

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE PROPOSED DEVELOPMENT OF A SOLAR PHOTOVOLTAIC PLANT NEAR DENNILTON, LIMPOPO PROVINCE

DEA Ref No: 14/12/16/3/3/2/737

INTRODUCTION

Nokukhanya Energy (Pty) Ltd (hereafter referred to as Nokukhanya) are proposing to construct a 75MW Solar Photovoltaic (PV) plant near Dennilton, Limpopo Province. Nokukhanya had previously completed a basic assessment for environmental authorisation of a 5MW solar PV plant near Dennilton, the reference number for which was 14/12/16/3/3/1/660. Subsequently the project has increased in capacity to 75MW and a new environmental impact assessment has commenced with the new reference number of 14/12/16/3/3/2/737. In terms of the Environmental Impact Assessment (EIA) Regulations (18 June 2010) promulgated under Sections 24 and 24D of the National Environmental Management Act (Act No. 107 of

1998) (NEMA), various aspects of the intended development are considered listed activities which may have an impact on the environment and therefore require authorisation from the National Department of Environmental Affairs (DEA) prior to the commencement of such activities. Nokukhanya has therefore appointed SiVEST as independent environmental assessment practitioner (EAP), to undertake the required Environmental Impact Assessment (EIA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

PURPOSE OF THIS DOCUMENT

The purpose of this Background Information Document (BID) is to inform Interested and/or Affected Parties (I&APs) about the EIA process that is being conducted for the proposed development.

In addition to supplying information about the proposed project as well as the EIA process, this BID will also provide I&APs with the opportunity to:

- Better understand the proposed project in order to provide comments and raise issues of concern
- Understand the EIA process in order to participate effectively;
- Make suggestions to enhance the proposed project;
- Comment on the specialist studies that will be conducted; and
- Contribute local knowledge.

BACKGROUND TO THE PROPOSED PROJECT

- The negative environmental impacts of using fossil fuels are well documented. In addition to depleting fossil fuels, the processes often

result in large pollution risks. The Government of South Africa has committed to contributing to the global effort to mitigate greenhouse gas emissions.

According to the White Paper on the Promotion of Renewable Energy and Clean Energy Development (2002), the Government has committed to develop the framework within which the renewable energy industry can operate, grow, and contribute positively to the South African economy and to the global environment. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. In response to this goal; Nokukhanya are proposing to establish a PV plant near Dennilton in the Limpopo Province.

The overall objective of the project is to generate electricity to feed into Eskom's national electricity grid by means of renewable energy technologies.

WHY USE SOLAR ENERGY?

The benefits of using solar energy include:

- Solar PV plants have the capability of delivering Megawatt-scale grid power;
- Solar energy is renewable, clean and non-polluting (greenhouse gases etc.), and

does not produce by-products (atmospheric contaminants or thermal pollution) that could be harmful to the environment;

- Solar PV plants are generally well suited to rural areas and therefore have a reduced impact on agriculture compared to other electricity generating options. Solar PV plants can also contribute to economic growth in these regions;
- Solar energy is one of the lowest-cost producers of electricity;
- Localised production of energy reduces transmission line losses associated with transmitting electricity over long distances;
- The use of solar energy reduces the use of coal and other fossil fuels with their associated emissions of greenhouse gases; and
- Solar plants improve energy security for South Africa, reducing dependency on fossil fuels.

PROJECT LOCATION

The proposed application site falls within the Elias Motsoaledi Local Municipality. It is located approximately 5km South West of Dennilton on three farms with a total area of 175 hectares. Nokukhanya owns two of the farms and is negotiating a lease

for the third farm. The project includes the following farms:

Solar PV Plant

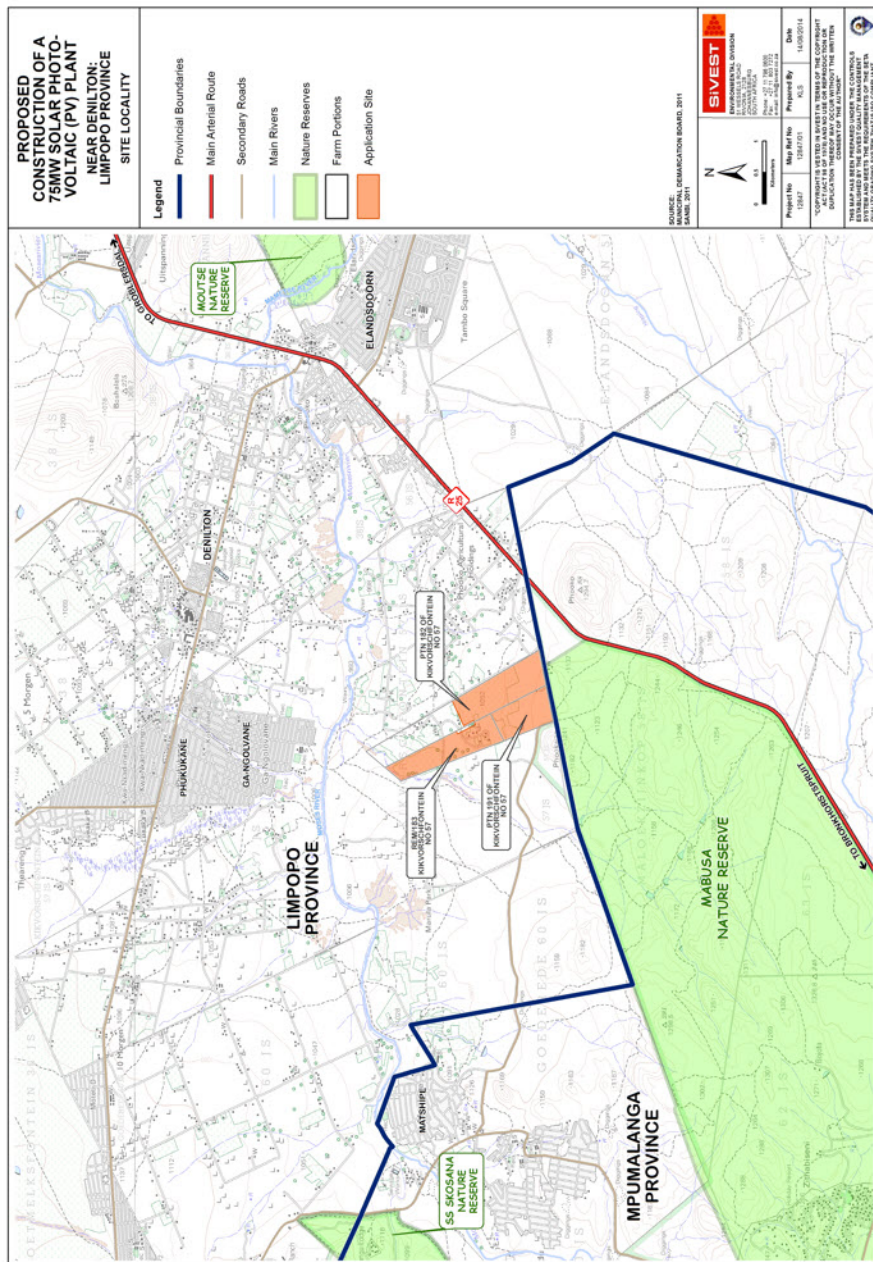
- Farm Kirkvoschfontein 57, portion number 182
- Farm Kirkvoschfontein 57, portion number 183
- Farm Kirkvoschfontein 57, portion number 191

The project site near Dennilton has been identified through pre-feasibility studies conducted by Nokukhanya based on an estimation of the solar energy resource as well as weather, dust, dirt, and surface albedo. Grid connection and land availability were also important initial considerations. The application site for the solar PV plant is shown in the locality map (Figure 1).

