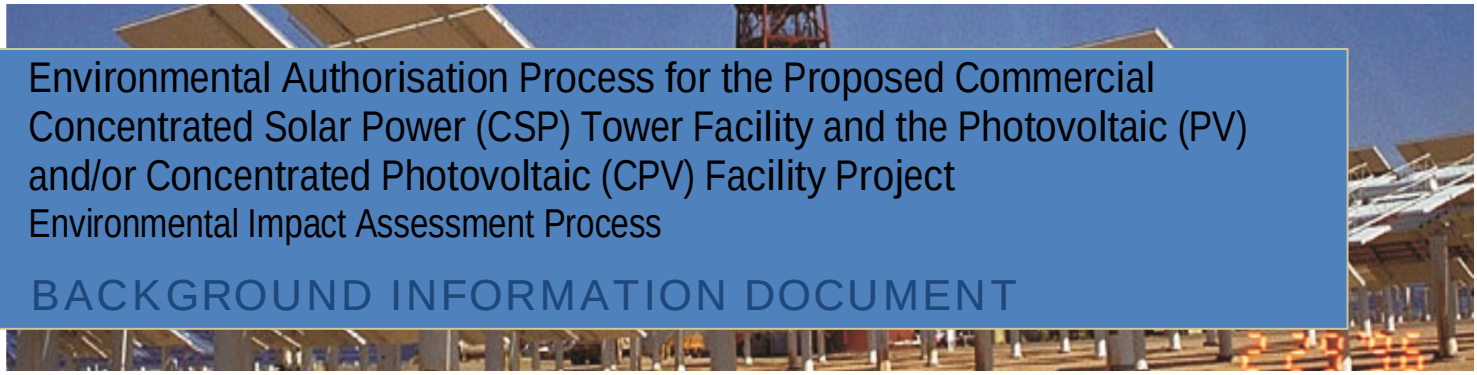

Environmental Authorisation Process for the Proposed Commercial Concentrated Solar Power (CSP) Tower Facility and the Photovoltaic (PV) and/or Concentrated Photovoltaic (CPV) Facility Project

Environmental Impact Assessment Process

BACKGROUND INFORMATION DOCUMENT

Purpose of this Document

This background information document (BID) introduces all stakeholders to the proposed Commercial Concentrated Solar Power (CSP) Tower Facility and Photovoltaic (PV) and/or Concentrated Photovoltaic (CPV) Facility project, to be constructed by Sasol New Energy Holding (Pty) Ltd (SNE), duly represented by Sasol Technology (Pty) Ltd, near Upington, Northern Cape Province. This project will be known as Project Solis.

The BID provides a description of the project, the environmental authorisation process to be followed, the role of stakeholders in the process and details for registration as stakeholders. Stakeholders are invited to participate in the environmental assessment process by commenting on the project, asking questions and raising issues that will be included in the project documents and taken into consideration, where relevant and applicable.

In addition to this document, at various stages of the environmental authorisation process, information and reports will be made available for registered stakeholders to comment on.

WSP Environment and Energy (WSP) has been appointed by SNE as the independent environmental assessment practitioner (EAP) to undertake the environmental impact assessment (EIA) process for the proposed project and to facilitate the stakeholder engagement process. To become a registered stakeholder and ensure all comments and queries regarding this project are accurately documented and addressed, please forward your contact details and comments by the 1st of June 2012 on the attached registration and comments sheet to:

Consultant: Chevonne Stevens
Company: WSP Environment and Energy
Address: P.O. Box 5384, Rivonia, 2128
Tel: 011 300 6178
Fax: 086 528 2231
Email: chevonne.stevens@wspgroup.co.za

Legal framework

Regulations promulgated under the amended National Environmental Management Act (No. 107 of 1998) (NEMA) in Government Notice Regulation (GNR.) 543, 544, 545 and 546 of 2010, specify lists of activities subject to environmental authorisation prior to implementation. The activities associated with the proposed Commercial CSP Tower Facility and PV/CPV Facility are:

- Listing Notice 1: Activity 10 (ii), 13 and 22(ii) and (iii) of GNR.544, activities triggered in this listing require a basic assessment (BA) process;
- Listing Notice 2: Activity 1, 8 and 18(iv) of GNR 545, activities triggered in this listing require a scoping and environmental impact assessment (S&EIA) process; and
- Listing notice 3: Activity 4, 13 and 14 pertains to specific geographical areas.

