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SCOPING REPORT

in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

File Reference Number:

14/12/16/3/3/2/989

Project Title:

Proposed Development of a 225MW Solar PV Plant on Several Portions of Farms in the Hanover District, Emthanieni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape.

Prepared for

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DOCUMENT CONTROL

Table 1: Document Control

| COMPILED/REVISED BY | STATUS | REVISION | REVIEWED/ APPROVED BY | DISTRIBUTED ON |
|---------------------|--------|----------|-----------------------|------------------|
| Philip Radford | Draft | 00 | Shaun MacGregor | 14 November 2016 |
| Philip Radford | Draft | 01 | Shaun MacGregor | 24 November 2016 |
| Philip Radford | Draft | 02 | Justin Bowers | 28 November 2016 |
| | | | | |

Checklist

Content of Scoping Report in terms of Appendix 2 of the EIA Regulations, 2014

| <i>“A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include-“</i> | | |
|--|------------|----|
| (a) details of- | YES | NO |
| (i) the EAP who prepared the report; and | X | |
| (ii) the expertise of the EAP, including a curriculum vitae; | X | |
| (b) the location of the activity, including- | | |
| (i) the 21 digit Surveyor General code of each cadastral land parcel; | X | |
| (ii) where available, the physical address and farm name; | X | |
| (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; | N/A | |
| (c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it | X | |
| (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or | N/A | |
| (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken; | N/A | |
| (d) a description of the scope of the proposed activity, including- | | |
| (i) all listed and specified activities triggered; | X | |
| (ii) a description of the activities to be undertaken, including associated structures and infrastructure; | X | |
| (e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process; | X | |
| (f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location; | X | |
| (h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including - | X | |
| (i) details of all the alternatives considered; | X | |
| (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; | X | |
| (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; | X | |
| (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; | X | |
| (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; | X | |
| (vi) the methodology used in determining and ranking the nature, | X | |

SCOPING ASSESSMENT REPORT - SOVENTIX

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| significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; | | |
| (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; | X | |
| (viii) the possible mitigation measures that could be applied and level of residual risk; | X | |
| (ix) the outcome of the site selection matrix; | X | |
| (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and | N/A | |
| (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity; | X | |
| (i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including- | | |
| (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; | X | |
| (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; | X | |
| (iii) aspects to be assessed by specialists; | X | |
| (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists; | X | |
| (v) a description of the proposed method of assessing duration and significance; | X | |
| (vi) an indication of the stages at which the competent authority will be consulted; | X | |
| (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and | X | |
| (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; | X | |
| (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. | X | |
| (j) an undertaking under oath or affirmation by the EAP in relation to- | X | |
| (i) the correctness of the information provided in the report; | X | |
| (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and | X | |
| (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; | X | |
| k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment; | X | |
| (l) where applicable, any specific information required by the competent authority; and | N/A | |
| (m) any other matter required in terms of section 24(4)(a) and (b) of the Act. | N/A | |

EXECUTIVE SUMMARY

The project proponent, Soventix South Africa have appointed Ecoleges Environmental Consultants as the Environmental Assessment Practitioner (EAP) to undertake an application for Environmental Authorisation (EA). The proposed Solar Photovoltaic (PV) Plant in the Northern Cape will trigger listed activities within the EIA Regulations (2014) and the application and supporting reports will be submitted to the National Department of Environmental Affairs (DEA) as the designated Competent Authority.

The proposed activity entails the construction of a 225MW solar photo-voltaic (PV) farm, in the form of 3 interconnected 75MW plants; connected to a sub-station that ties into the existing Eskom 400KV or 132 kV overhead powerlines. The project location is on several Portions of Farms in the Hanover District, Emthanieni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape. Several potential locations have been considered, but 3 alternatives have been identified within the preferred site in consultation with the EAP, Client and Landowner.

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity. A number of solar cells electrically connected to each other and mounted in a support structure or frame is called a photovoltaic module (solar panel). The facility will include areas used for management, security and control room, maintenance and canteen as well as changing facilities. An on-site substation will be required with the necessary infrastructure to feed the electricity generated, via cut and tie-in, into the immediately adjacent 132kv or 400kv Eskom network.

The purpose of the new Solar PV system, includes the establishment of De Aar as a Renewable Energy Hub, which can be achieved by providing different renewable energy options. The aforesaid Hub has to be within close proximity to existing Eskom infrastructure. Locally, the establishment of the proposed project would strengthen the existing electricity grid for the area, providing power in a short space of time (potentially less than two years to commissioning). Should the proposed project be approved it would result in long-term benefits for the De Aar area, e.g. creation of employment and business opportunities.

This EIA forms part of the feasibility study and prerequisite by National Energy Regulator of South Africa (NERSA) for awarding a Power Purchase Agreement (PPA) under the Renewable Energy Feed in-Tariff (REFIT) program. The REFIT program is also a key project component due to the fact that the next scheduled phase includes Solar PV as an option and the project proponent will take the opportunity to submit the project proposals. The requirement for the successful establishment of a Solar PV plant does include, inter alia, proximity to existing Eskom infrastructure in order to feed electricity into the grid.

The NEMA prescribes that all Environmental Impact Assessments, which are to be utilised in informing an application for environmental authorisation, must identify and investigate the alternatives to the activity on the environment, and include a description and comparative assessment of the advantages and disadvantages that the proposed activity and feasible and reasonable alternatives will have on the environment and on the community, that may be affected by the activity. The Environmental Scoping process identified the potential positive and negative environmental (biophysical and social) impacts

associated with the proposed establishment of a Solar PV Plant and associated infrastructure. A number of issues for consideration were identified by the EAP and appointed Specialists during the scoping process. These environmental aspects will be assessed in more detail during the environmental impact process for the alternative locations within the preferred site.

The general objectives of public participation will be undertaken to provide the registered interested and affected parties the opportunity to comment at different stages of the EIA process including a public meeting and receipt of project information and associated statutory reports. The comments and responses will be recorded and form part of the final Environmental Impact Report (EIAR).

TABLE OF CONTENTS

DOCUMENT CONTROL 2

EXECUTIVE SUMMARY 5

ABBREVIATIONS AND DEFINITIONS 8

SECTION A: DETAILS OF THE EAP AND APPLICANT 10

SECTION B: LOCATION OF THE PROPOSED ACTIVITY 13

SECTION C: LOCATION PLAN OF THE PROPOSED ACTIVITY 13

SECTION D: DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY 14

SECTION E: DESCRIPTION OF THE POLICY AND LEGISLATIVE CONTEXT 22

SECTION F: MOTIVATION FOR THE NEED AND DESIRABILITY FOR THE PROPOSED ACTIVITY 29

SECTION H: INVESTIGATION OF ALTERNATIVES TO REACH THE PROPOSED PREFERRED ACTIVITY 39

SECTION I: PLAN OF STUDY 63

SECTION J: APPOINTED INDEPENDENT EAP 68

SECTION K: ENVIRONMENTAL IMPACT ASSESSMENT AGREEMENT BETWEEN EAP AND I&AP'S 69

SECTION L: COMPETENT AUTHORITY SPECIFIC INFORMATION 70

SECTION M: OTHER INFORMATION REQUIRED BY REGULATIONS 71

BIBLIOGRAPHY 72

SECTION N: APPENDICES 74

ABBREVIATIONS AND DEFINITIONS

Table 2: List of terms for abbreviations and acronyms used in this document.

| Abbreviation | Term |
|--------------|--|
| CA | Competent Authority |
| DEA | Department of Environmental Affairs (National) |
| DMR | Department of Mineral Resources |
| DENC | Department of Environment and Nature Conservation (Northern Cape) |
| DWS | Department of Water and sanitation |
| EA | Environmental Authorisation |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| ELM | Emthanjeni Local Municipality |
| ELU | Existing Lawful Use |
| GA | General Authorisation |
| GWh | Gigawatt per hours |
| I&APs | Interested and Affected Parties |
| IDP | Integrated Development Plan |
| IPR | Integrated Resource Planning |
| LA | Listed Activity (EIA Regulations, 2014) |
| LN1 | Listing Notice 1: GN R. 983, 4 December 2014 |
| LN2 | Listing Notice 2: GN R. 984, 4 December 2014 |
| LN3 | Listing Notice 3: GN R. 985, 4 December 2014 |
| MPRDA | Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) |
| MTS | Main Transmission Station |
| NEMA | National Environmental Management Act, 1998 (Act 107 of 1998) |
| NERSA | National Energy Regulator of South Africa |
| NHRA | National Heritage Resources Act, 1999 (Act No. 25 of 1999) |
| NWA | National Water Act, 1998 (Act No. 36 of 1998) |
| PDM | Pixley ka Seme District Municipality |
| PPA | Power Purchase Agreement |
| REFIT | Renewable Energy Feed-in Tarrif |
| SAHRA | South African Heritage Resources Agency |
| SDF | Spatial Development Framework |

| | |
|-----|-------------------|
| WUL | Water Use License |
|-----|-------------------|

Table 3: Definitions of some terms used in this document.

| Term | Source | Definition |
|----------------------|-----------------|--|
| Environmental Impact | ISO 14001: 2004 | Any change to the environment, whether adverse or beneficial, wholly or partially resulting from those elements of the proposed activities that can interact with the environment. |
| Scope | ISO 14001:2004 | Refers to the extent and boundaries of the EMPr including geographical location, a timeframe, organisational units and activities. |

SECTION A: DETAILS OF THE EAP AND APPLICANT

- Details of –*
- (i) *The EAP who prepared the report; and*
(ii) *The expertise of the EAP, including a curriculum vitae;*

| | |
|--|------------------------------------|
| Environmental Assessment Practitioner | Ecoleges Environmental Consultants |
| Contact Person | Justin Aragon Bowers |
| Postal Address | PO Box 9005, Nelspruit, 1200 |
| Telephone | +27(0)83 644 7179 |
| E-mail | justin@ecoleges.co.za |

| | |
|------------------------------|--|
| Project Applicant | Soventix South Africa (Pty) Ltd |
| Trading Name (if any) | Soventix South Africa |
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Abbreviated Curriculum Vitae of Justin Aragon Bowers

Justin Aragon Bowers

| | |
|--|---|
| Name | Justin Bowers |
| Date of birth / ID No. | 15 October 1972 7210155074089 |
| Nationality | South African |
| Marital Status | Married with four children |
| Current Address | P O Box 516, Machadodorp, 1170. ● Redwing Farm, erf. Kaalbooi 368JT, Waterval Boven District, 1195, Mpumalanga, South Africa ● Cell: 082 451-5608 ● e-mail: justin@ecoleges.co.za |
| Languages | English, Afrikaans and Basic Zulu |
| Driver's Licence | Code EB, A & C1 |
| Specialisations | Key Fields: Compliance monitoring, vegetation ecology, rehabilitation plans, environmental/ecological management plans, environmental auditing, Environmental Impact & Basic Assessment. |
| Qualifications & Courses Attended | 1998 – 2000 NATIONAL DIPLOMA: NATURE CONSERVATION, Technikon Pretoria 2001 – 2002 BACCALAUREUS TECHNOLOGIAE: NATURE CONSERVATION, Technikon Pretoria 2003 – 2007 MAGISTER TECHNOLOGIAE: NATURE CONSERVATION (CUM LAUDE), Tshwane University of Technology, Pretoria 1999 – 2000 Level 1 & 2 Qualifications, Field Guides Association of Southern Africa 2008 Environmental Law elective (MBA Programme), Rhodes University, Grahamstown. 2010 – Present Certificate in Aquaculture, Department of Genetics & Aquaculture, University of Stellenbosch 2014 Implementing Environmental Management Systems, Centre for Environmental Management, North-West University, Potchefstroom. |
| Latest Publication | Sadie J. Ryan, Paul C. Cross, John Winnie, Craig Hay, Justin Bowers, Wayne M. Getz. 2012. The utility of normalized difference vegetation index for predicting African buffalo forage quality. <i>Journal of Wildlife Management</i> DOI: 10.1002/jwmg.407. |
| Countries worked | South Africa, United Kingdom. |

| | |
|-----------------------|---|
| Career Summary | <p>Jan 1995 – Jul 1997 Head Ranger (Idube Lodge, Sabi-Sands Wildtuin).</p> <p>Dec 2000 – Dec 2001 Research student, Scientific Services, KNP.</p> <p>Jan 2001 – Mar 2006 Senior Research Assistant, Mammal Research Institute, University of Pretoria.</p> <p>Apr 2006 – current Main Member, Ecoleges Environmental Consultants.</p> |
|-----------------------|---|

Full Curriculum Vitae available if required

SECTION B: LOCATION OF THE PROPOSED ACTIVITY

Including –

- (i) The 21-digit Surveyor General code of each cadastral land parcel;*
- (ii) where available, the physical address and farm name;*
- (iii) where the required information in terms (i) and (ii) is not available, the coordinates of the boundary of the property or properties;*

The 21-digit Surveyor General Codes of each cadastral land parcel are as follows:

- Remainder of Farm Goedehoop 26C C0300000000000260000
- Portion 6 of Leuwe Fountain 27C C0300000000000270006
- Remainder of Farm Riet Fountain 39C C0300000000000390000
- Portion 1 of Farm Riet Fountain 39C C0300000000000390001
- Remainder of Kwanselaars Hoek 40C C0300000000000400000
- Portion 1 of Kwanselaars Hoek 40C C0300000000000400001
- Portion 4 of Taaibosch Fontein 41C C0300000000000410004
- Portion 1 of Farm Kafferspoort 56C C0300000000000560001

SECTION C: LOCATION PLAN OF THE PROPOSED ACTIVITY

At an appropriate scale, or if it is –

- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities to be undertaken; or*
- (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;*

Please refer to the following Appendices for more details:

- Appendix A: SITE PLAN
- Appendix B: SITE PHOTOGRAPHS

SECTION D: DESCRIPTION OF THE SCOPE OF THE PROPOSED ACTIVITY

Including -

- (i) all listed and specified activities triggered;*
- (ii) a description of the activities to be undertaken, including associated structures and infrastructure;*

Legal requirements must be met before a person may commence with any Listed Activity in terms of the National Environmental Management Act, 1998.

National Environmental Management Act, 1998

The provisions and regulations published in Government Notice No. R. 982, R. 983, R. 984, and R. 985 in Government Gazette No. 38282 of 04 December 2014, promulgated in terms of sections 24(5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) regarding control over listed activities which may have a detrimental effect on the environment, must be complied with (Table 1).