SOLAR PV TECHNICAL DETAILS

At this stage, it is proposed that the development will consist of 100,000s of solar PV panels and associated infrastructure with a total generation capacity of approximately 75MW. The generated electricity will be fed into the national distribution network via the Kwaggafontein or Dennilton substation, and associated power lines. As the detailed design for the project has not been completed at this time, the key components detailed below illustrate a typical 75 MW solar plant.

Figure 1: Locality Map





How does a PV plant work?

Typically, PV plants use semiconductor materials to convert sunlight directly into electricity (Figure 2). The solar panels can be fixed or they can be installed to track the sun.

The solar panels are generally configured in banks of arrays or sub-arrays depending on the number of PV panels used and the size of the arrays. The rows of PV panels are spaced both to allow access to vehicles during maintenance and to ensure that one array or one sub-array does not cast a shadow over the one behind. The electricity is cabled to

inverters, which convert DC power to AC and synchronised to the electricity grid. The output is connected through various switchgear, protection devices and meters to local users and the grid. The inverters, switchgear and other electrical equipment are standard items as used for a wide range of industrial applications.

PV power plant key components and associated infrastructure:

The key components of the proposed solar power facility include the following:

- PV solar Panels and arrays;
- PV Panel mountings;
- DC-AC current inverters and transformers; and
- Underground cabling / overhead power lines.

The PV panels will be arranged in rows (arrays) and made up of

sections depending on the optimal final design and layout of the development. The PV panels will be mounted on frames with a maximum height of approximately 3 m above the ground, supported by rammed, concrete or screw pile foundations, and they will face north in order to capture the optimum amount of sunlight.

Additional associated infrastructure that is likely to be required for the project includes the following:

- a small site office, including security and associated facilities;
- security system;
- site fencing;
- upgraded access roads;
- car park; and a lay-down area for the temporary storage of materials during the construction activities.

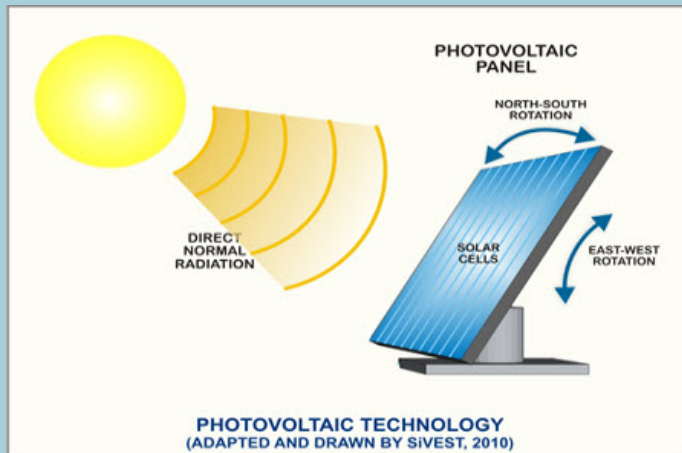


Figure 2: Typical Solar PV Panel.

The above key components may be subject to change throughout the EIA process based on environmental constraints.

The section below describes the technical components that would be involved in the construction of the proposed infrastructure.

1.1.1 Solar Field

The smallest unit of a PV installation is a cell. A number of cells form a module, and finally a number of modules form the arrays (Figure 3). Modules are

storey building with warehouse / workshop space and access. The office will be used for telecoms and ablution facilities will be included. Security will be required.

formalise this grid application and the agreement will form part of the Power Purchase Agreement (PPA).

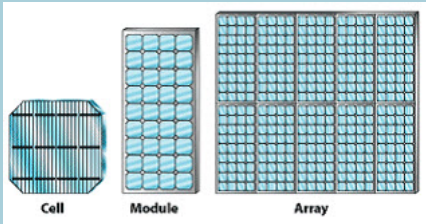


Figure 3: Illustration of a PV installation

arranged into strings that form the solar field. Modules are arranged in section sizes of approximately 40m x 5m called tables and are installed on racks which are made of aluminium or steel. All the arrays are wired to inverters that convert direct current (DC) into alternating current (AC) that can be stepped up and fed into the national grid system.