Therefore, a S&EIA process is being undertaken with the aim to receive environmental authorisation for the proposed project. An application form was submitted in terms of the NEMA to the National Department of Environmental Affairs (DEA), the competent authority.

Abstraction and treatment of water from the Orange River may be necessary for the proposed project. These requirements, as well as associated waste and water use licence requirements will be investigated in the S&EIA.

Stakeholder engagement process

The purpose of stakeholder engagement is to consult with interested and affected parties in the public and private sectors in the decision-making process on projects which may affect them. The process aims to develop and maintain open channels of communication between the project team and stakeholders. This process provides the public and stakeholders with the opportunity to openly express their views and concerns regarding the proposed project through project correspondence. The EAP documents the views and concerns of stakeholders, and makes the project team and relevant authority aware of issues that need to be considered during the compilation and evaluation of the potential risks and impacts associated with the project.

Solar power is the generation of electricity from sunlight.
The proposed project includes two types of commercial solar power generation technologies to be used are as follows;

- photovoltaics (PV) which convert sunlight directly into electricity,
- concentrated solar power (CSP) which focuses the sun's energy to heat liquids or gases and which is then utilised to generate electricity.

Who is a stakeholder?

Any person, group of persons or organisation interested and/or affected by the proposed development.

Register your interest by completing the Registration and Comments Form attached to this document and send it to WSP.

Rationale for concentrated solar power development in South Africa

South Africa's demand for electricity started challenging Eskom's reserve margins during the winter of 2004 and more continuously from mid-2007. In spite of attempts to implement energy efficiency and demand side management, the sharp increase in demand necessitated the implementation of load shedding during 2008. As a result, the Department of Energy compiled an Integrated Resource Plan (IRP) which is a long term electricity capacity plan, which defines the need for new generation and transmission capacity for the country. The shortage of electricity, as well as the IRP, has subsequently opened opportunities for organisations in the electricity sector. There has been a growing need for the independent power producers (IPPs) to contribute generation capacity to the national grid.

Solar energy is the most abundant energy source on Earth, and is a clean energy source. The levels of solar irradiation in Southern Africa are comparable with, and in some places even better than in countries such as Spain and the USA where solar power has been successfully implemented (Figure 1).

While it is not currently cost competitive with conventional coal and nuclear power, the cost of solar energy has been consistently decreasing. It is widely acknowledged that solar power has the potential to become cost competitive with conventional coal and nuclear power but this will require further technology development.

The development of concentrated solar power in Southern Africa will bring the following benefits:

- Supply of electricity at a time when the country and region urgently requires additional capacity;
- Supply of clean electricity that will reduce the countries CO2 footprint;
- Creation of new industries and associated jobs; and
- Improving the image and competitiveness of the country and the economy.