Table 1: Potential listed activities triggered in respect of the proposed project.

| Activity and Notice No. | Listed Activity | Motivation including a Description of the Activity |
|-------------------------|--|--|
| 19, GNR 983, 2014 | “The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving- (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies”. | The current overhead Eskom transmission lines that the Solar PV plant will feed into, run within an expansive drainage system, requiring limited work within this system to enable the tie-in. |
| 27, GNR | “The clearance of an area of 1 hectares or | Vehicle service tracks will be created |

| | | |
|-------------------|--|--|
| 983, 2014 | more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) The undertaking of a linear activity; or Maintenance purposes undertaken in accordance with a maintenance management plan. | between the panel arrays as well as around the perimeter of the facility on the inside of the fence, that will require limited vegetation removal, but will exceed collectively 1 hectare. |
| 28, GNR 983, 2014 | "Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes". | The land use is currently agriculture, and will retain in part its agricultural use for livestock grazing, but will convert significant sections for commercial Solar PV for a fixed-term. |
| 1, GNR 984, 2014 | "The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area." | The solar PV installation will be a minimum of 75MW with additional phases in increments of 75MW possible totally 225MW per footprint. |
| 9, GNR 984, 2014 | "The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex". | The one set of overhead ESKOM lines are 400KVA and the tie-in from the sub-station to the ESKOM overhead lines will thus need to be 400KVA. |

Detailed Description of the Scope of the Proposed Activity

The proposed activity is the construction of a 225MW solar photo-voltaic (PV) farm, in the form of 3 interconnected 75MW plants; connected to a sub-station that ties into the existing ESKOM 400KV or 132 kV overhead powerlines.

The size of the proposed development footprint, is approximately 520ha. This area includes three 75MW solar PV plants (170ha each), with associated infrastructure, as well as the sub-station that will tie into the ESKOM overhead 400KV powerlines. Existing roads will be used for main access, which may need to be enlarged to allow large equipment to access the site during construction.

Several potential sites have been considered, but 3 sites have been identified as preferred in consultation with the EAP, Client and Landowner.

The alternative sites must also be assessed to ensure the preferred sites do not result in unacceptable biodiversity impacts relative to the alternatives.

Photovoltaic Renewable Energy

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity. This is done by using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material. These materials exhibit this property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current results that can be used as electricity.

A number of solar cells electrically connected to each other and mounted in a support structure or frame is called a photovoltaic module (solar panel). Multiple modules can be wired together to form an array. In general, the larger the area of a module or array, the more electricity that will be produced. Photovoltaic modules and arrays produce Direct Current (DC) electricity. They can be connected in both series and parallel electrical arrangements to produce any required voltage and current combination.

Solar Panels

Solar panels arranged in units with a total generating capacity of approximately 225 MW to be constructed as three separate yet integrated facilities of 75 MW each and totalling a footprint of approximately 520 ha. (**Appendix A: Site Plan**). Each 75 MW facility will have an operations building to be constructed within a <1000 m² lay down area for each facility. The facility will include areas used for management, security and control room, maintenance and canteen as well as changing facilities. The on- site substation per facility with the necessary infrastructure to feed the electricity generated, via cut and tie-in, into the immediately adjacent 400kv Eskom network.

Each facility is proposed to include an array of PV panels using thin film solar cell module technology and associated infrastructure. It is anticipated that the modules would have dimensions in the order of 1 m x 2 m (i.e. 2 m²). The units comprise of blocks of PV arrays (Figure) mounted on pedestals, with a converter unit and supported by associated infrastructure, both permanent and temporary. Each converter has its own set up transformer. These transformers will be fed to a point of connection consisting of switchgear and protection infrastructure.

Solar arrays would be orientated in a northern direction, offset at a maximum of 15 degrees either to the east or west and would have a maximum height of approximately 2.5 to 3 m (technology dependent) above ground level and placed approximately 7.4 m apart (**Figure 2**). The racks would have either a ballasted or piled foundation, which will be determined once the geotechnical survey has been completed. The use of a tracker system is also being considered. A tracker system could increase the performance of modules during early morning and late afternoon periods.

Modules would be arranged in 1.25 MW blocks of approximately 2.5 ha each and would be tilted at a 30-degree angle, with each 75MW footprint covering a total area of 170 ha (including rack frame, access roads etc.). Solar arrays would be placed over the vegetation, where possible. However, vegetation over 60 cm in height beneath the modules would need to be removed or cropped. In addition, vegetation within the proposed footprint of rack foundations, access roads, pylons and the internal underground cables (some of which are in the road verges) would also have to be partially removed.

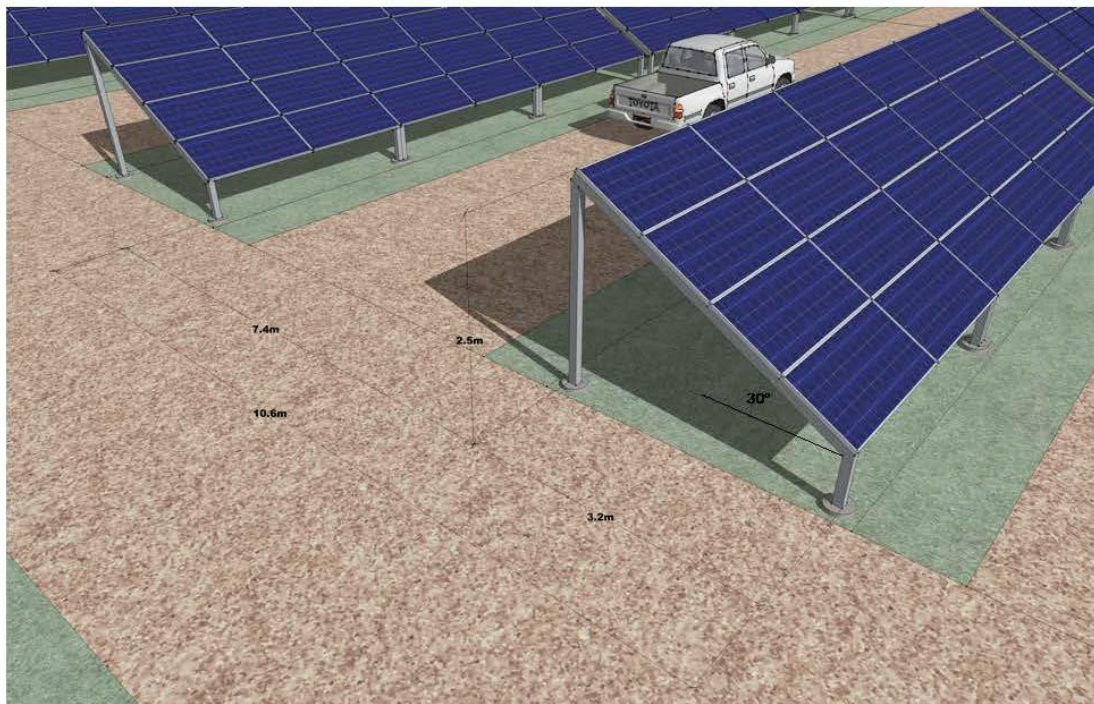


Figure 2: Illustration of the array layout and spacing (CCA Environmental, 2012).

Although the final layout is primarily determined by the technology choice and detailed design considerations, an example of a Solar PV plant layout is shown below in Figure 3. The final layout will be informed by the recommendations made in the specialist baseline studies that were undertaken during the Scoping Phase.

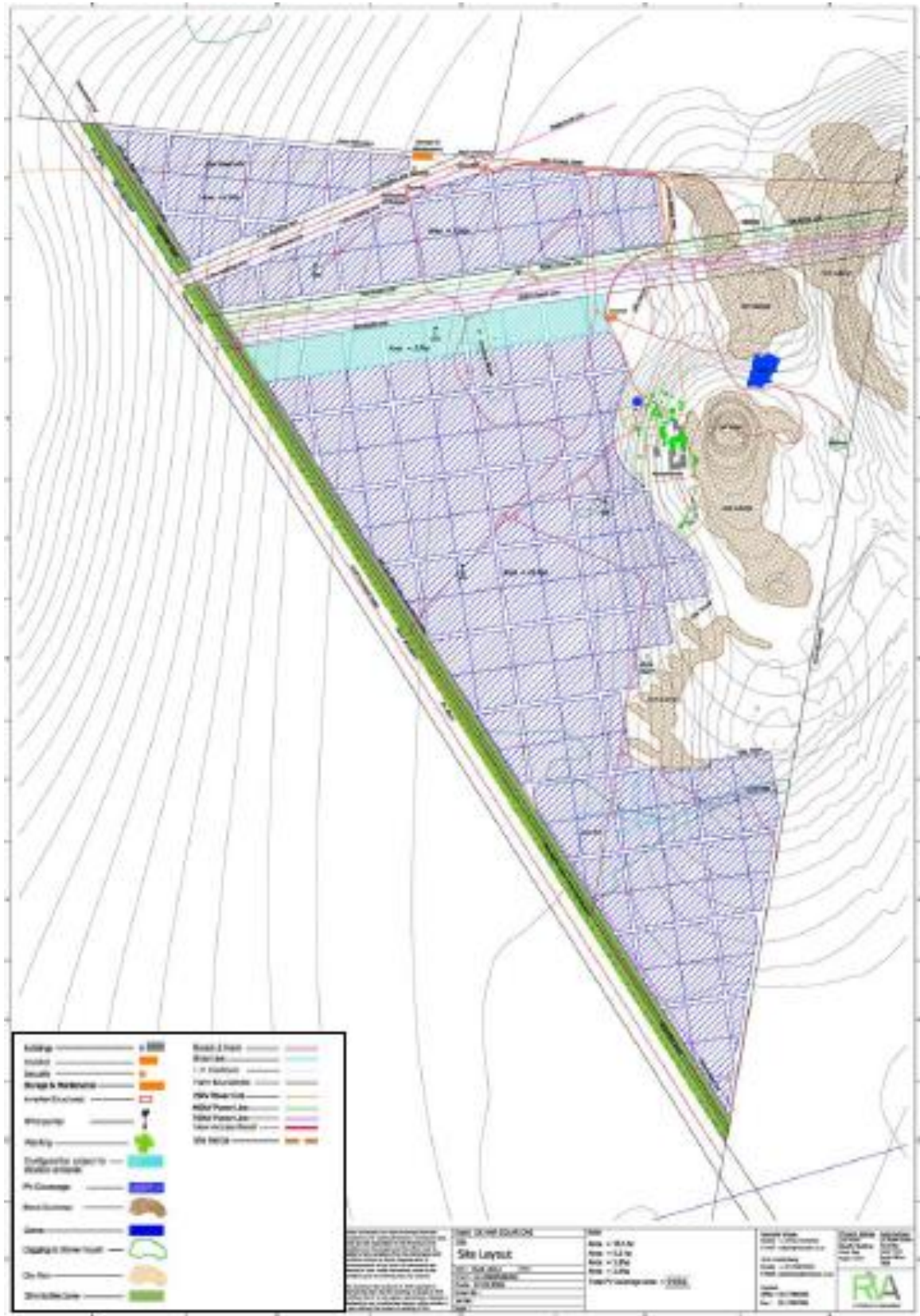


Figure 3: Illustration example of a Solar PV Plant lay out plan (Cape Lowlands Environmental Services, 2012)

Project phases

Construction Phase

The estimated construction period for the integrated solar farm is 12 months. During this period approximately 300 people would work on site. A large number of the workforce would be sourced from the local labour force in and around De Aar and Hanover. The appointed contractor would be required to establish a construction camp and laydown area. It is anticipated that an area of approximately 1.5 ha per phase would be required for these purposes.

It is anticipated that the construction equipment will include:

- A water tanker,
- A grader,
- A tipper truck,
- Cement mixers,
- Compaction equipment, and
- Light delivery vehicles.

Operational Phase

The permanent operational team will consist of;

- Four (4) security guards;
- Eight (8) technical personnel;
- Sixty (60) Solar Panel Cleaners.

It is proposed that local labour from the surrounding community would be employed as far as possible.

Decommissioning Phase

The Power Purchase Agreement is valid for a period of 20 years after which the Agreement would be renewed or the power plant decommissioned and the site rehabilitated. Extensions of the life of the plant of up to 10 to 20 years would depend on the choice of technology and the development of the technology over the first operational period. If the power plant is decommissioned the site would revert back to current land use activities (namely the grazing of small game and livestock). During decommissioning approximately 50 to 100 people would be working on site over a period of six to 12 months. A large number of the workforce, if not all, would be sourced from the De Aar / Hanover area.

Description of Associated Structures and Infrastructure

Rezoning and land-use

The site is currently zoned *Agricultural* and would be need to be rezoned to *Special*, or other appropriate zoning in consultation with the provincial authority in terms of the Northern Cape Planning

and Development Act, 1998. A rezoning application will only be prepared and submitted to the Provincial Administration and the local municipality if the proposed project attains preferred bidder status.

Power lines

The proposed photovoltaic plant would be connected to the Eskom network via either a 132 kV power line that feeds directly or via loop-in loop-out into Hydra Main Transmission Station (MTS) near De Aar or to the 400 kv powerline between Hydra and Poseidon MTS, via a loop-in and loop-out connection (see Appendix C for full details and alternatives).

Transformer and inverter

The transformers (22/400 or 22/132 kV 225 MVA sub-station) and photovoltaic inverters (250 kW) would be required for each 1.25 MW block of modules. The inverters convert the variable DC output of the modules into a utility frequency AC current that can be fed into the commercial electrical grid or used by a local, off-grid electrical network.

Access roads

The main access is off the N10 between De Aar & Hanover, which enters the site from the west. The provincial unsurfaced road (Burgersville Road) and the existing farm access road would also be utilised. Access roads totalling an estimated 14.5 km would be required between the individual solar arrays during the construction phase. It is anticipated that a third of these roads would remain as permanent during the operation phase (± 5 km).

The permanent roads would be in the order of 4 m wide and remain unsurfaced, which would facilitate the infiltration of storm water into the soil. Precast box culverts or pipes may be required where the access roads pass through the drainage channels on site. Any fill material required would be obtained from the current borrow pits on site (no mining permit will be required as per the exemption afforded in section 106 of the MRPDA).

Buildings

Various operations and maintenance buildings would be constructed, including:

- Main building including offices and workshops (± 0.70 ha), which would be shared by control and security staff,
- Main electrical substation,
- Transformers (max 500 m² fenced area) and Inverter structures in between arrays (each ± 15 m²) – prefabricated concrete or steel structures, and
- Transformer structures – small concrete or steel structures. The buildings would be single storey and would be constructed from brick or stone with metal sheet roofing.