The proposed development will be situated within the boundary of the three farms included in the EIA application. Some clearing/grading of the area might be required, the cleared areas will however be rehabilitated as per the requirements of the EMPr.

The panel arrays are mounted into metal frames, which are usually aluminium. Concrete or screw pile foundations are used to support the panel arrays. Arrays usually reach up to between 5m and 10m above ground level.

1.1.2 Building Infrastructure

The solar field will require onsite buildings, which will relate to the daily operation of the plant. The plant will require administration buildings (office) and possibly a warehouse for storage. The buildings will likely be a single

1.1.3 Associated Infrastructure

• Electrical Infrastructure

The PV arrays are typically connected to each other in strings and the strings connected to DC to AC inverters (Figure 4).

Inverters, like the substation transformers, also contain oil. Bunds will be constructed to ensure that any oil spills are suitably attenuated and not released into the environment.

The distribution substation will be typically 90m x 120m in size and will be located in close proximity to the existing power line. The substation will be securely fenced and will be operated by Eskom.

to DC to AC inverters (Figure 4).

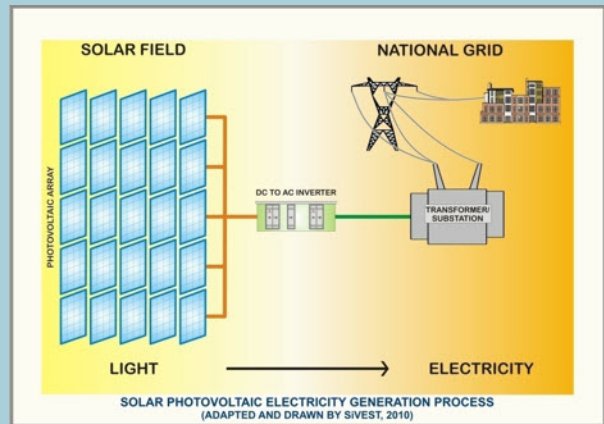


Figure 4: PV electricity generation and conversion process

The strings are connected to the inverters by low voltage DC cables. Power from the inverters is collected in medium voltage transformers through AC cables. Cables may be buried or pole mounted depending on voltage level and site conditions.

The solar facility connection to the national grid will be via an onsite transformer unit. The intention is to connect into the Kwaggafontein-Dennilton 132kV Eskom power line, located approximately 3km to the north of the site. The project applicant has engaged with Eskom to

At least one corridor alternative will be assessed to provide grid access from Kirkvoschfontein farm. Approximately 3km of Kingbird lines will be built from the project switching station to the Kwaggafontein-Dennilton 132kV feeder.

The alternative corridors will be assessed as part of the EIA for the proposed construction of the Nokukhanya 75MW solar PV plant.

- Solar Resource Measuring Station

A permanent solar resource

measuring station is required to be installed within the solar park. Each station will consist of two pyrometers, temperature and pressure sensors, relative humidity detectors and wind measuring equipment. These will measure solar irradiation levels and will be used to derive energy forecasts for the grid operator as part of the Renewable Energy Independent Power Purchase Programme (REIPPP) requirements.

- Roads

An access road with a gravel surface from the public road onto the site will be required. An internal site road network to provide access to the solar field, power block and other infrastructure (substation and buildings) will also be required. Existing farm roads will be used where practical. The site road network will include turning circles for large trucks, passing points and where necessary, may include culverts over low points in the landscape. All internal site roads will require a width of typically at least 5m. Drainage trenches along the side of the internal road network will be installed, as required.

- Fencing

For various reasons (security, public protection and lawful requirements), the plant will be secured by enclosing it with security fencing. Access points will be managed and monitored by a full time security company. The actual choice of fencing is yet to be determined, but may be a fully electrified option, or a full height palisade or even a hybrid of the two.

- Temporary work areas / activities during construction

A lay down area of 10 000m² is typical, adjacent to the site or access route will be required. This will be temporary in nature. Associated with this will be a contractor's site office, which is typically 5 000m².

