon. The thin film technologies comprise of thinner layers of semiconductor material, which are produced using a splutter process.

Photovoltaic production has been doubling roughly every 2 years, increasing by an average of 48%annualy since 2002, making it the world's fastest-growing energy technology. The volume of new grid-connected PV capacities

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

world-wide rose from 16 GW in 2010 to 27 GW in 2011. This increased the total installed PV capacity world-wide to over 67 GW at the end of 2011. Roughly 90% of PV generating capacity consists of grid-tied electrical systems. Such installations may be ground-mounted (and sometimes integrated with farming and grazing) or built into the roof or walls of a building, known as Building Integrated Photovoltaics.

Photovoltaic solar power plants are comprised of solar modules connected together to form solar arrays for the production of electricity. Direct current electricity is produced from the solar array, which in turn is connected to inverters for conversion to alternating current. Power from the inverters is then stepped up via transformers to voltages suitable for injection into the national grid for distribution to consumers.

Solar power plants can either have fixed tilt systems or tracking systems as shown in the diagrams below. Modules in a fixed tilt system are mounted at an optimised angle facing the sun. With tracking systems, the surface of the arrays is moved to follow the sun resulting in large radiation gains. Systems can be set to track the sun's daily path and/or its annual path. Figure 1 below shows a typical example of a fixed tilt PV array and Figure 2 shows a typical example of a tracking PV array (these are examples only).

Concentrated Photovoltaics (CPV) can be established in combination with the preferred conventional PV system. CPV systems are very unique in that sunlight is concentrated though a lens onto high performance solar cells, and by doing so increases the electricity generated. The CPV panels are mounted on tracking systems as to maximise the collection of energy from the sun. The concentrated light improves the efficiency of the cells and reduce the amount of expensive solar cell material needed to produce a certain amount of electricity, but is more expensive to construct than normal PV. Certain designs of CPV utilises panels of up to 23.5 meter wide with more than 1000 pairs of lenses and solar cells on each panel (See Figure 3). The panels can be mounted on dual axis tracking systems to maintain 0.8 degree angles with the sun throughout the day.

Figure 1: Fixed tilt PV array

Figure 2:Tracking PV array

Figure 3: Example of Concentrated Photo-voltaic technologies (Bullis, 2011).

Photovoltaic (PV) arrays can be up to several hundred hectares in spatial extent. The panels are mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep seated screw. Central inverters are wired to sections of the PV field which can have a rated power of 500kW - 1250kW each. The inverter is a pulse width mode inverter that converts DC current to AC current at grid frequency. A typical central inverter rated at 500kW has a size of approximately 3m x 2.5m x 1m, and an output voltage of 480V Alternating Current (AC).

The grid connection requires transformation of the voltage from 480V to between 22,000V and 400 000V depending on the existing infrastructure. The normal components and size of a distribution-rated electrical substation will be required. Tracking Arrays comprises of one (single axis) or two (dual-axis) motors and a sun sensor used to track the sun. The motors usually contain gears and moving parts that will need greasing from time to time.

Refer to Appendix A of this report for more detail on the detailed technical specifications of PV and CPV arrays proposed.

Infrastructure:

The solar power generation facility is proposed to accommodate and array of photovoltaic (PV) or Concentrated photovoltaic panels (CPV) with a generation capacity of 19MW. Approximately 1.5-2 hectares are required per installed MW of PV panels. The following infrastructure is required for PV solar facilities:

- Foundations to support the PV panels.
- Photovoltaic (PV) panels: The panels are placed in number rows with a buffer from the boundary fence and access roads in between each row. Panels will have a junction box located below the rows where all connections between rows meet up. Underground cables run from this box to the inverter/ transformer house at 400V-1000V Direct Current (DC).
- Access and inside roads/paths – Existing paths are to be used where possible, the turning circle of trucks are to be taken into consideration, and use of roads /paths are minimal when the plant is in operation.
- Trenching – all DC and AC wiring within the PV plant must be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand, and a concrete layer where vehicles will pass. Cable trenches will be approximately 600mm (0.6m) deep and 400mm (0.4m) wide, and backfilled with sand. Manhole covers will be placed every 40m or at each direction change. A concrete slab will be placed where vehicles pass over cable trenches.
- Inverter/ transformer building –6m x 3m brick buildings located within the PV array each containing an inverter and a step up transformer will be constructed in the plant. The number of buildings will be dependent on the size of plant and inverters chosen. Alternatively a pre-packaged inverter/transformer housed in a concrete substation for outdoor use can be utilised.
- Combined guard house/ control room – One (1) brick building of approximately 100m^2 on the perimeter of the plant. Guardhouse will include a small kitchen and toilet, and a storeroom for spare parts kept on-site. The control room will contain switchgear and monitoring equipment for the PV plant. The buildings will be a standard height of approximately 3m.
- Connection to grid – The grid connection requires transformation of the voltage from 480V to between 22,000V and 400 000V depending on the available infrastructure. The normal components and size of a distribution-rated electrical substation will be required.
- A small substation for the plant will be located outside of the control room.

2. FEASIBLE AND REASONABLE ALTERNATIVES

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

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

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

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

Note Regarding Alternatives:
In terms of development / technology / design / operational alternatives, both conventional/standard Photovoltaic (PV), the preferred option, and Concentrated Photovoltaic (CPV) are considered in the sections that follow.
Site alternatives other than the proposed site were not assessed, as the feasibility and suitability of a site for the establishment of any solar energy power plant is highly dependent on the site-specific meteorological characteristics (e.g. hours sunshine per year, cloud cover, sun intensity etc.). These technical factors have been considered by Aurora Power Solutions (APS) in evaluating several locations in the country, and APS is currently applying for Environmental Authorisations for development of available sites that were found technically suitable through this and several other Basic Assessment-processes.
However, in terms of the actual development footprint of just under 20ha within the boundary of the proposed site, various areas of the property have been considered as alternatives for the exact development footprint based on environmental and other considerations.

3. ACTIVITY POSITION

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

Alternative:	Latitude (S):		Longitude (E):	
Alternative S1[2] (preferred or only site alternative)	27°	23‘	23°	00‘
Alternative S2 (if any)	o	‘	o	‘
Alternative S3 (if any)	o	‘	o	‘

In the case of linear activities: *Not Applicable*

Alternative:	Latitude (S):		Longitude (E):	
Alternative S1 (preferred or only route alternative)				
• Starting point of the activity	o	‘	o	‘
• Middle/Additional point of the activity	o	‘	o	‘
• End point of the activity	o	‘	o	‘
Alternative S2 (if any)				
• Starting point of the activity	o	‘	o	‘
• Middle/Additional point of the activity	o	‘	o	‘
• End point of the activity	o	‘	o	‘
Alternative S3 (if any)				
• Starting point of the activity	o	‘	o	‘
• Middle/Additional point of the activity	o	‘	o	‘
• End point of the activity	o	‘	o	‘

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.

4. PHYSICAL SIZE OF THE ACTIVITY

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

Alternative:	Size of the activity:
Alternative A1[3] (preferred activity alternative)	195 000m^2 (19.5 Ha)
Alternative A2 (if any)	195 000m^2 (19.5 Ha)
Alternative A3 (if any)	m^2

or, for linear activities: *Not Applicable*

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

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur): *Not Applicable*

Alternative:	Size of site/servitude:
Alternative A1 (preferred activity alternative)	
Alternative A2 (if any)	
Alternative A3 (if any)	

[2] “Alternative S..” refer to site alternatives.
[3] “Alternative A..” refer to activity, process, technology or other alternatives.

5. SITE ACCESS

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

Describe the type of access road planned

There is already access to the site. The site has a substation on it (Dougnor substation) and a switching station (Milner), as well as number of power lines, which have service roads. There are a number of general farm dirt roads as well. The site is bounded on the west by the R380 tar road, and is across the road from BHP Billiton's existing Mamatwan Manganese mine..

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

6. SITE OR ROUTE PLAN

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

The site or route plans must indicate the following:

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

6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
6.11 the positions from where photographs of the site were taken.

7. SITE PHOTOGRAPHS

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

8. FACILITY ILLUSTRATION

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

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 350-400 Million
What is the expected yearly income that will be generated by or as a result of the activity?	R 80 000 000.00
Will the activity contribute to service infrastructure or is it a public amenity? (service infrastructure)	YES √ / NO
How many new employment opportunities will be created in the development phase of the activity?	60
What is the expected value of the employment opportunities during the development phase?	R 8 216 000.00
What percentage of this will accrue to previously disadvantaged individuals?	38%
How many permanent new employment opportunities will be created during the operational phase of the activity?	5
What is the expected current value of the employment opportunities during the first 10 years?	R 12 000 000.00
What percentage of this will accrue to previously disadvantaged individuals?	50%

9(b) Need and desirability of the activity

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

NEED:			
1.	Was the relevant provincial planning department involved in the application?		NO √
2.	Does the proposed land use fall within the relevant provincial planning framework?	YES √	
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:		
	Local authorities (municipal) have been involved and the draft BA provided for their comment and input regarding planning issues. No comments have been received within the given time frames. It is not expected that the development would be in contradiction with any local planning / development objectives, considering current land-use and limited agricultural potential, and that fact that development of renewable energy facilities is national policy with related targets and objectives set at national level. The activity involves the construction of a solar power (Photovoltaic) facility. With populations in South Africa growing rapidly, and the need for "green" energy (such as solar power) becoming more prevalent, the project will provide a sustainable, green energy, resource for present and future generations. The positive aspects of using solar		

	power far outweigh the negative. This proposed site will aid the new generation capacity to the national grid from renewable energy and share a part of the 42% share targeted by the Department of Energy for renewable energy (Integrated resource plan, 2010-2030). According to the above strategy, 8.4GW of the share is proposed to be generated by PV solar sources over the next twenty years.

DESIRABILITY:			
1.	Does the proposed land use / development fit the surrounding area?		NO √
2.	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	YES √	
3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	YES √	
4.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:		
	It is not expected that the development would be in contradiction with any local planning / development objectives, considering current land-use and limited agricultural potential, and that fact that development of renewable energy facilities is national policy with related targets and objectives set at national level. The activity involves the construction of a solar (Photovoltaic) power generation facility. Although the project would entail the development of a greenfield site (undeveloped land), due to the specific nature of the infrastructure and operational phase of the project, it is not expected to have a significant impact on the surrounding area. The activity does not exactly fit with the surrounding areas to the north, east and south (which are areas of agricultural livestock grazing land). However, there is an existing mine on the western side of the proposed solar power plant site. The development will thus fit into the surroundings well, as it would be unobtrusive as opposed to the mining development. The fact that there are a number of substations and power lines on the site also indicate that the solar development would fit in with the immediate land use. With populations in South Africa growing rapidly, and the need for "green" energy (such as solar power) becoming more prevalent, the project will provide sustainable, green energy, for years to come. Some advantages of solar power compared with conventional (coal-fired) generation are: • Reliable, established technology • Ability to scale the installation • Free resource (Solar energy) • Solar Insolation levels in Northern parts of South Africa are some of the best in the world • Reduces carbon footprint • Fixed energy price for duration of solar plant.		
5.	Will the proposed land use / development impact on the sense of place?	YES √	
6.	Will the proposed land use / development set a precedent?		NO √
7.	Will any person's rights be affected by the proposed land use /		NO

	development?		√
8.	Will the proposed land use / development compromise the "urban edge"?		NO √
9.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation.		
	Regarding 5 above, although the proposed solar plant is not aligned with surrounding land-use, the impact on 'sense-of-place' is not considered significant as the area is not a tourism destination, the site is bordered by a big mine operation, no intensive agriculture occurs in the vicinity, the area is sparsely populated, electricity supply infrastructure (sub-station and power lines) already occurs on-site, and the particular infrastructure is not visually intrusive (see Visual Impact Assessment).		