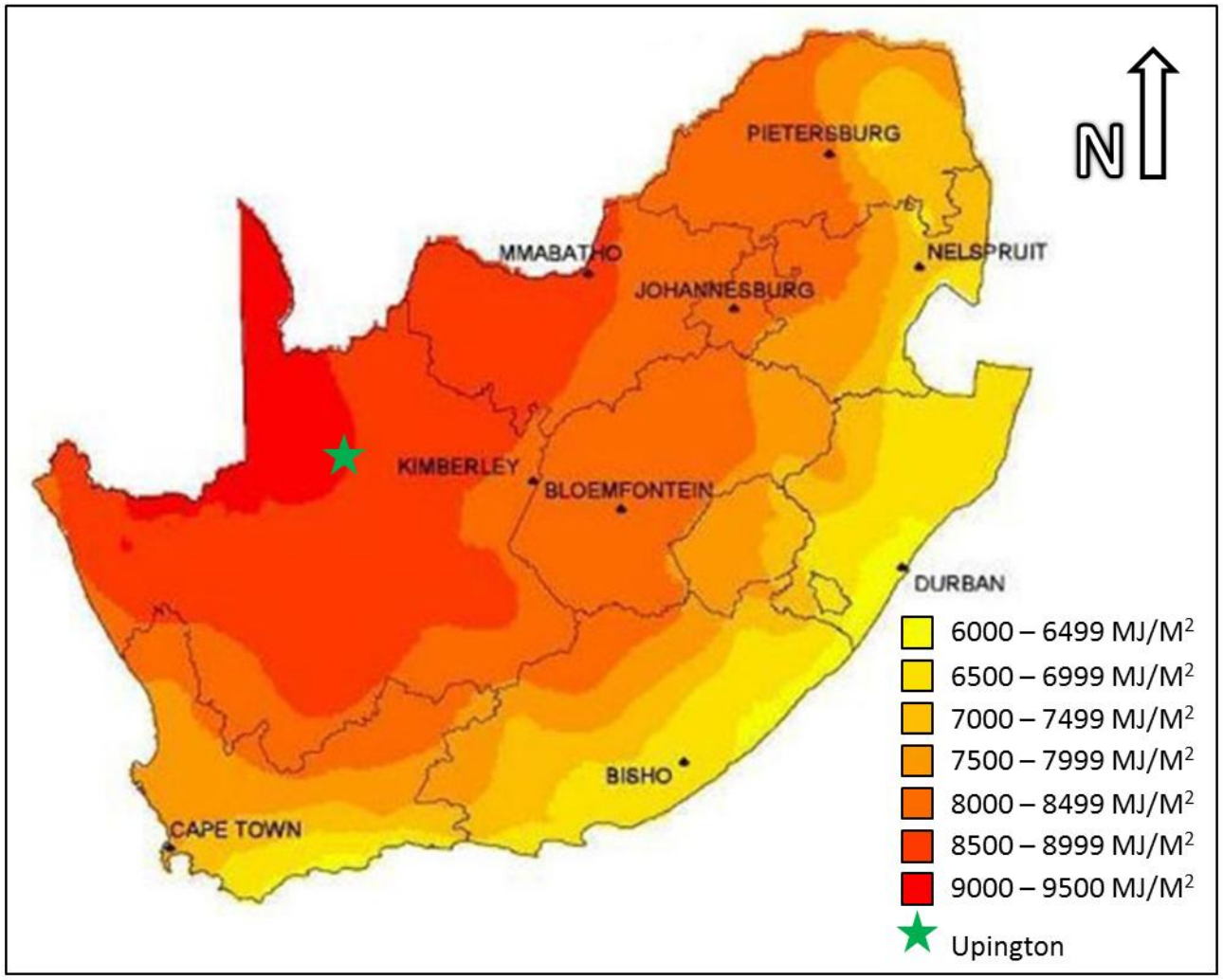

Figure 1: Solar Resource Map (Source: Solarvision, 2010)

Concentrated Solar Power Technology

A wide range of solar concentrating technologies exists, and various techniques may be used to track the sun and focus light. In these systems, fluid (gas or liquids) is heated by focussing sunlight onto a receiver by means of mirrors. The fluid is then used for electricity generation or energy storage. Sasol New Energy has identified one type of CSP systems that is potentially viable for the project, this being the central receiver (central tower) Rankine Cycle CSP technology. Sasol New Energy is also looking at other projects utilising sunlight for electricity production, these being PV and/or CPV based projects.

Central Receiver (Central Tower)

Central receivers (also known as 'central tower' power plants or 'heliostat' power plants) capture and focus the sun's thermal energy with thousands of tracking mirrors (called heliostats). A tower resides in the centre of the heliostat field. The heliostats focus sunlight on a receiver which sits on top of the tower. Within the receiver, the concentrated sunlight heats a process fluid (liquid or gas) to very high temperatures. The heated fluid is then used to drive a turbine to generate electricity.

This power production portion of the process is similar to that of a standard coal-fired power plant; except it is fuelled by clean and free solar energy. It must be noted that, while the "fuel" is free, generating the electricity is not. Refer to Figure 2-4 for illustrations of a central tower plant which will be based on the Rankine cycle, whereby it converts heat into work. The heat will be supplied to a closed loop, which will use water as the working fluid.