No accommodation facilities will be constructed. Staff will be required to leave the site at the end of the day.

Fencing

The proposed plant would be fenced off with a 2.5 m high wire mesh security fence or clear view fencing, with access gained via a security gate.

Visual screening

Depending on the findings of the Visual Impact Assessment, a visual buffer maybe required between the external farm boundary along the N10 and the proposed layout of the preferred location.

Services

Water supply

Groundwater would be used for construction and operational purposes. There are several existing boreholes on site, which would be used to abstract groundwater.

There is also a quarry adjacent to the N10 which may be considered if a groundwater constraint exists. This water would be stored in an aboveground JoJo type storage tanks with a capacity not exceeding 100 cubic metres (100 m³), which would be located near the office buildings. It is anticipated that approximately 100 kL of water would be required every 3 months during the operational phase. This water would be used to clean the modules / solar array and general office use (e.g. toilets, drinking water, etc.) and supply water to the sheep that will retain access to the solar farm for grazing purposes as a complementary vegetation management tool. Construction phase water requirements would depend on where the fabrication of certain components of the project would take place. This would require approximately 50 to 75 kl of water per day during the construction phase, including dust suppression along access roads. The affected properties fall within the D62D catchment. General Authorisation GN 538, GG 40243, 2 September 2016 allows for 2000m³ per property per year of surface water and 45m³ per hectare per year of groundwater abstraction and storage. Hence, the water volumes required for the construction phase and operational phases fall well within the promulgated limits.

Electricity supply

Electricity would be obtained from Eskom via the existing supply to the site.

Sewerage treatment

Installation of bio-box package plant for treatment of effluent to special limits would be used to treat sewage and wastewater from the office buildings. It is envisaged that a maximum of 2 kL of sewage and wastewater would be generated per day.

Waste disposal

All non-recyclable waste would be disposed of at the De Aar licensed landfill site.

SECTION E: DESCRIPTION OF THE POLICY AND LEGISLATIVE CONTEXT

Including

An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;

List of Applicable Legislation and Other Documents

On 04th December, 2014 the Minister of Environmental Affairs, Bomo Edith Molewa promulgated the new EIA Regulations.

The following legislation, guidelines, departmental policies, environmental management instruments and/or other decision making instruments that have been developed or adopted by a competent authority in respect of activities associated with a development of this nature, were identified and considered in the preparation of this EIA process, and subsequent amendments.

1. Conservation of Agricultural Resources Act (No 43 of 1983) and the regulations dealing with declared weeds and invader plants;
2. DEA (2010), Guideline on Need and Desirability, Integrated Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria, South Africa.
3. DEA (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria, South Africa;
4. DEA (2011), National list of ecosystems that are threatened and in need of protection. GN 1002, GG 34809, 9 December 2011.
5. DEA&DP (2010), Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP);
6. DEAT (2002), Specialist Studies, Information Series 4, Department of Environmental Affairs and Tourism (DEAT), Pretoria;
7. DWAS (2016), General Authorisation in GN No. 509 published in Government Gazette No. 40229 dated 26 August 2016;
8. DWA (2007), Guideline for Developments within a Flood line (Edition 1), Department of Water Affairs and Forestry, Pretoria, South Africa;
9. DWAS (2016), General Authorisation in GN No. 538 published in Government Gazette No. 40243 dated 2 September, 2016;
10. Environment Conservation Act (No 73 of 1989), including Schedules 4 and 5 of the National Regulations regarding Noise Control made under Section 25 of the Environment Conservation Act, 1989 (Act 73 of 1989) in GN No. R 154 of Government Gazette No. 13717 dated 10 January 1992. (Note that this particular section of the Environment Conservation Act is not repealed by NEMA (107 of 1998)). Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);
11. IDP (Final) 2011 – 2016, Emthanjeni Local Municipality;
12. Minerals and Petroleum Resources Development Act, 2002 (No 28 of 2002);

13. National Environmental Management Act, 1998 (No 107 of 1998) including EIA Regulations, 2014 published in Government Notice No. R. 982, R. 983, R. 984 and R. 985 in Government Gazette No. 38282 dated 04 December 2014;
14. National Environmental Management: Air Quality Act, 2003 (No 57 of 2003) including the list of activities which result in atmospheric emissions published in GN No. 248 of Government Gazette No. 33064 dated 31 March 2010;
15. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004);
16. National Environmental Management: Waste Act, 2009 (Act No. 59 of 2009) (“NEM:WA”);
17. National Forest Act, 1998 (No 84 of 1998);
18. National Heritage Resources Act, 1999 (No 25 of 1999);
19. National Veld and Forest Fire Act, 1998 (No 101 of 1998);
20. National Water Act, 1998 (Act No. 36 of 1998), Sections 27, 28,29,30,31 and 39 (Sections dealing with General Authorisations and Water Use Licenses);
21. Northern Cape Provincial Spatial Development Framework, (2012);
22. Northern Cape Nature Conservation Act, 2009 (No 9 of 2009);
23. Emthanjeni Local Municipality, 2007 Spatial Development Framework.

24. Legislative Context of the Proposed Activity

This EIA forms part of the feasibility study and prerequisite by NERSA for awarding a PPA under the REFIT programme.

A review of the relevant legislation, policies and documents pertaining to the energy sector indicate that solar energy and the establishment of photovoltaic power plants are supported at a national, provincial and local level.

National Energy Act, 2008

One of the objectives of the National Energy Act, 2008 (No. 34 of 2008) is to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar (see extract below).

“To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements ...; to provide for ... increased generation and consumption of renewable energies ...”

Electricity Regulation Act, 2006 (Act No. 4 of 2006)

The Act's objective to provide control over the generation and supply of electricity; and the existence of NERSA and other related matters. The issuing of licences, determination of process, settling disputes, collecting information are the functions of NERSA.

White Paper on the Energy Policy of the Republic of South Africa (1998)

This paper identifies the need for demand side management and the development and promotion of energy efficiency in South Africa. It requires energy policies to consider 'energy efficiency and energy conservation' within the Integrated Resource Planning (IRP) framework from both supply and demand side in meeting energy service needs;

“Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future”.

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, such as the proposed De Aar Solar One Photovoltaic Power Project. These renewable applications are in fact in most cases the most cost effective; more so when social and environmental costs are taken into account.

Government policy on renewable energy is thus concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented;

- Ensuring that an equitable level of national resources are invested in renewable technologies, given their potential and compared to investments in other energy supply options; and
- Addressing constraints on the development of the renewable industry.

The White Paper also acknowledges that South Africa, even though the country's renewable energy resource base is extensive and many appropriate applications exist, has neglected the development and implementation of renewable energy applications.

The White Paper also notes that renewable energy applications have specific characteristics that need to be considered.

Advantages include:

- In comparison with traditional supply technologies there are less environmental impacts in operation; and
- Generally high labour intensities and lower running costs and.

Disadvantages include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Depending on specific conditions, especially with sun and wind based systems, provide lower levels of availability.

White Paper on Renewable Energy (2003)

Following Cabinet approval of the White Paper, the DoE proceeded with the development of its renewable energy strategy. The implementation plan of the various technologies was identified in a macroeconomic study undertaken in 2003.

The White Paper's target of 10 000GWh renewable energy contribution to final energy consumption by 2013 was confirmed to be economically viable with subsidies and carbon financing. Achieving the target will:

- Provide approximately 1.667MW new renewable energy capacity, with a positive impact on GDP as high as R1.071 billion per year;
- Secure additional government revenue of 299 million;
- Create additional income flow to low income households by as much as R128 million, stimulating over 20 000 jobs; and
- Leading to water savings of 16.5 million kilolitres, which equates to a R26.6 million saving.

Integrated Resource Plan 2010 (2010)

The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. It was indicated at the time that the IRP should be a "living plan" which would be revised by the Department of Energy (DoE) every two years. Since the promulgation of the Integrated Resource Plan (IRP) 2010-30 there have been a number of developments in the energy sector in South and Southern Africa. In addition, the electricity demand outlook has changed markedly from that expected in 2010. The objective of the IRP

2010 is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next 25 years. The IRP 2010 is intended to, *inter alia*, consider environmental and other externality impacts and the effect of renewable energy technologies.

- allocates 43% of new energy generation facilities in South Africa to renewables;
- allows for an additional 14 749 MW of renewable energy in the electricity blend in South Africa by 2030;
- an accelerated roll-out of renewable energy options to derive the benefits of localisation in these technologies.

While there are a number of renewable energy options (including, *inter alia*, wind, solar and hydropower) being pursued in South Africa, many more renewable energy projects are required to meet the targets set by the IRP 2010. With regards to photovoltaic solar energy the IRP 2010 expresses the need for firm commitment to this sector in order to facilitate the connection of the first units to the grid in 2012. It also identifies the need to provide security of investment in order to ramp up a sustainable local industry cluster.

Renewable Energy Feed-in Tariff

The NERSA 'Renewable Energy Feed-in Tariff' (REFIT) guidelines were published in 2009 under the Electricity Regulation Act (Act of No. 4 of 2006) pledging attractive rates of payment for renewable energy sold back to the grid. An innovative initiative to encourage investment within the sector of renewable energy and to help achieve the national renewable energy targets.

The REFIT programme includes a number of phases as follows;

- Phase 1: Including quotas for wind, small hydro, landfill gas and Concentrated Solar Power (CSP);
- Phase 2: Including quotas for Solar though without storage and central tower, additional CSP and photovoltaic systems including large ground or roof based and concentrating photovoltaic (CPV), as well as biomass solid and biogas technologies.

Northern Cape Provincial Growth and Development Strategy (2004-2014)

At a provincial level the Northern Cape Provincial Growth and Development Strategy (NCPGDS) makes reference for the need to ensure the availability of inexpensive energy for the Northern Cape. The NCPGDS notes;

“the development of energy sources such as solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape”.

The NCPGDS also highlights the importance of close co-operation between the public and private sectors in order for the economic development potential of the Northern Cape to be realised. The

NCPGDS also highlights the importance of enterprise development and noted that current levels of private sector development and investment in the Northern Cape are low. It also noted that the Northern Cape lags in the key policy priority areas of small, medium and micro enterprise (SMME) development and Black Economic Empowerment. The proposed project has the potential to create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape.

Northern Cape Climate Response Strategy

The Northern Cape Government is in the process of finalising a Provincial Climate Change Response Strategy. The key aspects of this strategy are, however, summarised in the MEC's (Northern Cape Provincial Government: Environment and Nature Conservation) 2011 budget speech. These are;

- commitment to develop and implement policy in accord with the National Green Paper for the National Climate Change Response Strategy (2010);
- an acknowledgement of the Northern Cape Province's extreme vulnerability to climate-change driven desertification.

The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly identified as an important element of the Provincial Climate Change Response Strategy.

Northern Cape Provincial Spatial Development Framework (2011)

The Northern Cape Provincial Spatial Development Framework (2011) notes that the Northern Cape Province's major energy challenges include securing energy supply to meet growing demand, providing everybody with access to energy services and tackling the causes and impacts of climate change. In this regard, the development of large-scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies for the Northern Cape Province and avoiding energy imports while minimising the environmental impacts. The Provincial Spatial Development Framework further notes that renewable energy has been identified as a mechanism to diversify the economy and thereby promoting a green economy in the province.

The Provincial Spatial Development Framework also notes that the tourism sector is identified as one of the key sectors with the capacity to 'grow, transform and diversify the provincial economy'. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed project; do not affect the tourism potential of the Province.

Pixley ka Seme District Municipality Integrated Development Plan (IDP) (2009-2012 and 2015-2016)

According to the Pixley ka Seme District Municipality IDP, a key development objective is to provide access to electricity to all households in the District by 2014. To achieve this, the District Municipality aims to fast track the delivery of free basic electricity and co-ordinate the maintenance and upgrading of the existing electricity infrastructure. While no specific mention is made of the promotion of

alternative energy sources, the proposed project would potentially support a number of the development goals and objectives of the District.

In the 2015-2016 IDP review a Key Performance Area was to “Reduce greenhouse gas emissions, climate change impacts and improved air quality”. Renewable energy projects assist in the mitigation of climate change impacts through reduction in emissions of green-house gases.

The District Municipality has developed its vision, development priorities, objectives and strategies with specific outcomes and outputs for the 2015/16 financial year. They are informed by the development goals/agendas of these policy documents:

- Solar/Wind Energy projects

District Renewable Energy Hub (Draft Concept Document)

The District Renewable Energy Hub Draft Conceptual Document (26 February 2010) drafted by the Local Economic Development Division of the Pixley ka Seme District Municipality has proposed the development of a Renewable Energy Hub along the N10 corridor and around the town of De Aar. The draft concept document outlines the proposed strategy, which is in line with both the National and Provincial policy with respect to renewable energy generation.

The Renewable Energy Hub is seen as a critical component to the revitalisation of both the broader District and the town of De Aar. The District is well positioned for renewable energy development (including solar, wind, biomass and hydro-electric) due to the ample availability of suitable land, the existence of adequate existing infrastructure.

It is envisaged that the Hub will;

- attract both local and foreign investors and research institutions;
- alleviate the increasing demand on electricity nationally;
- reduce South Africa’s dependence on fossil fuel;
- create employment and downstream business opportunities for local entrepreneurs; and
- utilise the high insolation rates and steady winds.

Emthanjeni Local Municipality IDP (May 2012)

The ELM IDP lists a number of industrial and manufacturing projects that form part of the larger strategy for the economic development of the municipality. One of these projects includes the establishment of De Aar as a Renewable Energy Hub. Basic service delivery, with energy as one of the priority issues, micro- and macro-economic development as well as land use management have been highlighted as key performance areas to be addressed within the ELM. The establishment of the proposed photovoltaic power plant has the potential to support a number of key strategies in the ELM IDP.

SECTION F: MOTIVATION FOR THE NEED AND DESIRABILITY FOR THE PROPOSED ACTIVITY

A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

Legislative Background and Strategic Context

National Environmental Management Principles of NEMA, 1998, which guide the interpretation, administration and implementation of NEMA, 1998 (and the EIA Regulations, 2014) specifically *inter alia* require that environmental management must place people and their needs at the forefront of its concern (Section 2(2)). The latter refers to the broader societal/community needs and interests, and is put into effect through the EIA Regulations, 2014, which require environmental impact assessments to specifically consider 'need and desirability' in order to ensure that the 'best practicable environmental option' is pursued and that development more equitably serves broader societal needs now and in the future. Furthermore, it ensures that the proposed actions of individuals are measured against the long-term public interest.

What is needed and desired for a specific area must be strategically and democratically determined (DEA&DP (2010) Guideline on Need and Desirability). The strategic context for informing need and desirability is best addressed and determined during the formulation of the sustainable development vision, goals and objectives of Integrated Development Plans ('IDPs') and Spatial Development Frameworks ('SDFs') during which collaborative and participative processes play an integral part, and are given effect to, in the democratic processes at local government level (DEA&DP (2010) Guideline on Need and Desirability). The need and desirability must therefore be measured against the contents of the credible IDP, SDF and EMF for the area, and the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF (DEA&DP (2010) Guideline on Need and Desirability). Integrated Development Planning (and the SDF process) effectively maps the desired route and destination, whilst the project-level EIA decision-making finds the alternative that will achieve the desired goal (DEA&DP (2010) Guideline on Need and Desirability). However, inadequate planning or the absence of a credible IDP and SDF means that the EIA has to address the broader need and desirability considerations. Consequently, 'need and desirability' is determined by considering the broader community's needs and interests as reflected in a credible IDP, SDF and EMF for the area, and as determined in the EIA decision-making process.

Furthermore, the Constitution calls for *justifiable* economic development. The specific needs of the broader community must therefore be considered together with the opportunity costs and distributional consequences in order to determine whether or not the development is 'justified'.

The general meaning of need and desirability refers to time and place, respectively, i.e. is this the right time and is it the right place for locating the proposed activity. The need and desirability of this application was addressed separately and in detail by answering *inter alia* the following questions:

Need ('timing')

Question 1:

Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP).

- Yes. The proposed project would contribute to the economic stability of the area by establishing a sustainable industry on a property that has low agricultural potential.
- At a provincial level, the Northern Cape Provincial Spatial Development Framework (PSDF, see Section 1.5.2.8) notes that the Northern Cape Province's major energy challenges include securing energy supply to meet growing demand, providing everybody with access to energy services and tackling the causes and impacts of climate change. In this regard, the development of large-scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies for the Northern Cape Province and avoiding energy imports while minimising the environmental impacts. The PSDF further notes that renewable energy has been identified as a mechanism to diversify the economy and thereby promoting a green economy in the province.
- The Northern Cape Provincial Growth and Development Strategy (NCPGDS) (see Section 1.5.2.5) states that the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes that the development of energy sources such as solar energy could be a means by which new economic opportunity and activity is generated in the Northern Cape. The NCPGDS also highlights the importance of close co-operation between the public and private sectors for the economic development potential of the Northern Cape to be realised.
- The ELM IDP lists a number of industrial and manufacturing projects that form part of the larger strategy for the economic development of the municipality. One of these projects includes the establishment of De Aar as a Renewable Energy Hub. Basic service delivery, with energy as one of the priority issues, micro- and macro-economic development as well as land use management have been highlighted as key performance areas to be addressed within the ELM. The establishment of the

proposed photovoltaic power plant has the potential to support a number of key strategies in the ELM IDP.

- The proposed project would create 200 to 300 employment opportunities (mainly unskilled and semi-skilled) during the construction phase and between 30 and 40 during the operational phase. A large number of the workforce would be sourced from the surrounding areas. Specific training would also be provided for more technical tasks.

Question 2:

Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?

- Yes, the ELM IDP recognises the need for economic growth and the creation of employment opportunities for local people;
- The N10 has been identified as a central part of the energy hub;
- The project list is incorporated in the IDP based on the needs of the community. The critical areas remain Infrastructure and Local Economic Development. Within the limited resources of the Municipality it will have to address the following;
 - Roads
 - Storm water
 - Housing delivery (servicing of sites)
 - Bulk services (**electricity**, water)
 - Support to SMME's
 - Sewerage.

Explanation:

Question 1 and 2 seeks to find clarity as to whether the proposed land use is catered for in the current planning framework of the SDF and is intended for at that specific point in time. In this context the term land use should not only be broadly defined as agriculture, residential or industrial use, etcetera., but where relevant, it must be further qualified, for example, stating specifically whether a housing development is for social or high income purposes, or whether the industrial use is for service industries, or heavy industry, or whether the development is a high-rise as opposed to low-rise development, etcetera. Furthermore, if the land use is to occur in the proximity of an urban area, clarity must also be provided regarding its location in relation to the urban area.

Question 3:

Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate).

- Yes, the area has an unemployment rate of 26% (Census 2001 data) and the site is marginal for profitable agricultural activities. The proposed project would create a relatively large number of temporary and permanent (over the lifespan of the project) employment opportunities for the local De Aar/Hanover communities. The area around De Aar has also been identified as a Renewable Energy Hub in the ELM IDP.
- The Municipality has agreed on seven (7) Strategic Objectives (STO) that are to be achieved;
 1. Provision of access to all basic services rendered to residents within the available resources.
 2. Development and transformation of the institution with the aim of capacitating the municipality in meeting their objectives.
 3. Promote the equitable creation and distribution of wealth in Emthanjeni Municipal area.
 4. Maintaining a financially sustainable and viable Municipality.
 5. Promote representative governance through the sustainable utilization of available resources in consultation with the residents of Emthanjeni Municipality.
 6. Contribute to the creation of communities where residents and visitors can work, live and play without threat to themselves or their properties.
 7. Contribute to the development and protection of the rights and needs of all residents with a particular focus on the poor.

Explanation:

Question 3 relates to the type of development and land use and not just its associated benefits or costs (i.e. the specific needs of the community at that specific time, e.g. small business rather than shopping centers, low-cost housing rather than luxury housing, etcetera, must be considered).

Question 4:

Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?

Electricity would be obtained from Eskom via the existing supply to the site. The proposed project would strengthen the local electricity grid for the area and thus improve the available electrical services. In terms of water requirements, the proposed project would utilise groundwater from existing boreholes on the property or if needed surface water accumulating in a disused stone quarry. All non-recyclable waste would be disposed of at the De Aar licensed landfill site. Installation of bio-box package plant to treatment effluent to special limits would be used to treat sewage and wastewater from the office buildings.

Question 5:

Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?

Yes. The District Municipality has proactively diversified its economy away from mining and agriculture through innovative local economic development initiatives, declaring themselves as a Renewable Energy Hub, seeking to attract foreign direct investment into solar, wind, hydro and biomass projects.

Explanation (Question 4 and 5):

According to the NEMA EIA Regulations, an EIA must contain a description and assessment of the significance of any environmental impacts, including cumulative impacts, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the activity. An associated activity/component essential for the undertaking of a proposed development (i.e. any associated component of the development, which cannot be separated from the development itself; e.g. residential development that cannot exist without the essential municipal infrastructure to serve it in terms of water and electricity provision, waste removal, treatment of sewage and management of stormwater) must be considered together with the proposed development, before the environmental authority decides on the development application. The environmental authority must (be able to) apply its mind to all the impacts (of the development and all its associated activities/components) prior to decision-making. Deferring decision-making on associated components to a future date constitutes conditional and piecemeal (incremental) decision-making, which result in the environmental authority not applying its mind to all the impacts and the pre-empting of decisions on the associated components-resulting in unsustainable development and legally impermissible administrative action.

Question 6:

Is this project part of a national programme to address an issue of national concern or importance?

Yes. The proposed project would strengthen the local electricity grid for the area and contribute to meeting the national renewable energy targets set by the Department of Energy (DoE).

Explanation (Question 6):

While the legislative frameworks require that national, provincial and municipal plans should be aligned, it is acknowledged that there might be certain strategically important developments (e.g. the construction of a nuclear power station) that are part of strategic programmes that are not always catered for in current planning framework of the SDFs. In these instances the strategic need and desirability considerations must be measured against the needs and desires of the area in question when determining the need and desirability of the development under consideration.

Desirability ('placing')

Question 7:

Is the development the best practicable environmental option for this land/site?

Yes. Due mainly to the prevailing unfavourable climatic conditions for arable agriculture, as well as the prevalence of soils with limited depth, the farm does not have a high agricultural potential. Furthermore, the proposed project plans to integrate with the current small livestock and game farming practices, increasing the profitability and optimises the opportunity costs of the property. While the solar PV farm will result in environmental impacts through disturbance to in situ vegetation, in the medium to long-term, it is possible that due to the creation of microclimates created beneath the solar panel arrays, a higher nett primary production may result, effectively increasing the grazing capacity of the land. This aspect will be quantitatively monitored through an ecological management plan.

Explanation (Question 7):

According to NEMA the "best practicable environmental option" means the option that provides the most benefit and causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term. In determining the best practicable environmental option, adequate consideration must also be given to opportunity costs.

Question 8:

Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF as agreed to by the relevant authorities?

No. The proposed project is in line with the initiatives of the ELM IDP to support economic growth, create job opportunities for local communities and establish De Aar as a Renewable Energy Hub.

Question 9:

Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?

No. The ELM does not have an EMF in place, and sensitivity analyses have been undertaken

according to National Biodiversity Planning datasets, and the proposed properties are not deemed sensitive environments.

Explanation (Question 8 and 9):

If the development is to occur in the proximity of an urban area, clarity must also be provided whether or not it will be situated within or outside of the urban area, with the impacts associated with its location in relation to the urban area to be specifically considered and reported on.

Question 10:

Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).

Yes. The location factors are favourable for the development of a Solar PV plant including high and good quality solar irradiation, flat and gentle slopes and close proximity to existing Eskom infrastructure including powerlines to feed into the grid and the N10 for transport links.

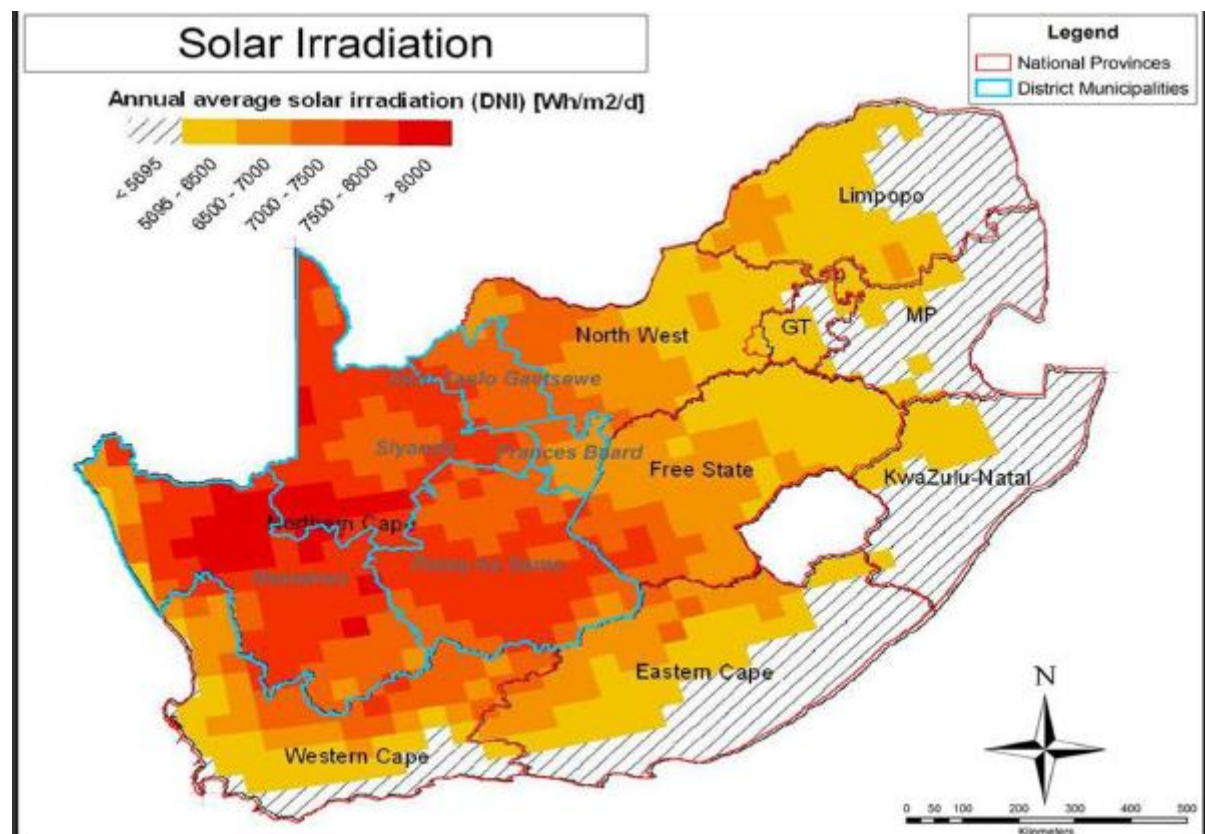


Figure 4. Solar irradiation map indicating the suitability of the Northern Cape for solar related projects (IDP, 2015-2016).

Question 11:

How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?

The EAP in conjunction with the Project Proponent and land owners has conducted a desk top study using GIS spatial analysis to identify potential development footprints that will have the least impact on the local environment. This exercise was followed up by a site inspection to ground truth the information collected from the desk top study. These findings have identified the potential environmental aspects and impacts that will be further assessed by the appointed Specialist inputs during the scoping phase.

Question 12:

How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc)?

The potential impacts on peoples' health and well-being will be assessed during the scoping phase, preliminarily the impact of potential concern is the visual impact that will further be assessed by the appointed specialist, who will conduct a full visual impact assessment.

Question 13:

Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?

No. On the contrary, the fact that the proposed project will be undertaken and implemented in conjunction with the pre-existing land use practices, the opportunity costs associated with the combined land uses are greatly improved. But the potential impacts associated with the proposed project are nonetheless to be assessed by appointed specialists that will concentrate on appropriate environmental aspects related to the proposed activity. These will be on a bio-physical and socio-economic level to determine whether or not replacing the current land use or next best alternative will create an unacceptable loss in opportunity costs. The project design alternatives will be selected in order to reduce any impact on the current land use of grazing including Solar PV arrays to be one (1) metre height in order for livestock grazing to continue below. The project is predicated to provide a positive impact on the local area including electricity from a non-polluting renewable energy source, benefits to job creation and skills development. It is therefore anticipated that there will not be any unacceptable opportunity costs.