- Panel maintenance

The panels will require cleaning and dust will accumulate on them affecting their productivity. Cleaning will take place once every quarter (providing job creation). Water will be sourced from a borehole and from a municipal connection.

Proposed site alternatives for the PV power plant

In terms of the NEMA and the EIA Regulations, feasible alternatives are required to be considered during the EIA Process. All identified, feasible alternatives are required to be evaluated in terms of social, biophysical, economic and technical factors. The following alternatives will be considered for the project:

- Site Layout Alternatives the 75MW PV plant will consider two different layout alternatives;
- Grid Connections Alternative alignments; and
- No-go Alternative.

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

What is an EIA?

An EIA is a process of collecting, organising, analysing, interpreting and communicating information that is relevant to consider a

particular environmental application.

EIAs are used by planning authorities/developers to obtain an independent and objective view of the potential environmental (biophysical and social) impacts that could arise during the construction and operation of the proposed development. This information needs to provide the Competent Authority with a sound basis for their decision-making.

National Environmental Management Act (NEMA)

The EIA for the proposed construction of a solar photovoltaic plant will be conducted in terms of the EIA Regulations under Government Notices No R543, R544, R545 and R546 promulgated on 18 June 2010, in terms of Section 24 (5) read with section 44 of the NEMA. According to the NEMA as amended, an EIA process is required for the proposed construction of a solar photovoltaic plant as several listed activities are triggered which require investigation. They include the following:

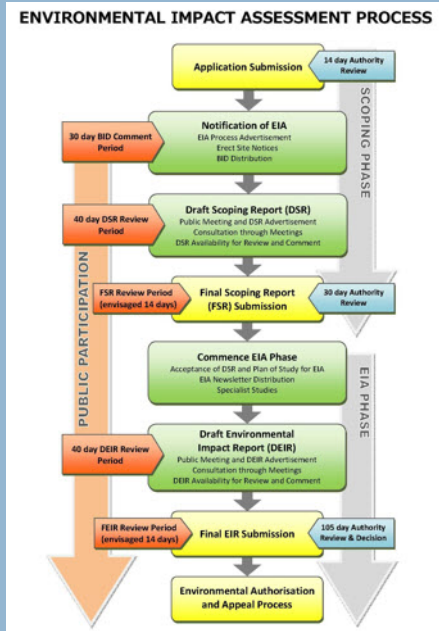
- GN R 544: Item 10, 11, 18, 22 and 26;
- GN R 545: Item 1 and 15; and
- GN R 546: Item 4, 12, 13, 14, 16 and 19.

The EIA process that will be followed for this proposed project is illustrated in Figure 5 (right).

COMPETENT AUTHORITIES

The Competent Authority for this proposed project is the Department of Environmental Affairs (DEA).

Figure 5: EIA process diagram



ENVIRONMENTAL ISSUES TO BE INVESTIGATED DURING THE EIA

Various environmental parameters have been identified that will require investigation for the proposed development. These are listed in Table 1 below.

SKILL	NAME
Project Director	SIVEST - Rebecca Thomas
Project Manager and EAP	SIVEST – Andrea Gibb
Public Participation Practitioner	SIVEST – Lynsey Rimbault
GIS and Mapping	SIVEST – Kerry Schwartz
Biodiversity	David Hoare Consulting – David Hoare
Surface Water	SIVEST – Shaun Taylor, Alistair Fyfe
Heritage	PGS – Wouter Fourie
Visual	SIVEST – Andrea Gibb, Kerry Schwartz
Social	Urban Econ – Elena Broughton
Soils and Agricultural Potential	Agricultural Research Council – Institute for Soil, Climate and Water – Garry Paterson
Desktop Geotechnical	Jeffares and Green – Steven Bok

Table 1. List of specialists and specialist studies to be undertaken for the proposed development

ALTERNATIVES

In terms of the EIA regulations, feasible and reasonable alternatives are required to be considered through the EIA process. These alternatives can include the following:

- the property on which or location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the design or layout of the activity;
- the technology to be used in the activity;
- the operational aspects of the activity; and
- the option of not implementing the activity.