Figure 2: Heliostat in USA (Source: Bright Source, 2010)

Figure 3: Central Tower CSP (Source: Abengoa Solar, 2010)

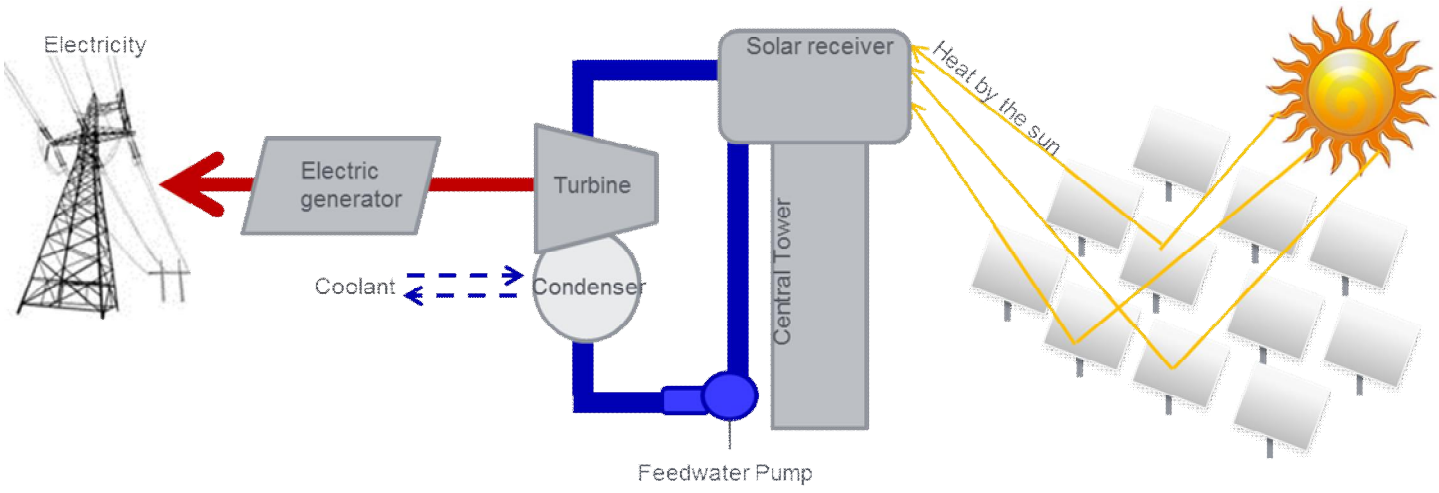

Figure 4: Central Tower Electricity Generation Process (http://fie-conference.org/fie95/4b4/4b43/4b43-2c.gif)

Photovoltaics

Photovoltaic (PV) arrays use semiconductor materials that directly generate electric power when exposed to light. PV cells are made from semiconductor material, usually silicon. The silicon is chemically treated so that the upper and lower layers are oppositely charged. Normally the electricity generated through the panels is stored in a battery or a bank of batteries. Because PV panels produce direct current (DC) and most appliances and equipment are designed to be powered by alternating current (AC), an inverter is used to convert the direct current from the PV panels or battery into alternating current.

Modules should be properly orientated to collect maximum energy. The amount of tilt towards the sun depends on the latitude and what time of year most solar collection is required. Batteries are used mainly as a back-up system that stores energy collected during sunny days for use at night or during cloudy days. Over the past 20 years, production costs have been dramatically reduced, increasing the viability of using this technology. Large solar PV arrays are being connected to electrical distribution networks to provide electrical energy without burning fossil fuels (Figures 5 and 6).

Figure 5: Photovoltaic technology at Nellis Air Force Base in the USA (USAF Photographic Archives, 2010)

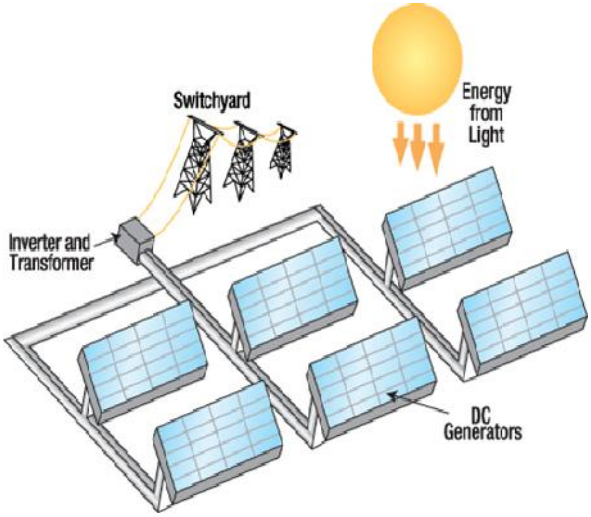

Figure 6: Photovoltaic electricity generation process (Glaskom.com, 2010)

Concentrated Photovoltaics

This technology makes use of optics such as lenses in order to concentrate the suns energy onto a small area of photovoltaic material thereby generating electricity. CPV systems are usually more cost effective than the conventional PV systems because the concentration allows for the production of a much smaller area of solar cells however, the cost of a concentrator and tracking system counteract this cost saving.