Explanation (Question 13):

Opportunity costs can be defined as the net benefit that would have been yielded by the next best alternative (for example, if farming is the next best alternative for a piece of land, then the forgone benefit of losing the farming option will be the opportunity cost of any other land use, or if not proceeding with the activity, then the forgone benefits of the proposed activity is the opportunity cost of not proceeding). Opportunity costs also relate to the use of limited resources, for example water. If a limited volume of water is available in an area the most desirable use of the water considering the needs in the area must be determined in order to consider the opportunity costs associated with the different uses of the water. The concept of opportunity costs is applicable to project alternatives as well as policy selection. It is vital information if decision makers are to understand the implications associated with specific development proposals. A key part of considering opportunity costs is commonly to comparatively consider and assess the different alternatives in terms of the benefits and/or disadvantages associated with each alternative. Opportunity cost is a concept that often need not involve monetary values, though where these values can be given, they allow for a more detailed comparison than would otherwise be possible.

Question 14:

Will the proposed land use result in unacceptable cumulative impacts?

The impact assessment shows that almost all identified impacts can be affectively mitigated, indicating that the cumulative impact effect will also be mitigated. Additional impacts and quantification of cumulative impacts will be assessed by the following appointed specialists:

- Terrestrial Ecology, specifically the impacts on the existing wetlands condition and associated fauna and flora;
- Grazing capacity determination and soil mapping;
- Wetland Delineation;
- Visual Impact;
- Heritage Impact;
- Geo-technical; and
- Traffic Study.

Explanation (Question 14):

Cumulative impacts can be defined as:

- *Addictive: the simple sum of all the impacts (e.g. the accumulation of ground water pollution from various developments over time leading to a decrease in the economic potential of the resource).*
- *Synergistic effects occur where impacts interact with each other to produce a total effect greater than the sum of individual effects. These effects often happen as habitats or resources approach capacity (e.g. the accumulation of water, air and land degradation over time leading to a decrease in the economic potential of an area).*

- *Time crowding effects occur when frequent, repetitive impacts occur on a particular resource at the same time (e.g. boreholes decreasing the value of water resources).*
- *Neutralizing effects occur where impacts may counteract each other to reduce the overall effect (e.g. infilling of a wetland for road construction, and creation of new wetlands for water treatment).*
- *Space crowding effects occur where we have a high spatial density of impacts on a particular ecosystem (e.g. rapid informal settlement).*
- *Externalisation of disadvantages occurs when there is no or insufficient consideration given to the associated social costs that will be borne by the public.*

The answers to the questions above will form key informants to the identification and consideration of alternatives, including the option not to proceed with the development.

SECTION H: INVESTIGATION OF ALTERNATIVES TO REACH THE PROPOSED PREFERRED ACTIVITY

A full description of the process to reach the proposed preferred activity, site and location within the site, including -

Details of the Alternatives Considered

(i) Details of all the alternatives considered;

Legislative background

The very consideration of a development in terms of EIA is about the consideration of alternatives related to the development. The NEMA prescribes that all environmental impact assessments, which are to be utilised in informing an application for environmental authorisation, must identify and investigate the alternatives to the activity on the environment and include a description and comparative assessment of the advantages and disadvantages that the proposed activity and feasible and reasonable alternatives will have on the environment and on the community that may be affected by the activity. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives exist, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not implementing the proposed project, is required during the assessment phase. In this instance, the EAP managing the application must provide the competent authority/DEA with detailed, written proof of the investigation(s) undertaken and motivation indicating that no reasonable or feasible alternatives, other than the preferred alternative and the no-go option, exist.

Definition of Alternatives

“Alternatives”, in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include the following types of alternatives:

- The property on which, or location where, it is proposed to undertake the activity;
 - Refers to both alternative properties (locations) as well as alternative sites on the same property.
- The type of activity to be undertaken;
 - Provision of public transport rather than increasing the capacity of roads.
- The design or layout of the activity;
 - Different architectural and or engineering designs.
 - Consideration of different spatial configurations of an activity on a particular site (Site Layout).
- The technology to be used in the activity;

- Option of achieving the same goal by using a different method or process.
- The operational aspects of the activity;
- Demand;
 - When a demand for a certain product or service can be met by some alternative means, i.e. the demand for electricity/storm water controls could be met by supplying more energy or using energy more efficiently by managing demand.
- Input;
 - Input alternatives for projects that may use different raw materials or energy sources in their processes.
- Routing;
 - Alternative routes generally apply to linear developments (pipeline routes).
- Scheduling and Timing;
 - Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.
- Scale and Magnitude;
 - Activities that can be broken down into smaller units and can be undertaken on different scales, i.e. for a housing development there could be the option 10, 15 or 20 housing units.
- The option of not implementing the activity (no-go option).
 - The no-go option is taken to be the existing rights on the property and this includes all the duty of care and other legal responsibilities that apply to the owner of the property. All the applicable permits must be in place for a land use to be an existing right.

The key criteria when identifying and investigating alternatives are that they should be “feasible” and “reasonable”. The “feasibility” and “reasonability” of and the need for alternatives must be determined by considering, *inter alia*, (a) the general purpose and requirements of the activity, (b) need and desirability, (c) opportunity costs, (d) the need to avoid negative impact altogether, (e) the need to minimise unavoidable negative impacts, (f) the need to maximise benefits, and (g) the need for equitable distributional consequences. The (development) alternatives must be socially, environmentally and economically sustainable. They must also aim to address the key significant impacts of the proposed development by maximising benefits and avoiding or minimising the negative impacts.

Given the aforementioned definition and description of alternatives, alternatives for investigation in this assessment were first identified by considering whether the different types of alternatives could meet the general purposes and requirements of a solar electricity generating facility, and subsequently constitute a comparable activity. Thereafter, the need for an alternative was assessed to determine whether it warranted further investigation. Given the core business of the project proponent (Solar PV Systems) other technology alternatives could not be considered as legitimate alternatives for

comparable assessment. Consequently, only alternatives that address site-specific impacts were considered throughout the assessment process, and mitigation(s) proposed.

Purpose and requirements of the PV solar plant

The purpose of the New PV Solar Plant is to address one of the Emthaneni Local Municipality (ELM) priority issues in respect of service (Electricity Generation/Demand) delivery. The (**IDP (Final) 2012/13 – 2015/16 Nkangala District Municipality**), lists a number of industrial and manufacturing projects that form part of the larger strategy for the economic development of the municipality. One of these projects includes the establishment of De Aar as a Renewable Energy Hub. Basic service delivery, with energy as one of the priority issues, micro- and macro-economic development, as well as land use management have been highlighted as key performance areas to be addressed within the ELM. The establishment of the proposed project has the potential to support a number of key strategies in the ELM IDP.

The investment in renewable energy and energy efficiency is considered important to reduce the negative economic, social and environmental impacts of energy production and consumption in South Africa (Winkler, 2006). Many renewable energy projects are particularly well suited to off-grid applications and, certainly in South Africa, could improve the flexibility of the grid by distributing generation across the country, closer to some key loads (Winkler, 2006).

Locally, the establishment of the proposed project would strengthen the existing electricity grid for the area, providing power in a short space of time (potentially less than two years to commissioning). Should the proposed project be approved it would result in long-term benefits for the De Aar area, e.g. creation of employment and business opportunities.

The requirement for the successful establishment of a Solar PV plant does include, inter alia, proximity to existing Eskom infrastructure in order to feed electricity into the grid.

Identification and investigation of alternatives including motivations

Alternative Type No. 1: Site and Location

- Purpose and Requirements

The proposed solar electricity generating facility intends to accommodate a photovoltaic (PV) component and associated infrastructure. The solar panels arranged in units generating capacity of 225MW to be constructed as three separate but integrated facilities of 75 MW each. An on-site sub station per facility will be necessary to supply the electricity generated through a loop-in loop-out into the adjacent 132 or 400 kV Eskom network.

The solar PV facilities combined have a maximum export capacity (MEC) of 255MW (three 75MW facilities are proposed). Several potential locations have been considered by the proponent, but the current location under review has been identified as preferred. Three (3) alternative sites within the property location have been identified in consultation with the EAP, Client and Landowner and must be assessed to ensure the preferred site does not result in unacceptable biodiversity impact relative to the alternatives.

The current land use is sheep farming and incidental game occurrence, which will continue within the solar PV plants to ensure minimal reduction (if any) on agricultural potential of the land as well as a management tool to control vegetation growth.

- Methodology

The project proponent (Soventix SA) has undertaken an extensive feasibility study throughout the Northern Cape to identify the best locations to develop Solar PV systems. The area chosen has included landowner consultation and proximity of appropriate Eskom infrastructure. The reason for the study area being concentrated within the Northern Cape is due to the high quality of solar irradiation of the region.

The proposed placement of the solar arrays was initially based on the following technical and topography criteria:

- Horizons;
- Gradient;
- Slope orientation;
- Accessibility; and
- Existing infrastructure (e.g. roads, power lines, substations)

The local study area is detailed within the grid assessment and Grid Solution Opinion report (**Appendix C**) for the Soventix SA William Retief solar PV facilities near the town of De Aar. The project site is located approximately 36km south east of De Aar, and in close proximity to Hydra MTS.

The investigation included an initial spatial analysis using GIS and desk top study, followed by ground truthing with a site visit to determine the sensitive receptors and local infrastructure. The site selection of the preferred location also took into account the proximity of the N10 and other provincial roads and the important tie into the Eskom 132 kV or 400 kV power lines and their capacity to receive the additional electricity generation. The preferred property and site alternatives within that property have

taken into account the avoidance of rocky outcrops and natural drainage channels including wetlands and watercourses.

The sites were selected on the basis of high irradiation levels, buy-in from the landowner and proximity to the Eskom power lines and local substations.

During the scoping phase these criteria were used to provide three feasible site footprints including the preferred site and two alternative sites. These three (3) site footprints are shown on the attached site / property map (**Appendix A**) and considered for the proposed development of 225MW via three (3) integrated 75 MW solar PV plants. The investigation included an identification of sensitive receptors to help position the development footprint that was determined by the EAP and specialist inputs.

The grid assessment and Grid Solution Opinion report will be discussed further below, including the site selection matrix to assess site location alternatives.

- Criteria used to investigate and assess alternatives

Initially the general area for the proposed Solar PV plant was determined by the fact that the area of the Northern Cape around De Aar is one of the regions with the highest solar irradiation intensity in South Africa. The three (3) alternative sites for the solar arrays was then based on the following technical and topography criteria:

- Quality of solar irradiation;
- Horizons;
- Gradient;
- Slope orientation;
- Accessibility;
- Existing infrastructure (e.g. roads, power lines, substations); and

The grid assessment and Grid Solution Opinion took into account the following criteria to determine the most feasible location at a local scale:

- Proximity to Eskom infrastructure including sub stations and power line crossings; and
- Landowner agreements.

- Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The project property site was chosen due to the fact that it achieves all the criteria highlighted above to accomplish a successful Solar PV plant. However, the assessment of alternative locations within that property was linked to the most feasible tie into existing Eskom infrastructure and the capacity of local Eskom main transmission substations, and lowest deemed environmental sensitivity.

Due to the existing Eskom electrical infrastructure surrounding the project site, a number of grid connection options are feasible. The options explored are a 132Kv direct connection to Hydra MTS (Option 1), a 132kV overhead line loop-in loop-out of an existing 132kV overhead line between Bletterman and Taaibos substation (Option 2), and lastly a 400kV overhead line loop-in loop-out of one of the existing 400Kv overhead lines between Hydra MTS and Poseidon MTS (Option 3).

Based on technical feasibility and cost the preferred grid connection is option 1. However, option 1 would require transformation capacity to be added to Hydra MTS beyond 2019, due to the significant interest shown in the area. This option is the most suited only if a single project is awarded “Preferred Bidder” status in the REIPPPP. Furthermore, this option would require a 30km overhead line to be installed from the project area to Hydra MTS, the environmental impact of which falls outside the scope of this EIA and would need to be assessed independently.

The Eskom Hydra Main Transmission Substation (MTS) currently does have transformation capacity constraints; and therefore, based on the interest shown in the De Aar area, particularly in close proximity to Hydra MTS, transformation upgrades will be required for projects beyond Bid Window 4 wanting to connect to Hydra MTS.

Option 3 (sites 1 & 2 (western most footprints) as per layout plan) are deemed the most practicable, when cost and logistics are combined, with a constraint being that they are only financially feasible if all three 75MW arrays are implemented.

Please refer to the Site Selection Matrix below.

The Environmental Scoping Study identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed establishment of a Solar PV Plant and associated infrastructure. A number of issues for consideration were identified by the EAP and appointed Specialists during the scoping process. This matrix serves to outline the approach utilised to evaluate the alternative sites and select a preferred site for the establishment of the proposed Solar PV Plant.

Site Selection Matrix

Scoring Index

- 1 = Low
- 2 = Medium
- 3 = High

| Criteria | Sites (Including Pre- and Post-mitigation) | | | | | |
|--------------------------------|--|-----------|-----------|-----------|-----------|-----------|
| | 1 | | 2 | | 3 | |
| | Pre | Post | Pre | Post | Pre | Post |
| Topography | | | | | | |
| Gradients (i.e. Flat) | <u>3</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Slope | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Soil Depth | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Drainage | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Land use | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> |
| Sensitive Receptors | | | | | | |
| Water Courses | <u>3</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>1</u> | <u>1</u> |
| Protected Flora | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Protected Fauna | <u>3</u> | <u>2</u> | <u>3</u> | <u>2</u> | <u>2</u> | <u>1</u> |
| Soil Erosion | <u>3</u> | <u>1</u> | <u>3</u> | <u>1</u> | <u>3</u> | <u>1</u> |
| Visibility | <u>3</u> | <u>2</u> | <u>2</u> | <u>1</u> | <u>3</u> | <u>2</u> |
| Heritage | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Existing Infrastructure | | | | | | |
| Accessibility (Roads) | <u>1</u> | <u>1</u> | <u>2</u> | <u>2</u> | <u>3</u> | <u>3</u> |
| Eskom Sub Station | <u>3</u> | <u>3</u> | <u>3</u> | <u>3</u> | <u>1</u> | <u>1</u> |
| Eskom Powerlines | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>3</u> | <u>3</u> |
| Security | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> | <u>2</u> | <u>1</u> |
| Cost | <u>2</u> | <u>2</u> | <u>2</u> | <u>2</u> | <u>1</u> | <u>1</u> |
| Land Use Compatibility | | | | | | |
| Agriculture, Grazing | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> | <u>1</u> |
| TOTALS | <u>36</u> | <u>22</u> | <u>34</u> | <u>22</u> | <u>33</u> | <u>22</u> |

Alternative Type No. 2: Type of Activity

- Purpose and Requirements

The purpose of the new Solar PV system, includes the establishment of De Aar as a Renewable Energy Hub, which can be achieved by providing different renewable energy options. The aforesaid Hub has to be within close proximity to existing Eskom infrastructure.