BENEFITS:			
1.	Will the land use / development have any benefits for society in general?	YES √	
2.	A target of 10,000 GWh of renewable energy was set by the South African government by 2013, due to the high level of renewable energy potential in the country. To contribute towards this target, and kick start the renewable energy industry in South Africa and socio-economic and environmentally sustainable growth a need for a market mechanism was established. The Independent Power Producer (IPP) Procurement Programme was introduced in 2011 for the procurement of renewable energy projects. A maximum tariff was set for each technology and developers would bid for projects and compete on a competitive price basis. The IPP Procurement Programme therefore supports the Government's 10,000 GWh 2013 Renewable Energy Target and also promote competitive markets in long term renewable sustained growth in comparison with conventional energies. South Africa electricity generation from renewable energy offers various socio-economic and environmental benefits. These benefits include: • Increased energy security: the current electricity crisis outlines the need for more sustainable sources of electricity generation as consumer's increase. A grid connection with renewable energy acts as an alternative source of electricity as traditional sourced become strained and more expensive. • Resource savings: Water and natural resources can be saved by using solar technologies as conventional coal fired power plant are major consumers of valuable natural resources. • Pollution reduction: Major by-products of fossil fuel burning are nitrogen, oxides and sulphur and have detrimental impacts on human health through the formation of smog and cause the spread of respiratory illnesses. PV solar generation transforms solar radiation directly into electrical energy and therefore no toxic pollutants are emitted. • Employment creation: The development, scale, installation, management and maintenance of solar facilities have significant potential for job creation in South Africa. The activity will provide local communities in the area with a reliable and clean source of energy for many years. Society in general will be benefited, as this project will create electricity without any emissions to air i.e. zero carbon emission to the atmosphere.		

	This is in contrast to coal-fired power stations, which have massive carbon emissions. Society will be benefited as less carbon emissions means less global warming, which evidently means healthier and better functioning environmental ecosystems on the planet. Further to this, and as described by de Jong 2011, *the project has the potential to create sustainable employment in the Northern Cape while addressing some of the fundamental drivers of Climate Change. Being one of the pioneers of solar power in South Africa the project has the inherent role of developing solar power technology for the region. The viability and success of this project is strategic to paving the way for sustainable power technologies in this region. This is a project of strategic and national importance and capable of enhancing South Africa's position in the global technology arena while aligning with the commitments made by South Africa in Copenhagen.*		
3.	Will the land use / development have any benefits for the local communities where it will be located?	YES √	
4.	The major benefit of the proposed project is that labour will be sourced from the local communities, and provide temporary employment (10-12 months). The additional power supply to the grid will likely result in more reliable and cleaner power supply to the country and consequent opportunities for business expansion. This will likely add to the economic output of the town. Permanent employment opportunities will also be created during the operational life of the facility as security guards and maintenance staff will be required. This would in return have a positive impact on the poverty levels. The facility will provide source of sustainable income for local inhabitants. Local communities in the direct area around the facility will have a source of clean, carbon-free energy, for many years to come. In addition to this, the project company plan to use a percentage of the profits from the power plant for socio-economic upliftment of the local communities. As part of the IPP programme the following thresholds are set as a minimum requirement: • Job creation - 12% from local community • Ownership - 2.5% from local community • Socio economic development - 1% of project revenue • Education and skills development • Enterprise development • Fostering rural development and involving communities • Participation of HDI and marginalised regions		

10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

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

Title of legislation, policy or guideline:	**Administering authority:**	**Date:**
<u>Regulation 544, Listing Notice 1, Activity 1:</u> The construction of facilities or infrastructure for the generation of electricity where: i. the electricity output is **more than 10 megawatts but less than 20 megawatts;** or ii. the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare.	- Northern Cape Department of Environment and Nature Conservation (DENC) - National Department of Environmental Affairs (DEA)	18 June 2010.
<u>Regulation 544, Listing Notice 1, Activity 10:</u> The construction of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a **capacity of more than 33 but less than 275 kilovolts**; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.	Northern Cape DENC & National DEA	18 June 2010.
<u>Regulation 544, Listing Notice 1, Activity 23:</u> The transformation of undeveloped, vacant or derelict land to– (i) residential, retail, commercial, recreational, industrial or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, or (ii) residential, retail, commercial, recreational, industrial or institutional use, **outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares**; - except where such transformation takes place, or (i) for linear activities; or (ii) for the purposes of agriculture or afforestation, in which case Activity 16 of Notice No. R 545 applies.	Northern Cape DENC & National DEA	18 June 2010.
<u>Regulation 546, Listing Notice 3, Activity 4:</u> The construction of a road wider than 4 metres with a reserve less than 13,5 metres.	Northern Cape DENC & National DEA	18 June 2012
<u>Regulation 546, Listing Notice 3, Activity 14:</u> The clearance of an area of 5ha or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.	Northern Cape DENC & National DEA	18 June 2012

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES √ / [redacted]
If yes, what estimated quantity will be produced per month?	50m^3

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

Waste will be temporarily stored in skips, and periodically taken off-site for disposal at an acceptable landfill of the nearest local authority. No solid waste will be disposed of on-site.

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

Waste will be temporarily stored in skips, and periodically taken off-site for disposal at an acceptable landfill of the nearest local authority. No solid waste will be disposed of on-site.

Will the activity produce solid waste during its operational phase?	[redacted] / NO √

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

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

N/A

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

N/A

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. *Not Applicable*

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	[redacted] / NO √

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

Is the activity that is being applied for a solid waste handling or treatment facility?	[redacted] / 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. *N/A*

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	[redacted] / 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?	[redacted] / 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?	[redacted] / NO √

If yes, provide the particulars of the facility: *N/A*

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:

N/A

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES √	
If yes, is it controlled by any legislation of any sphere of government?		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. *N/A*

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

The proposed activity will only generate small amount of dust associated with general construction activities such as earth and vehicle movement activities mostly associated with construction sites. The impact created by the generation of dust is considered to be negligible although proper mitigation measures (dust suppression techniques) will be employed to ensure that the impact is properly managed. No emissions are expected during the operational phase.

11(d) Generation of noise

Will the activity generate noise?	YES √	
If yes, is it controlled by any legislation of any sphere of government?		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. *N/A*

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

There will be no noise generated during operation of the site. There will be a slight increase in ambient noise levels during construction, but will be localised to the site itself. The noise impact associated with the proposed project is considered to be negligible as the noise levels are not expected to be very high.

12. WATER USE

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

Municipal		Groundwater	
√		√	

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: 37 500 litres

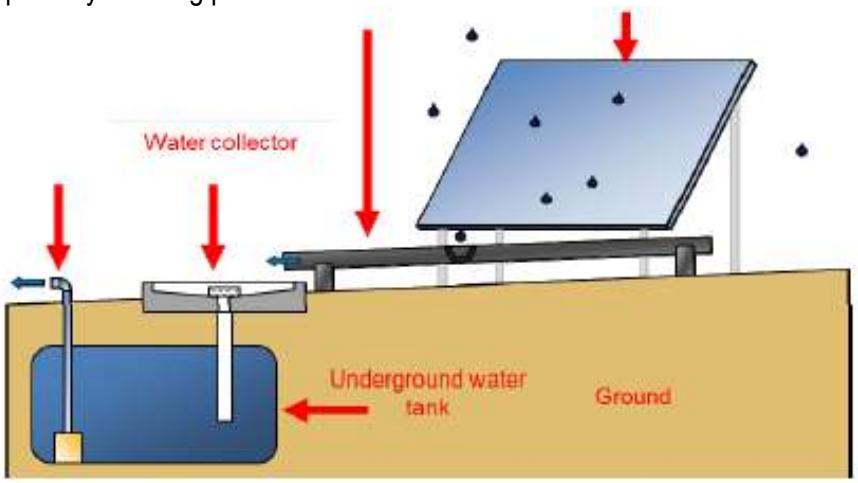
Does the activity require a water use permit from the Department of Water Affairs? YES / NO / *Possibly*

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

A WULA will be submitted if groundwater is to be used (see below).

Approximately 450m³ of water will be required annually for the cleaning of the panels. Cleaning is anticipated to be undertaken on a quarterly basis. Therefore, approximately 112.5m³ will be required every three months (which converts to 37 500 litres per month on average). The applicant will be meeting with the Municipality to discuss the issue of obtaining this water from the municipal supply or Water Use Licence for abstraction of groundwater will be applied for, if required. In the event that a supply of water for this project is not possible, the project proponent has indicated that the use of compressed air will be considered as an alternative.

The figure below represents a simple schematic diagram of rainwater harvesting for a PV facility. Runoff rainwater is directed into gutters (gutters located below the solar panels). The gutters will channel water to and through a filter into underground storage tanks (JoJo tanks). Water can then be pumped out for quarterly cleaning periods.



13. ENERGY EFFICIENCY

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

The whole purpose of the proposed PV power plant is to produce energy from a clean power source, and add to the existing electrical supply in the country. Solar PV panels produce electricity by direct conversion of energy from the sun. There is therefore no consumption of fuel as the energy source is “free” whenever the sun shines. The majority of the power supply in the country is primarily driven by fossil fuelled power plants. The electricity consumption in the solar power plant will be minimal, almost zero compared to the power generated from the plant. Optimum solar radiation must be taken into account in designing the facility as to ensure capturing solar radiation effectively.

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

No alternative energy sources have been taken into account for this development. The installation of a PV solar power plant is considered as a “clean and renewable alternative energy source” for power generation as opposed to the currently and most widely used energy producer in South Africa which is coal.

The PV array will obviously be set up and engineered in such a way that it makes use of insulation in the most energy efficient way possible making use of PV panel tilt angle.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

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

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

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

3. Has a specialist been consulted to assist with the completion of this section? NO √

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Appendix D.

Property description/physical address:	Farm Adams 328. Surveyor general code: C04100000000032800000. The Farm Adams is located in the John Taolo Gaetsewe (formerly Kgalagadi) District Municipality; Joe Morolong Local Municipality. It is 35kms north of the town of Kathu and 21kms south of Hotazel on the R380 main tar road.
	(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.
	In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.
Current land-use zoning:	Undetermined (currently used for cattle grazing) – "Agricultural". Various servitudes registered under Eskom for Powerlines which traverse the farm.
	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 √
Must a building plan be submitted to the local authority?	YES √

Locality map:

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

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

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat √	[redacted]

Alternative S2 (if any):

[redacted]

Alternative S3 (if any):

[redacted]