How CPV (Figures 6 and 7) works:

A large dish of reflective mirrors or concentrating lenses that direct sunlight onto a photovoltaic surface produce electricity directly from the sun's energy. Modules are installed on a high-precision dual-axis tracking system which ensures optimal operation throughout the day. These systems can be configured to concentrate the sun's energy between two to 500 times Some advantages of CPV

- Increased solar cell efficiencies
- Reduction in cost of cells
- Is scalable to a range of sizes

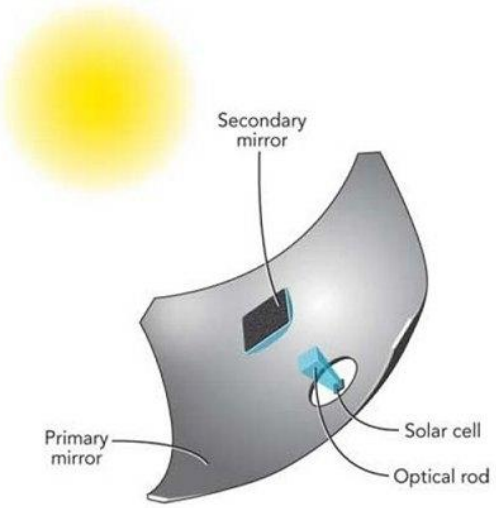

Figure 7 Illustration depicting how CPV works (individual cell)

Figure 8: Amonix Solar Concentrating PV Module (large dish of cells).
(Amonix Solar:http://www.amonix.com/products/index.html)

Project Description

Sasol's objective of the proposed commercial facility is to:

- Explore opportunities for a long-term reduction of Sasol's carbon and water footprint by reducing their greenhouse gas emissions, including particulate matter, sulphur dioxide (SO_2) and nitrogen oxides (NO_x) emissions, as well as their water requirements for power generation;
- Develop expertise in solar energy applications; and
- Participate in further development of CSP technology.

As mentioned above, this project proposed by SNE will be one project however will include two different solar power technologies, being a CSP Tower facility and PV/CPV facility, located near Upington, Northern Cape Province.

Refer to Table 1 for the plant specification details.

In accordance to the independent power producer bid submission, one environmental authorisation processes will be undertaken for the CSP facility and one for the PV and/or CPV plant. The stakeholder engagement process will however integrate both technologies.

Table 1: Plant specifications

Plant Specification	CSP Plant	PV/CPV Plant
Installations will occupy	700ha	200ha
Number of heliostats / panels (mirrors)	50 000 heliostats	PV: 235 000 panels each with a capacity of 210 - 320W. CPV: 2 600 panels each with a capacity of 15-69kW. It must be noted that the above capacities are estimates and will be finalised once the technology supplier is determined.
Size of heliostats/panels	17m^2	TBC
Centre tower height	200m	N/A
Output temperature	585°C	N/A

Site Selection

The proposed project will be located at Van Rooys Vlei near Upington in the Northern Cape Province. The project site footprint is 2 606 ha with the following co-ordinates:

- 28° 26' 22.30" S and 20°55' 9.36" E
- 28° 24' 54.82" S and 21°0' 13.57" E
- 28° 24' 40.91" S and 21°2' 14.91" E
- 28° 26' 38.73" S and 21°1' 5.12" E
- 28° 28' 6.80" S and 20°59' 24.64" E
- 28° 27' 40.15" S and 20°57' 46.26" E

Refer to Figure 9 for the site illustration. The proposed project installation footprint area will be 700ha and 200ha for CSP and PV/CPV respectively.