- Methodology

Several feasibility studies have been completed by various role players that have identified solar as a preferred technology for South Africa and more specifically the northern Cape. The annual 24-hour solar radiation average for South Africa is 220 W/m², compared with 150 W/m² for parts of the USA and about 100 W/m² for Europe. Almost the whole of the interior of the country has an average insolation in excess of 5 000 Wh/m²/day. Some parts of the Northern Cape have an average insolation of over 6 000 Wh/m²/day (Winkler, 2006).

The Pixley ka Seme District Municipality as entrenched in their IDP, have declared themselves as a Renewable Energy Hub due to the suitability of inter alia solar technologies. Indicative of the suitability of the area for solar can be seen in the awarding of 19 of the 28 preferred bidders in the 2011 REIPPP bid award within the Pixley ka Seme District Municipality.

Investments in solar projects bring socio-economic relief to distressed communities via job creation during construction and operation. These developments help to nurture the local economy and create enterprise opportunities and social programmes.

- Criteria used to investigate and assess alternatives

Numerous reports, guideline documents and government gazettes were reviewed in order to assess the feasibility of solar PV technology as a sustainable energy generation option.

- Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The core business of the project proponent is PV panel development and installation for the use in the generation of electricity. As such, the fundamental alternative of a development other than to conduct and operate a solar energy facility is therefore not viable in this case and will not be considered further in the EIA. The REFIT program is also a key project component due to the fact that the next phase includes Solar PV as an option and the project proponent will take the opportunity to submit the project proposals.

Although a different type of renewable energy technology can achieve the same purpose, there is an existing Solar PV network and the long-term environmental implications of operating and maintaining the various renewable energy systems, particularly on the receiving environment, are not known.

Alternative Type No. 3: Design and Layout

The final layout would primarily be determined by the Eskom infrastructure tie in choice and detailed design considerations. This layout will be informed by the recommendations made in the specialist baseline studies being undertaken.

Alternatives in relation to layout and design will be considered in terms of environmentally sensitive areas especially which are to be avoided or mitigated by the proposed development, such as avoiding water courses and wetlands, flat and open areas away from rocky outcrops, facing north and reduced visual impact.

The design would include mounting panels at their lowest point 1 m high, to allow sheep grazing to continue, which helps control the build-up of phytomass and reduces the need to manually control vegetation growth.

The proposed layout will be amended slightly based on the recommendations made in the specialist baseline studies. The rocky outcrops and water courses including wetlands have purposely been excluded from the proposed plant layout.

Furthermore, the findings of the GSO will bear heavily on the technical and financial constraints as to which footprint is to be considered for development.

Alternative Type No. 4: Technology

Refer to Activity No. 2 in respect of the type of activity.

The preferred technology for the proposed PV panels makes use of the thin film PV panels. The thin film solar panels have lower losses or in other words perform better in hot climates and higher temperatures, low radiation conditions such as in the early morning or during sunset and cloudy conditions.

Alternative mounting systems are also being investigated. There are many ground mounted structures available based on either piled or ballast systems (see Figure 3.8). Piled systems utilise a metal pile that is driven into the soil on which the main structural beam is mounted. This system is utilised extensively in Europe where soils are generally deep. An advantage of this system is the mechanisation of the process, lowering the construction costs in Europe where labour is expensive. Ballast foundations utilise a concrete or other material foundation with sufficient mass to offset wind loads. This system requires no penetration of the soil and is suitable for hard rocky soils.

Polar trackers are also being considered. This system is suitable for use with standard crystalline and thin-film modules. The tracker is oriented on a north-south axis and tracks in two dimensions only (also called a 'single-axis' tracker). This system increases the performance of modules by approximately 20% over a fixed configuration. This improvement is mainly experienced early and late in the day and covers more of the morning and evening electricity usage peaks.

The core business of the project proponent is PV panel development and installation for the use in the generation of electricity. As such, the fundamental alternative of a development other than to conduct and operate a solar energy facility is therefore not viable in this case and will not be considered further in the EIA.

Alternative Type No. 5: Operational Aspects

- Purpose and Requirements

The purpose of the new Solar PV system, includes the establishment of De Aar as a Renewable Energy Hub, which can be achieved by providing different renewable energy options. The aforesaid Hub has to be within close proximity to existing Eskom infrastructure.

- Methodology

Operational alternatives will be taken into account where identified by the specialists. Additional requirements, that may be enforced by ESKOM, will need to be adhered to.

- Criteria used to investigate and assess alternatives

N/A

- Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Alternative operational aspects were not investigated during the scoping phase as in-depth specialist studies are still underway. On-site operational activities should clearly be guided by best labour practices in relation to optimal use of local labour, provision of a good standard workplace environment and facilities without undue or avoidable impacts on the environment. This is especially applicable concerning the use of potable water as well as good management practice for wastewater and solid waste, taking into account operational procedures related to disposal.

Alternative No. 6: Demand

- Purpose and Requirements

The investment in renewable energy and energy efficiency is considered important to reduce the negative economic, social and environmental impacts of energy production and consumption in South Africa (Winkler, 2006). Many renewable energy projects are particularly well suited to off-grid applications and, certainly in South Africa, could improve the flexibility of the grid by distributing generation across the country, closer to some key loads (Winkler, 2006).

Methodology

This EIA forms part of the feasibility study and prerequisite by NERSA for awarding a PPA under the REFIT programme.

Criteria used to investigate and assess alternatives

N/A

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The purpose of the New PV Solar Plant is to address one of the Emthaneni Local Municipality (ELM) priority issues in respect of service (Electricity Generation/Demand) delivery. The **(IDP (Final) 2012/13 – 2015/16 Nkangala District Municipality)**, lists a number of industrial and manufacturing projects that form part of the larger strategy for the economic development of the municipality. One of these projects includes the establishment of De Aar as a Renewable Energy Hub. Basic service delivery, with energy as one of the priority issues, micro- and macro-economic development, as well as land use management have been highlighted as key performance areas to be addressed within the ELM. The establishment of the proposed project has the potential to support a number of key strategies in the ELM IDP.

Alternative No. 7: Input

- Purpose and Requirements

The purpose of the new Solar PV system, includes the establishment of De Aar as a Renewable Energy Hub, which can be achieved by providing different renewable energy options. The aforesaid Hub has to be within close proximity to existing Eskom infrastructure.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The core business of the project proponent is PV panel development and installation for the use in the generation of electricity. As such, the fundamental alternative of a development other than to conduct and operate a solar energy facility is therefore not viable in this case and will not be considered further in the EIA.

Although a different type of renewable energy technology can achieve the same purpose, there is an existing Solar PV network and the long-term environmental implications of operating and maintaining the various renewable energy systems, particularly on the receiving environment, are not known.

-Alternative No. 9: Scheduling and Timing

The proposed Solar PV plant will be dependent on the scheduling and timing of the REFIT program and the proposed project time frames would be coordinated to be part of the next window of REFIT phase, which includes Solar PV as the preferred type of renewable energy.

-Alternative No. 10: Scale and Magnitude

The appointed specialists will provide feedback on biophysical and social environmental aspects of the alternative locations which will in turn guide the scale and magnitude of the preferred development footprint.

-Alternative No. 11: No-go Option

The option of not implementing the activity (no-go option) was used as the benchmark against which all impacts associated with the proposed development were assessed.

The No-Go alternative relates to the option of not developing the proposed Solar PV plant and associated infrastructure (i.e. the Status Quo). If the proposed project is not developed, the current land use activities are assumed to continue in the long-term including grazing of livestock.

If the proposed activity was not to go ahead, there would be no additional impacts on the local biodiversity, hydrology, heritage resources provided the current land use remained the same as livestock grazing intensity and carrying capacity. However, the no-go option would result in a loss of positive opportunities including an increase in renewable energy source and therefore helping reduce South Africa's dependence on non-renewable fossil fuels. There would also be a lost opportunity within job creation and skills development associated with the proposed project.

The identification of the locations within the preferred site within that Hanover property were helped determined by the site selection matrix (Page 45). The remaining types of alternatives will be investigated within the ***EIA Plan of Study*** section.

Details of the Public Participation Process

- (iii) details of the public participation process undertaken in terms of regulation 14 of the Regulations, including copies of the supporting documents and inputs;

Level of Public Participation

The level of public participation was determined by taking into account the scale of the anticipated impacts of the proposed project, the sensitivity of the affected environment and the degree of controversy of the project, and the characteristics of the potentially affected parties. Based on the findings of the aforementioned consideration (**Appendix D-A: Level of Public Participation**), there was no reason to elaborate on the minimum requirements of the public participation process outlined in the EIA Regulations, 2014 or use reasonable alternative methods for people desiring of but unable to participate in the process due to illiteracy, disability or any other disadvantage. A Public Meeting is still to be held early in 2017, to provide another platform to I&APs to raise issues and gain a deeper insight into the nature of the project, through an open debate forum. The date and location of the public meeting will be advertised in due course.

Potentially interested and affected parties were notified of the site meeting and proposed application by –

- a. fixing a notice board 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;

Three notice boards (**Appendix D-B: Site notice text**) advertising the applications were fixed along the property boundary on the 5th of October 2016, but due to prevailing weather conditions shortly after them being displayed, they were damaged and are in the process of being replaced with a more robust alternative.
There was no reasonable alternative sites (Section D (5)).

- b. Emailing Background Information Documents (BID) (**Appendix D-D: Background Information Document (BID) text**) on the 30th of September to –

The owner or person in control of that land if the applicant is not the owner or person in control of the land:
Willem Retief: wretief@webmail.co.za; 082 944 7167

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:

Remainder of FARM No. 149 (Farm Goodhope)
Neville Wimpany, kathywimpany@yahoo.com; 082 868 1991 or 041 366 1037

Remainder of LEUWE FOUNTAIN No. 27 (Farm: Leeuwfontein)
Corneulis Oosthuizen; louisaa.oosthuizen25@gmail.com; 061 271 0268

Portion 1,2 & 4 LEUWE FOUNTAIN No. 27 (Farm Weltevrede)
Pieter du Toit; psdutoit4@gmail.com; 083 278 2590

Remainder of TAAIBOSCH FONTEIN No. 41 and Portion 1 (Farm: Constancia)
Andries Pienaar; andriespienaar@hotmail.com; 082 762 2206

| |
|---|
| <p>Portion 2 & 5 TAAIBOSCH FONTEIN No. 41 (Farm: Skilpadskuil) Manual Orfao; kmss@worldonline.co.za; 082 782 1972</p> <p>Portion 3 of TAAIBOSCH FONTEIN No. 41 Dawie du Plessis; lduplessis@live.com; 083 544 4139</p> <p>Remainder & Portion 7 &9 of KAFFERSPOORT No. 56 (Farm:Dieprivier) Andries Pienaar; andriespienaar@hotmail.com; 082 762 2206</p> <p>Remainder of BARENDS KUILEN No. 38 (Farm: Blaawboschkuil) Christiaan Venter; wortelfontein@vodamail.co.za; 082 378 3601</p> <p>Remainder & Portion 1 of BLAAUWBOSCH KUILEN OUTSPAN No. 37 (Farm: Blaawboschkuil) Christiaan Venter; wortelfontein@vodamail.co.za; 082 378 3601</p> |
| <p>The municipal councilor of the ward in which the site or alternative site is situated and any organisation of rate payers that represent the community in the area: Awaiting details of the relevant role player from the municipality.</p> |
| <p>The municipality which has jurisdiction in the area: Pixley ka Seme District Municipality Mr Rodney Pieterse (Municipal Manager); mm@pksgdm.gov.za; 053 631 0891; Mr Archie Staffa (PA); emmanuel.staffa@gmail.com; 053 631 0891 Mr Sonwabile Nkondephe (Env Director); pixley@telkomsa.net; 053 631 0891 Ms Hilda Mapuleng (Town Planner); hmapuleng@gmail.com; 053 631 0891 Emthanjeni Local Municipality Mr Isak Visser (Municipal Manager); visser@emthanjeni.co.za; 053 632 9101 Ms Marushel Meyers (PA); mmeyers@emthanjeni.co.za; 053 632 9101 Mr Francois Paljaard (Town Planner); paljaardf@emthanjeni.co.za, 053 632 9126 Mr Soyiso Mvandaba (LED); smvandaba@emthanjeni.co.za; 071 868 0309</p> |
| <p>Any organ of state having jurisdiction in respect of any aspect of the activity: DENC Thulani Mthombeni; tmthombeni@ncpg.gov.za; 072 409 2277 Doreen Werth; dwerth@ncpg.gov.za; 060 991 4675 Dineo Moleko; dmoleko@ncpg.gov.za; 053 807 7467 DWS Mr A. Abrahams; AbrahamsA@dwa.gov.za; 053 830 8802 DAFF Samkelisiwe Lubanga; SamkelisiweL@daff.gov.za; 083765 4691 Jacoline Mans; JacolineMa@daff.gov.za; 0828082737 DPW Sylvia Moholo; sylvia.moholo@dpw.gov.za; 053 838 5200 Claire Jacobs; claire.jacobs@dpw.gov.za; 053 838 5257</p> |
| <p>Any other party as required by the competent authority/EAP: SAHRA Loaded onto SAHRIS EWT Head Office, ewt@ewt.org.za; 011 372 3600 Cobus Theron; cobust@ewt.org.za; 021 788 5661 Bonnie Schumann; bonnies@ewt.org.za; 021 788 5661 WESSA Sandy Crake; admin@wessa.co.za; (021) 701 1397 WWF Lameez Bayat; lbatat@wwf.org.za; 021 657 6633</p> |

Servitude Holders:

ESKOM

Bossie Uys; uysj@eskom.co.za; 053 632 6714

Henk Wydeman; WydemaH@eskom.co.za

Daan Liebenberg; LiebenDa@eskom.co.za

Keketso Mbete; MbeteKC@eskom.co.za

SANRAL

Nicole Abrahams; abrahamsn@nra.co.za; 021 957 4602

TRANSNET

Leonie Visagie; leonie.visagie@transnet.net; 053 838 3119

Brenda Ackerman; brenda.ackerman@transnet.net; 053 838 3082

Ronald Bosch; ronald.bosch@transnet.net; 053 838 3424

Sharon Khobotlo; sharon.khobotlo@transnet.net; 053 838 3295

Mervin Mac Donald; mervin.macdonald@transnet.net; 023 348 4379

- 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
 - iii. 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

An advertisement (**Appendix D-F: Advertisement text**) was placed in a provincial newspaper, the Northern Cape Express, on the 05th of October, 2016 (**Appendix D-G: Proof of placed advertisement**).

- d. 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 illiteracy, disability or any other disadvantage.

Alternative methods were not required given the scale of the anticipated impacts and that the upgrade is needed in this specific area of De Aar.

In terms of regulation 55(1), all organs of state which have jurisdiction in respect of the proposed activity and all persons who submitted written comments, attended the site meeting or requested, in writing, to be registered were placed on the register (**Appendix D-H: List of Registered Interested and Affected Parties**).

Summary of the Issues raised by Interested and Affected Parties

- (iv) *a summary of the issues raised by interested and affected parties, and an indication of the matter in which the issues were incorporated, or the reasons for not including them;*

A summary of the issues raised (**Appendix D-I: Comment and Response Sheet**) –

The Environmental Attributes Associated with the Alternatives.

- (v) The environmental attributes associated with the alternatives focusing on geographical, physical, biological, social, economic, heritage and cultural aspects;

Geographical Aspects

De Aar is situated in the Northern Cape Province, with an approximate population of 35 539 people (census 2001). De Aar situated within the Emthanjeni Municipality, is renowned for its central location on the main railway line between Johannesburg, Cape Town, Port Elizabeth and Namibia. The Municipality is further situated in the Pixley ka Seme District Municipality with an approximate population of 164 607 people (census 2001), this represents 16, 92% of the Northern Cape population. The Municipality is also approximately 300km south west of Kimberley, 440 km south east of Upington, 300 km north east of Beaufort West and 300 km south west of Bloemfontein.

Hanover lies approximately 65 km east of De Aar on N1 main north to south route. Britstown is situated about 55 km west of De Aar on the N12 route. Both these main routes link Johannesburg and Cape Town. The towns of Emthanjeni lie in an extensive stock farming area with the emphasis on sheep, mutton and wool farming, especially Merino's. Emthanjeni Municipality, specifically De Aar, is the seat of Pixley ka Seme District Municipality; the Municipality further hosts all Government Departments. Emthanjeni Municipality covers an area of approximately 11390km². Emthanjeni comprises 11% of the district land area and 3% of the province. We further represent approximately 23% of the district's population.

(Emthanjeni Local Municipality, Integrated Development Plan 2011 – 2016).

Physical Aspects

-Climate

The climate of the study area (Koch & Kotze, 1986) can be regarded as warm to hot with a summer rainfall and dry, cold winters. Temperatures vary from an average monthly maximum and minimum of 32.6°C and 15.4°C for January to 16.8°C and 0.3°C for July, respectively. Temperature ranges are large with lows of -10°C in winter to mid 40°C in summer. The long-term average annual rainfall in this region of the Northern Cape is only 289mm, of which 201 mm (70%) falls from November to April. Frost occurs most years, 30 days on average, between late May and early September. The climatic restrictions (namely very low rainfall) means that this part of the Northern Cape is best suited for grazing, although the grazing capacity is low (approximately 20-25 ha/large stock unit) (ARC-ISCW, 2004). The only means of cultivation would be by irrigation. The region is subject to periodic droughts which have a serious impact on the surrounding farming areas and on the economy of the towns. The area has a low prevailing agricultural potential.

-Topography

The area is characterised by wide open plains with relatively flat topography typical of the Central Karoo. The site is relatively flat (average slope gradient is less than 10% from the east to the west) with

some low rocky ridges in the east and north-east of the site. There are a few shallow drainage lines present on site. The site is located at an altitude of approximately 1 300 m to 1 340 m above sea level.

-Geology

The geology of the area comprises shales, mudstones and sandstones of the Adelaide Formation (Beaufort Group, Karoo Supergroup), which have been intruded in places by dolerite of the Jurassic age. The sedimentary shales and sandstones are more readily weathered than the dolerite that forms resistant rocky outcrops (Barichievy, 2010; Outeniqua Geotechnical Services, 2011).

-Soils

Duplex soils (Prisma- and Pedocutanic soils) – these are potentially dominant soils in some landscapes within the De Aar/Hanover area within the sediments of this Beaufort Geological Group geology. The Beaufort Group is a sub-division of the Karoo Super-group (Norman and Whitfield, 2006). The geology that underlies these soils that are deposited in the Karoo Basin, consist essentially of sandstone, mudstone and shale. Illuviation accumulation of clay in the subsoil results in strong blocky, prismatic or columnar structure and cutanic character. The amount of organic matter is usually low and due to textural contrast the permeability is often limited by the sub (B-) horizon (although surface crusting may also impede infiltration. The electrical conductivity (CEC), pH and reserves of plant nutrients are typically greater in the B-horizon than the Orthic A topsoil. Base status may differ considerably within duplex soils. High levels of exchangeable sodium (and sometimes magnesium are common especially in the prisma-cutanic forms and in those families of pedocutanic forms that have coarser, more angular structure (i.e., macropedal structure). Salinity may be evident immediately below the B-horizon. Duplex character often manifests itself not only in a clear or abrupt increase in clay content with depth, but also in contrasting mineralogical composition of the coarser fractions and show clear evidence of cutanic character (Fey, 2010). The vegetation of these soils are often heavily grazed.

Biological Aspects (Fauna & Flora)

- Flora

The vegetation is typical of the Karoo region with Karoo bushes and grass as the dominant features. Lone thorn trees occur in limited areas. The vegetation at the study area is classified as Eastern Upper Karoo (Vegetation unit NKu 4, Mucina and Rutherford (2006). This is described as flat and gently sloping plains, interspersed with hills and rocky areas, with grasses such as *Aristida* and *Eragrostis* species that dominate.

-Fauna

The following species were identified during the initial site inspection with additional species claimed by the landowner to be resident, but a full species list will be supplied in the Specialist Biodiversity Assessment:

- Blue crane
- Caracal
- Cape fox
- Bat-eared fox
- Black korhaan

- Steenbok
- Mountain reedbuck
- Pale chanting goshawk
- Black-backed jackal
- Side-striped jackal
- Aardvark
- Porcupine
- Aardwolf
- Springbok
- Riverine rabbit
- Rock rabbits
- Mountain tortoise
- Gemsbok
- Bustard
- Rock hyrax
- Warthog
- Sable

Social Aspect

-Administrative context

The proposed project will be located in Ward 6 of the Emthanjeni Local Municipality that falls under the Pixley Ka Seme District Municipality in the Northern Cape Province. For the baseline description of the area, data from Census 2011, Community Survey 2016, municipal IDP's and websites were used. The Emthanjeni Local Municipality is the seat of the district and is located centrally on the main railway line between Johannesburg, Cape Town, Port Elizabeth and Namibia. It covers an area of 13 472 km². The main towns in the area are Britstown, Burgerville, De Aar, Griesenkraal and Hanover.

-Population and population groups

The Pixley ka Seme District Municipality's total population was estimated at 166 849 people, with the ELM accounting for approximately 23% (38 228) (Community Survey, 2007). The average population growth between 2001 and 2010 was estimated at 0.60% (ELM IDP, 2010). Given the size of the Municipality and the relatively small total population size, the population density within the Municipality generally is low at 3.4 people per km². According to the ELM IDP (2010), the municipal population is largely Coloured (57.5%), followed by Black African (35.3%), White (7.1%) and Asian (<1%). (Emthanjeni Local Municipality, Integrated Development Plan 2011 – 2016).

The study area of Ward 6 almost half of the population belongs to the Coloured population group, with just over two fifths of the population belonging to the Black population group. Ward 6 has a higher proportion of people belonging to the Black population group than on local or district level. The average age in all the municipal areas are around 28 years, with the lowest average age (28.24) in Ward 6. Just below a third of the population in Ward 6 is aged 14 years or younger, with almost half aged 24 years or younger. Such a young population place a lot of pressure on resources and infrastructure of the area, and a great demand for future infrastructure and creation of livelihoods can be expected.

-Education

About two fifths of the people in Ward 6 aged 20 years or older have no schooling or only some primary education. This is higher than on local, district or provincial level. These high levels of illiteracy should be taken into consideration when consulting with farmworkers or communities on the project.

-Employment

Ward 6 has the highest proportion of people aged between 15 – 65 years that are employed. Just over half of the people who are employed in Ward 6, are employed in the formal sector. This is much lower than on local or district level. About a quarter of the employed work in the informal sector, which is proportionately higher than on local or district level.

Economic Aspects

Agriculture forms the backbone of the economy of the Emthanjeni LM (Emthanjeni LM IDP, 2016/2021) with mutton and wool being the main produce. Besides sheep farming, cattle, goat, pig and game are also being farmed. The manufacturing sector shows potential for growth through the introduction of renewable energy projects in De Aar and the surrounding areas. There are also stone crushers in the area that specialise in the manufacturing of sand, bricks cement and rocks. Other economic activities include services, retail, transport and tourism.

De Aar is the main town of Pixley ka Seme and is a potential industrial growth point with ample industrial sites, reasonable prices and tariffs, affordable labour and the necessary infrastructure. De Aar is therefore the ideal place to establish industries, a fact which can be borne out by various major industries which have already established themselves here. The central location and excellent rail and road links have resulted in several chain stores opening branches.

Hanover is also well endowed with qualified construction industry artisans. Like the other towns in this region, wool is exported to Port Elizabeth without being processed. We note with great concern the opportunities for local people in relation to the second economy but we also further identified the need for the municipality to become involved with the empowerment of SMME's and the roll out of cooperatives. This should enable the second economy initiatives to become active contributors to the economy of Emthanjeni as well as the entire district.

Heritage Aspects

-Palaeontological Resources

The possible impact of the proposed development on palaeontological resources is gauged by using the fossil sensitivity maps available on the SAHRIS and the nature of the proposed development.

Karoo Sedimentary Rocks

The Beaufort Group contains fossils of diverse terrestrial and freshwater tetrapods of *Tapinocephalus* and *Lystrosaurus* genera (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways) and sparse vascular plants (*Glossopteris* Flora, including petrified wood) that dates to the Late Permian – Early Triassic Periods (c. 266 – 250 Ma).

The area of the proposed development where this geological signature is regarded as highly sensitive with regards to palaeontological heritage.

Karoo Dolerites

No fossil heritage has been recorded in these intrusive dolerites (dykes, sills) and associated diatremes. The dolerite dykes and sills within the area of the proposed development are not palaeontologically significant. Notice must however be taken of the presence of these features as Stone Age quarry sites are usually found at the foot of dolerite hills hornfel outcrops occur. Dolerite is also associated with engraving sites. One such site has been recorded at the Commonage in Hanover Town.

Archaeological Resources

Archaeological heritage resources and cultural landscapes are linked to specific time periods. In summary the various eras are as follows:

The Stone Age time period is divided between three different time periods, namely:

Early: c. 2 500 000 to 150 000 Before Common Era

Middle: c. 150 000 to 30 000 Before Common Era

Late: c. 30 000 Before Common Era until the historical time periods commenced

The Stone Age is well represented in the area by the archaeological remains associated with Stone Age hunter gatherers and herders and includes cave shelters and surface sites (Goodwin & van Riet Lowe 1929, Sampson 1985 and Bousman 1991). These occurrences cover represent the Early, Middle and Later Stone Ages. Erosion gullies and river/streambeds and dolerite outcrops are usually associated with stone tool assemblages.

Sampson (1972 & 1974) surveyed the Seaco Drainage near Hanover and recorded numerous Stone Age sites ranging from the Early, Middle and Later Stone Ages. Proto-historic sites associated with pastoralist was also recorded. His research established a model for identifying stone tool industries and occupations in the entire district (Huffman 2013).

Surface scatters of stone tools (mostly Early and Middle Stone Age) were recorded during various Heritage Impact Assessments:

The farm Plooyfontein 93 (Palaeo Field Services) in the Hanover District Erf 3094 on the old De Aar 180 farm (Huffman, 2013)

Low to medium density stone tools have been identified within 46 metres of the borrow pit and these are the type of stone tools that are known to occur in the De Aar and Burgerville areas. S 30 50 1.95 E 24 18 10.3. A variable density of stone artefacts, mostly of Pleistocene age, was noted over most of the

area examined during the Archaeological Specialist Input on the site of the proposed Taaibosch Photovoltaic between De Aar and Hanover (David Morris, 2011)

Rock art sites have also been recorded (Morris 1988, Rudner & Rudner 1968). Included is the engraving sites at the Hanover Town Commonage and at the farm Groenfontein, Hanover District. (Palaeo Field Services)

The Iron Age and farmer period occurred in southern Africa from Common Era (2000 years ago to 1950) to historical periods. The definition is divided between Early Iron Age (c. 200 CE to c. 1400 CE) and Late Iron Age (c. 1400 CE to 1800's (Archaic, 2008)). The historical period indicates dates from 1500s to present (Natalie Swanepoel, Amanda Esterhuysen and Phillip Bonner, 2007). The Iron Age is defined as a time period that occurred during c. 200 to c. 1000 Common Era, named as the early period, and c. 1000 to 1800's Common Era (Archaic, 2008). The Iron Age is not represented in the general area of the development. No Iron Age sites should be present.

More Recent Events/Historical Period

Usually refers to white or literate history, but more recently also refers to the last five hundred years of South African history. Dates from 1500s to present. Farms and other historical settlements in the area dates back to the 1840's, whilst the area also have evidence associated with the South African (Anglo Boer War). Signs of historical occupation is common in the general area and includes abandoned sheep kraals and homestead ruins. Old railway infrastructure (housing, old railway lines and foundations) was also recorded (S30°49'26.29" E24°17'31.31") at nearby Burgervilleweg (Becker). The proximity of the railway means that material traces may exist alongside that relate to its construction, maintenance and use, and its protection by way of blockhouses, as a major transport route for British forces further inland during the Anglo-Boer War. The Google Earth image of the area clearly shows different generations of railway alignment within the study area. Jean Beater's heritage report describes Anglo-Boer War redoubts (components of a blockhouse line) on the north side of the older railway.

Where dolerite koppies occur there is a possibility that rock engravings might be found, while rock paintings might be found in shelters formed either in certain dolerite topographic formations or in shelters where sandstone scarps provide for their formation. More or less rich spreads of Stone Age artefacts may occur across this Karoo landscape with localised 'sites' having higher densities. More recent heritage features of note may exist in the vicinity of railway and farm infrastructure.

Cultural Aspects

De Aar

It is the second-most important railway junction in the country[1], situated on the line between Cape Town and Kimberley. The junction was of particular strategic importance to the British during the Second Boer War. De Aar is also a primary commercial distribution centre for a large area of the central Great Karoo. Major production activities of the area include wool production and livestock farming. The area is also popular for hunting, although the region is rather arid. De Aar is also affectionately known as " Die SES " deriving its nickname from the six farms that has surrounded De Aar since the 1900. (Website: www.wikipedia.org)

Hanover

Hanover claims to be the country's most central place. It is equidistant from Cape Town and Johannesburg, centrally positioned between Cape Town and Durban as well as Port Elizabeth and Upington and it is the hub of an arc formed by Richmond, Middelburg and Colesberg.

Historic figures were at the centre of life here, people like Olive Schreiner, author and women's rights champion, and the tempestuous Rev. Thomas Francois Burgers. Among its residents were the wealthy and eccentric. The town's chief constable was the grandson of Lord Charles Somerset, the magistrate's clerk a son of Charles John Vaughan, Dean of Llandaff, well-known churchman and devotional writer of his day, and the local doctor was the son of a former Solicitor-General of Jamaica. Well-known people of today hailing from Hanover includes Zwelinzima Vavi, the General Secretary of the Congress of South African Trade Unions.

Today the busy Karoo N 1 route cuts through the veld between the town and its cemetery. But during the last century all roads converged in Hanover and all travellers passed through the town. It was on an important stop for stage coaches carrying passengers to the Diamond Fields, and the Free State mail was carried through by post cart. Daily life bubbled with people ever on the move. But then in 1884, the advent of the railway deprived the town of much of its through traffic and its character slowly changed. (Website: www.wikipedia.org)

The Impacts and Risks Identified for each Alternative.

- (vi) The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources; and
 - (cc) can be avoided, managed or mitigated;

Please refer to the Impact Assessment in **Appendix E**.

The Methodology used in Determining and Ranking the Impacts and Risks associated with the Alternatives.

- (vii) The methodology used for determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;

Please refer to the Impact Assessment in **Appendix E**.

The Positive and Negative Impacts that the Proposed Activity and Alternatives on the Environment and Community.

- (viii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.

Please refer to the Impact Assessment in **Appendix E**.

The Possible Mitigation Measures application and level of Residual Risk.

- (ix) The possible mitigation measures that could be applied and the level of residual risk;

Please refer to the Impact Assessment in **Appendix E**.

The Site Selection Matrix.

- (x) The outcome of the site selection matrix;

Please refer to Section H: Alternatives Discussion.

The Motivation for no Alternatives, including Alternative Locations.

- (xi) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and;

The Concluding Statement for the Preferred Alternative.

- (xii) A concluding statement indicating the preferred alternatives, including preferred location of the activity;

Conclusion

The preferred technology alternative is a Solar PV plant which is considered to be the most feasible option for the northern Cape, which is experiencing increasing interest in this development sector. The Solar PV technology is the most reliable of the renewable energy technologies considered for electricity generation. As a solid state technology it has the advantage of being able to directly convert sunlight into electricity. Whereas other renewable energy technology including wind, biomass and other solar options must indirectly convert the received energy to thermal or mechanical energy prior to producing electricity.

The core business of the project proponent is PV panel development and installation for the use in the generation of electricity. As such, the fundamental alternative of a development other than to conduct and operate a solar energy facility is therefore not viable in this case and will not be considered further in the EIA.

The preferred site was considered to successfully meet the required criteria to operate an efficient Solar PV plant. The farm portions selected in the Hanover District of the Northern Cape have the benefits of high quality solar irradiation, excellent sun orientation and abundant flat topography. In addition, the vital and necessary Eskom infrastructure including sub stations and powerlines to tie in the Solar PV plant are available.

The Scoping process identified the potential positive and negative environmental (biophysical and social) impacts associated with the proposed establishment of a Solar PV Plant at three (3) alternative locations within the preferred site. A number of issues for consideration were identified by the EAP and appointed Specialists during the scoping process. These environmental aspects will be evaluated further within the EIA process for the alternative locations and select a preferred location for the establishment of the proposed Solar PV Plant.

SECTION I: PLAN OF STUDY

A plan of study for undertaking the environmental impact assessment process to be undertaken, including-

Description of the Alternatives Investigated within the Preferred Site (location).

- (i) *a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;*

The three (3) site (footprint) alternatives will be investigated within the preferred site shown in Appendix 1. The environmental aspects of each location will be assessed and these factors will help inform the decisions made regarding the alternatives within the preferred site as shown below;

- Design and Layout Alternatives;

The design and layout alternatives will be dependent on the findings of specialist assessments in order to minimize the impacts of the proposed Solar PV plant footprint on the local environment.

- Operational Alternatives;

Operational alternatives will be taken into account if identified by the specialists' requirements and recommendations.

- Scheduling and Timing Alternatives;

The proposed Solar PV plant will be dependent on the scheduling and timing of the REFIT program and the proposed project time frames would be coordinated to be part of the next window of REFIT phase, which includes Solar PV as the preferred type of renewable energy.

- The No-Go Alternative;

The option of not implementing the activity (no-go option) was used as the benchmark against which all impacts associated with the proposed development were assessed.

The No-Go alternative relates to the option of not developing the proposed Solar PV plant and associated infrastructure (i.e. the Status Quo). If the proposed project is not developed, the current land use activities are assumed to continue in the long-term, including grazing and watering small game and livestock.

There would be no additional impacts on the vegetation, fauna, freshwater, groundwater and heritage resources on site provided that current management and farming practices remained as at present in terms of grazing intensity and carrying capacity. However, the no-go option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy given

South Africa's position as one of the highest per capita producer of carbon emissions in the world. There would also be a lost opportunity in terms of the employment and business opportunities associated with the proposed project and the benefits associated with the establishment of a Community Trust. The no-go option would represent a negative social cost of HIGH significance.

Description of Aspects Assessment for the Environmental Impact Assessment.

- (ii) a description of the aspects to be assessed as part of the environmental impact assessment process;

Please refer to the Impact Assessment in **Appendix E**.

Specialist Assessments.

- (iii) aspects to be assessed by specialists;

Specialists

The following specialist assessments shall be undertaken to address the aspects and impacts identified for the project as well as issues and concerns (uncertainty) raised by I&APs and the authorities to date:

- Terrestrial Ecology,
- Wetland Delineation;
- Visual Impact;
- Heritage Impact;
- Geo-technical;
- Soils and Grazing Study; and
- Traffic Study

Method for Assessing the Environmental Aspects.

- (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;

Method Assessments

The above-mentioned assessments require specialist input and shall form part of the environmental impact assessment process. The tasks shall be undertaken by the specialists and in the manner outlined in the following appendices.

Appendix F-A: Visual Impact Assessment

Appendix F-B: Heritage Impact Assessment

Appendix F-C: Chiropteran Assessment (Bat Survey)

Appendix F-D: Grazing, soils and wetland Impact Assessment

Appendix F-E: Traffic Impact Assessment

Appendix F-F: Social Impact Assessment

Appendix F-G: Fauna & Flora Impact Assessment

Method for Assessment of Duration and Significance.

- (v) a description of the proposed method of assessing duration and significance;

Please refer to the Impact Assessment in **Appendix E**

Stages of Competent Authority Consultation.

- (vi) an indication of the stages at which the competent authority will be consulted;

The draft scoping report will be distributed to I&AP's on 28th OF November 2016, after 30 days of review the comments and responses received from I&AP's will be included in the draft scoping report. The draft scoping report will then be submitted to DEA which will be within the required 10-44 days from submitting the application form to DEA acknowledging the proposed activity. The DEA have 43 days to comment and accept the draft scoping report and the EAP has 144 days to compile the Environmental Impact Assessment Report.

The draft EIR and EMPr will be distributed to the I&AP's for 30 day's review period and any comments received by the EAP will be incorporated into the final EIR. The EIR will then be submitted to DEA for a decision on the authorisation.

Public Participation Process during the Environmental Impact Assessment.

- (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and

Please refer to Section H: (iii) Public Participation Process.

In summary, the following tasks will be completed;

- Distribute draft Scoping report to I&APs;
- Incorporate I&AP comments into final Scoping Report;
- **Submission of Scoping Report to DEA**
- Distribute draft EIR & EMPr to I&Aps;
- Incorporate I&AP comments into Final EIR & EMPr;
- **Submission of EIR & EMPr to DEA**
- Acknowledgment of receipt of EIR by DEA;
- DEA decide to grant/refuse EA;
- DEA notify applicant of EA;
- Notify I&APs of the decision.

Tasks to be undertaken during the Environmental Impact Assessment.

- (viii) A description of the tasks that will be undertaken as part of the environmental impact assessment process;

The tasks for the EIA are to:

- Undertake a formal public participation process, which specifically addresses the distribution of information to I&APs; provide an opportunity for I&APs to raise any concerns or issues and to provide an opportunity for I&APs to comment on draft and final reports;
- Undertake the necessary specialist studies to address and assess key concerns or issues identified during the Scoping Study;
- Integrate all the information into an EIR to allow an informed decision to be taken concerning the proposed project; and
- Ensure that the study complies with the requirements of NEMA and the EIA Regulations 2014.

| Phase 2: EIA Process | | | | |
|-----------------------------|--|-------------------|------------------------|--------------------|
| Task No. | Description of task | Start date | Completion date | No. of days |
| 17 | Compile EIR report | 2016/12/01 | 2017/04/24 | 145 |
| 18 | Compile EMPr | 2016/12/01 | 2017/04/24 | 145 |
| 19 | Specialist Studies (EIA): | 2017/01/09 | 2017/02/28 | 51 |
| 19,1 | Bat Assessment | 2017/01/09 | 2017/02/28 | 51 |
| 19,2 | Visual Impact Assessment | 2017/01/09 | 2017/02/28 | 51 |
| 19,3 | Social Impact Assessment | 2017/01/09 | 2017/02/28 | 51 |
| 19,4 | Traffic Impact Assessment | 2017/01/09 | 2017/02/28 | 51 |
| 19,5 | Geotechnical Assessment | 2017/01/09 | 2017/02/28 | 51 |
| 19,6 | Soils & Grazing capacity | 2017/01/09 | 2017/02/28 | 51 |
| 19,7 | Heritage Impact Assessment | 2017/01/09 | 2017/02/28 | 51 |
| 20 | Review of Specialist studies | 2017/03/01 | 2017/03/14 | 14 |
| 21 | Distribute draft EIR & EMPr to I&APs | 2017/03/15 | 2017/04/19 | 36 |
| 22 | Incorporate I&AP comments into final EIR & EMPR | 2017/04/20 | 2017/04/24 | 5 |
| 23 | Printing of EIR & EMPr | 2017/04/25 | 2017/04/27 | 3 |
| 24 | Submission of EIR & EMPr to DEA | 2017/04/28 | 2017/04/28 | 1 |
| 25 | Acknowledgment of receipt of EIR by DEA | 2017/04/29 | 2017/05/10 | 12 |
| 26 | DEA decide to grant/refuse EA | 2017/05/11 | 2017/08/28 | 110 |
| 27 | DEA notify applicant of EA | 2017/08/29 | 2017/09/02 | 5 |
| 28 | Notify I&APs of the decision | 2017/08/29 | 2017/09/12 | 15 |
| 29 | "Cool down" period & project handover | 2017/09/29 | 2017/10/18 | 20 |

Mitigation Measures to Manage and Monitor Identified Impacts.

- (ix) Identify suitable measures to avoid, reverse, mitigate or manage identified impacts to determine the extent of the residential risks that need to be managed and monitored;

Please refer to the Impact Assessment in **Appendix E**.

SECTION J: APPOINTED INDEPENDENT EAP

An undertaking under oath or affirmation by the EAP in relation to-

Report Information Accuracy.

- (i) the correctness of the information provided in the report;

Stakeholder and Interested and Affected Parties Feedback.

- (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and

Comments and Response between EAP and Interested and Affected Parties.

- (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;

SECTION K: ENVIRONMENTAL IMPACT ASSESSMENT AGREEMENT BETWEEN EAP AND I&AP'S

(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;

EAP AFFIRMATION.

Appendix 2 Section 2 (k) of the Environmental Impact Assessment (EIA) Regulations, 2014 (promulgated in terms of the National Environmental Management Act 107 of 1998, as amended - NEMA), require an undertaking under oath or affirmation by the Environmental Assessment Practitioner (EAP) in relation to the level of agreement between the EAP and interested and affected parties on the Plan of Study for undertaking the environmental impact assessment.

I, **Justin Aragorn Bowers**, on behalf of Ecoleges, hereby affirm that all comments and inputs received from stakeholders and interested and affected parties have been accurately recorded herein and, insofar as comments are relevant and practicable, accommodated in the Plan of Study submitted with the final Scoping Report to the Competent Authority, thereby attaining a desirable level of agreement for undertaking the environmental impact assessment.



Signature of the EAP

28 November 2016

DATE:

SECTION L: COMPETENT AUTHORITY SPECIFIC INFORMATION

(i) where applicable, any specific information required by the competent authority; and

Specific Information:

N/A.

SECTION M: OTHER INFORMATION REQUIRED BY REGULATIONS

(m) any other matter required in terms of section 24(4)(a) and (b) of the Act.

Other Information:

None.

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SECTION N: APPENDICES

APPENDIX A: SITE PLAN(S)

Annexure A: Site/Property Plan

APPENDIX B: SITE PHOTOGRAPHS

Annexure A: Site photos

APPENDIX C: TECHNICAL REPORT

Annexure A: Grid Solutions Opinion Report

APPENDIX D: PUBLIC PARTICIPATION PROCESS

Annexure A: Level of public participation
Annexure B: Site notice text
Annexure C: Proof of displayed notice boards
Annexure D: Background Information Document (BID) text
Annexure E: Proof of given Background Information Document (BID)
Annexure F: Advertisement text
Annexure G: Proof of placed advertisement
Annexure H: List of Registered Interested and Affected Parties
Annexure I: Comment and Response Sheet
Annexure J: Copies of Comments Received

APPENDIX E: IMPACT ASSESSMENT

Annexure A: Impact Assessment
Annexure B: Leipold Matrix

APPENDIX F: SPECIALIST REPORTS

Annexure A: Visual Impact Assessment
Annexure B: Heritage Impact Assessment
Annexure C: Chiropteran Assessment (Bat Survey)
Annexure D: Grazing, soils and wetland Impact Assessment
Annexure E: Traffic Impact Assessment
Annexure F: Social Impact Assessment
Annexure G: Fauna and Flora Impact Assessment

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Annexure F: Social Impact Assessment

Annexure G: Fauna and Flora Impact Assessment