2. LOCATION IN LANDSCAPE

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

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

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

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

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

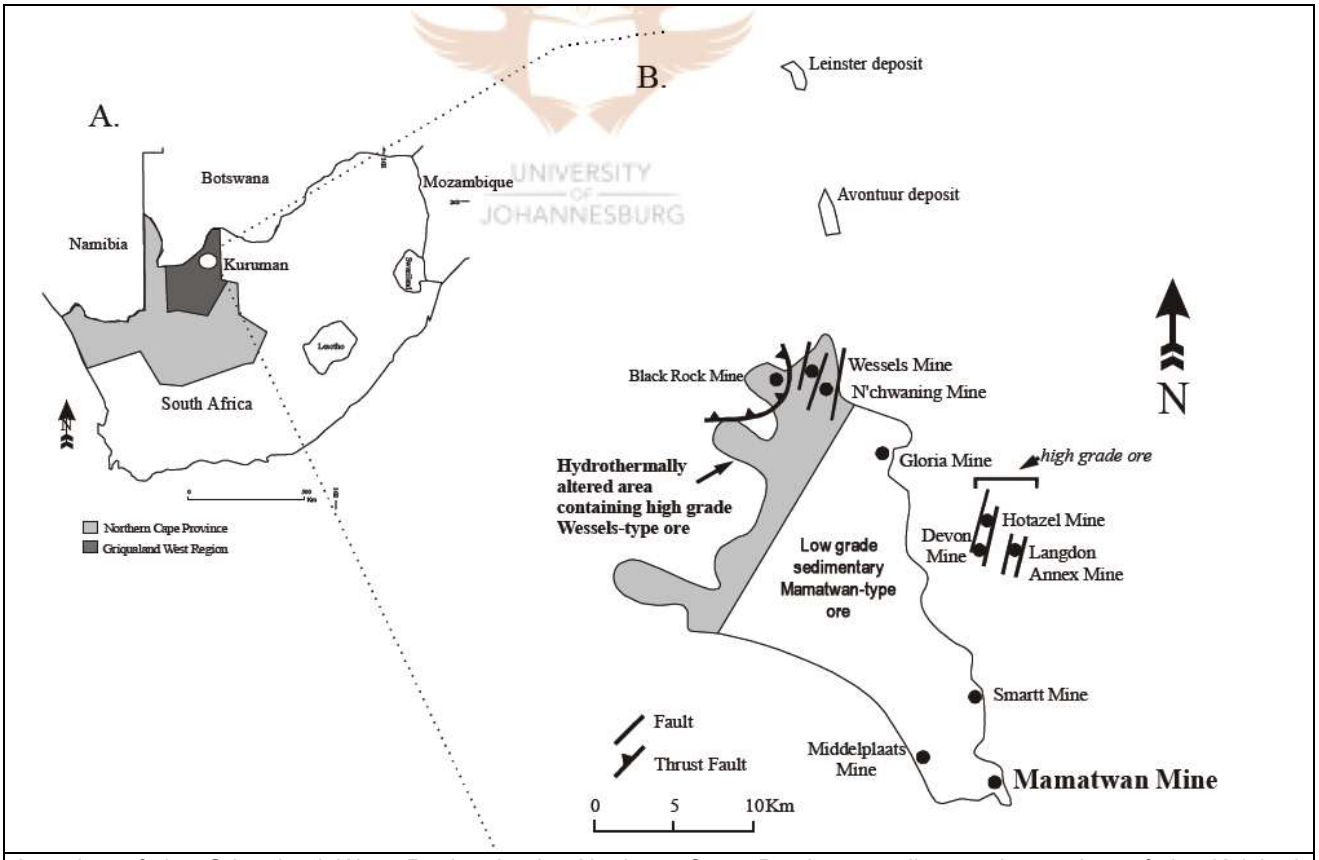
ADDITIONAL INFORMATION – Groundwater, Geology & Soils

As the site falls within an area of Southern Africa which is classified as being arid (due to the fact that the area receives less than 400mm rainfall per annum) and therefore prone to desertification. Disturbance of vegetation due to proposed facility has the potential to cause erosion without proper mitigation measures being implemented.

Geology Overview:

The Adams site is located just west of the Mamatwan Manganese mine and is located on the southern tip of the Kalahari manganese field in the Griqualand West region of the Northern Cape Province, South Africa. The morphology is dominated by flat plains intersected by generally N-S striking ranges of the Gamagara Ridge, Klipfontein Hills and the Asbestos Hills. These plains are characterised by thick calcretes and wind-blown Kalahari sands (Preston, 2001). The figure below the relative location of the site located within the Griquialand west region as well the location of the Kalahari Manganese field just west of the Adams site located next to the Mamatwan mine.

The farm Adams falls within the land type Ah9. The area presented by land type Ah9 has a terrain type A1. This indicates that more than 80 % of the slopes are less than 8% with a height difference of less than 30 metres between 30 and 90 metres. The terrain is flat with a distribution of the terrain units 4 and 5. Approximately 95 % of this land type is presented by terrain unit 4 with slopes less than 5 %.



Location of the Griqualand West Region in the Northern Cape Provinces well as enlarge view of the Kalahari Manganese field (Preston, 2001).

The farm Adams falls within the land type Ah9. The area presented by land type Ah9 has a terrain type A1. This indicate that more than 80 % of the slopes are less than 8% with a height difference of less than 30 metres between 30 and 90 metres. The terrain is flat with a distribution of the terrain units 4 and 5. Approximately 95 % of this land type presented by terrain unit 4 with slopes less than 5 %

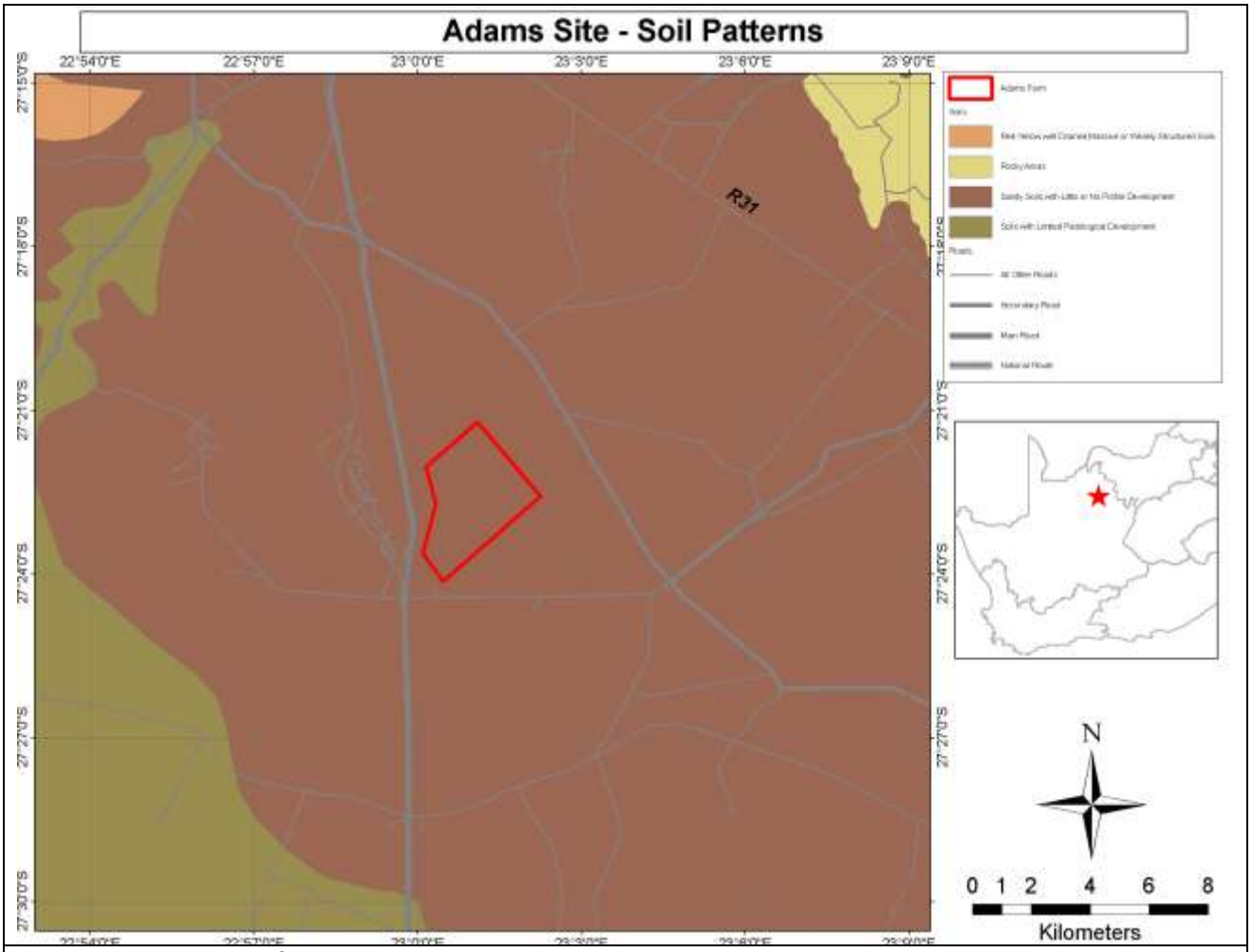
Land type Ah9:

Soils:

- Clovelly form covers approximately 64 % of the farm mainly on terrain unit 4. Soil texture vary from Sandy to loamy sand with depths of more than 1200mm
- Hutton soil form covers approximately 28 % of the area mainly on terrain unit 4. Soil depths of more than 1200mm. Soils are sandy loam to sandy 2-3
- Mispah form covers 3-4 % of the area mainly on terrain unit 5. Soil texture varies between sandy to loamy sand. Soil depth vary between 100-300 mm
- Fernwood forms cover approximately 4 % of the area mainly on terrain unit 5 and with soil depth of more than 1200 mm. Soil texture varies from sandy to loamy sand.
- Several pans are found on the farm

Land capability and land use:

The area is categorised by mainly grazing mostly due to soil constraints (very sandy) and climatic conditions. The only method of crop production would be if the area can be irrigated. This would however require large amount of capital to implement and due to water constraints in the area irrigation is not a viable option.



Regional soil patterns of the site and surroundings

Agricultural potential:

The agricultural potential in the area is considered to be very low due to climate and soil condition. The area can be cultivated but would require large amounts of water , however due to constraints in available natural water sources within the area this would be impractical.

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 with scattered aliens[E] √	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.

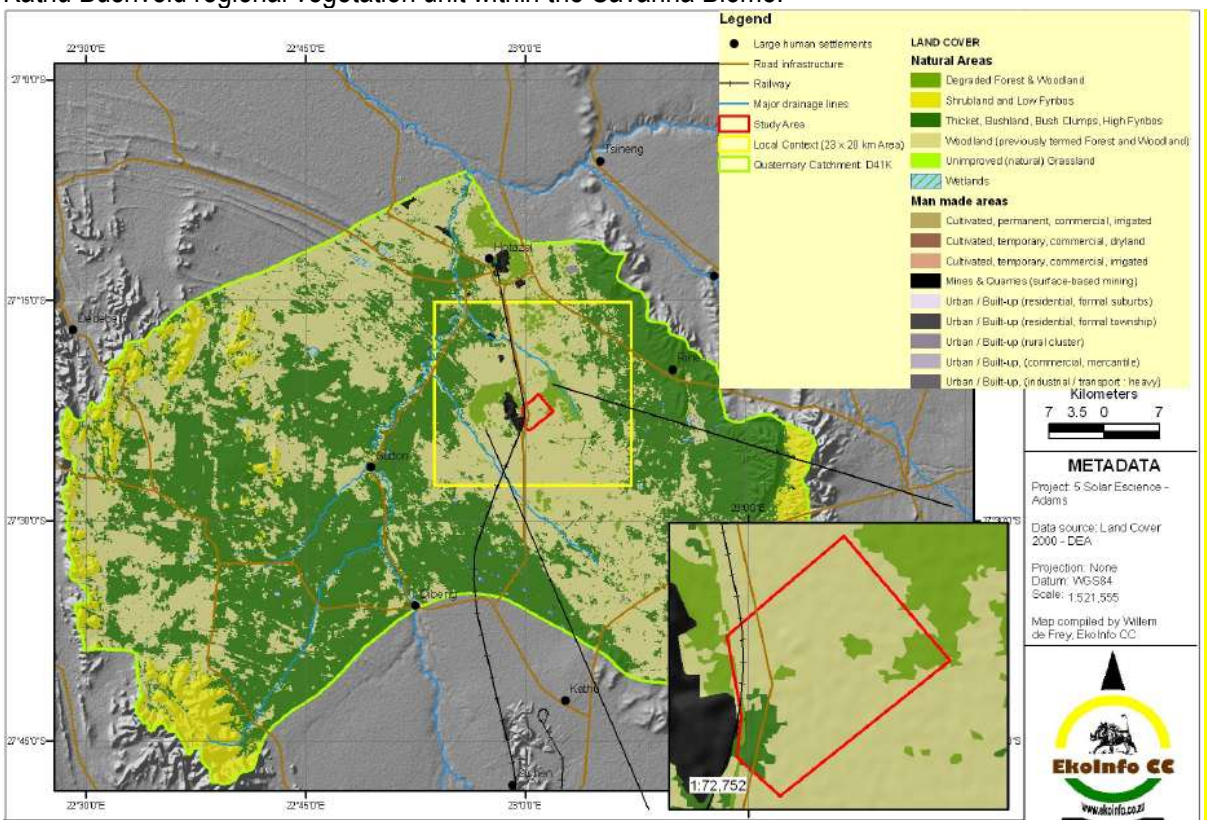
Has a specialist been consulted?	YES √	

If YES, please complete the following:

Name of the specialist:	Mr. Willem de Frey		
Qualification(s) of the specialist:	BSc Botany and Zoology. MSc Wildlife Management		
Postal address:	P.O. Box 72847, Lynwood Ridge, Pretoria, South Africa		
Postal code:	0040		
Telephone:	012 3652546	Cell:	082 579 5049
E-mail:	wdefrey@ekoinfo.co.za	Fax:	012 3653217

Are there any rare or endangered flora or fauna species (including red data species) present on any of the alternative sites?	Yes √	
If YES, specify and explain:		

Two trees were observed during the site visit, Acacia erioloba E.Mey. and Acacia haematoxylon Willd, which are protected in terms of National Forest Act (Act no. 84 of 1998). It should be noted that permits are required from the national and provincial authorities to destroy these protected plants, and a permit will accordingly be applied for removal if these species are identified within the final placement of the 19.5 ha facility. The vegetation onsite does not only occur in that isolated area, but is very widespread throughout the region. The image below (Sourced from de Frey, 2011) shows the land cover classification (2000 data) for the Adams site. The study area is located within the least threatened Kathu Bushveld regional vegetation unit within the Savanna Biome.



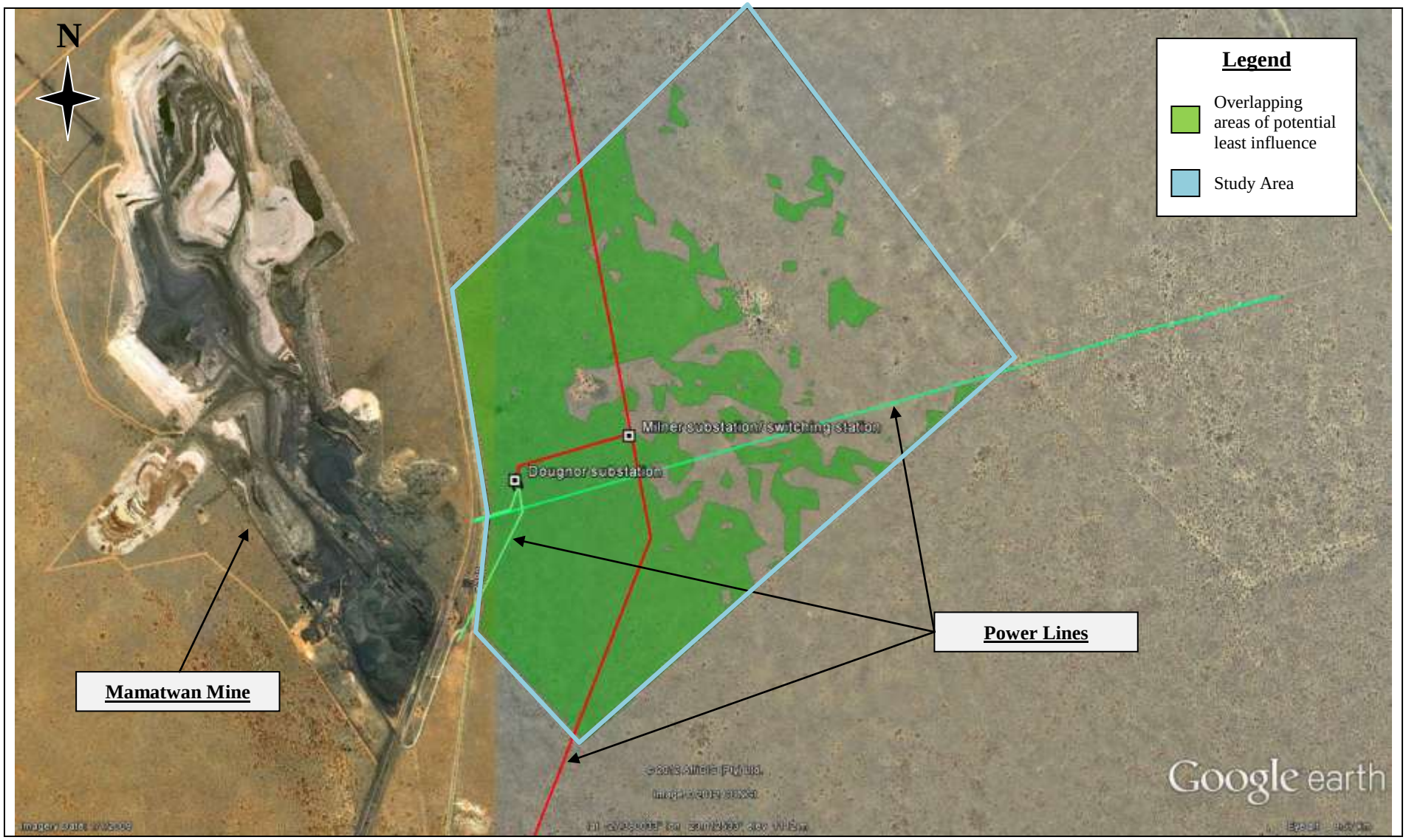
In terms of available land cover information from 2000 on a national level (see above) it is evident that quaternary catchment D41K is in a pristine state in terms of transformation levels, with less than 1% of the land cover being associated with transformation (habitat loss and fragmentation). Therefore, the development of the solar park with a footprint no more than 20 ha, will contribute not even 1% to transformation in the quaternary catchment (even if the whole area is developed it will only lead to 0.2% transformation).

On a local scale/ landscape level 4, the level of transformation or habitat loss is even lower at less than 1%. The footprint of the proposed 20 ha solar park will still contribute less than 1% habitat loss on a local scale, and should the whole study area be converted to a solar park, then it will contribute to 1.7% habitat loss, which is still not significant at a local scale. On a farm or study area level (very large scale), the establishment of a 20 ha solar park will contribute 2.3% to transformation (habitat loss), which is insignificant, if this was the only solar park to be developed within the area. Currently on a national scale, the whole study area is considered to be pristine, with no transformation present. However, this is incorrect as there is an ESKOM substation present and the Mamatwan mine to the west of the site.

Based on the assessment it was concluded that the majority of threatened plants within the Northern Cape, occurs at an altitude between 500 – 1 000 metres above sea level. They are found both on igneous or sedimentary rock, and often on granites, at any aspect, on coarse textured soils and rocky areas, seldom in association with water. Located either in the Fynbos or Karoo biomes, often in full sun, mainly in the agricultural/ rural areas. Therefore, the likelihood that threatened flora could occur at the site is regarded as low, due to the fact that the site is located in the Savanna biome above the 500 – 1 000 m altitudinal range, but has present sedimentary rocks, with coarse material associated with the Aeolian sand of the Kalahari. It should be noted that permits are required for the removeal Acacia erioloba E.Mey and Acacia haematoxylon Willd occurring one site from the national and provincial authorities to destroy/remove these protected plants found on site.

Are there any special or sensitive habitats or other natural features present on any of the alternative sites? If YES, specify and explain:		No √

Using Landsat 7 (at various bands), in an unsupervised classification, clusters of regionally and locally derived areas of LEAST influence were modelled (de Frey, 2012). The image below shows the overlay of both the regionally and locally potential areas of least influenced on farm Adams. If the proposed solar panel station footprints are located within the areas where these two layers overlap, then in principal the construction of the stations will have the least influence on both regional and local level (de Frey, 2012).


N
Legend
Overlapping areas of potential least influence
Study Area
Miner substation/ switching station
Dougnor substation
Power Lines
Mamatwan Mine
Google earth

The figure above shows the distribution and extent of only the overlapping potential areas of least influenced, taken from the locally and regionally derived data (de Frey, 2012).

Therefore, in conclusion, the solar power plant will have the LEAST influence on floral habitat and ecosystem functioning if constructed in areas where the green shading is indicated in the figure above. It must however be noted that the plant cannot be located exactly in the green areas above (as a fragmented plant will not be functional). The development will accordingly take into consideration the areas of LEAST influence as much as possible.

5. LAND USE CHARACTER OF SURROUNDING AREA

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

Natural area √	Low density residential	Medium density residential	High density residential	Informal residential[A]
Retail	Commercial & warehousing	Light industrial	Medium industrial[AN]	Heavy industrial[AN] √
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Hospitality facility
Open cast mine √	Underground mine	Spoil heap or slimes dam[A] √	Quarry, sand or borrow pit √	Dam or reservoir
Hospital/medical center	School	Tertiary education facility	Church	Old age home
Sewage treatment plant[A]	Train station or shunting yard[N] √	Railway line[N] √	Major road (4 lanes or more)[N]	Airport[N]
Harbour	Sport facilities	Golf course	Polo fields	Filling station[H]
		Agriculture (sheep and cattle grazing land) √	River, stream or wetland	Nature conservation area
		Historical building √	Graveyard	Archeological site
Other land uses (describe):				

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

The activity will not in any way be impacted on or impact on the train shunting yard or railway line. The line services the various mines in the area, and the site right across the road from the BHP Billiton Mamatwane Manganese Mine. The Solar power plant and associated structures will have no impact in this, nor will that current activity have any impact on a Solar Power plant.

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

The prosed site for the PV solar generation plant is within 500m of the BHP Billiton Mamatwan manganese mine. The propose development will not impact existing works as it is located on the other side of the road.

If YES, specify:

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

If YES, specify and explain:
If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Has a specialist been consulted?	YES √			
If YES, please complete the following:				
Name of the specialist:	***A.J. Pelser***			
Qualification(s) of the specialist:	Members: AC van Vollenhoven BA, BA (Hons), DTO, NDM, MA (Archaeology) [UP], MA (Culture History) [US], DPhil (Archaeology) [UP], Man Dip [TUT], DPhil (History)[US] AJ Pelser BA (UNISA), BA (Hons) (Archaeology), MA (Archaeology) [WITS]			
Postal address:	P.O. Box 55 GROENKLOOF,0027			
Postal code:	0027			
Telephone:		Cell:	083 459 3091	
E-mail:	antonp21@yahoo.com	Fax:	086 520 0376	
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				NO √
Archaeological or palaeontological sites, on or close (within 20m) to the site?				NO
If YES, explain:	N/A			

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

Briefly explain the findings of the specialist:	Archaetnos cc was appointed by EScience & Associates, on behalf of Aurora Power Solutions, to conduct a Heritage Impact Assessment for a proposed Photo-Voltaic Solar Power Generation Plant on the farm Adams 328, near Hotazel the Northern Cape Province. The first find is a single stone tool (core), possibly dating to the Middle Stone Age, found in the narrow strip between the tar road running between the farm and Mamatwan Mine and the farm boundary fence. No other stone tools were identified in the area. The only site found in the area is represented by the remains of structures related to earlier mining on the farm. According to the client (Mr.Brian Gardner of EScience Associates and the current farm owner Mr.Hendrik Venter) the site is that of a mining hostel that were abandoned during the 1970's. Based on the cement and bricks from which the buildings were constructed the site is less than 60 years of age. From a Cultural Heritage point of view there should be no objection to the continuation of the proposed development, taking into consideration the conclusions and recommendations made by the heritage specialist, which will be incorporated into the final recommendation of this report.