Figure 9: Proposed site for the CSP and/or PV/CPV plant

Project Motivation

Rising fossil-fuel prices, geopolitical developments, and environmental concerns have led to growing demand for renewable energy sources. In order to ensure that Sasol remains competitive and can grow in a sustainable manner, in a carbon-constrained world, Sasol is investigating the use of alternative sources of energy creation. Solar energy is the most abundant renewable energy source available on Earth; it is secure and carbon-free during its operational lifespan. CSP and PV/CPV represents an attractive opportunity for Sasol to develop a technology position due to the following considerations:

- South Africa enjoys a high level of Direct Natural Irradiation that is comparable to Spain and the Nevada desert (USA) where solar power has been successfully implemented;
- The levelised cost of electricity from solar technologies has been steadily decreasing, thus creating the potential for solar power to become competitive with other low carbon electricity alternatives within the next decade;
- CSP technology is attractive to Sasol as the technology components are understood and the plant is characterised as a process type of plant ;
- Over the past year the cost of CSP and CPV have reduced significantly to such an extent that these are considered some of the most cost competitive renewable electricity technologies available;
- Thermal energy storage and hybridisation options make the technology attractive for dispatchable power and possibly base load applications (although this is not currently under consideration for this project);
- The Integrated Resource Plan for Electricity for 2010 – 2030 has clearly outlined the major contribution of renewable electricity to the South African electricity generation mix and the role of Independent Power Producers in this regard.
- The objective of the project is for Sasol to establish itself as a leading, large scale Renewable Energy Independent Power Producer, focussing specifically on world-class solar power technologies. Explore opportunities for a long-term reduction of Sasol's carbon and water footprint by reducing their greenhouse gas emissions, including particulate matter, SOx and NOx emissions, as well as their water requirements for power generation

Specialist input for the CSP Project

The scoping phase of the EIA process will provide baseline data for an in-depth assessment of the potential direct and indirect environmental impacts, and risks associated with the construction and operation phases of the project. The EIA phase will also consider cumulative impacts of the proposed project on both the local and regional receiving environment. Nevertheless, a preliminary survey of the documentation available suggests that the following specialist studies will be required:

- Agricultural;
- Hydrological and geohydrological;
- Social-economic;
- Ecological
- Flora assessment; and
- Faunal assessment;
- Avifauna;
- Visual;
- Traffic;
- Cultural and heritage impact assessment;
- Air quality; and
- Noise.

Agricultural Impact Assessment

The current agricultural potential for the region, including the study areas, is defined as non-arable, low potential grazing land; expected to be due to the arid climate and soil conditions. Since the area is expected to be unsuitable for arable agriculture, the following will be undertaken as part of the assessment.

A desktop study will be conducted to determine the land capability and grazing capacity of the proposed sites. The grazing potential will be described based on the number of animals that can be sustained without deterioration of the natural resources. Based on the desktop study, the land capability and grazing potential for the proposed site will be described. Based on the grazing capacity determined for the study site, the potential economic cost for the loss of grazing land will be estimated. The report will be accompanied by relevant mapping.

Hydrological and Geohydrological Impact Assessment

Due to the area being classified as semi-arid, with water resources being scarce and requiring protection, the aim of the study will be to determine water supply options available to the site, and to limit the potential impacts of the project on these water resources. This includes both the surface water and groundwater resources. The assessment will include:

- Review of all available hydrological and geohydrological information pertinent to the area;
- Hydrocensus of all groundwater wells within a 2km radius of the proposed development by use of the DWA National Groundwater Database and associated groundtruthing;
- Assessment of the prevailing surface and groundwater quality within a 2km radius; and
- Assessment of the need for any water use licence requirements associated with the project.

Based on available project related information, a conceptual model of the surface water and groundwater resources will be developed. This will define the relationships between the resource and associated users. A report will be compiled outlining the status of the water resources relevant to the sites. This will include an assessment of the water quality and quantity status of both the surface water and groundwater resources. This will be used to describe potential water supply options to the site. A description of the potential impacts associated with the project will be described, and mitigatory measures will be advocated to limit these impacts.

Social-economic Impact Assessment

Stakeholder data will be sourced in order to compile a database of the communities affected by the proposed project. The socio-economic profile would serve to contextualise the affected community for the purposes of diligent stakeholder engagement. Individual land owners and/or community representatives will be visited and a list of all interviews will be kept as summaries of salient issues discussed. This task would estimate the anticipated negative and positive socio-cultural impacts to the various socio-economic groups. A sensitivity map showing those communities and/or resources that will be most affected by the proposed solar project, in particular, disadvantaged populations, important historical or cultural sites, property values, and other features as appropriate will be developed.

A report incorporating the above elements will be produced. The report will make recommendations for mitigation measures to be considered in the design and operation of the project. The positive and negative impacts of the alternatives on various groups of affected parties (with and without mitigation) will be identified and evaluated and recommendations that may include additional work, outside of this scope, that may need to be conducted and/or attended to.