Layout alternatives, power line alignment alternatives and the no-go alternative will be considered in the impact phase of the EIA process.

THE PUBLIC PARTICIPATION PROCESS

Public participation is the cornerstone of any EIA, as it will be for this proposed project. The principles of NEMA govern many aspects of EIAs, including public participation. The key objective of public participation during this EIA will be to provide I&APs with sufficient and relevant information and to conduct a transparent consultation process on an on-going basis, in order to ensure effective participation throughout the EIA process. As part of this public participation process you will also be provided with the opportunity to comment on the environmental findings as per the EIA Reports (Scoping and Impact Assessment), which will be made available for public review and comment during the process.

It is important that relevant I&APs and Stakeholders are identified and involved in the public participation process from the outset of the proposed project. As a registered I&AP, you will receive personal notifications by SA Postal Services, e-mail and/or sms where applicable of all documents available for comment, and due dates for comment at every stage.

YOUR RESPONSIBILITIES AS AN I&AP

In terms of the EIA Regulations, your attention is drawn to your responsibilities as an I&AP:

- In order to participate in this EIA process, register yourself on the project database;
- Inform any other parties (neighbours, friends, colleagues, etc.) who may be interested and/or affected by the proposed project about the EIA process and encourage

them to become involved; and

- Ensure that any comments regarding the proposed project are submitted within the timeframes that have been approved or set by DEA, or within any extension of a timeframe agreed to by the DEA and the applicant, Nokukhanya.

OUR RESPONSIBILITIES AS THE INDEPENDENT EAP

In terms of the EIA Regulations, our responsibilities in the public consultation process include:

- Ensuring that sufficient information regarding this proposed project is made available to you, either through the BID or providing information as and when requested;
- Ensuring that you have an understanding of the proposed project to be able to comment informatively, and to enable you to submit any concern in an informed manner; and
- Ensuring that the following actions are taken upon receiving any comments/queries/issues:
 - The contact details provided by you will be entered into the project database and that you will be sent all further information releases;
 - If you send us queries or comments, we will respond in writing; and
 - If you call us, your details and queries / comments will be recorded. Should we not be able to answer your question immediately, your call will be returned as soon as possible with a response.

HOW TO BECOME INVOLVED

If you wish to register as an I&AP, you can do so by the following methods:

- Respond (by phone, fax or e-mail) to our invitation for your participation, which has been advertised in the printed media;
- Mail, fax or e-mail the attached Registration and Comment Form to SiVEST;
- Attend the meetings to be held during the course of the project. Should you register as an I&AP you will automatically be invited to attend these meetings;
- Contact us telephonically should you have a query, comment or require further project information; and
- Review the draft Environmental Scoping Report and the draft Environmental Impact Report within the review periods that will be stipulated in your personalised letter.

If you consider yourself an I&AP for this proposed project, we urge you to make use of the opportunities created by the public participation process to become actively involved in the process and provide comment or concerns which affect and/or interest you, or about which you would like more information. Your input into this process forms a key part of the Environmental Studies and we would like to hear from you to obtain your views on the proposed project.

By completing and submitting the accompanying Registration and Comment Form, you automatically register yourself as an I&AP for this proposed project, ensuring that your comments and/or concerns raised regarding the proposed project will be noted. The public participation consultants will respond to all comments and queries received during the course of the project.


Please be informed that all relevant public documents can be downloaded from the SiVEST's website





We look forward to your contributions

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 **Fax: (011) 803 7272**

Website: www.sivest.co.za

LIST OF ACRONYMS

AC	Alternating Current
BID	Background Information Document
DC	Direct Current
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
EIA	Environmental Impact Assessment
I&AP	Interested and/or Affected Party
MW	Megawatt
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
PPA	Power Purchase Agreement
PV	Photovoltaic
REIPPP	Renewable Energy Independent Power Purchase Programme