Will any building or structure older than 60 years be affected in any way?		NO √
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?		NO √

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

VISUAL IMPACTS

Has a specialist been consulted?	YES √		

If YES, please complete the following:

Name of the specialist:	Kotie Geldenhuys		
Qualification(s) of the specialist:	BA IOW		
Postal address:	P.O. Box 1702, Garsfontein East, Pretoria		
Postal code:	0060		
Telephone:		Cell:	0825745002
E-mail:	kotie@propagandastudios.co.za	Fax:	

Will the development cause any unacceptable visual impact on the surrounding land?		NO √
If YES, specify and explain:		
Are any further specialist studies recommended by the specialist?		NO
If YES, specify:		
If YES, is such a report(s) attached?	YES	NO

Signature of specialist:	See declarations in Appendix P.	Date:	

Visual impact assessment overview and conclusions:

The Visual Impact Assessment (Attached hereto as appendix G) determined that a minimal visual impact is expected for the development of the PV plant on the farm Adams. The existing scenic quality of the area scores 0/32, constituting an existing scenic value of 0%. This indicates low scenic quality. The level of contrast the development will have in relation to its environment scores 8/12, constituting a contrast value of 66,6%. This indicates a medium contrast ratio, with anticipated high compatibility with surrounding scenery. Due to its distance from vantage points 2 and 3, as well as its particular size, it is anticipated to be minimally visible, or not visible at all. Due to its proximity to vantage point 1 it is anticipated to be moderately visible. The proposed development poses an anticipated visual change rating of 52%, constituting a moderate visual change rating.

It is recommended by the specialist that this project can be developed without causing any significant degree of visual impact in the area. While only two selected placement options have been investigated for development, it is inferred that an installation over a larger area, or a development using larger PV units, will still pose very little or negligible impact toward the two sensitive receptors, or any other points in view of the installation. While visible, seen relative to the adjacent Mamatwan Mine, it can be inferred that it can be viewed as a positive contribution, contributing to the target set by government for renewable energy, bringing in social development to an area of generally low development and contributing to the global push towards renewable energy. The only management actions recommended is included in how the preliminary placement options chosen for the purpose of the Visual Impact Assessment process has informed the project's positioning, at a distance of 100m to 360m from the road (nearest possible vantage point), allowing perspective and Visual Absorption Capacity to diminish visual impact. However, should the development be placed closer to the road, the low scenic rating of existing scenery pre development, the close presence of the Mamatwan Mine and the viewer frequency and types of viewers who will frequently use the road will not

necessarily increase the project's visual impact.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

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

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

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:
(a) indicate the details of the application which is subjected to public participation; and
(b) state—
  (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
  (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental

authorisation;
(iii) the nature and location of the activity to which the application relates;
(iv) where further information on the application or activity can be obtained; and
(iv) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

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

Advertisements and notices must make provision for all alternatives.

4. DETERMINATION OF APPROPRIATE MEASURES

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

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E.

6. AUTHORITY PARTICIPATION

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

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

The following Authorities were sent a hardcopy of the draft Basic Assessment Report (Appendix I):

Northern Cape Department of Environment and Nature Conservation	Tshlo Makaudi
Northern Cape Department of Agriculture, Forestry and Fisheries	Mrs. Jacoline Mans Chief Forester (Ref: F13/11/2/116 for BA)

Northern Cape Department of Water Affairs	Mr. A Abrahams
!Kai! Ga-Segonyana Local Municipality	MR. M. Tsatsimple
John Taolo Gaetsewe Distrit Municipality	Mr. T. Matlhare

The following Authorities were sent opertunity to comment on the final Basic Assessment Report (Appendix I):

Northern Cape Department of Environment and Nature Conservation	Tshlo Makaudi
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Joe Morolong Local Municipality	Ms Paballo Sampson
!Kai! Ga-Segonyana Local Municipality	MR. M. Tsatsimple
John Taolo Gaetsewe Distrit Municipality	Mr. T. Matlhare

The following Authorities were sent an electronic copy of the Basic Report for Comment.

Raquel (Nosie)	Mazwi	DWA Northern Cape Deputy director
A	Abrahams	DWA Northern Cape
Bettie	Conradie	DWAF
LJ	Snyders	DWAF (Regional director)
Mrs. Anneliza	Collett	DAFF: Directorate: Land Use and Soil Management
Simphiwe	Nundze	Pixley ka Seme District Municipality
Tshlo Makaudi		Northern Cape Department of Environment and Nature Conservation
Masilo	Ramapkakela	Field service centre manager (Eskom Northern Cape)
Suzanne	Erasmaus	WESSA NC
Tania	Anderson	WESSA NC
Elizabeth	Manong	SAHRA (NC)
MJ	Sinthumule	Heritage Northern Cape
Kevin	Leask	Eskom (Grid Connectivity)
Ronald	Marais	Eskom (Grid Connectivity)
Ms Mashudu	Marubini	Delegate of the Minister (Act 70 of 1970
Ms Thoko	Buthelezi	AgriLand Liaison office

List of authorities from whom comments have been received:

No comments by any above authorities have been received within the 40 day prescribed commenting period. The final Basic Assessment Report will be submitted to all the relevant parties on submission of the report to DEA.

7. CONSULTATION WITH OTHER STAKEHOLDERS

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

Has any comment been received from stakeholders?

	NO √

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

The BHP billion Mamatwan mine to the west of the site had questions regarding the proposed use of water and indicated that the groundwater in the area is limited and could potentially risk there supply of groundwater due to additional abstraction.

A background information document was sent to all initially identified I&APs and adverts where placed in local and national newspapers. (Please see Appendix E: Public Participation Report).

SECTION D: IMPACT ASSESSMENT

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

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

There has been little interest in the project and only the BHP billion Mamatwan mine to the west of the site had questions regarding the proposed use of water and indicated that the groundwater in the area is limited and could potentially risk there supply of groundwater due to additional abstraction.

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

APS has approached the local municipality as to source water from the them, if the municipality is unable to supply water to the development a water use licence will be applied for abstraction of groundwater to the Department of water affairs. The water requirements for the project are minimal compared to other industrial uses in the area.

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

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

2.1 PLANNING AND DESIGN

Alternative (preferred alternative)

Direct impacts:

The planning and design of the power plant facility all takes place off site. All diagrams are drawn and the layout of the facility is planned offsite. There will be no direct, indirect or cumulative impact on the site during the planning and design phase of the project.

Movement on site during the planning and design phase is limited to very periodic (perhaps 2-3 days a month) light vehicle movement for access on site for the purposes of site familiarization and taking photos. Vehicle movement onsite will only be on the jeep-tracks currently onsite, thus limiting the potential for further disturbance.

Indirect impacts:

None envisaged.

Cumulative impacts:

None envisaged.

2.2 CONSTRUCTION PHASE

Alternative (preferred alternative)

Direct impacts:

NEGATIVE:

- Change in land-use character of the area (Medium to high impact)
- Impact on the movement and habitat of wildlife and other fauna
- Removal of plants and grasses on the selected 19.5 hectare area – loss of vegetation
- Removal of topsoil and disturbance of surface level rock structure
- Alteration of surface hydrology on each site during construction phase
- Alteration of visual character of the site and surrounding areas during construction
- Possible decrease in groundwater quality and possible contamination during construction (potentially from minor oil or petrol spillages by construction machinery. (low impact, as mitigation will be implemented)
- Increase in noise pollution around the site area during construction (none or very minimal impact predicted)
- Potential loss of significant cultural heritage or archaeological finds during the construction phase:
    - In the case of the sandy areas around outcrops and hillocks: Neutral (no impact) since no significant concentrations of Stone Age artefacts were found (those that were found consist of isolated scatters that are out of their original context)
    - Curious workers and visitors may damage, remove or destroy archaeological artefacts surrounding the facility

POSITIVE:
Job creation for local communities and South Africa in general during construction

Indirect impacts:
None envisaged

Cumulative impacts:
Usual impacts associated with ground clearing and levelling. Loss of vegetation, overall visual impact, combined with construction noise and displacement/ disturbance of fauna and flora during the construction phase. The cumulative impact is deemed to be moderate (score of 42.6667), which is nearing on high (score of >50). The impact will however be minimized substantially if the mitigation measures prescribed are strictly enforced (a site ECO will oversee this implementation of mitigation measures). However, once construction is over, the cumulative impact will decrease substantially (see cumulative impact for operation phase later in the report).

Aspect	CUMULATIVE IMPACT of entire construction phase of activity						
Impact	Cumulative impact of construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	4	4	1	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							42.66666667
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

2.3 OPERATION PHASE

Alternative (preferred alternative)

Direct impacts:

NEGATIVE:

- Change in land-use character of the area
- Impact on the movement and habitat of wildlife and other fauna
- Removal of plants and grasses on the selected 19.5 hectare area – loss of vegetation
- Removal of topsoil and disturbance of surface level rock structure
- Alteration of surface hydrology on each site during construction phase
- Alteration of visual character of the site and surrounding areas during construction
- Decrease in groundwater quality and possible contamination during construction (potentially from minor oil or petrol spillages by vehicles visiting/ doing maintenance. (low impact, as mitigation will be implemented)
- Increase in noise pollution around the site area during construction (neutral – no impact)

- Potential loss of significant cultural heritage or archaeological finds during the construction phase:
    - Neutral with regard to the actual solar power facility site
    - Potentially negative with regard to the areas around the solar power facility site, e.g. curious workers and visitors may damage, remove or destroy archaeological artefacts at outcrops and hillocks surrounding the facility

POSITIVE:

- Climate change: Zero carbon emissions whilst producing clean, renewable energy
- Job creation for local communities and South Africa in general during the operational phase
- Provides surrounding communities and greater municipal area with clean, renewable energy.
- Energy security to the country

Indirect impacts:

POSITIVE:

- Long-term renewable energy source
- Reduction in overall carbon emissions

Cumulative impacts:

The cumulative impact of developing a PV array on the site is very low. An area of approximately 878 hectares was surveyed, and it was found that a very suitable area of approximately 20 hectares would be available for the PV plant. Development in this approximate 19.5 hectare area will not cause high impacts, as the area identified is close to the substation (which is directly across the road from an existing mine and sinter plant), and it does not in any way effect any drainage lines or other potentially sensitive features onsite.

From the cumulative impact assessment that was undertaken it was determined; that with mitigation the overall impact score will be 28. This figure, as described in the Impact Assessment Methodology (Appendix J), means that a moderate impact is expected from the PV

plant. A moderate impact is described as follows: "*the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition the project benefits must be shown to outweigh the impact".*

The overall development will undoubtedly directly affect the 19.5 hectare area where the PV array will be placed, but areas surrounding the development area will be very minimally impacted (if at all) by the development.

The positive impacts of the development far outweigh the impact of the PV plant on 19.5 hectares of land. The potential for job creation, energy security and reduction in carbon emissions from negating fossil fuel combustion, make this development sustainable. The EMPr must however be implemented and if done correctly, the cumulative impact can, in the long run, become positive.

Aspect	CUMULATIVE IMPACT of entire operational phase of activity						
Impact	Cumulative impact						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	4	3	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							28
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

2.4 DECOMMISSIONING AND CLOSURE PHASE

Alternative (preferred alternative)

Direct impacts: This activity will not be decommissioned in the foreseeable future. This project has an extended lifespan period. Decommissioning of the project will only occur after 20-25 years. Due to this, no possible mitigation can at this stage be tabled, due to many environmental changes that may take place over time, which will subsequently render any mitigation discussed, void. However, if the panels will be removed, they will be sent to a recycling facility. Depending on the technological advancements that will have taken place during the life span of the plant some of the infrastructure, such as frames can be used for a new plant otherwise they can be removed and also recycled.