Ecological Impact Assessment

Flora Assessment

A floral assessment will be undertaken which will include the following:
Obtain relevant aerial imagery of the proposed areas to identify homogenous vegetation/habitat units within the proposed development area. Undertake a comprehensive literature review of the area to determine potential occurrence of: Red data floral species, Species of special concern, and endemic and protected species which will be identified through the SANBI PRECI database as well as other available literature and confirmed on site.

Undertake a quantitative field vegetation survey on the properties: Droogehout, Areachap and Van Rooys Vlei, located near Upington in the Northern Cape which will include but not limited to:

- Species composition;
- Cover estimation of each species according to the Braun-Blanquet scale;
- Amount of bare soil and rock cover;
- Presence of biotic disturbances, e.g. grazing, animal burrows, etc.
- Produce an integrated ecological site sensitivity map whereby each vegetation type unit will be ranked in terms of conservation importance in terms of provincial biodiversity priorities, as well as ecological sensitivity.
- Identify any areas that may be considered 'no-go' areas from a biodiversity perspective
- Evaluate the alternate properties in terms of relative sensitivity.
- Suggest possible management measures to prevent/minimise/manage the identified impacts, namely the position of the proposed infrastructure, relocation and

rehabilitation plans, monitoring programmes etc.

Faunal Assessment

A faunal assessment will be undertaken and will include the following:

- A pre-site preparation – examination of maps, satellite visuals and reference searches etc ;
- A site investigation where the following will be identified:
  - Keystone species in the immediate and surrounding areas; and
  - Rare and endangered (Red Data, ToPS and CITES Listed) species.
- A review of known data, field trip reports and museum specimen data for the area will be undertaken;
- A detailed faunal specialist report will be compiled and include:
  - Mammalogical, ornithological, herpetological (reptiles and amphibians and selected arachnid* species tables for the site and immediate surrounds with relevant discussions;
  - Detailed mitigation proposals for construction and operational phases of the project; and
  - Potential offset project possibilities.

*Please note that the arachnological assessment will be limited to high risk or protected species only.

Avifaunal Impact Assessment

Bird Life South Africa (BLSA) has issued a Position Statement on the effect of solar power facilities on birds. One of many concerns is that CSP plants are of greater concern because of the associated central receiver tower, standby focal points and heliostats with some of the major issues including collision with heliostats and the central receiver tower thus resulting in injury or death (reflective surfaces act as attractants for approaching birds) and mortality of birds due to the extreme heat. The avifaunal assessment will therefore include the following:

An initial desktop review will be undertaken of available literature to better understand the impacts associated with the CSP and PV and/or CPV, as well as their impacts on birds, the predominant avifaunal communities present in the area and the general biogeochemical history of the site. A risk assessment will be undertaken for the species present and expected based on the literature reviews and site inspections. Multi-seasonal surveys of the site and surrounding areas will be conducted to establish presence/absence of all species, as well as to inspect habitat suitability and regional-level movement patterns. Mitigation measures and recommendations will be thoroughly investigated and proposed, based on literature review, the risk assessment, site inspections and a meeting with BLSA.

Visual Impact Assessment

As there may be a potential for visual impacts in the flat landscape in the vicinity of the proposed project a visual impact assessment will be undertaken. Visual impacts are a function of the sensitivity of the visual receptors and resource and the magnitude of change in the baseline conditions (i.e. "impact") resulting from the proposed development. The assessment will include:

A qualitative assessment of visual impacts in relation to critical viewing points, such as neighbouring farms and prominent view sites within a 5 km radius will be undertaken. Extensive use of GIS and 3D modelling technology will be used. Furthermore, photo montages will be used as a photographic representation of the proposed landscape modification as viewed from a specific location. To ensure that this representation is ethical, VRM Africa subscribes to the Proposed Interim Code of Ethics for Landscape Visualisation (CALP, July 2003).

The system will consist of two stages:

- Inventory (viewshed and visual resource inventory); and
- Analysis (visual resource contrast rating).

The inventory stage involves the identification of the visual resources of the area, assigning them to inventory classes.
The process involves rating the visual appeal of the property, measuring public concern for scenic quality through the public meeting and determining whether the tract of land is visible from travel routes or observation points. Through the inventory process, objective classes are assigned to each defined land parcel.