Indirect impacts:

None

Cumulative impacts:

None

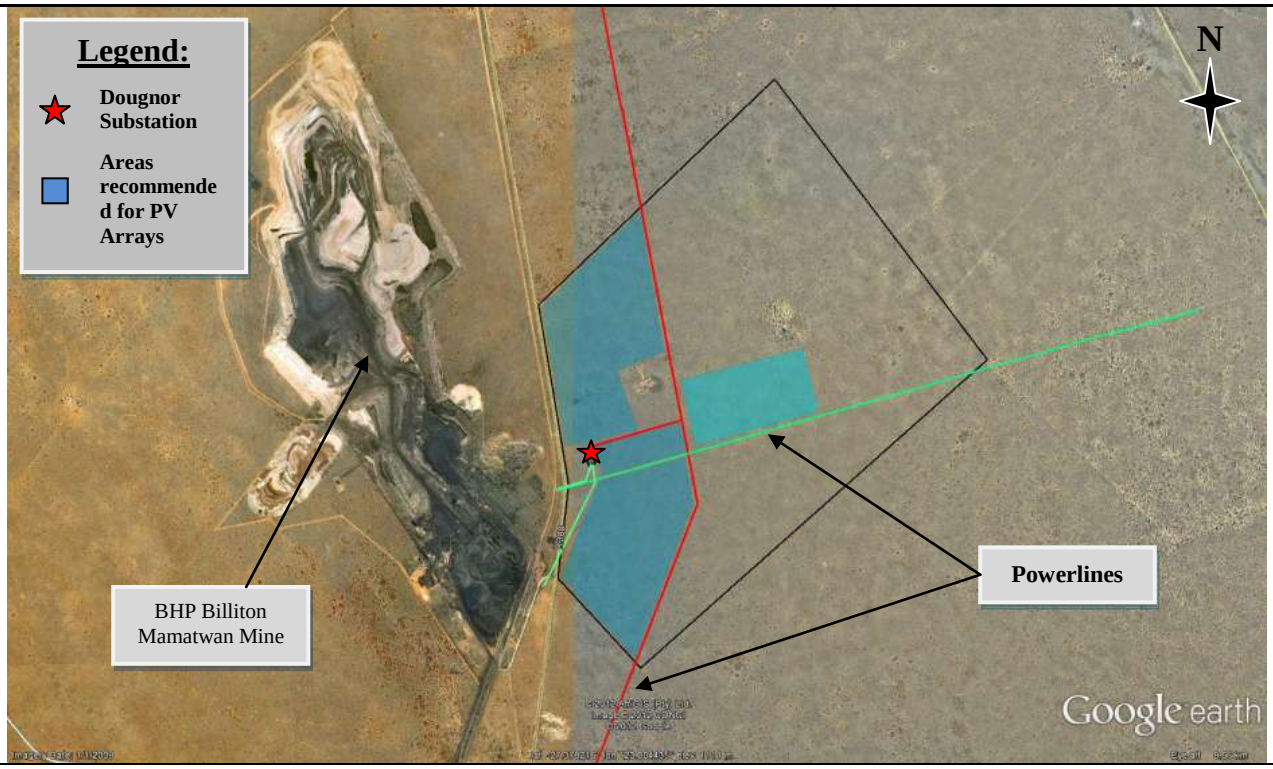
3. ENVIRONMENTAL IMPACT STATEMENT

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

The energy demand in South Africa is increasing on a daily basis. This increase in demand means that the demand for electricity is getting greater, and thus more coal is being mined and combusted in order to supply electricity. Coal combustion is the primary source of electricity in South Africa, and it is a non-renewable resource, which is being depleted at a rapid rate. Furthermore the negative impact of traditional generation technologies on the global climate increases as the use of fossil fuel for electricity generation continues.

South Africa need to move swiftly away from its reliance on coal as a primary source of energy, and more towards clean and renewable energy sources such as solar power. Taking into consideration the 3 pillar of sustainable development, being social, economic and environmental, and the likely impacts that have been assessed in this impact assessment process, it is concluded that all direct impacts on the environment on the site can be effectively mitigated and managed so that the overall cumulative impact is low, and the production of clean, renewable energy to the electricity grid in the area is sustainable.

From the environmental impact assessment, with most importantly taking visual, biodiversity, heritage/archaeology, soils, road access, proximity to Dougnor substation and associated power lines into consideration, it has been determined that there are three approximate preferred areas within the study area as indicated in the figure below (Blue shaded areas). These areas are the most suitable areas for the construction of the 19.5 hectare site for the installation of the photo-voltaic solar power plant array and associated infrastructure from an environmental perspective. These areas were chosen by integrating all the relevant specialist study mostly from a fauna and flora perspective, which determined the areas with least influence, but the limiting factor is that the three power lines bisects the site. After technological and engineering considerations have been thoroughly investigated these area may or may not be feasible. However, from an environmental perspective, this area is considered to be acceptable for development. The three sites are considered desirable areas for the PV array to be established. It must however be made clear that ONLY 19.5 ha of the feasible areas as shown below will be developed (for a 19.5 hectares facility), NOT whole area.



However, even though the most suitable areas are indicated above, it is felt that the area within the site boundary (black outline) in the image above, is also suitable for development, depending on factors relating to cost of installation and proximity to the sub-station, which will be determine once final planning, design and cost of the facility is finalised. From the impact assessment, it must however be made clear that less than 20 ha of this area will be allowed to be disrupted and the remaining areas within the study areas should left in their natural state. The most suitable area for development has also been informed by the flora report which shows the area in the south westerly of the site to have the least influence on flora on a local scale.

No negative impacts have been identified that in the opinion of the Environmental Assessment Practitioner, should be considered –fatal flaws from an environmental perspective, and thereby necessitate substantial re-design or termination of the project.

Based on the findings of this Basic Assessment, and given national and provincial strategic requirements for renewable energy, it is the opinion of the Environmental Assessment Practitioner that the project benefits outweigh the costs, and that the project will make a positive contribution to steering South Africa on a pathway towards sustainable development. Provided that the specified mitigation measures are applied effectively, it is proposed that the project receive environmental authorization in terms of the EIA Regulations promulgated under the National Environmental Management Act (NEMA).

Alternative A (preferred technology alternative - CPV)

There will be no additional impact caused above those already occurring from proposed technology alternative. CPV technology is a very viable alternative to standard PV panels as some models are more effective in capturing solar radiation (thus generate more electricity), this technology however requires higher initial capital cost. It was indicated to us by the client that there is a possibility to develop CPV panels on the proposed site and from an environmental point of view there should also be no objections to the proposed.

No-go alternative (compulsory)

The energy demand in South Africa is increasing on a daily basis. This increase in demand means that the demand for electricity is getting greater, and thus more coal is being mined and combusted in order to supply electricity. Coal combustion is the primary source of electricity in South Africa, and it is a non-renewable resource, which is being depleted at a rapid rate. The cumulative impact of the no-go option, (i.e. do not construct and operate PV power plant facility) would place further demand on coal reserves and resources, and the demand for coal would increase substantially over time. The cumulative impact of the no-go option will then put unneeded pressure on non-renewable resources and mines in other parts of South Africa, thereby increasing their environmental liability and South Africa's reliance on Coal, and increasing South Africa's contribution to global warming due to coal combustion.

The ripple effect on power supply throughout South Africa will become ever more prominent in the future, as the rolling black outs throughout the country in the past 5 years is further evidence that if the no-go option is realized, these black-outs will continue, and even get worse.

The area in which the Adams site is located is also a heavily industrialised area with numerous manganese mines and the Sishen Iron Ore mine only 30km south of the site. The Mamatwan Manganese mine is across the road from the Adams site. The large scale mining in the area has also put huge pressure on the electricity grid of the entire area, as the mining operations require large amounts of energy in order to operate. The realisation of this type of renewable energy project in an area already energy stressed would do a great deal for energy security in the area for the longer term, and will thus make energy and mining development more sustainable.

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 √	

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:

It is hereby recommended that an environmental authorization be granted to Aurora Power Solutions for the development of a photo-voltaic solar power plant on the farm Adams in the Northern Cape, adjacent to Dougnor Sub-station respectively. As per the application, the total size of the facility is to be less than 20 hectares in extent, and will produce less than 20 MW of electrical power.

Proposed conditions of Authorization for the site should be:

1. The development of Adams solar facility must be undertaken in accordance to the EMPr.
2. All mitigation measures and management conditions contained in the EMPr must be adopted and strictly implemented before any onsite activity is to take place.
3. Development on Adams should occur on only one of the areas as prescribed in section 7 of this report (Environmental Impact Statement), and preferably in an area close to power line connections and existing roads, to avoid habitat disruption and potential visual impact fragmentation.
4. A secondary vegetation survey should be undertaken on the exact chosen 19.5 Ha area on each site, before construction commences (It must be noted this mitigation measure will be undertaken if the project is successful for development and that this requirement should be a condition of the authorization to be implemented before construction commences, and should not be made obligatory before environmental authorization is granted) as to:
    i. identify all those species for which permits are required to allow their removal or destruction
    ii. identify plant specimens, which would qualify for plant rescue or for which seed should be obtained to assist with their re-establishment
    iii. document qualitative and quantitative, the species present, their composition and ecological drivers, to facilitate future rehabilitation of the area, should the activity be stopped and closure required, without this information no baseline information would be available to facilitate and monitor/ measure the success of the rehabilitation process.
5. A water use license is to be obtained before the abstraction of water is undertaken from any borehole on the sites, for the purpose of cleaning the PV array. A water use license must be obtained for the abstraction of groundwater for the cleaning of the PV panels in the array, if groundwater will be used. (It must be noted that this water use license requirement should not be made obligatory before environmental authorization is granted, but should be a condition of authorization)

6. If any subterranean archaeological and/or historical sites, features or artefacts are accidentally discovered during site clearing, a qualified archaeologist must be called in to investigate.
7. It is also a recommendation from the EAP that both CPV and PV technologies receive authorisation on the site. Thus the facility will have the option to construct both CPV and PV in combination or isolation within the final placement of the facility.

Is an EMPr attached?	YES √	

The EMPr must be attached as Appendix H.

SECTION F: APPENDIXES

Appendix A: Locality maps, site plans and PV array technical details

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Route position information

Appendix E: Public participation information

Appendix F: Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information

Appendix G: Specialist reports

Appendix H: EMPr

Appendix I: List of state departments who have received draft BA report

Appendix J: Impact assessment Methodology

Appendix K: Calculated impact significance for identified impacts – Construction phase of SPV plant

Appendix L: Calculated impact significance for identified impacts – Operation Phase of SPV plant

Appendix M: Calculated impact significance for identified impacts – Construction Phase for CPV plant

Appendix N: Calculated impact significance for identified impacts – Operation Phase for CPV plant

Appendix O: Environmental Status Report for the Northern Cape – in support of Basic Assessment Report

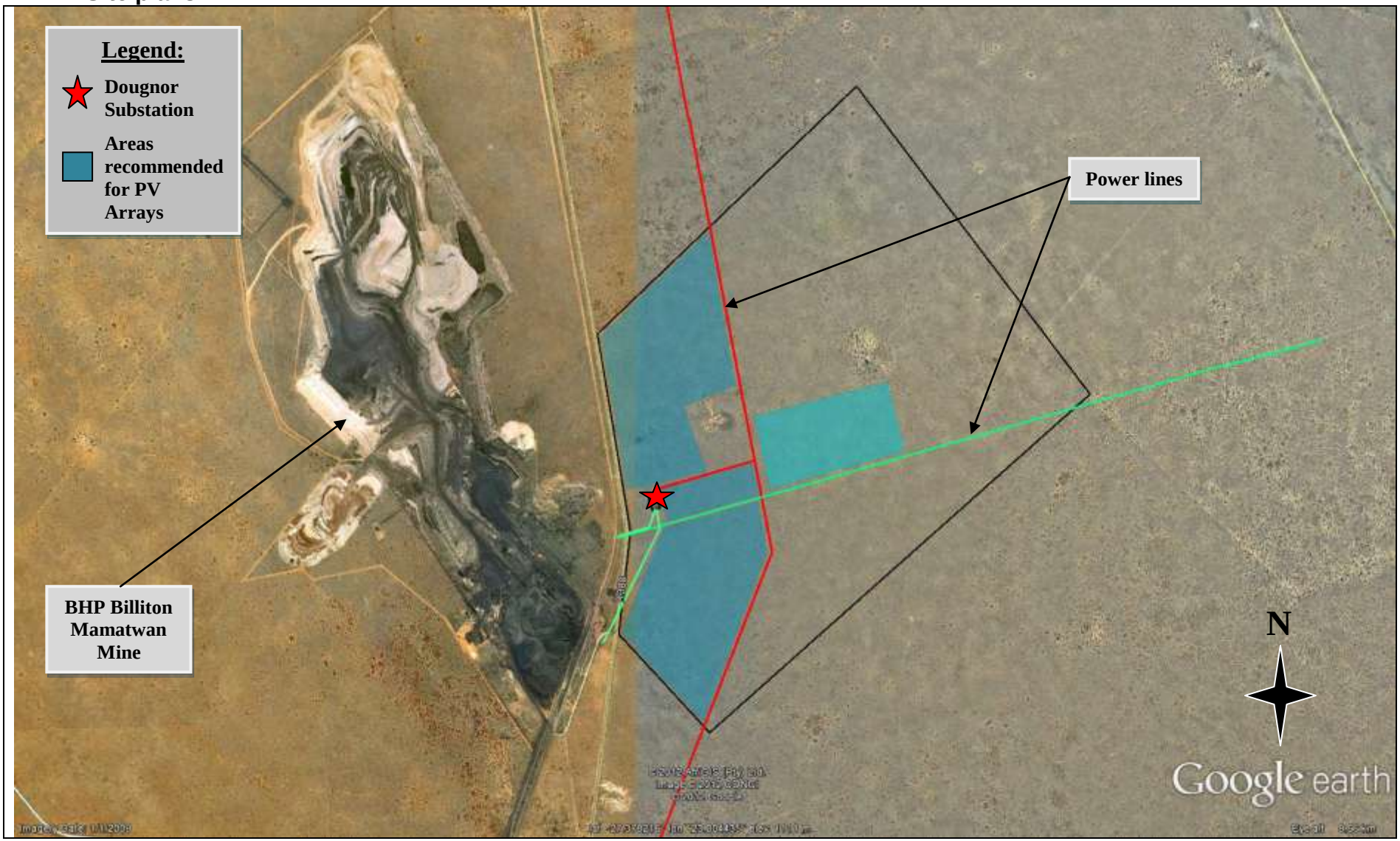
Appendix P: Specialist's Declarations

Appendix Q: References used to compile Basic Assessment Report

Appendix A: Locality maps, Site plans and PV array technical details

1. **Locality maps**

2. Site plans


Legend:
Dougnor Substation
Areas recommended for PV Arrays
Power lines
BHP Billiton Mamatwan Mine
N
Google earth

3. PV Array Technical details and diagram

PV Array technical details:

- Distance between panel rows – 5.7m
- Height of panels above ground – approximately 3m at the high end
- Number of panels in on a 20 ha site will be approximately 60 000 depending on the generating capacity of the plant and the rating of the panels
- Panels have a junction box located below the rows of panels where all connections between rows meet up. Underground cables run from this box to the inverter/ transformer house at 400V-1000V DC

CPV Array technical details:

- The dimensions of a single tracking unit is approximately 14m x7m
- Approximately 650m^2 of land required per tracking unit
- Each tracking unit is mounted on a two-axis tracking system , with an elevation movement of 5˚ - 90˚
- Each of these tracking units weighs approximately 7500 kgMain components of a CPV panels consists of the CPV system, Module, Tracker and Air Drying Unit

Auxiliary onsite structures:

- Inverter/ transformer building –several 6mX3m brick buildings located within the PV array each containing a 1250kW inverter and a 400V/22kV step up transformer
- Combined guard house/ control room – One (1) 100m^2 brick building on the perimeter of the plant. Guardhouse will include a small kitchen and toilet. Building will include a storeroom for spare parts kept onsite. Control room will contain switchgear and monitoring equipment for the PV plant. The buildings will be a standard height of approximately 3m high.
- Small substation for the plant will be located on the outside of the control room. It will have an AC bus bar for connections from the 22kV side of the transformers. These cables will also be routed underground at 22kV. Transmission lines to the grid connection point will leave the plant from the substation.
- Cable trenches will be approximately 600mm (0.6m) deep and 400mm (0.4m) wide and backfilled with sand. Manhole covers will be placed every 40m or each direction change. A concrete slab will be placed where vehicles pass over cable trenches.

The diagram on the previous page shows the typical outlay of a PV solar power plant which is just less than 20 hectares in extent. The diagram takes into consideration a square area of approximately 400m X 500m.

Appendix B: Photographs

Appendix C: Facility illustration(s)

The photos below have been sourced from various websites, and give an indication of what the PV array (preferred technology) facility will look like.

http://svr225.stepx.com:3388/renewable-energy

Ground mounted PV array. (Source: www.studio-eos.eu)

A 2-megawatt, ground mounted PV array occupies the site of a former landfill at Ft. Carson, Colorado, USA (Source: www.wapa.gov)

A 2-megawatt, ground mounted PV array occupies the site of a former landfill at Ft. Carson, Colorado, USA (Source: www.wapa.gov)

The photos below have been sourced from various websites, and give an indication of what the CPV array (alternative technology) facility will look like.

Example of Concentrated Photo-voltaic technologies (Bullis, 2011).

Appendix D: Route position information

Not Applicable

Appendix E: Public participation information

Appendix E1 – Proof of site notice

Appendix E2 – Written notices issued to I&APs

Appendix E3 – Proof of newspaper advertisements

Appendix E4 –Communications to and from I&APs

Appendix E5 – Minutes of any public and/or stakeholder meetings

Appendix E6 - Comments and Responses Report

Appendix E7 –Comments from I&APs on Basic Assessment (BA) Report

Appendix E8 –Comments from I&APs on amendments to the BA Report

Appendix E9 – Copy of the register of I&APs

Appendix E10 – Comments from I&APs on the application

Appendix E11 – Other (Background information Document sent to initially identified I&AP's)

Appendix F: Water use license(s) authorization, SAHRA information, service letters from municipalities, water supply information

- **SAHRA information**

Proof of submission and confirmation of receiving Heritage Impact report to SAHRA.

Roelof Letter

From: antonp21@yahoo.com
Sent: 20 April 2012 07:30 AM
To: MARIAGRAZIA GALIMBERTI
Cc: Roelof Letter
Subject: Re: AIA Report Adams Photo-Voltaic Project near Hotazel

Hi Mariagrazia,

Thank you very much.

Kind regards,

Anton Pelser

From: MARIAGRAZIA GALIMBERTI <mgalimberti@sahra.org.za>
To: antonp21@yahoo.com
Sent: Friday, April 20, 2012 6:40 AM
Subject: Re: AIA Report Adams Photo-Voltaic Project near Hotazel

Dear Anton,

Many thanks for these reports. I have received them and I will do my best to meet the deadline prescribed by the Environmental Assessment process.

Kind regards
Mariagrazia

Mariagrazia Galimberti (PhD)
APM Impact Assessor
South African Heritage Resources Agency
111 Harrington Street
PO Box 4637, Cape Town 8000,
South Africa
E-mail: mgalimberti@sahra.org.za
Phone : +27 (0)21 462 4502
Fax : +27 (0)21 462 4509
>>> <antonp21@yahoo.com> 04/19/12 8:55 PM >>>
Hi Mariagrazi,

Hope that you are well. Attached is a report on an AIA for the above I did recently. Please just confirm receipt and provide comments as soon as is possible. Let me know should there be any questions. I will be sending through two other reports as well for comments.

Kind regards,

Anton Pelser

- **Service Letters from municipalities**

- **Appendix G: Specialist reports**

A: Biodiversity scan/ assessment
B: Visual impact assessment
C: Heritage & Archeological impact assessment
E: Soils and agricultural potential assessment

A: Biodiversity scan/ assessment

B: Visual impact assessment

C: Heritage & Archeological impact assessment

D: Soils and agricultural assessment

Appendix H: EMPr

Appendix I: List of state departments who have received draft BA report

The following Authorities were sent a hardcopy of the draft Basic Assessment Report and the final BAR:

Northern Cape Department of Environment and Nature Conservation	Tshlo Makaudi
Northern Cape Department of Agriculture, Forestry and Fisheries	Mrs. Jacoline Mans Chief Forester (Ref: F13/11/2/116 for BA)
Northern Cape Department of Water Affairs	Mr. A Abrahams
!Kai! Ga-Segonyana Local Municipality	MR. M. Tsatsimple
John Taolo Gaetsewe Distrit Municipality	Mr. T. Matlhare

The following Authorities were sent notification to comment on finals Basic Assessment Report and the final BAR:

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Northern Cape Department of Agriculture, Forestry and Fisheries	Mrs. Jacoline Mans Chief Forester (Ref: F13/11/2/116 for BA)
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Joe Morolong Local Municipality	Ms Paballo
!Kai! Ga-Segonyana Local Municipality	MR. M. Tsatsimple
John Taolo Gaetsewe Distrit Municipality	Mr. T. Matlhare

The following Authorities were sent an electronic copy of the Basic Report for Comment.

Raquel (Nosie)	Mazwi	DWA Northern Cape Deputy director
A	Abrahams	DWA Northern Cape
Bettie	Conradie	DWAF
LJ	Snyders	DWAF (Regional director)
Mrs. Anneliza	Collett	DAFF: Directorate: Land Use and Soil Management
Simphiwe	Nundze	Pixley ka Seme District Municipality
Tshlo Makaudi		Northern Cape Department of Environment and Nature Conservation
Masilo	Ramapkakela	Field service centre manager (Eskom Northern Cape)
Suzanne	Erasmaus	WESSA NC
Tania	Anderson	WESSA NC
Elizabeth	Manong	SAHRA (NC)
MJ	Sinthumule	Heritage Northern Cape
Kevin	Leask	Eskom (Grid Connectivity)
Ronald	Marais	Eskom (Grid Connectivity)
Ms Mashudu	Marubini	Delegate of the Minister (Act 70 of 1970
Ms Thoko	Buthelezi	AgriLand Liaison office

Proof of sending draft Basic Assessment Report to commenting Authorities for review and comments.

Appendix J: Impact assessment Methodology

The following criteria and methodology is proposed to determine the significance of environmental impacts caused by the proposed project.

Type of Impacts:

Potential environmental impacts may either have a positive or negative effect on the environment, and can in general be categorised as follows:

a) Direct/Primary Impacts

Primary impacts are caused directly due to the activity and generally occur at the same time and at the place of the activity.

b) Indirect/Secondary Impacts

Secondary impacts induce changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken.

c) Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of the proposed activity on common resources when added to the impacts of the other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time, and can include both direct and indirect impacts.

Determining Significance:

The following criteria will be used to determine the significance of an impact. The scores associated with each of the levels within each criterion are indicated in brackets after each description [like this].

Nature -

Nature (N) considers whether the impact is:

positive [- ¼]

negative [+1].

Extent -

Extent (E) considers whether the impact will occur:

- on site [1]
- locally: within the vicinity of the site [2]
- regionally: within the local municipality [3]
- provincially: across the province [4]
- nationally or internationally [5].

Duration -

Duration (D) considers whether the impact will be:

- very short term: a matter of days or less [1]
- short term: a matter of weeks to months [2]
- medium term: up to a year or two [3]
- long term: up to 10 years [4]

- very long term: 10 years or longer [5].

Intensity -

Intensity (I) considers whether the impact will be:

- negligible: there is an impact on the environment, but it is negligible, having no discernable effect [1]
- minor: the impact alters the environment in such a way that the natural processes or functions are hardly affected; the system does however, become more sensitive to other impacts [2]
- moderate: the environment is altered, but function and process continue, albeit in a modified way; the system is stressed but manages to continue, although not with the same strength as before [3]
- major: the disturbance to the environment is enough to disrupt functions or processes, resulting in reduced diversity; the system has been damaged and is no longer what it used to be, but there are still remaining functions; the system will probably decline further without positive intervention [4]
- severe: the disturbance to the environment destroys certain aspects and damages all others; the system is totally out of balance and will collapse without major intervention or rehabilitation [5].

Probability -

Probability (P) considers whether the impact will be:

- unlikely: the possibility of the impact occurring is very low, due either to the circumstances, design or experience [1]
- likely: there is a possibility that the impact will occur, to the extent that provisions must be made for it [2]
- very likely: the impact will probably occur, but it is not certain [3]
- definite: the impact will occur regardless of any prevention plans, and only mitigation can be used to manage the impact [4].

Mitigation or Enhancement -

Mitigation (M) is about eliminating, minimising or compensating for negative impacts, whereas enhancement (H) magnifies project benefits. This factor considers whether –

A negative impact can be mitigated:

- unmitigated: no mitigation is possible or planned [1]
- slightly mitigated: a small reduction in the impact is likely [2]
- moderately mitigated: the impact can be substantially mitigated, but the residual impact is still noticeable or significant (relative to the original impact) [3]
- well mitigated: the impact can be mostly mitigated and the residual impact is negligible or minor [4]

A positive impact can be enhanced:

- un-enhanced: no enhancement is possible or planned [1]
- slightly enhanced: a small enhancement in the benefit is possible [2]
- moderately enhanced: a noticeable enhancement is possible, which will increase the quantity or quality of the benefit in a significant way [3]

- well enhanced: the benefit can be substantially enhanced to reach a far greater number of receptors or recipients and/or be of a much higher quality than the original benefit [4].

Reversibility -

Reversibility (R) considers whether an impact is:

- irreversible: no amount of time or money will allow the impact to be substantially reversed [1]
- slightly reversible: the impact is not easy to reverse and will require much effort, taken immediately after the impact, and even then, the final result will not match the original environment prior to the impact [2]
- moderately reversible: much of the impact can be reversed, but action will have to be taken within a certain time and the amount of effort will be significant in order to achieve a fair degree of rehabilitation [3]
- mostly reversible: the impact can mostly be reversed, although if the duration of the impact is too long, it may make the rehabilitation less successful, but otherwise a satisfactory degree of rehabilitation can generally be achieved quite easily [4].

Calculating Impact Significance:

The table below summarises the scoring for all the criteria.

Scoring for Significance Criteria						
CRITERION	**SCORES**					
	- ¼	**1**	**2**	**3**	**4**	**5**
N-nature	positive	negative	-	-	-	-
E-extent	-	site	local	regional	provincial	national
D-duration	-	very short	short	moderate	long	very long
I-intensity	-	negligible	minor	moderate	major	severe
P-probability	-	very unlikely	unlikely	likely	very likely	-
M-mitigation	-	none	slight	moderate	good	-
H-enhancement	-	none	slight	moderate	good	-
R-reversibility	-	none	slight	moderate	good	-

Impact significance is a net result of all the above criteria. The formula proposed to calculate impact significance (S) is:

- For a negative impact: $S = N \times (E+D) \times I \times P \div \frac{1}{2}(M+R)$; and
- For a positive impact: $S = N \times (E+D) \times I \times P \times (H)$.

Negative impacts score from 2 to 200. Positive impacts score from – ½ to -200.

Understanding Impact Significance:

The following is a guide to interpreting the final scores of an impact (for negative impacts):

Final Significance Scoring		
Final score (S)	**Impact significance**	
0 – 10	Negligible	the impact should cause no real damage to the environment, except where it has the opportunity to contribute to cumulative impacts
10 – 20	Low	the impact will be noticeable but should be localized or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in an EMP and managed appropriately
20 – 50	Moderate	the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition the project benefits must be shown to outweigh the impact
50 – 100	High	the impact will affect the environment to such an extent that permanent damage is likely and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed
100 – 200	Severe	the impact will result in large, permanent and severe impacts, such as local species extinctions, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives that are substantially different should be looked at, otherwise the project should not be approved

Appendix K: Calculated impact significance for identified impacts – Construction Phase of PV plant

Aspect	Land use character						
Impact	Change in land use character of area during construction phase						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	4	4	3	1
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Fauna/ Wildlife						
Impact	Decreased number of faunal species making use of disturbed area during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	3	3	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							14.4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Flora/ plant life						
Impact	Clearing of vegetation to make space for PV array and additional surface infrustructure						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	4	4	2	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Geology and soils						
Impact	Removal of top-soil layer and disturbance of surface level rock structure						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	4	3	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							14.4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Hydrology						
Impact	Alteration of surface hydrology during construction phase						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	2	2	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Visual and aesthetic						
Impact	Alteration of the visual character of the site and surrounding area during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	3	4	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							19.2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Ground water						
Impact	Decrease in grounwater quality and possible contamination during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	1	2	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Noise						
Impact	Increase in noise pollution in the site area during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	3	3	2	1
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Cultural heritage						
Impact	Loss of significant area(s) of cultural heritage during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	3	2	3	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							6
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Socio-Economics						
Impact	Positive impact: Job creation during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	2	3	3	4		3
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-45

Appendix L: Calculated impact significance for identified impacts – Operation Phase for PV plant

Aspect	Climate Change						
Impact	Zero carbon emmissions whilst producing clean, renewable energy						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	5	5	4	4		4
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-160

Aspect	Socio-Economics						
Impact	Positive impact: Job creation						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	4	3	3	3		2
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-31.5

Aspect	Socio-Economics						
Impact	Positive impact: Clean, renewable energy to communities						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	5	3	3	4		4
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-96

Aspect	Land use character						
Impact	Change in land use character of area						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	1	3	4	2	1
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							48
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Fauna/ Wildlife						
Impact	Decreased number of faunal species making use of disturbed area accommodated by solar panel array						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	2	2	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							21
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Flora/ plant life						
Impact	Potential for invasive species to encroach indigenous areas during operation of PV power plant						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	1	4	4	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Geology and soils						
Impact	Erosion of soils						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	1	1	3	4	4	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							6.857142857
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Hydrology						
Impact	Alteration of surface hydrology						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	2	2	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Visual and aesthetic						
Impact	Alteration of the visual character of the site and surrounding area						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	4	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							33.6
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Ground water						
Impact	Abstraction for PV array cleaning						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	1	1	3	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Ground water						
Impact	Decrease in grounwater quality and possible contamination						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	3	2	1	1	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Hydrology						
Impact	Contamination of surface water sources from PV panel cleaning agents/ detergents						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	2	2	4	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							8
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Cultural heritage						
Impact	Loss of significant area(s) of cultural heritage						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	3	1	2	1	4	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2.285714286
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	CUMULATIVE IMPACT of entire operational phase of activity						
Impact	Cumulative impact						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	4	3	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							28
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Appendix M: Calculated impact significance for identified impacts – Construction Phase for CPV plant

Aspect	Land use character						
Impact	Change in land use character of area during construction phase						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	4	4	3	1
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Fauna/ Wildlife						
Impact	Decreased number of faunal species making use of disturbed area during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	3	3	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							14.4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Flora/ plant life						
Impact	Clearing of vegetation to make space for PV array and additional surface infrustructure						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	4	4	2	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Geology and soils						
Impact	Removal of top-soil layer and disturbance of surface level rock structure						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	4	3	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							14.4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Hydrology						
Impact	Alteration of surface hydrology during construction phase						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	2	2	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Visual and aesthetic						
Impact	Alteration of the visual character of the site and surrounding area during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	3	4	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							19.2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Ground water						
Impact	Decrease in grounwater quality and possible contamination during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	1	2	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Noise						
Impact	Increase in noise pollution in the site area during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	3	3	2	1
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Cultural heritage						
Impact	Loss of significant area(s) of cultural heritage during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	1	3	2	3	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							6
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Socio-Economics						
Impact	Positive impact: Job creation during construction						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	2	3	3	4		3
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-45

Appendix N: Calculated impact significance for identified impacts – Operation Phase for CPV plant

Aspect	Climate Change						
Impact	Zero carbon emmissions whilst producing clean, renewable energy						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	5	5	4	4		4
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-160

Aspect	Socio-Economics						
Impact	Positive impact: Job creation						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	4	3	3	3		2
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-31.5

Aspect	Socio-Economics						
Impact	Positive impact: Clean, renewable energy to communities						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact	-0.25	5	3	3	4		4
Negative Impact							
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							#DIV/0!
Impact Significance for Positive Impact = N x (E+D) x I x P x H							-96

Aspect	Land use character						
Impact	Change in land use character of area						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	1	3	4	2	1
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							48
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Fauna/ Wildlife						
Impact	Decreased number of faunal species making use of disturbed area accommodated by solar panel array						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	2	2	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							21
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Flora/ plant life						
Impact	Potential for invasive species to encroach indigenous areas during operation of PV power plant						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	1	4	4	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							24
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Geology and soils						
Impact	Erosion of soils						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	1	1	3	4	4	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							6.857142857
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Hydrology						
Impact	Alteration of surface hydrology						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	2	2	2	2	4	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							4
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Visual and aesthetic						
Impact	Alteration of the visual character of the site and surrounding area						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	4	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							33.6
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Ground water						
Impact	Abstraction for PV array cleaning						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	1	1	3	4
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Ground water						
Impact	Decrease in grounwater quality and possible contamination						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	3	2	1	1	3	2
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Hydrology						
Impact	Contamination of surface water sources from PV panel cleaning agents/ detergents						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	2	2	4	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							8
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	Cultural heritage						
Impact	Loss of significant area(s) of cultural heritage						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	3	1	2	1	4	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							2.285714286
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Aspect	CUMULATIVE IMPACT of entire operational phase of activity						
Impact	Cumulative impact						
	Criteria Scoring						
	Nature (N)	Duration (D)	Extent (E)	Intensity (I)	Probability (P)	Reversibility (R)	Mitigation /Enhancement (M/H)
Positive Impact							
Negative Impact	1	5	2	3	4	3	3
Impact Significance for Negative Impact = N x (E+D) x I x P ÷ ½(M+R)							28
Impact Significance for Positive Impact = N x (E+D) x I x P x (H)							

Appendix O: Overview Environmental Status Report for the Northern Cape – in support of Basic Assessment Report

Appendix P: Specialist’s Declarations

Appendix Q: References used to compile Basic Assessment Report

1. www.studio-eos.eu (Accessed numerous times during January 2011)
2. www.wapa.gov (Accessed numerous times during January 2011)
3. Aurora Power Solutions archive material
4. http://svr225.stepx.com:3388/renewable-energy
5. Text from Regulation 543 and 544 of 18 June 2010
6. Specialist reports contained in Appendix G
7. Google Earth Imagery, 2010 and 2011.