The criteria for the assessment of visual impacts for the proposed project will be based on the DEA&DP Guideline for involving visual and aesthetic specialists in EIA processes. Impacts will be defined for all the proposed landscape modifications.

Traffic Impact Assessment

An access road will be developed for this project and therefore a traffic impact assessment will be undertaken. This assessment will include but is not limited to a data collection phase whereby a traffic survey will be undertaken and information will be gathered regarding existing and future roads and intersections.

Subsequently a traffic analysis will be undertaken and will involve additional data collection, intersection analysis, restricted access, pedestrian and traffic movement investigations. In addition to this drawing will be developed to illustrate the new access road any associated features.

Cultural and Heritage Impact Assessment

Based on archaeological and historical research and various heritage assessments in the region of the proposed site, the occurrence of palaeontological and archaeological heritage resources is anticipated, as well as the remains of colonial heritage such as farmsteads, graves and similar features. A cultural heritage assessment is proposed that comprises:

- Baseline studies (mapping and significance assessment of heritage resources) of the development site;
- Assessment/definition of impacts (by construction and operation) on identified heritage resources;
- Formulation of possible heritage management measures before and during construction; and
- Recommended design responses to preserve and/or memorialise significant heritage resources.

Air Quality Impact Assessment

This study will focus on the construction phase dust impacts, however, potential impacts during operational lifespan of the project will also be considered. The latter would include increased dust release from the removal of vegetation from the site footprint as well as possible sulphur dioxide (SO_2) or nitrogen oxide (NO_x) emissions as a result of the fuel powered generator that will be on site.

Models will be developed using data from the South African Weather Services weather station and dust monitoring will take place to

provide additional data and information to the study. An emissions inventory will also be compiled which will include key emission sources during construction and operation of the facility.

Noise Impact Assessment

An inventory of noise sources will be compiled for the construction phase along with identification of potential surrounding sensitive receptors (if any). Typical noise levels for each piece of construction equipment will be obtained and used in accordance with a distance decay model to determine the noise levels over certain distances and at selected receptors. Meteorological data will also be sourced as this is required in the prediction of noise propagation patterns from the site. An integrated sound propagation model (according to SANS methodology) will be used to generate noise contours (noise footprint) for the study area during construction.

This will give an indication of the criteria for an assessment of annoyance. All relevant data will be put into an appropriate GIS format. A basic GIS raster surface grid map of the proposed site and surround areas will be created using GIS grid tools to produce a blanket coverage output. A detailed impact assessment report will be compiled to summarise the data sources, information obtained, and interpretation at a strategic level, limitations and recommendations for further study as well as mitigation measures for consideration during the construction phase.

What does the Stakeholder Engagement Process consist of?

Notification of Project

The first step is to notify the public through the following mediums:

- Newspaper advertisements in the The Star, the Kalahari Bulletin (Upington) and Northern Cape (NC) Express;
- Site notices;
- Written notification letters to surrounding landowners and municipal ward councilors; and
- Distribution of the BID to surrounding landowners and registered stakeholders.

Public Meeting and Scoping Report Review

A public meeting will be held, to which all registered and any other stakeholders are invited. All comments will be recorded so that they can be addressed in an issues trail and response report.

Once the separate draft scoping reports for each technology has been completed, they will be made available for public review for a period of 40 days. WSP will notify all registered stakeholders of the location of the documents for review and date of the public review period for the Scoping Reports. At present, the two separate scoping reports are scheduled to occur in June to July 2012.

PUBLIC MEETING

All stakeholders are invited to attend a public meeting on the:

Date: 21 May 2012
Time: 17h30 – 19:30
Venue: Piet Phole Hall,
Leeukop Straat,
Roasedale,
Upington

Registration and Comments Sheet

To be a registered stakeholder and ensure all comments and queries regarding this project are accurately documented and addressed please forward your comments and contact details with the attached response sheet to:

Chevonne Stevens
WSP Environmental (Pty) Ltd
Address: P.O. Box 5384, Rivonia, 2128
Tel: (011) 300 6178
Fax: (086) 528 2231
Email: Chevonne.Stevens@wspgroup.co.za

Please insert your personal details below:

Name:	
Organisation & Designation:	
Address:	
Tel:	
Fax:	
E-mail:	

Please list your interest in the project and comments below:
