Draft Basic Assessment Report

July 2018

PROPOSED PORTION 2 OF FARM ROODE PAN 150, HOPETOWN RD

19MW PHOTOVOLTAIC SOLAR ENERGY FACILITY

Orania

Northern Cape Province

RENEWABLE ENERGY

DOCUMENT DESCRIPTION

Client:	Solar Capital Pty Ltd
Project Name:	The proposed construction of Portion 2 of Farms Roode Pan 150, Hopetown RD PV Solar Energy Facility in Orania, Northern Cape Province
Report Type:	Draft Basic Assessment Report
Ecocompliance Ref:	SCL2018/06
Compiled by:	Percy Ngidi

EXECUTIVE SUMMARY

1. Inleiding

Solar Capital (Edms) Bpk (hierna “Solar Capital”) het Ecocompliance aangestel as hoofkonsultant om die omgewingsimpakstudie- (OIS-)proses te bestuur vir die oprigting van ’n voorgestelde fotovoltaïese sonenergiefasiliteit en gepaardgaande infrastruktuur op gedeelte 2 van die plaas Roode Pan 150. Die terrein is geleë sowat 2 km buite die dorp Orania in die Noord-Kaapprovinsie. Die voorgestelde projek beoog die gebruik van fotovoltaïese (FV) tegnologie met ’n maksimum leweringsvermoë van ongeveer 20 MW, wat aan die bestaande Orania-substasie sowat 2 km vanaf die terreingrens gekoppel sal word. Die studiegebied val onder die regsbevoegdheid van die distriksmunisipaliteit Pixley ka Seme en die plaaslike munisipaliteit Thembelihle. Die aard en omvang van die voorgestelde fasiliteite word in meer besonderhede in hierdie agtergronddokument uiteengesit.

2. Projekoorsig

Die fasiliteit word voorgestel op **gedeelte 2 van die plaas Roode Pan 150 (hierna “plaas Roode Pan”)**, wat ongeveer 2 km suid van Orania geleë is. Die westelike grens van die studieterrein is naby die R369 tussen Hopetown en Petrusville (sien liggingskaart). Die studieterrein word as uiters geskik beskou vir die oprigting van ’n sonfasiliteit weens verskeie kernfaktore, waaronder die oorvloedige sonhulpbron, die klimaatsomstandighede, die grootte van die terrein, orografiese omstandighede, grondbeskikbaarheid sowel as die ligging naby Orania, Hopetown en Petrusville as ’n moontlike bron van arbeid. ’n Oorhoofse kraglyn van 75 kV sal gebruik word om krag uit die fasiliteit direk na die Eskom-elektrisiteitsnetwerk te gelei, hoewel dit onderworpe sal wees aan ’n afsonderlike OIS-proses.

’n Groter studiegebied van sowat **2 467 ha** word oorweeg waarbinne die fasiliteit opgerig sal word, hoewel die werklike ontwikkelingsvoetspoor van die voorgestelde fasiliteit kleiner sal wees, na gelang van die spesialis se bevindinge. Daarom kan die FV panele en die gepaardgaande infrastruktuur op gepaste wyse binne die grense van die groter terrein geplaas word om enige bepaalde omgewingsensitiwiteit te voorkom.

Die fasiliteit sal onder meer uit die volgende infrastruktuur bestaan:

- FV sonpanele met ’n opwekkingsvermoë van 20 MW
- Fondamente om die FV panele te ondersteun

- ’n Substasie op die terrein, met ’n direkte koppeling aan die bestaande Orania-substasie deur middel van ’n oorhoofse kraglyn
- Kabelwerk tussen die projekkomponente, welke kabels ondergronds gelê sal word waar dit prakties uitvoerbaar is
- Interne toegangspaaie
- Werkwinkelarea vir instandhouding en berging

Die ontwerp en uitleg van die fasiliteit is bedoel om maksimum elektrisiteit deur blootstelling aan sonstraling op te wek, en terselfdertyd infrastruktuur-, bedryfs- en instandhoudingskoste sowel as maatskaplike en omgewingsimpak te beperk. Die gebruik van sonenergie vir kragopwekking put geen natuurlike hulpbronne uit nie, en stel ook geen kweekhuisgasse vry nie. Die opwekking van hernubare energie dra by tot Suid-Afrika se elektrisiteitsopwekkingsmark, wat tot dusver deur steenkoolgebaseerde kragopwekking oorheers is.

3. Fotovoltaïese sonenergiefasiliteite en kragopwekking

Sonenergiefasiliteite soos dié wat van FV panele gebruik maak, benut die energie van die son om elektrisiteit op te wek deur ’n proses wat die fotovoltaïese effek genoem word. Hierdie effek verwys na die botsing van ligfotone met elektrone, wat die elektrone dan in ’n hoër energietoestand plaas sodat dit kan elektrisiteit skep.

’n Fotovoltaïese sel word gemaak van silikoon, wat as ’n semigeleier dien en die fotovoltaïese effek voortbring. Individuele FV selle word gekoppel en agter ’n beskermende glasblad geplaas om ’n fotovoltaïese paneel te vorm. Die FV sel word aan die een kant positief en aan die ander kant negatief gelaai, en elektriese geleiers word aan albei kante gekoppel om sodoende ’n stroombaan te vorm. Hierdie stroombaan vang die vrygestelde elektrone in die vorm van ’n elektriese stroom (gelykstroom) vas. ’n Omkeerder word dan gebruik om hierdie gelykstroom in ’n wisselstroom om te skakel. Daarna word die elektrisiteit deur ’n kraglyn gelei vir verspreiding en gebruik.

Figuur 1: FV panele uit die lug en op grondvlak.

Die FV panele sal geheg wees aan ’n steunstruktuur en sal teen die regte hoek geïnstalleer word om die maksimum hoeveelheid sonstraling te ontvang. Die hoek van die paneel hang af van die breedteligging van die voorgestelde fasiliteit, en die hoeke kan aangepas word om somer- en wintersonstraling die beste te benut. Die FV panele is ontwerp om vir langer as 20 jaar ononderbroke, onbeman en met weinig instandhouding te funksioneer.

Figuur 2: Lugfoto van FV fasiliteit.

4. Omgewingsimpakstudie- (OIS-)proses

Ingevolge die OIS-regulasies wat kragtens artikel 24(5) van die Wet op Nasionale Omgewingsbestuur 107 van 1998 ("NEMA") gepubliseer is, moet Solar Capital (Edms) Bpk toestemming van die Nasionale Departement van Omgewingsake ("DEA"), in oorleg met ander staatsbelanghebbendes, ontvang om die voorgestelde hernubare-energiefasiliteit op te rig en te bedryf. Volgens artikel 24 en 24D van NEMA, gelees in samehang met die OIS-regulasies, moet 'n omvangsbepaling- en OIS-proses vir hierdie voorgestelde projek gevolg word. Ten einde toestemming te verkry, moet omvattende, onafhanklike omgewingstudies ooreenkomstig die OIS-regulasies uitgevoer word.

'n OIS is 'n doeltreffende beplanning- en besluitnemingsinstrument. Daarmee word die moontlike omgewingsgevolge wat 'n tegniese fasiliteit gedurende die oprigting sowel as die bedryf daarvan kan hê, geïdentifiseer en behoorlik bestuur. Dit bied ook die aansoeker 'n vroeë waarskuwing van enige moontlike omgewingskwessies, en maak dit moontlik om die kwessies wat uit die omgewingsverslae sowel as gesprekke met belangstellende en geaffekteerde partye spruit, uit te stryk.

Solar Capital het Ecocompliance as onafhanklike omgewingskonsultant aangestel om die vereiste OIS-proses te onderneem, enige moontlike omgewingsimpak verbonde aan die voorgestelde projek te bepaal, en toepaslike tempering- en bestuursmaatreëls deur middel van ’n omgewingsbestuursprogram (“EMPr”) voor te stel. As deel van hierdie omgewingstudies sal belangstellende en geaffekteerde partye aktief betrek word deur ’n openbare deelnameproses wat Ecocompliance sal onderneem.

5. Moontlike impak verbonde aan die voorgestelde fasiliteit

’n Aantal moontlike omgewingsinvloede, sowel positief as negatief, verbonde aan die voorgestelde sonenergiefasiliteit is geïdentifiseer. Dit sluit die volgende in:

Ekologie	Die oprigting van die fasiliteit en gevolglike ontwrigting van plantegroei kan ’n impak hê op die ekologie.
Maatskaplik	Die oprigting en bedryf van die fasiliteit kan tot beperkte werksgeleenthede lei, en kan ook ’n impak hê op plaaslike grondgebruik.
Landbou	Moontlike impak op landboupotensiaal en grondvermoë van die terrein
Visueel	Die voorgestelde ontwikkeling kan ’n moontlike impak op die visuele en estetiese waarde van die terrein hê.
Erfenis	Erfenisterreine en fossiele/paleontologie kan moontlik gedurende die oprigting van die fasiliteit ontwrig of vernietig word.
Voëllewe	Moontlike impak op voëls in die omgewing

Spesialisstudies sal gedoen word om die beduidendheid van hierdie moontlike invloede te bepaal en te beoordeel. Die moontlike omgewingsimpak verbonde aan die nie-uitvoering van die voorgestelde projek sal ook ondersoek word. Spesialisstudies sal gegrond word op bestaande inligting, veldwaarnemings en kommentaar uit die openbare deelnameproses. As ’n belangstellende en geaffekteerde party, word u kommentaar as ’n belangrike deel van hierdie proses beskou, en moedig ons u aan om deel te neem.

6. Openbare deelname

Die openbare deelnameproses is bedoel om inligting oor te dra, en bied u ’n geleentheid om uit die staanspoor aktief betrokke te wees by die OIS. Kommentaar en bydraes van belangstellende en geaffekteerde partye gedurende die OIS-proses word aangemoedig om te verseker dat enige moontlike impak as deel van die studie aandag ontvang.

Die openbare deelnameproses wil verseker dat belangstellende en geaffekteerde partye:

- volledige inligting met alle tersaaklike feite van die aansoek ontvang om te bestudeer;
- se deelname so gefasiliteer word dat hulle ’n redelike geleentheid ontvang om op die voorgestelde projek kommentaar te lewer; en
- genoeg tyd ontvang om op die bevindinge van die konsep- basiese studieverslag kommentaar te lewer.

7. U verantwoordelikhede as ’n belangstellende en geaffekteerde party

Ingevolge die OIS-regulasies word u hiermee op u verantwoordelikhede as ’n belangstellende en geaffekteerde party gewys:

- Om aan hierdie OIS-proses deel te neem, moet u op die projekdatabasis registreer.
- U moet sorg dat enige kommentaar oor die voorgestelde projek binne die aangeduide tydraamwerke ingedien word.
- U moet enige moontlike direkte sake-, finansiële, persoonlike of ander belang by die goedkeuring of weiering van die aansoek om die voorgestelde fasiliteit verklaar.

Indien u uself as ’n belangstellende en geaffekteerde party vir hierdie voorgestelde projek beskou, moedig ons u aan om gebruik te maak van die geleenthede wat die openbare deelnameproses skep om kommentaar te lewer, of om daardie kwessies te opper wat u bekommer en/of interesseer en waaroor u graag meer inligting wil hê. U deelname aan hierdie proses is ’n kernelement van die OIS.

8. Kommentaar en navrae

Rig alle kommentaar, navrae of reaksies aan:

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Background Information

The Department of Energy (DoE), through its energy policy initiatives has initiated a programme to include renewable energy source into its energy supply pool. These alternative sources of energy will be used to generate electricity and supply the energy to the national grid. DoE is also looking at developing generating facilities in various solar parks within the Solar Corridors in the Northern Cape Province where there is sufficient radiation to generate solar energy. Solar Capital Pty Ltd (SC) has identified this opportunity to generate and supply solar energy to the national grid through these energy initiatives from DoE. Ecocompliance Pty Ltd (Ecocompliance) was appointed to undertake the Environmental Impact Assessment (EIA) on behalf of SC to ensure that all environmental aspects are considered and potential negative impacts mitigated accordingly. The proposed photovoltaic solar energy facility (PVSEF) and associated infrastructure will be located on **Portion 2 of Farm Roode Pan 150, Hopetown RD**; located approximately 2km from Orania town in the Northern Cape Province. The proposed project is envisaged to make use of the photovoltaic (PV) technology with a maximum output of approximately **19MW** which will be connected to the existing Orania Substation located approximately 2km from the site boundary. The study area is located within the jurisdiction of the Pixley ka Seme District Municipality and Thembelihle Local Municipality. The nature and extent of the proposed facility is explored in more detail in this Draft Basic Assessment Report (DBAR). The EIA process is a legal requirement in terms of National Environmental Management Act, 107 of 1998 (NEMA) as amended.

9. Project Description

The proposed project consists of the following infrastructure development but not limited to:

- Construction of the solar facility bulk infrastructure (power blocks, collector substation, underground cables, etc)
- Solar panel arrays;
- Building infrastructure;
- Storm water, drainage and sewage;
- Telecommunication;
- Subsoil & topsoil stockpile area;
- Internal access roads; and
- Workshop & office areas
- An onsite control room

The final proposed development footprint will be informed by the findings of the specialist studies undertaken. It is envisaged that the development footprint will be much smaller than the actual study area.

In terms of the EIA regulations, a feasible and reasonable alternative has to be considered within the EIA process, including “No Go” option. All identified, feasible and reasonable alternatives are required to be identified in terms of social, biophysical, technical and economic factors.

The EIA process for the proposed 19MW solar energy facility comprises of the following tasks:

Key tasks undertaken within the draft basic assessment phase

- Identify important characteristics of the affected environment
- Ensure openness and transparency of the EIA process
- Assessment and determination of possible impacts of the proposed Project on the biophysical, socio-economic environment and associated mitigation measures, and
- Ensure compliance to the relevant and applicable legislation
- Identification and registration of stakeholders
- Consultation with the relevant authorities
- Undertaking desktop studies

10. Evaluation of the Proposed Project

Issues identified through the desktop study as being potentially associated with the proposed project and associated infrastructure includes:

- Impacts on biodiversity including habitat alteration
- Impacts on heritage resources
- Impacts on avifauna
- Impacts on water resources
- Visual impacts
- Social impacts (positive and negative)

Based on the desktop studies and site visits undertaken to date, no environmental flaws were identified that would prohibit the project from continuing as this stage of the process. However, a site inspections undertaken by the specialist has recommended that certain areas be excluded from the study due to the drainage lines that are found in that section of the farm.

Most of the environmental impacts are expected to occur during the construction phase of the development, although a number of environmental impacts can also be expected during the operation phase.

Environmental impacts associated with **construction and decommissioning** are similar in nature and include inter alia:

- Impact on Ecology
- Impact on Heritage resources
- Impact on surface water resources
- Impact on visual receptors
- Social impacts
- Impact on soil and agricultural potential of the site

Environmental impacts specific to **operational phase** of the proposed development include inter alia:

- Long term loss of fauna and flora and disruption of broad scale ecological processes
- Change in land use and potential of soil loss
- Visual impacts
- Social impacts
- Modified surface water runoff

11. Cumulative Impacts

The cumulative impacts associated with large solar facility developments are largely linked to the impacts on the sense of place and visual impacts. Due to the possibility of other solar plants being constructed in proximity to the proposed site, significance of potential cumulative impacts, specifically on the landscape, sense of place and visual impacts has to be assessed thoroughly during the EIA process. There are no solar plants currently constructed in Orania, however, there are similar projects proposed around Petrusville (approximately 50km from Orania) and these projects are not anticipated to contribute significantly to the overall cumulative impacts in Orania.

12. Structure of this Report

The Basic Assessment Report generally consists of the following sections:

- **Introduction**: The section provides background to the proposed project and the Environmental Impact Assessment Process
- **Draft BAR**: This section describes the study approach used to gather all the information, assumptions, and limitations. The chapter also includes the approach that will be considered and reported on in the final BAR.

- **Legal Requirements**: This section outlines legislation, policies and guidelines applicable to the proposed development.

- **Public Participation Process**: This section describes the methodology used for the Public Participation Process and the findings or results of this PPP

- **Project Description and Alternatives**: The chapter describes the environmental planning and design aspects of the project. The chapter also addresses design options that were considered in order to ensure that the proposed project is technically feasible without significantly impacting on the biophysical and socio-economic environment.

- **Description of the Affected Environment:** This chapter describes the key elements of the socioeconomic and biophysical environment. The chapter will also meant to incorporate any findings of any studies undertaken during the desktop studies phase and issues and concerns raised during the public participation process.

- **Identification of Potential Environmental Impacts:** This section is a description of the potential environmental impacts of the proposed project based on the field assessment and specialist findings. A summary of the most important findings will be provided.

- **Conclusion and Recommendations:** This chapter summarises the key findings and conclusions drawn from the impact assessment process, and further provides recommendations for the phases to follow.

13. Details of the Applicant

The Applicant for this development is Solar Capital (Pty) Ltd, which is a South African private company active in the development and implementation of renewable energy projects. The applicant has undertaken various solar PV energy projects in various parts of South Africa. Some of the completed and operational solar projects includes Ilanga Lethemba PV solar projects in De Aar, Northern Cape Province.

The Contact Details of the applicant are provided below:

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Ecocompliance

Proposed 19MW PV Solar Energy Facility, Orania

Northern Cape Province

Document Description

Executive Summary (Afrikaans & English)

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Abbreviations

BID	Background Information Document
CAA	Civil Aviation Authority
CSP	Concentrated Solar Power
DC	Direct Current
DEA	Department of Environmental Affairs
DEADP	Department of Environmental Affairs and Development Planning
DENC	Department of Environment & Nature Conservation
DOE	Department of Energy
DSR	Draft Scoping Report
DAFF	Department of Agriculture, Forestry & Fisheries

DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
GIS	Geographic Information System
Ha	Hectare
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producers
Km	Kilometre
KV	Kilovolt
M	Metre
NEMA	National Environmental Management Act (107 of 1998)
NERSA	National Regulator of South Africa
NWA	National Water Act (36 of 1998)
PPP	Public Participation Process
PV	Photovoltaic
REIPPPP	Renewable Energy independent Power Producer Procurement Programme
SAHRA	South African Resource Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards
SANBI	South African National Biodiversity Institute

SDF	Spatial Development Framework
SIA	Social Impact Assessment
SKA	Square Kilometre Array
ToR	Terms of Reference
VIA	Visual Impact Assessment
WMA	Water Management Area

1. INTRODUCTION

The Department of Energy (DoE), through its energy policy initiatives has initiated a programme to include renewable energy source into its energy supply pool. These alternative sources of energy will be used to generate electricity and supply the energy to the national grid. DoE is also looking at developing generating facilities in various solar parks within the Solar Corridors in the Northern Cape Province where there is sufficient radiation to generate solar energy. Solar Capital Pty Ltd (SC) has identified this opportunity to generate and supply solar energy to the national grid through these energy initiatives from DoE. Ecocompliance Pty Ltd (Ecocompliance) was appointed to undertake the Environmental Impact Assessment (EIA) on behalf of SC to ensure that all environmental aspects are considered and potential negative impacts mitigated accordingly. The EIA process is a legal requirement in terms of National Environmental Management Act, 107 of 1998 (NEMA).

1.1 Project Location

The proposed photovoltaic solar energy facility (PVSEF) and associated infrastructure will be located on **Portion 2 of Farm Roode Pan 150, Hopetown RD**; located approximately 2km from Orania town in the Northern Cape Province. The proposed project is envisaged to make use of the photovoltaic (PV) technology with a maximum output of approximately **19MW** which will be connected to the existing Orania Substation located approximately 2km from the site boundary. The study area is located within the jurisdiction of the Pixley ka Seme District Municipality and Thembelihle Local Municipality. The locality map showing the proposed project area is shown in **Figure 1.1**. The proposed project will cover an area of approximately 300ha. The final project footprint will be confirmed during the final BAR phase due to various specialist studies finding which will inform the final layouts to be selected for the project. Environmental sensitive areas such as watercourses and botanical sensitive areas must be avoided to minimise significant environmental impacts.

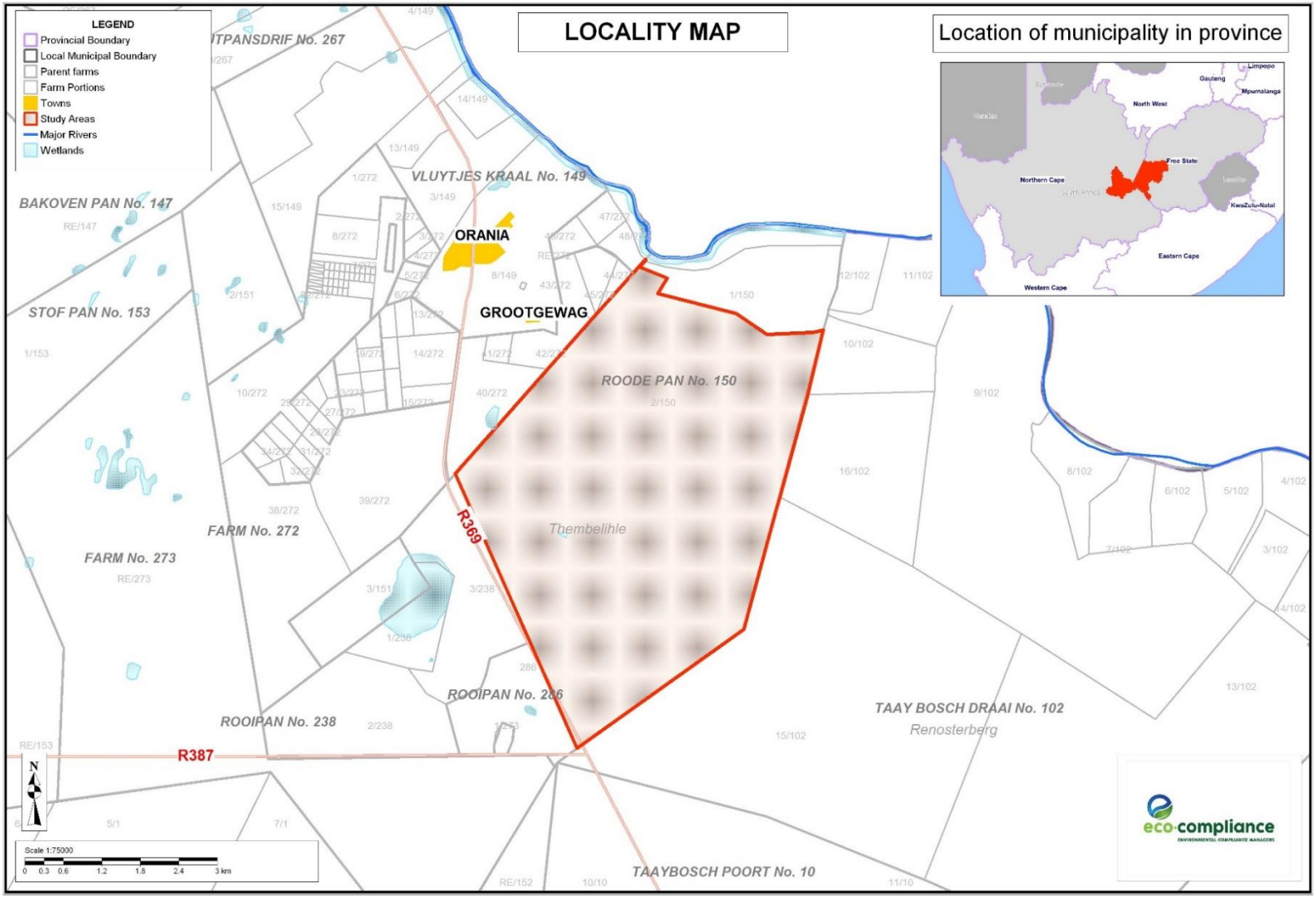

Figure 3: Locality map showing the proposed project site

Chapter 2 Needs and Desirability for the Project

Electricity generation sources need to be spread across various methods and resources to ensure security supply and reduction of carbon footprint created by heavy reliance of South Africa on coal to produce electricity. South Africa, amongst many nations, made commitments during the COP17 held in Durban, 2011, to reduce their carbon emissions. The use of renewable energy sources is an effort by the Government to honour those commitments and to also create much needed jobs in South Africa. The electricity demand is increasing in South Africa, and the renewable energy initiatives are used to meet these demands. Solar, wind, hydro, biomass and biogas are technologies that South Africa has identified that are to be developed and implemented.

The Northern Cape Province was identified as the most suitable location for solar projects, due to its consistent solar radiation, flat terrains and sparsely populated areas. Studies on solar radiation have indicated that Upington, De Aar and other small town within the Northern Cape Province are some of the highest areas in radiation in the world and would thus be good locations to develop solar energy projects.

The proposed project will be developed and operated by Solar Capital and will connect into the grid through the existing Orania substation located approximately 2km from the farm boundary. The proposed project will have a life of 25 to 30 years or more to generate 19MW of electricity from renewable solar power. The energy generated from this project will need to be integrated and connected with the local and provincial electricity grid to enable safe electricity supply, and this will be done in conjunction with Eskom who is the national power supplier.

There are major benefits associated with the proposed project and other similar project proposed for development around Orania and opportunities for economic development through national participation in the solar energy value chain. The studies undertaken have indicated that there are no fatal flaws to the establishment of the proposed project and could provide significant benefits to both the local and provincial economy in terms of job creation, skills transfer and carbon footprint reduction. However, recommendations to avoid drainage lines were made in the Ecological Impact Assessment Report and this will be adhered to.

Global Need for Renewable Energy

Global climate change has been the subject of extensive research for decades. As computational models have improved, so has the understanding of the processes, which bring about global climate change, and its likely consequences. Scientists worldwide hypothesize that global warming is occurring, and that greenhouse gas emissions, including emissions from coal fired power stations, are a major contributor. The Intergovernmental Panel on Climate Change (IPCC), an internationally recognized scientific body on climate change, concluded in its Fourth Assessment Report that climate change is unequivocally occurring and is due in large part to human activity (IPCC, 2007). In 2004, an international study on the effects of climate change showed that well over a million species could be potentially threatened with extinction (Thomas et al., 2004). The study clearly stated that climate change is the biggest new extinction threat. It also found that 15- 20% of all land species could potentially be saved from extinction if minimum, rather than maximum, anticipated climate warming occurs. This underlies the critical importance of rapid implementation of technologies to decrease greenhouse gas emissions and hence reduce climate warming. Renewable Sources such as including Solar Energy positively contribute to the reduction of climate change.

3. PROJECT DESCRIPTION

3.1 Project Components

The following chapter provides an overview of the proposed 19MW PV solar energy facility and include a description of the planning/design, construction, operation and decommissioning activities. The proposed project consists of the following infrastructure development but not limited to: (**see Figure 2 below**)

- Construction of the solar facility bulk infrastructure (power blocks, collector substation, underground cables, etc)
- Solar panel arrays;
- Building infrastructure;
- Construction of pipeline for water supply
- Storm water, drainage and sewage;
- Telecommunication;
- Subsoil & topsoil stockpile area;
- Internal access roads; and
- Workshop & office areas

The proposed development footprint will be informed by the findings of the specialist studies undertaken. It is envisaged that the development footprint will be much smaller than the actual study area. In terms of the EIA regulations, a feasible and reasonable alternative has to be considered within the EIA process, including “No Go” option. All identified, feasible and reasonable alternatives are required to be identified in terms of social, biophysical, technical and economic factors.

3.1.1 Foundations

Depending on the structure that is selected, the following foundation options may be considered.

- Mass concrete block foundation
- Ground screw foundation
- Concrete pile foundation

For fixed or rack structures, either driven steel piles or small concrete footings are cast in the ground for the foundations. These concrete foundations are typically of the same size as for small buildings

Figure 4: A completed and operation solar plant

3.1.2 Photovoltaic Modules

There are various types of PV modules defined according to the materials used:

- Si-Monocrystalline
- Si-Polycrystalline
- Thin Film
- High Concentrated

There are also a wide range of PV module manufacturers in the market. Currently the trend for utility scale facilities such as this is towards polycrystalline module technology. In the Independent Power Producer Procurement Programme an important bid criteria is local content and the use of locally manufactured or assembled PV modules is promoted to help the local economy, local job creation and the local communities. The pricing of the local versus imported modules will play a major role when the construction phase of the project commences.

3.1.3 Inverters

There are various types of inverters defined according to their technology: The inverter will be selected on the basis of making the most of its rated power according to the manufacturer specifications and the power to be installed in each site. The choice of inverter depends on the performance of the PV module chosen (type and model).

3.1.4 Distribution Centre

The distribution centre is where all the medium voltage lines coming from the various transformers are collected. The distribution centre is housed in a pre-fabricated or a steel structure and a MV line runs from here to the Eskom substation.

3.1.5 Lightning Protection

To protect the PV plant, equipment and personnel from lightning strikes, a lightning protection system composed of masts and surges arresters will be installed. This system will be designed by a specialist and will comply with the South African laws and standards applicable at the time construction phase commences.

3.1.6 Auxiliary Power Supply

The PV plant requires a continuous power supply for the operation of the plant. This is for the plant monitoring and control systems, the perimeter and security systems, lights and air-conditioning etc for the buildings. The most cost effective and efficient source for the auxiliary power supply is usually directly from the Eskom supply, however, a self-sufficient renewable energy source, probably in the form of PV modules, battery banks and inverters will be put in place.

3.2 Photovoltaic (PV) Solar Energy Facilities

3.2.1 Solar Energy

Solar energy represents an inexhaustible clean energy source that can be tapped and converted into electric power using various technologies such as the photovoltaic (PV) technology. Solar is indeed the energy force that sustains life on Earth for all plants, animals, and people. The earth is situated at the perfect distance and orbit from the sun and is essentially a giant solar collector that receives radiant energy from the Sun in the form of electromagnetic radiation in the order of 1,000 W/m^2 , although availability varies with location on earth and time of year. Solar energy can be converted through chemical (e.g., photosynthesis), thermal, or electrical (i.e., PV) processes. Capturing solar energy typically requires equipment with a relatively high initial capital cost. However, over the lifetime of the solar equipment, these systems can prove to be cost competitive, especially because there are no recurring fuel costs, as compared to conventional energy technologies.

3.2.2 Photovoltaic Systems

Solar electric power, or PV systems, is a cost-effective and viable solution to supply electricity for locations off the conventional electrical grid. PV power systems have been utilized almost everywhere. However, the higher capital cost of PV means it is most cost effective for remote sites where other, more conventional options are not competitive. There are often

misperceptions regarding what constitute a good candidate PV application and site; thus, careful site consideration is necessary to eliminate unsuitable locations. For instance, projects that require large amounts of power are generally nonstarters for PV consideration. PV systems have both advantages and disadvantages that should be carefully considered by the project implementer and the end user. PV project success is directly related to a clear knowledge of site conditions and resources, as well as an understanding of PV capabilities and limitations. What makes a site adequate for solar energy? What differences are there in resources from site to site? What is the approximate system cost?

- **Solar cell**. The PV cell is the component responsible for converting light to electricity. Some materials (silicon is the most common) produce a PV effect, where sunlight frees electrons striking the silicon material. The freed electrons cannot return to the positively charged sites ("holes") without flowing through an external circuit, thus generating current. Solar cells are designed to absorb as much light as possible and are interconnected in series and parallel electrical connections to produce desired voltages and currents.

- **PV module**. A PV module is composed of interconnected solar cells that are encapsulated between a glass cover and weatherproof backing. The modules are typically framed in aluminium frames suitable for mounting.

- **PV array**. PV modules are connected in series and parallel to form an array of modules, thus increasing total available power output to the needed voltage and current for a particular application. PV array may either be fixed, sun-tracking with one axis of rotation, or sun-tracking with two axes of rotation.

3.3 Supporting Infrastructure

3.3.1 Access Roads

The Solar Energy Facility will require a main access road to the facility, and a network of internal access roads will interlink each project field and the main control hub and administration office. The main access road will remain as the existing site access off the R369 road, which is in a fairly good condition and wide enough. However the site will require internal roads, which should be approximately 5 meters wide in order to accommodate site construction vehicles. Although there are already some existing access routes on the farm, these will need to be upgraded and constructed to a grade suitable for use by heavy delivery and maintenance vehicles and machinery.

3.3.2 Power Transmission Lines

The internal transmission lines from the PV modules will be buried underground cables and earthing (grounding) and in cable trenches. The trenches will where possible be run along the internal access road reverses and watercourse crossings. All energy generated would then be evacuated into the existing local grid at the existing Eskom Orania Substation located

approximately 2km from the site boundary. The authorization for connection into the grid at this substation shall be subject to Eskom's standard connection assessment and agreements between Eskom and the applicant.

3.3.3 Substation

The generated power will be connected into the existing Eskom Orania Substation. However, an onsite substation may be constructed depending on the agreements between Eskom and the applicant at the time of construction phase. It is also important to highlight that the overhead powerlines required to evacuate the generated power from the facility will be subject to a separate EIA process and is not part of this EIA process as the routes are not yet known nor agreed with between the applicant and Eskom.

3.3.4 Water Supply

- Possible sources for this water are to be investigated and the relevant authorities will be approached during the EIA process. The main water usage during construction phase is for domestic purposes and dust suppression. Based on previous experiences from the other applicant's projects, it is almost certain that precast concrete trucks will be used to bring in ready mixed concrete to the site. This lowers the need and use for water for concrete mixing.
- A PV plant does not require much water for operation. The only requirements are water for the domestic needs of the security and operational personnel and for the cleaning of the PV panels.
- Possible sources for this water are to be investigated and the relevant authorities will be approached during the planning stage, concurrent to the EIA process. Noting that the majority of the water is required for cleaning, the water could be obtained from the Orange River. Alternatively water could be procured from the Local Authority and brought to site by a vehicle equipped especially for the cleaning operation. The water for the "domestic" use could similarly be transported to site. Relevant permits will be obtained where necessary in order to remain compliant with the relevant legislation applicable at the time construction phases commences.

3.3.5 Stormwater & Drainage

The development is not likely to significantly increase stormwater runoff, however in areas which will be surfaced especially the roads, stormwater drains will be constructed to allow surface run-off to flow in the natural watercourses and as much as possible not alter or interfere any natural watercourses or surface water flow direction. The drainage system proposed will be a surface management system based on not collecting stormwater but rather spreading or distributing it over the site to soak away or drain slowly similarly to the normal pre-development flows. This avoids the soil erosion and downstream flooding problems normally associated with the concentrated flows.

3.3.6 Access Control, Security and Fencing

- The perimeter, access points and general site will be monitored by CCTV cameras infrared / night vision technology and passive intrusion detection systems. There will be security lighting which will be linked to the passive intrusion detection systems so will not be on all night.
- Given the high material values and risk of theft associated with PV panels and electrical cabling it is imperative that the perimeter fences and security systems get installed and commissioned as soon as is practical. This is especially so before the reticulation is operational, when the materials are less easy to steal.
- The process will be to first fence off a delivery, storage and processing area within the site as a start and then to erect the perimeter fence and security. This will allow the initial construction start up activities to begin earlier.

3.4 Construction Phase

The construction of the proposed Solar Energy Facility will take place in a phased approach. The project is anticipated to take approximately 9 months to complete. Once the construction has been completed all the temporary site camps and works will be removed from the site and vast majority the land will be restored to its original condition to the greatest degree possible before the operational phase is kicked off.

3.4.1 Surveying and Demarcation

Prior to the commencement of roads, foundations and PV erection, a number of enabling works need to be undertaken. These will include final Engineering design and a geotechnical assessment for the construction works to be undertaken on the site.

- This activity will also include the demarcation of the site and designating the various key construction areas, access roads, site works, site camps etc.
- The following areas have been defined for construction purposes and are indicated on the concept Site Development Plan:
    - Site Camps
    - Lay down area
    - Assembly area and
    - Waste management area

3.4.2 Construction of Site Camps and Lay-down Areas

- A temporary site camp or construction compound and associated parking will be set up on the site. The site camp will be used for the staging of materials and equipment, and will also serves as a gathering point for safety talks and will house office facilities for the staff involved in constructing the Project.

- Lay down areas are areas needed for the reception of different materials such as PV modules, rack or tracker components, motors, gears, electrical devices, conduits for wires, transformers, switchgears, prefabricated structures etc.
- Establishment of the laydown area will involve the removal of vegetation and the stripping and stockpiling of topsoil.
- The laydown area will be decommissioned and all temporary facilities removed when construction is completed, although portions of the area may be retained to provide vehicle parking for maintenance personnel and equipment storage.
- The lay-down provision must be made for the safe working area, parking excavation and delivery vehicles etc.

3.4.3 Site Clearance

- Owing to the relatively open or expansive nature of the PV plant and hence the construction process, no specific service or haul roads are envisaged.
- The site will be sufficiently cleared to allow access for the excavation equipment and the rough terrain vehicles that will deliver the site assembled PV rack or trackers structures to their positions.
- The development footprint portion of the site needed will be cleared, grubbed and graded by means of the necessary cuts and fills in order to condition the terrain to the maximum slopes allowed for buildings, roads and racks.
- Given the flat nature of the site there is very little cut and fill envisaged.
- Vegetative ground cover reduces dust which influences the PV panel efficiency. The re-growth of the ground cover or rehabilitation is thus important to the PV plant. It thus makes sense to minimise the disruption of the existing vegetative ground cover, however in general the entire site will be trampled and a vegetation rehabilitation measures will need to be implemented. Applicable vegetation clearance permits will be obtained from the relevant government department where necessary before vegetation clearance occurs.

3.4.4 Drainage Crossings

If drainage crossings will be required, box culverts will be constructed over these drainage watercourses in order to create the crossings. The crossings will be constructed to the standard that they can withstand larger, heavier loads. Relevant authorisation must be obtained before any drainage culverts are constructed.

3.4.5 Construction of Internal Roads

- The proposal is that the main access to the site will be directly from the local Regional Road, which runs adjacent to the site.
- Sufficient space will be allowed at the access point to ensure that the vehicles do not stack up on the road while being processed through security. Also the road alignment and layout will take into account the safety precautions necessary for road crossings.

- The road layout will be designed in order to ensure ease of access to every field and the horizontal geometry will be designed to enable the turning of trucks.
- During the operational phase access around the site is generally only required for security and routine inspection. Access for cleaning operations or maintenance is very infrequent, thus generally the internal service roads need only be gravel tracks.
- The topsoil removed would be stored in accordance with best practice methods, and later used for site restoration. Soils needed for backfill would be stored temporarily in bunds adjacent to the excavations until needed. Any remaining excavated material would be recycled to a local site needing clean fill material, or stockpiled for future use

3.4.6 Labour and Workforce

The project is anticipating employing over 200 various people from within the local community during the various stages of the construction phase. This is aimed at temporary job creation in a manner similar to the goals of the extended public works projects that use labour intensive methods where applicable and practical. According to previous projects, a description of “local” extends to a 50km radius. For this project, this includes town such as Hopetown, Petrusville, Phillipstown, Vanderkloof and Strydenburg.

3.5 Operation Phase

Once all the construction, erection, and commissioning are completed and the project is in the start- up phase, all temporary works will be removed and any disturbed areas shall be rehabilitated and restored to the original state. Once the solar energy facility is operational; very minimal human and vehicle activity will be required.

- The internal site roads will be used for periodic maintenance and safety checks.
- A comprehensive Supervisory Control and Data Acquisition (SCADA) system will be installed for remote monitoring and control, which will minimize the need for on- site personnel. The SCADA system ensures safe efficient operation of each turbine and of the overall Project Site.
- A Large notice board or signage board will be located at the entrance to the site. This sign will provide essential safety information such as emergency contacts and telephone numbers. Safety signs, such as speed limit and safety information, would also be installed throughout the Project Site. These signs will be maintained throughout the operational life of the wind farm.
- Scheduled maintenance work will be carried out several times each year throughout the operational phase. This will involve site light maintenance truck for approximately 6 weeks per year. Unscheduled maintenance is minimal, as the SCADA system provides 24- hour monitoring of the modules on site.
- As an example, but not limited to, the following activities occur in operation phase:
    - Checking and verifying of the electricity production
    - Maintaining and monitoring a weather station
    - Routine inspection of all equipment and systems

- Periodic maintenance
- Cleaning of PV modules
- Security operations
- The traffic generated by the PV plant during operation phase once the plant is generating electricity is negligible and will be of the order of four or five vehicles per day.

3.6 Decommissioning Phase or Upgrade

After the 20 years of operation, the PV plant will either be upgraded if a new license is granted or the plant will be decommissioned. Upgrading the PV power plant will consist of replacing old PV modules for new ones, increasing the total peak power of the plant (a process called "Repowering") or increasing the power of the plant by adding new elements such as trackers, PV modules or transformers. However; if the plant is to be decommissioned then the site should be returned to close to its original state. Besides the concrete, all of the components of a PV plant have an intrinsic value either for re-use or recycling. This value will cover the cost of decommissioning the plant and rehabilitating the site.

- The PV panels will be removed from the steel structures and sent to special recycling facilities without further disassembly at the site.
- The transformers and electrical control devices would either be removed for reuse, with or without re-conditioning, or sold as scrap after removal of the fluids.
- The electrical power management and conditioning equipment would be recycled or disposed of as scrap.
- The underground cable runs could be abandoned in place, or they could be pulled out. The cable has a very high scrap value so the latter is more likely.
- The steel in the fixed rack has high scrap value so these structures will be dismantled and removed for scrap.
- The gravel or aggregate in the access road, on-site service roads, in the electrical substations, transformer pads, and building foundations could be removed and recycled for use in other fill operations if not abandoned.
- The buildings can be taken over by the farmer for his operations or all the re-usable material can be removed and the shell demolished and the rubble taken away to a commercial dump site. Temporary buildings can be removed or relocated

Disturbed land areas can be rehabilitated, the rubble removed, the soil scarified and reseeded or replanted with indigenous vegetation. Part of the decommissioning and rehabilitation process would be the inspection for and documentation of the presence of industrial wastes in the soil from minor spills or leaks, and decontamination as necessary. If deemed necessary soil testing would be conducted after decommissioning. Transportation activities during site decommissioning would be similar to but less than those during site development and construction.

CHAPTER 4: CONSIDERATION OF ALTERNATIVES

4.1. Background

This section seeks to address the consideration and assessment of alternatives. The EIA Regulations call for feasible and reasonable alternatives to be considered during environmental impact assessment process. All identified, feasible and reasonable alternatives are required to be identified in terms of social, biophysical, economic and technical factors. In terms of the EIA Regulations, the definition of "alternatives" in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity which may include: (a) the property on which or location where it is proposed to undertake the activity; (b) the type of activity to be undertaken; (c) the design or layout of the activity; (d) the technology to be used in the activity; and (e) the operational aspects of the activity. The other critical aspects in the definition of project alternatives are terms such as 'reasonable', 'practicable', 'feasible' or 'viable'. Given the understanding, there are essentially two types of alternatives, the incrementally different (modifications) alternatives to the Project; and the fundamentally (totally) different alternatives to the Project.

- Fundamentally different alternatives are usually assessed at a strategic level and EIA practitioners recognise the limitations of project-specific EIAs to address fundamentally different alternatives. Electricity generating alternatives have been addressed as part of the National Integrated Resource Plan (NIRP) published by the National Energy Regulator of South Africa (NERSA) and the Integrated Strategic Electricity Plan (ISEP) undertaken by Eskom. Environmental aspects are considered and integrated into the NIRP and ISEP using the strategic environmental assessment approach, focusing on environmental life-cycle assessments, water-related issues and climate change considerations.
- The environmental impact assessment phase, thus, can only meaningfully consider site-specific alternatives of the proposed facility, and does not evaluate any other power generation options.

4.2. Project Planning

A great deal of project planning and preliminary design work has gone into the evolution process of the proposed facility. The development of the site development plan and project plan has involved assessment of various alternatives based on site findings, desktop analysis, pre-planning, site design, and stakeholder consultation. Alternatives have been considered at various levels:

- **Strategic site selection**: On a broad scale, this was performed to identify an appropriate study area where land could be leased and a proposal for a site could be developed by considering a wide range of technical and environmental criteria.
- The area required for the development of the PV plant is determined by a number of factors. Given that these sites are mostly flat, with a northern orientation, the key factors

determining the size of the site needed are the production capacity of the plant and the technology used.

- For purposes of the EIA it was decided to investigate a larger area than required for the PV plant envisaged for the application. This is in order to provide for sufficient space for the preferred technology and flexibility in the positioning and detail layout of the plant in response to on site or environmental conditions or for design optimisation.
- **Specific site design**: The overall objective of the planning process was to develop a project in a manner that will enhance the positive environmental, social and economic benefits, while reducing or minimizing the negative impact on the receiving environment.
- The site selection process was based on locating sites that matched as many as possible of the ideal criteria for the development of a PV electricity generation plant. These selection criteria will filter out alternative sites which are in some way or other not suitable for the development of a PV electricity generation plant that is environmentally and economically sustainable.
- The ideal PV plant site would have the following criteria;
    - High solar irradiation area. This allows for the maximisation of the solar energy received.
    - Flat to gently sloped terrain. This allows for the optimisation of the layouts and minimum interference with respect to shadows etc, between the individual trackers.
    - Northern orientation or no high obstructions to the north, east or west. This allows for efficiency.
    - Not in high potential agricultural land. This avoids conflict with competing activities and the national priority of food security.
    - Not in an environmentally sensitive area.
    - Suitable ground conditions. This is for the stability of the structures and reduction of construction costs.
    - Adjacent to an existing Eskom sub-station or power-lines on the Eskom grid. This avoids the necessity of transmission infrastructure and associated transmission losses over long distances.
    - Existing capacity at the sub-station and local grid to receive the generated electricity.
    - Potential to expand. This is about the sub-station having a reasonable demand growth and there being capacity for the expansion of the PV plant.

4.3 Strategic Site Selection

A range of criteria has been considered which affect the suitability of an area for a wind & solar Energy Facility and which could potentially constrain development. The criteria include technical, environmental, and land use considerations. The following is a comprehensive list of the criteria considered:

- **Technical Considerations**
    - Sufficient solar resource
    - Capacity of the local electrical distribution network
    - Proximity to Eskom substation

- **Environmental Considerations**
  - Proximity to provincial or nationally significant parks or wetlands
  - Proximity to natural areas and sensitive environments
  - Any other sensitive provincial or municipal designations
- **Land Use Considerations**
  - Other nearby land uses in the area;
  - Available access to the land and suitable ground conditions
  - Proximity to residential properties, communities, and towns
- **Planning Considerations**
  - Municipality official plans and zoning by-law regulations
  - Provincial Policy Statement and regional planning ordinances.
  - Available access to the land and suitable ground conditions o

4.4 Site Alternatives

The portions of land making up the proposed facility were chosen based on site selection and iterative design process based on all considerations outlined in the planning phase but also on the basis of ownership and willingness of the land owner to develop such a facility. Before zeroing in on this specific site, a number of other sites throughout the region province were looked, however few met the screening criteria. The proposed development site was therefore chosen because it met all the screening criteria.

No further site alternatives have been considered for the proposed project as the placement of solar panels depends strongly on the consistent solar radiation, the terrain and sparsely populated land, grid connectivity and good transport infrastructure. However, depending on the findings of the specialist studies, the layout plan can be modified to avoid areas identified as being sensitive by the specialists.

4.5 Technology Alternatives

Wind: Solar Capital has considered the option of constructing a wind farm to generate power and connecting it to the national grid as required by DoE but their main focus at this stage is solar energy power generation.

Solar: the construction of a PV solar energy facility is the preferred option for the applicant at this stage. The Northern Cape Province has sufficient solar radiation to meet the requirement for the development of a solar energy facility.

4.6 The “No-go” Alternative

The electricity demand in South Africa surpassed existing power generation capacity in 2008, causing nation-wide black-outs and load shedding. The crisis has temporarily been averted through the forced reduction of use to the mining industry by 10%, causing vast job-losses in its wake. South Africa requires additional capacity if it is to meet the growing demand for electricity. The 'do nothing' option will, therefore, contribute to these electricity demands not being met. Not meeting the growing electricity demand will have major adverse impacts on economic activity

and economic growth in South Africa, which in turn will have an adverse impact on socio-economic development in South Africa. Additional electricity generation options will contribute to meeting this energy demand. The recent increase in oil prices, the exhaustibility of fossil fuels and the urgent need for stable, reliable, non-polluting sources of electrical energy that are indispensable to a modern industrial economy focuses attention on alternative energy sources, such as renewable energy sources.

CHAPTER 5: LEGISLATIVE REQUIREMENTS

5.1. Introduction

This section provides a brief overview of the environmental legal requirements that are likely to have direct or indirect bearing or influence on the proposed project, and which need to be taken into consideration during the basic assessment process and the design, construction and operation of the project. The following outlines the various key pieces of legislation and policies from National, Provincial, and Local Government that have been considered in this draft BAR.

5.2 National Constitution of the Republic of South Africa

The Constitution of the Republic of South Africa, 1996 has major implications for environmental management. The main effects are the protection of environmental and property rights, the drastic change brought about by the sections dealing with administrative law such as access to information, just administrative action and broadening of the locus stand of litigants. These aspects provide general and overarching support and are of major assistance in the effective implementation of the environmental management principles and structures of the Environment Conservation Act and NEMA. Section 24 in the Bill of Rights of the Constitution specifically states:

"Everyone has the right –

- To an environment that is not harmful to their health or well-being; and
- To have the environment protected, for the benefit of present and future generations, through

reasonable legislative and other measures that -

  - Prevent pollution and ecological degradation;
  - Promote conservation; and
  - Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

This section of the Constitution obliges industries and organisations that are responsible for generating waste, to manage the waste in a way that will not cause pollution and thus negatively affect the health and well-being of humans.

5.3. National Environmental Management Act, 1998 (Act 107 of 1998)

The overarching environmental legislation for the management of the environment in South Africa is the National Environmental Management Act, 1998 (Act 107 of 1998 “NEMA”) and its amendments. This legislation states that sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of

environmental decisions to ensure that development serves present and future generations. Chapter 5 of NEMA makes provisions for regulations to be formulated and published. Section 28 of the Act places a duty of care on all persons not to degrade and pollute the environment, and should any such pollution or degradation occur, remedial steps must be taken. The liability regime is such that employees, companies and directors may accrue personal liability for clean-up and in some instances criminal prosecution should an environmental crime be committed. Section 30 of NEMA prescribes the steps to be taken should an environmental emergency incident occur.

5.4. National Water Act, 1998 (Act 36 of 1998)

The National Water Act (NWA) administered by Department of Water Affairs (DWA) aims to manage and protect the national water resources to achieve sustainable use of water for the benefit of all water users. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, and managed in ways that take into account:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and droughts.

5.5. National Environmental Biodiversity Act, 2004 (Act 10 of 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) provides for the management and conservation of South Africa’s biodiversity within the framework of the NEMA. This Act allows for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources and the establishment and functions of the South African National Biodiversity Institute.

Key elements of the Act are:

- The identification, protection and management of species of high conservation value;
- The identification, protection and management of ecosystems and areas of high biodiversity
- value;
- Biodiversity Initiatives such as and Biodiversity Conservation plans.

- Alien invasive species control of which the management responsibility is directed to the landowner; and
- Section 53 of the Act identifies that any process or activity that is regarded as a threatening process in terms of a threatened ecosystem, requires environmental authorization via a full Environmental Impact Assessment.

5.6. National Heritage Resources Act, 1999 (Act 25 of 1999)

The National Heritage Resources Act 25 of 1999 was introduced to ensure protection of South Africa's important heritage features. The act covers the following areas of heritage value:

- Archaeology
- Palaeontology
- Meteorites.
- Old structures
- Graves, both old and new
- As well as areas of historic cultural significance.

Tools used to conserve and manage these resources are the formal regulated EIA processes as well as permits issued by the South African Heritage and Resources Agency (SAHRA) to restrict and/or regulate development within a heritage environment. No heritage item may be removed, damaged or destroyed without authorisation. If the heritage assessment is performed as part of the EIA process, the comment of the responsible heritage agency must be obtained prior to a decision being made by the environmental authority.

5.7. Aviation Act, 1962 (Act 74 of 1962)

The Minister of Transport has under section 22(1) of the Aviation Act, 1962 (Act No 74 of 1962) promulgated the Civil Aviation Regulations (CAR's) of 1997. This legislation and regulations are primarily intended for ensuring safety of civil aviation. The key parts of these regulations, which are likely to have a direct bearing on the proposed Solar PV Facility, include the following:

CAR Part 139.01.33 - Obstacle limitations and marking outside aerodrome or heliport:

- Any structure exceeding 45m above ground level, or structures where the top of the structure exceeds 150m above the MEAN ground level, like on top of a hill, the mean ground level considered to be the lowest point in a 3 Kilometre radius around such structure. Structures lower than 45m, which are considered as a danger or a potential danger to aviation, shall be marked as such when specified.
- Specified markers are to be used to highlight structures when it is impractical to make them conspicuous by painting.

Part 91.01.10 of the CAR of 1997 - endangering safety, which states "No person shall, through any act or omission endanger the safety of an aircraft or person therein, or cause or permit an aircraft to endanger the safety of any person or property".

Part 185.00.1(1) (f) makes non-compliance with the above-mentioned Regulation an offence.

5.8. Occupational Health and Safety Act, 1993 (Act 85 of 1993)

The Occupational Health and Safety Act 85 of 1993 is South Africa's principle legislation concerning health and safety of employees. It also aims to protect persons who are not at work against hazard to health and safety arising out of or in connection with the activities of persons at work.

The Act places the responsibility on the employer to ensure a safe and healthy working environment and to cause every employee to be made conversant with health and safety requirements relevant to their work. At the same time the Act places the responsibility on the employee to follow its employer's health and safety procedures and instructions. A number of Regulations have been promulgated under the Act that are relevant to development including the following:

- General Administrative Regulations, 1994
- Asbestos Regulations, 2001
- Lead Regulations, 2003
- Regulations for Hazardous Chemical Substances, 1995
- Hazardous Biological Agents of 2001;
- General Safety Regulations, 1986
- Environmental regulations for workplaces (Department of Labour, 1994); and
- Construction Regulations, 2003.

5.9. National Forestry Act 84 of 1998

This Act is relevant for managing protected trees. A list of protected trees has been identified and no tree on the list may be removed, destroyed or damaged prior to authorisation being obtained from the relevant competent authority at the time.

5.10. Fencing Act 31 of 1963

Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the protection of flora.

5.11. National Veld and Forest Fire Act 101 of 1998

The purpose of the Act is to prevent and combat wildfires, veld, and forest and mountain fires throughout the Republic. A duty is placed on landowners to maintain firebreaks.

5.12. National Energy Act (Act No 34 of 2008)

The Act is aimed 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 and interactions amongst economic sectors.

The Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The act also establishes an institution to be responsible for promotion of efficient generation and consumption of energy and energy research; and to provide for all matters connected therewith.

5.13. Guideline Documents

The general approach to this study has been guided by the principles of Integrated Environmental Management (IEM). In accordance with the IEM an open, transparent approach, which encourages decision-making, that has been accountable, has been adopted. IEM is a procedure for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy aims to achieve a desirable balance between conservation and development (DEAT, 1992). The IEM guidelines intend encouraging a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. Further to the above guidelines, other best practice guideline documents from other provinces and also international source have been used in the scoping report and also in the environmental impact assessment phase to be done. Among these guidelines are those developed by the Western Cape Provincial Environmental Department, which include:

- Guideline for Determining the Scope of Specialist Involvement in EIA Processes;
- Guideline for the Review of Specialist Input into the EIA Process;
- Guideline for Involving Biodiversity Specialists in EIA Processes;
- Guideline for Involving Heritage Specialists in EIA Processes;
- Guideline for Involving Visual and Aesthetic Specialists in EIA Processes;
- Guideline for Involving Economists in EIA Processes;
- Guideline for Environmental Management Plans; and
- Guideline for Involving Social Assessment Specialists in EIA Processes.

International Guidelines used include:

- Guidelines for Landscape and Visual Impact Assessment (The Landscape Institute and the Institute of Environmental Management and Assessment, 2002); Those EAP and the specialists involved with the proposed Solar Energy Facility have and shall ensure these guidelines are used and implemented where applicable and appropriate.

5.14. Policy on Renewable Energy

The White Paper on Renewable Energy supplements the government's overarching policy on energy as set out in its White Paper on the Energy Policy of the Republic of South Africa (DME, 1998), which pledges 'Government support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications'. Government's overall vision for the role of renewable energy in its energy economy is:

An energy economy in which modern renewable energy increases its share of energy consumed and provides affordable access to energy throughout South Africa, thus contributing to sustainable development and environmental conservation.

The purpose of this White Paper is to set out government's principles, goals and objectives for renewable energy. It furthermore commits government to a number of enabling actions to ensure that renewable energy becomes a significant part of its energy portfolio over the next ten years. With an increasing demand in energy predicted and growing environmental concerns about fossil fuel based energy systems, the development of large-scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing the environmental impacts.

CHAPTER 6. METHODOLOGY FOR IMPACT ASSESSMENT

This section provides a detailed description of the environmental impact assessment process and the methodology used to complete the environmental impact assessment study for the proposed solar energy facility.

6.1. The Environmental Impact Assessment Regulations

The overarching environmental legislation for the management of the environment in South Africa is the National Environmental Management Act, 1998 (Act 107 of 1998 "NEMA") and its amendments. This legislation states that sustainable development requires the integration of social, economic and environmental factors in the planning, implementation and evaluation of environmental decisions to ensure that development serves present and future generations. Chapter 5 of NEMA makes provisions for regulations to be formulated and published and these became effective from August 2010.

These EIA regulations replaced the Environmental Impact Assessment Regulations promulgated in 2006. Section 24 (F) of the NEMA prohibits a listed activity from commencing prior to the authorisation thereof by the competent authority. The purpose of these Regulations is "to regulate procedures and criteria as contemplated in Chapter 5 of the National Environmental Management Act for the submission, processing, consideration and decision of applications for environmental authorisation of activities and for matters pertaining thereto."

In terms of these EIA Regulations, there are two major categories of Environmental Impact Assessment Processes namely:

- Basic Assessments:
- Scoping and Environmental Impact Assessment (commonly referred to as Full EIAs).

6.2. Listed Activities

Further to the above, the EIA Regulations in Government Notice No. R. 982 make reference to a schedule of listed activities which may not commence prior to authorization. These contemplated listed activities are identified in Government Notices No. R. 983, No. R. 984 and No. R. 985 of 2014.

The relationship of the listed activities and the EIA process is as follows:

- In terms of Environmental impact assessment process, all listed activities identified under Government Notices No. R. 982 and R. 983 of 2014, require a Basic Assessment to be undertaken as part of the application for authorization; and

- All listed activities identified under Government Notices No. R. 984 require a scoping and environmental impact assessment to be undertaken as part of the application for authorization.

With respect to the proposed Portion 2 of Farm Roode Pan 150 Photovoltaic Solar Energy Facility the following table summarises the listed activities, which the proposed development is likely to trigger, for which this draft Basic Assessment Report and Application for Environmental Authorization has been prepared.

Table 1: Listed Activities likely to be triggered by the proposed Farm Roode Pan 150 PVSEF

Detailed description of listed activities associated with the project	
Listed activity as described in GN R 983, 984 and 985	Description of project activity that triggers listed activity
GN R327 Item 1(i): *the development of facilities or infrastructure for the generation of electricity from a renewable resource where the output is 10MW but less than 20MW*	*The proposed solar energy facility will have an output of 19MW*
GN R327 Item 11(i): *the development of facilities or infrastructure for the transmission and distribution of electricity outside urban edge or industrial complexes with a capacity of more than 33kV but less than 275kV*	*A network of underground cables will form part of the proposed development*
GN R327 Item 12(iii): *the development of bridges exceeding 100square metres in size*	*Certain section of the road network may cross watercourses and construction of bridges*
GN R327 Item 24(ii): the the development of a road with a reserves wider than 13.5m, or where no reserve exists where the road is wider than 8m	*The proposed development will have roads constructed to access the site*
GN R327 Item 27: *the clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation*	*Certain areas of the project site will require vegetation clearance and limited civil works to ensure that the ground is flat enough for the solar modules and supporting structures*

Given the above listed activities likely to be triggered by the proposed development, whereby a number of activities fall within Government Notices No. 983, the proposed development will be subjected to a detailed basic assessment process.

6.3 The Basic Assessment Process

6.3.1 The Competent Authority

The competent authority in respect of this application will be the National environmental authority; the Department of Environment Affairs (DEA) in Pretoria, specifically because of the listed activities above includes an Energy Generation Facility, which is a national competency. The Northern Cape – Department of Environment and Nature Conservation (DNEC) has been notified as a key stakeholder in a commenting capacity on the Scoping and EIA process.

6.3.2 Consultation with Authorities and Key Stakeholders

During the assessment phase a number of stakeholders and other regulating authorities were identified and were furnished with the background information document and requested to comment on the proposed development. The registration process for stakeholders is ongoing.

6.3.3 Identification of Potential Environmental Impacts

Potential positive and negative direct and indirect environmental impacts associated with the proposed project were identified within the assessment phase and have been evaluated through specialist studies and site inspection. A number of specialists have undertaken some desktop studies and site inspections and their findings have impacted on the final recommendations on this report.

6.3.4 The Public Participation Process

In terms of the EIA Regulations, a detailed and appropriate Public Participation Process must be undertaken as part of the assessment process. The details of the public participation process undertaken are presented in Section 9 of this report.

6.3.5 Specialist Studies

It is a requirement from the NEMA EIA Regulations, 2010 that specialists assessments be undertaken in order to investigate may key environmental issues that may be impacted by the proposed development. The following specialists and specialist studies have been appointed to undertake the specialist studies during the Environmental Impact Assessment Phase of the proposed development.

Table 2: Project Specialists

Specialist Field	Specialist Name
Biodiversity Impact Assessment	Johan De Preez
Heritage Impact Assessment	Dr D. Kgotleng
Paleontological Impact Assessment	Dr. D. Kgotleng

Avifauna Impact Assessment	Luke Stragnell
Visual Impact Assessment	Willem Ritcher
Social Impact Assessment	Hilda Bezuidenhout
Agriculture Potential	D.G Paterson

The Terms of Reference including Specialist Declaration of Interest for the above identified specialist studies are detailed in their specific reports. The findings of the abovementioned specialist studies have been incorporated in this draft Basic Assessment Report and attached as Annexure D of this DBAR.

Chapter 7: DESCRIPTION OF THE RECEIVING ENVIRONMENT

This section provides a description of the receiving environment and local setting within the project area. Information provided in the various specialist studies were used to describe the surrounding environment.

7.1 The Project Regional Setting

7.1.1 Administrative Region

The proposed project will be located within the Pixley Ka Seme District Municipality in the Eastern Karoo Region of South Africa. The closest town to the proposed project site is Orania located approximately 2km North East of the site. See Figure below

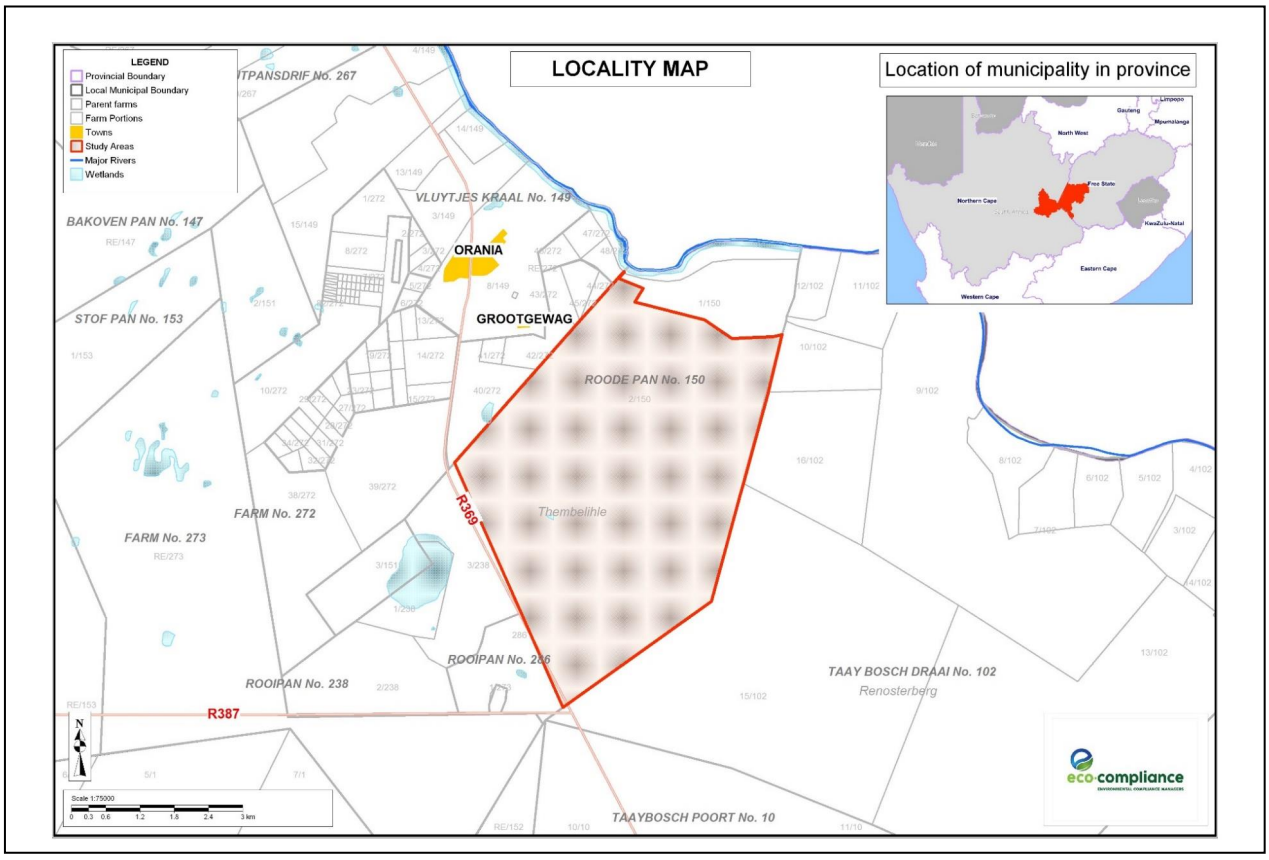

Figure 5: Map showing the location of the site

The site is accessible via the R369 connecting Orania and Petrusville. There are several internal dirt roads which will be upgraded to accommodate construction vehicles during construction and operation phases.

Figure 6: some internal farm road will need to be upgraded

7.1.2 Socio-Economic Context.

Orania is a predominantly Afrikaner farming town in South Africa located along the Orange River in the Karoo Region of the Northern Cape Province. A local census carried out in 2014 found 1,085 inhabitants in 386 households – an average of 3.5 people per household. The population is currently estimated at 1500 inhabitants. Children made up a quarter of the population in 2007. The population had grown by 10% annually over the three years to 2015. In 2013, more than 100 businesses were located in Orania. Economic services provided in town include a call centre, stockbroking and architecture. The community's annual turnover in 2011 was estimated at R48million with an average wage at approximately R4 000 per month. In 2015, a visiting journalist estimated the poverty rate of 70-80% in Orania. People from all levels of society generally perform their own manual labour and rapid growth had led to the construction of new commercial developments which contributes to the town economic growth.

The Orania Chamber of Commerce was established in 2001. The Orania Spaar-en Kredietkoöperatief (Orania Savings and Credit Co-operative) is a local cooperative bank. It

registered with the South African Reserve Bank in 2011, and in 2013 it had R45 million in savings deposits.

Farming is an important part of Orania's economy, the most prominent project being a massive pecan nut plantation, one of the largest in South Africa. The plantation is said to have given Orania a substantial economic boost. Most of the agricultural production is exported to China. Since purchasing the 430-hectare town, the community has added 7,000 hectares of agricultural land to it. A pumping station on the Orange River, financed and built by the town's residents, provides water for agricultural use. The station is connected to a 9km pipeline. The construction industry is also an important element of the local economy. Orania counts 8 construction companies as of 2017.

7.2 The Biophysical Environment

7.2.1 Climate

Orania is part of the Nama Karoo biome, and receives 200–250mm of rain a year. The area around the town is semi-arid, however, more than 30 000 tress have been planted in Orania and the surrounding farmlands.

Table 3: Average annual rainfall and temperature of the area

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high °C	34.1	30.6	26.2	22.7	17.7	18.9	23	28.2	27.2	30.1	31.7	27.1
Average low °C	17.9	16.7	14.4	12.5	3.8	3.4	1.5	4.2	9.9	12.1	13.4	17.1
Average Rainfall (mm)	65	5	30	26	0	0	0	0	0	0	0	129

7.2.2 Geology & Soils

The geology consists of mud and sandstone of the Ecca Group. The soil varies from deep Aeolian sand deposits of the Hutton, Bainsvlei and Plooysburg forms. The clayey soils are of the Kroonstaad, Rensburg forms (MacVicar *et al*. 1974).

7.2.3 Topography and Landform

The topography of the site can be described as flat with scattered dolerite ridges and hills in various areas of the study area. The topography of the background and surrounding areas are also generally slopes, koppies and rolling hills. The proposed project site drains towards the Orange River and numerous seasonal drainage lines occur nearby.

7.2.4 Hydrology

The general study area is drained by a number of small watercourses, streams and surface drainage systems. There are wetland areas within the study area as well as nearby. There are two small man-made dams which trap storm water. Further towards the Orange River are numerous drainage lines which indicate poor vegetation cover and serious erosion. See Figure below.

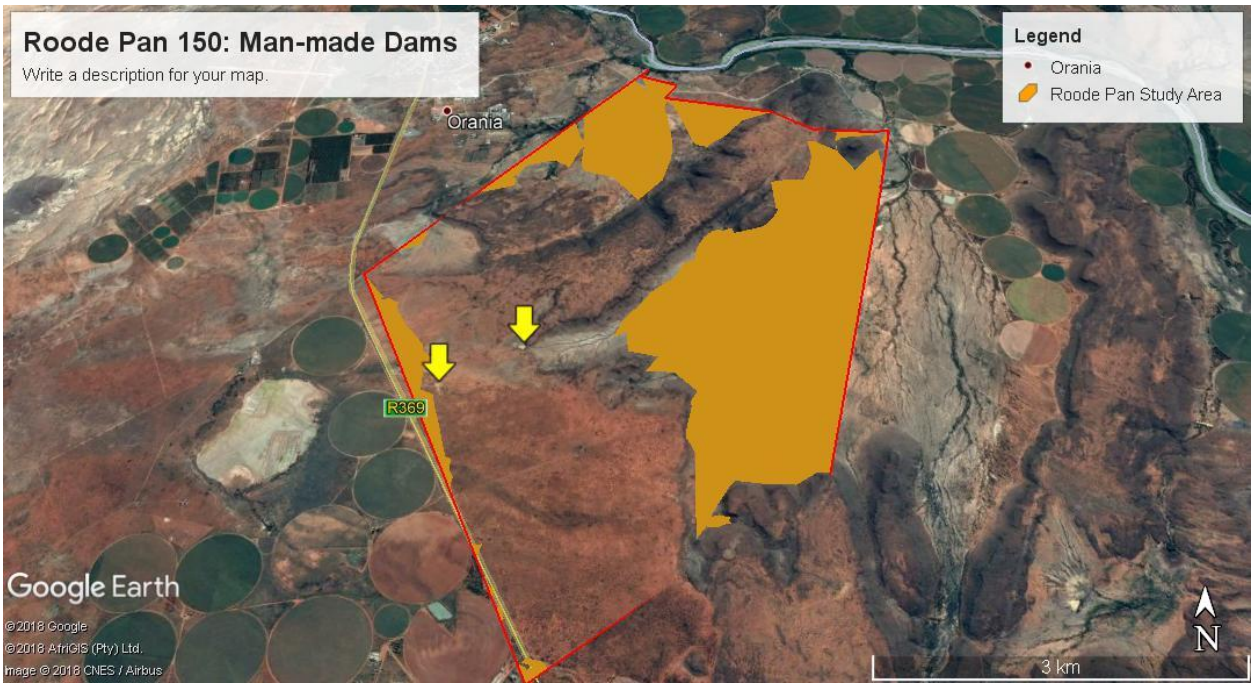

Figure 7: Yellow arrows indicate man-made dams on site

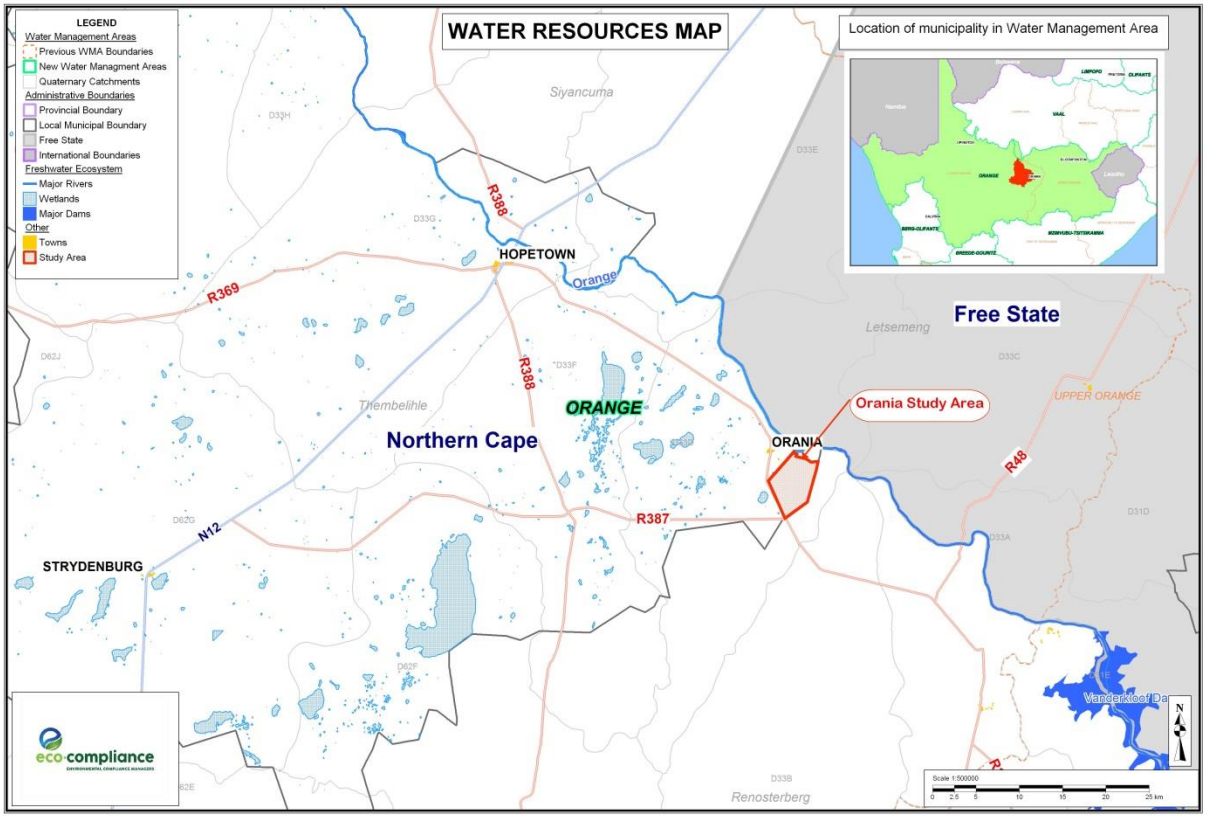

Figure 8: the overall water resources surrounding the study area

7.2.5 Agricultural Potential

The project site is situated in an agricultural area. The area comprises a mixture of deep, red and red-brown soils; sometimes loam and structureless, but also with some structured, clayey soils. The low rainfall in the area and high annual evaporation means that the arable cultivation would be marginal.

Most of the arable land has been transformed for crop production and most of the veld is being used for grazing. According to findings of Agricultural assessment report, there is currently limited agricultural activity on the development site itself.

7.2.6 Vegetation and Land Cover

The information presented in this section below is based on the Biodiversity Impact Assessment undertaken on the study area. It was found that the vegetation of the project site is not related to the Northern Upper Karoo (NKu 3) as described by Mucina & Rutherford (2006). The dominant plants are the karroid shrubs *Rhigozum Trichotomum, Chrysocoma ciliate, Felicia muricata etc* and grasses *Aristida congesta, Chloris virgate and Eragrostis lehmanniana* amongst others. Other plants noted are the trees *Searsia lancea, Vachelia karoo and Prosopis glandulosa.*

7.2.7 Protected and Red Data Species on Site

Detailed information on the Ecological sensitivities within the study area is also contained in the Biodiversity impact assessment study that (Annexure D) that was conducted as part of the EIA process. According to the report, although there are protected plants species within the greater study are, however, there were no red data species recorded on site.

A species list from POSA of the study area was obtained. POSA generated species list also contain updated Red Data species status. Only protected and red data species that may potentially occur in the study and project site have been listed under results; the actual field survey confirmed which of the species, recorded by the POSA list actually occur on site. Of the species that are considered to occur within the geographical area under consideration, there are **10** species which is regarded conservation worthy. **Zero** species recorded in the degree grids are listed on the Red List plant species but one is listed in terms of the National Forest Act (Act 84 of 1998)

Fauna Survey

The potential diversity of mammals within the study area is low because it is a human – managed area and most natural habitats have been transformed. There are several factors which will reduce the actual number of species present within the project site. The presence of humans and roads, the destruction of natural vegetation, noise etc., has had a major impact on the natural animal populations in the Solon area.

Listed mammals which may occur in the area include the White-tailed Mouse *Nystroms albicaudatus* (Endangered), and Black-footed Cat *Felis nigripes* (Vulnerable), South African hedgehog *Atelerix frontalis* (SA RDB NT).

During the site visit the following faunal species were confirmed within the project site:

- Dung of Steenbuck (*Raphicerus campestris*) was found
- A porcupine (*Hystrix cristata*) was found
- Single rodent burrows (most likely Four-striped Grass Mouse (*Rabdomys pumilo*).
- Relative large burrows (likely to have been made and utilized by Aardwolf – *Proteles cristatus* and/or Aardvark – *Orycteropus afer*).

None of these species noted within the project site are listed and or protected species.

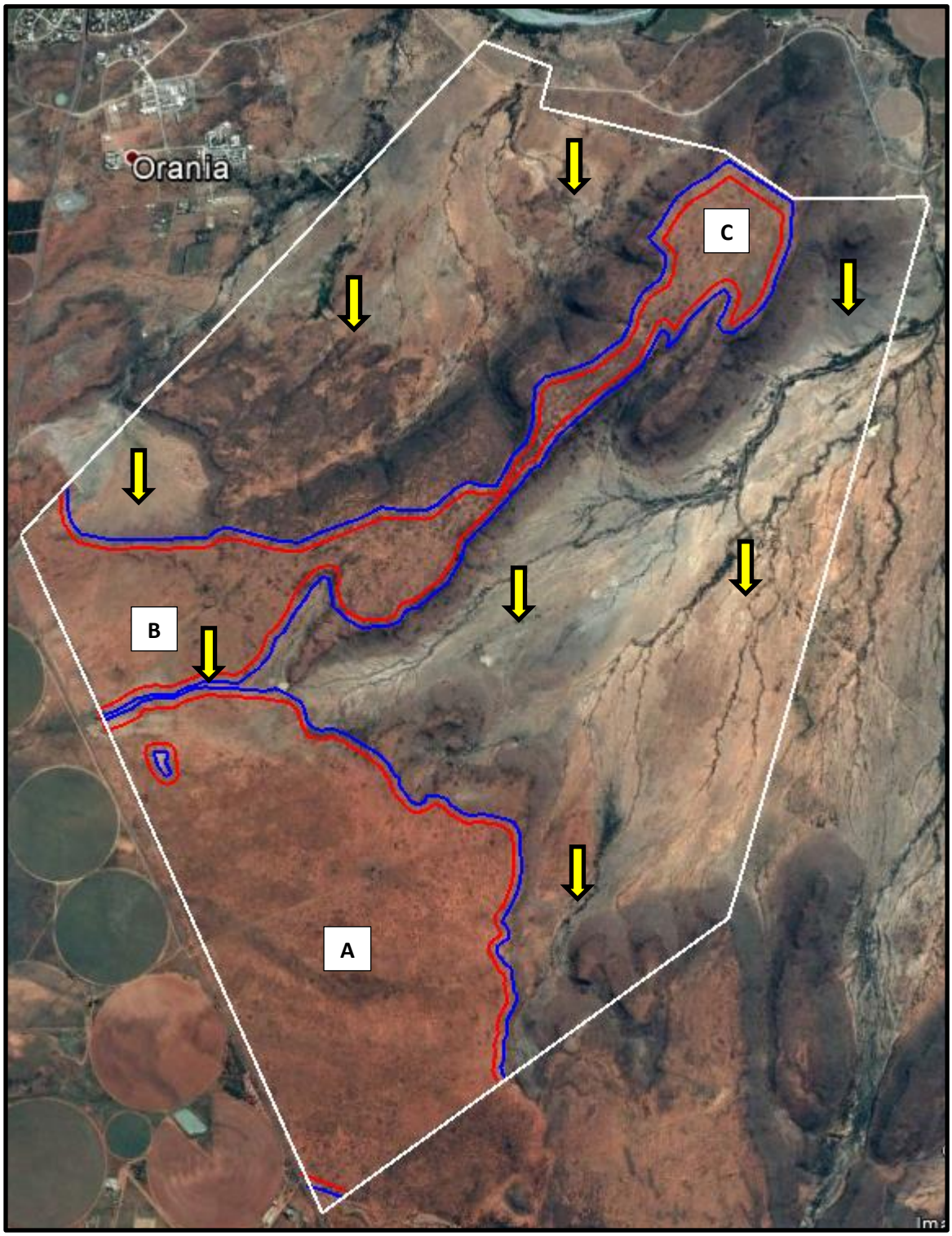

Figure 9: The arrows and blue lines indicate sensitive systems present within or near the project site. The red line is a 50 m buffer zone to protect the sensitive areas. The areas indicated as A, B & C are degraded areas which are suitable for this kind of development.

Chapter 8: Public Participation Process

The EIA regulations specify that a public participation process (PPP) must be conducted as an integral part of the EIA. This Chapter outlines the PPP followed to date and future engagements with registered stakeholders. The aim and purpose of the PPP was to:

- Ensure that all relevant Key stakeholders and Interested and Affected Parties (I&APs) have been identified and invited to engage in the basic assessment process.
- Create a platform for key stakeholders to freely communicate any issues or concerns and suggestions for enhancing potential benefits and/or to prevent or mitigate impacts.
- Raise awareness, educate and increase understanding of stakeholders about the proposed project, the affected environment and the environmental process being undertaken.
- Accurately document all opinions, concerns and queries raised regarding the project.
- Ensure issues and concerns of the stakeholders and I&APs are addressed in an adequate manner

All the PPP documents (BID's, site notices, correspondence with I&AP's, etc) that have been engaged during the draft BAR are attached as **Annexure F**.

8.1 Identification of stakeholders and Registration of I&AP's

The first step of the PPP was to try and identify key stakeholders and I&AP's, and to create a registration database, which will be used for ongoing communication during the course of the basic assessment process. The following summarises the methods used to identify and notify the key stakeholders in the project:

- Placement of Site Notices
- Preparation and distribution of Background Information Documents (English and Afrikaans)
- Consultation with the community leaders
- Consultation with the neighbouring farm owners
- Research on the area
- Focus group meeting
- Completion of Comments and Response table

8.2 Background Information Documents and Notifications

A Background Information Document (BID) which briefly describes the proposed project and provides information on how to participate as an I&AP, was prepared in Afrikaans and English as these two languages are the two predominant languages in the study area. The BID was distributed to all surrounding land owners and identified and registered I&AP's and stakeholders. A copy of the BID is included in Annexure F1.

8.3 Site Notices

Site notices were prepared in both English and Afrikaans and placed on the fence of the proposed development site and public places in Orania, such as notice boards and information centre.

Figure 10: Site notice at the property gate

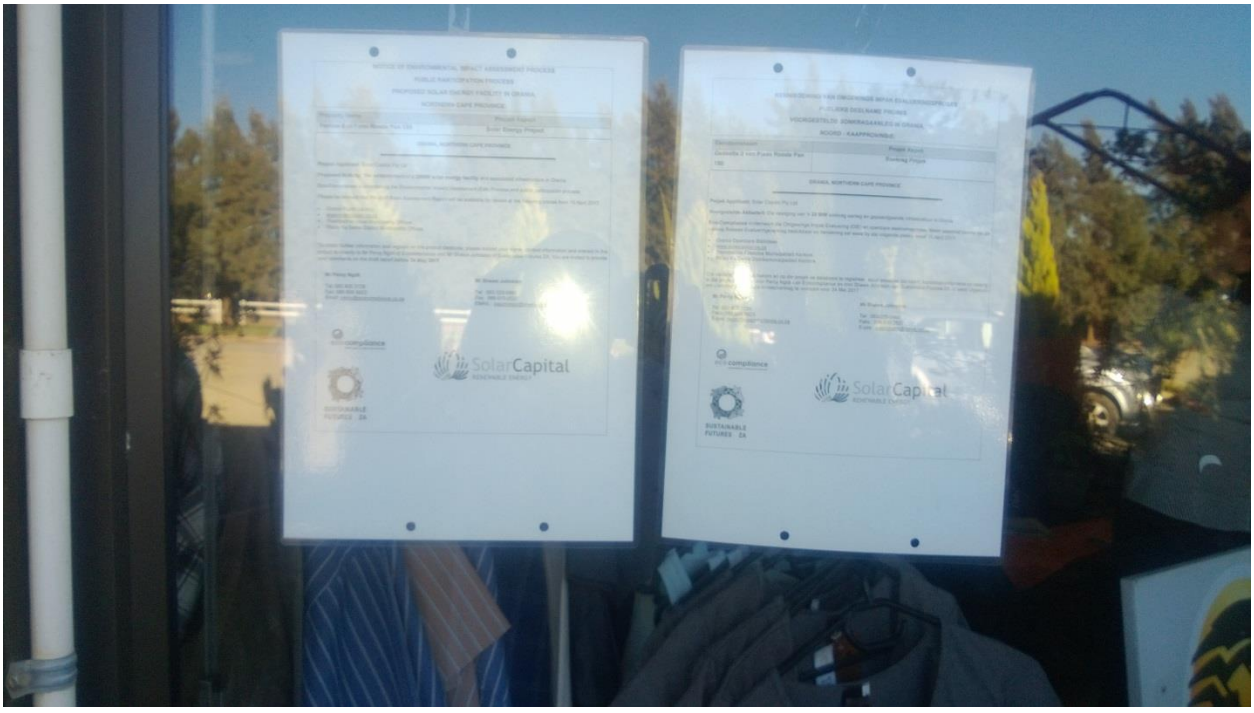

Figure 11: Site notice at Orania Information Centre

8.8 Newspaper Adverts

A Notice and advertisement of the basic assessment process for the proposed development was placed in the Regional Newspaper, Ditsem Nuus on 06 July 2018. The Ditsem has a far reaching publication that covers areas around the study area and much more. The purpose of the advertisement and site notice is to notify the public about the proposed development and invite them to register as I&AP's.

8.9 Focus Group Meetings

A focus group meeting with the Orania community leaders was held on 19 June 2018 at the Orania Town Council offices. The purpose of the meeting was to present the proposed development to the community leaders and allow them an opportunity to comment, as well as to document and discuss any issues which the community wishes to raise. Valuable information was obtained from this focus group meeting. Meeting notes and Comments & Response Table is attached as **Appendix D** of this report. Further engagements are planned later in the EIA process.

8.6 Public Review Period

This report is a draft basic assessment report and was made available to the public for review from 19 July 2018 to 19 August 2018. The draft reports were placed at the following public places for ease of access: Orania Town Council/Municipality, Orania Library and Prixley ka Seme District Municipality. Key stakeholders and I&AP'S were informed of the placement of these reports and were reminded to submit any comments before the end of the public review. During this public review period, comments were requested from SAHRA via the SAHRIS on 09 July 2018.

8.7 Key Issues and Comments Raised During PPP

A comments and response report was prepared detailing all the comments raised during the public participation to date. The comments and response table is attached as Appendix D of this draft BAR. It is anticipated that more comments will be submitted by the public at the end of the review period. Those comments and any issues raised will be compiled into one report and included in the final BAR to be submitted to DEA for consideration and decision making.

CHAPTER 9: POTENTIAL ENVIRONMENTAL IMPACTS

This chapter describes the environmental issues and impacts as identified by the EAP and through findings of the specialist studies.

The construction and operation of a PV solar plant on a large scale can result in negative local environmental impacts e.g. on birds, landscape and sustainable land use. The negative environmental impacts from solar plants are much lower than those produced by conventional energies, but they still need to be assessed.

On the other hand, solar generated power also has a number of positive impacts when considering the greater scheme of energy generation. One of these is the fact that solar power is the cleanest renewable resources available. So while many of the negative impacts may be on a local scale, the positive impacts may have a global reach.

Based on the requirements of the impacts assessment, impacts identified and issues and concerns are assessed with regard to their significance. The impact assessment is aimed at determining the impacts associated with the proposed development and the prescription of mitigatory measures. The significance of the potential impact is described in terms of their nature, extent, duration, intensity and probability.

9.1 Impact Assessment Criteria and Methodology

For the purpose of assessing, rating and assigning significance to the potential impacts, impact criteria has been developed. The assessment of the impacts shall be based on the EAP's and specialist expertise, professional judgement, field observations and desktop analysis. The criteria for assessing the identified potential environmental impacts or impact prediction, aims at providing a basis for determining the likely significance of each impact. This involves the use of a number of recognised methods to forecast the significance of the potential impacts. In order to ass the potential impacts as objectively as possible the following assessment criteria will be used:

9.1.1 Extent or Severity of Impacts

This criterion considers the severity of the impact in terms of how it impacts on the receiving environment, taking into account the degree to which the impact may be irreversible damage or loss to the resource.

Table 4: Magnitude or Intensity

Rating	Definition of Rating
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way.
High	Site-specific and wider natural and/or social functions and processes are severely altered
Very High	Resulting in irreversible change or permanent loss.

9.1.2 Scale/Extent of Impacts

This criterion considers the extent of the impact in terms of the spread of the impact, area covered, volume and distribution

Table 5: Spatial Scale

Rating	Definition of Rating
Localised	Site specific or confined to project footprint
Regional	Extending beyond the boundaries of the project site and its buffer zone, affecting neighbours, town, local authority, district and even province
National	Affecting areas beyond province, and country
International	Affecting areas beyond the country's borders.

9.1.3 Duration of Impacts

This criterion considers the duration of the impact in terms of persistence of the impact.

Table 6: Duration Scale

Rating	Definition of Rating
Short Term	Short term will disappear with mitigation or completion of phase, or up to 2 years
Medium Term	Persist beyond the phase but be negated afterwards. Typically more than 2 years but less than 15 years

Long Term	Life of the facility but will be mitigated directly or by natural processes, or more than 15years
Permanent	Beyond facility's lifespan and/or no form of mitigation can result in the impact to be considered transient

9.1.4 Probability of Activity

This criterion considers the probability of the occurrence of the activity leading to potential impact

Table 7: Probability of Activity

Rating	Definition of Rating
Improbable	<40% chance of occurring
Possible	>40%>70% chance of occurring
Probable	>70%<90% chance of occurring
Definite	>90% chance of occurring

9.1.5 Reversibility

Table 8: Reversibility of Impact

Rating	Definition of Rating
Irreversible	Impact will be permanent
Short Term	The impact is reversible within 2 years after construction
Long Term	The impact is reversible within 2 to 10 years after construction

9.1.6 Irreplaceable Loss of Resource

This refers to the degree to which the impact can cause irreplaceable loss of resources. The impact will be regarded as low

Table 9: Irreplaceable Loss of Resources

Rating	Definition of Rating
Low	The impact results in the loss of resources but the natural, cultural and social processes/functions are not affected.
Medium	There is a loss of resources but natural and/or social functions and processes continue albeit in a modified way.
High	Impacts result in irreplaceable loss of resources

9.1.7 Significance of Impacts

In this method the significance any given impact is predicted as a product of the consequence and the probability of that impact as per the example in the table below:

Table 10: Significance Rating

Significance Rating	Consequence	Probability
Insignificant	Very Low	Possible
	Very Low	Improbable
Very Low		
Low		
Medium		
High		
Very high		

9.1.8 Impact Rating Tables

The matrix table below illustrates the summary of the results of the assessment for each Activity and impact. A full impact assessment Sheet is included.

Impact Rating Tables

The impacts that will be identified from the site assessment will be presented as follows:

Table 11: Impact Rating Table

Impact		
Nature of Impact		
Development phase		
Status		
Extent		
Duration		
Intensity		
Probability		
Reversibility		
Irreplaceability		
Significance	With Mitigation	Without Mitigation
Mitigation		

9.2 Potential Key or Significant Environmental Impacts

The following key environmental issues emerged as the more pertinent and substantive issues:

9.2.1 Impact on Biodiversity (Vegetation Loss and Habitat Disturbance)

The installation of solar PV module arrays and associated infrastructure will result in loss of vegetation and habitat disturbance which will consequently affect ecosystems on site. The proposed development will result in vegetation clearance to accommodate, however, with proper mitigation measures, the impacts will be insignificant.

Although some parts of the site have already been transformed or disturbed through agriculture, there are still areas which may be still intact and active ecosystems.

These areas could negatively affected in due care is not taken into account during planning and implementation of different project phases. The clearing of vegetation will result in establishment of alien and invasive vegetation. Such soil disturbances could enhance the establishment and spread of alien invasive plants to natural systems adjacent to the development. According to the biodiversity specialist, the proposed project has no fatal flaws from a biodiversity perspective.

However, recommendations to avoid certain drainage lines were made and will be adhered to. The impact is assessed as follows:

Table 12: Removal of vegetation and habitat destruction

Impact	**Removal of vegetation and habitat destruction**	
Nature of Impact	Destruction or permanent loss of vegetation through vegetation clearance	
Development phase	Construction, operation and maintenance	
Status	Negative	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• Monitor and control alien plants during construction phase • No development of areas identified as no-go areas • Keep as much natural vegetation as possible	

- **Destruction of threatened and protected plant species**

The proposed development poses a significant threat to fauna species in terms of road kill, as many of the animals are not used to or not yet driven away by road traffic. The construction phase will involve a massive increase road transport to and from site, which will impact on the local fauna populations. Most of these animals are nocturnal or crepuscular, and move around and forage mostly during the night time. The best way to mitigate this impact would be to restrict all road transport to daylight hours.

Table 13: Destruction of threatened and protected plant species

Impact	**Destruction of threatened and protected species**	
Nature of Impact	Destruction or permanent loss of vegetation through vegetation clearance	
Development phase	Construction, operation and maintenance	
Status	Negative	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• Monitor and control alien plants during construction phase • Limit all road transportation on and around site to daylight hours • Control and monitor site personnel in terms of settling snares or hunting local wildlife. • No development of areas identified as no-go areas • Keep as much natural vegetation as possible	

- **Landscape connectivity loss**

The large-scale removal of vegetation and subsequent extensive fencing of the site will discontinue most of the movements of larger fauna species on the proposed study area. The impact is not considered to be of high significance, seeing that most of the larger fauna species will be driven away from the proposed site once construction phase commences. No mitigation is possible or necessary in view of the nature of the impact and the proposed development.

Table 14: Landscape connectivity loss

Impact	Landscape connectivity loss	
Nature of Impact	Discontinuation of the movement of larger fauna species	
Development phase	Construction, operation and maintenance	
Status	Negative	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• No possible mitigation in view of the impacts and the proposed development.	

- **Erosion and alien plant establishment**

Erosion is certain once large scale removal of vegetation is accomplished. Erosion control measures, which would not require too much work in the flat areas of the site, should be implemented during all phases of the development. All roads, areas where natural vegetation were removed, and the minor drainage lines identified as sensitive areas should be targeted for monitoring and control. It is good practise to keep as much natural vegetation intact as possible; this will be emphasized within the environmental management programme for the proposed development in order to jeep the impact as low as possible.

Table 15: Erosion and alien plant establishment

Impact	Erosion and alien plant establishment
Nature of Impact	Establishment of alien plants and erosion
Development	Construction, operation and maintenance

phase		
Status	Negative	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• Monitor and control alien plants during construction phase • Keep natural vegetation wherever possible. • Avoid no-go areas • Implement erosion control measures regularly on roads and elsewhere necessary.	

9.2.2 Impact on Avifaunal Species (Birds & Bats)

Solar energy PV modules are not generally associated with negative impacts on birds and bats, unless there are overhead powerlines, which may present a risk for both resident and migratory birds. However, the construction phase may pose some impacts such as:

- Habitat disturbance: construction and maintenance work can displace birds from preferred habitats and the breeding success rate may be reduced
- Interference with birds' movements
- Possible displacement or disturbance of sensitive species
- Mortality caused by collision with the associated power line network, and electrocution of avifauna.

Impacts on birds cannot be generalised for several reasons:

- Impacts vary among the different bird species
- Impacts are site-dependent (depending on landscape topography, site layout, season, types of residents and migratory birds in the area)

Table 16: Impact on Avifauna

Impact	Impacts on avifauna	
Nature of Impact	Destruction and fragmentation of habitat	
Development phase	Construction, operation and maintenance	
Status	Negative	
Extent	Site	
Duration	Long term	
Intensity	Low	
Probability	Improbable	
Reversibility	Low	
Irreplaceability	n/a	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• No possible mitigation in view of the impacts and the proposed development.	

9.2.3. Impacts on Agricultural Potential

The Portion 2 of Farm Roodepan 150 is approximately 2467ha in extent and is zoned as agricultural land. From an agricultural perspective the loss of high value farm land and or food security production, as a result of the proposed activities, is the primary concern of this assessment. In South Africa there is a scarcity of high potential agricultural land, with less than 14% of the total area being suitable for dry land crop production. Consequently areas which could sustainably accommodate dry land production need to be protected from non-agricultural land uses. The proposed development will use approximately 300ha of agricultural land

The agricultural assessment undertaken has revealed that there are no agricultural sensitive areas. There are, however, man-made dams present on site. The assessment has highlighted the following impacts:

- Soil degradation (due to wind and water erosion, oil, diesel, petrol contamination)

Table 17: Soil Degradation

Impact	Soil Degradation	
Nature of Impact	Soil degradation and contamination	
Development phase	Construction, operation and maintenance	
Status	Negative	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• Clearing activities should be kept to a minimum and must only be undertaken during agreed working times, as well as permitted weather conditions. • The further unnecessary removal of groundcover vegetation from slopes must be prevented, especially on steep slopes. • Storm water control and wind screening should be undertaken to prevent soil loss from the site. • Ensure that the mixing /decanting of all chemicals and hazardous materials should take place on a tray or impermeable surface. • Dispose of any generated waste at a registered landfill site. • Ensure all storage tanks are designed and managed in order to prevent pollution of drains, groundwater and soils.	

Table 18: Farm Activities Interference

Impact	Farm Activities Interference	
Nature of Impact	Interference with farm and livestock management activities and a decline in the long term food production	
Development phase	Construction, operation and maintenance	
Status	Negative	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• When farming infrastructure, i.e. Fences, water pipes etc is removed or damaged, it should be replaced as soon as possible. Construction must be coordinated with the land owner to allow for proper planning for the farm activities	

It is the conclusion of the agricultural assessment that the long term impact on the agricultural potential and productivity of the proposed Roode Pan 150 PV solar energy facility will be negligible with the application of effective measures.

9.3 Visual Impact

The site is situated close to the town of Orania along the R369 connecting Orania and Petrusville in the Northern Cape Province where the dominant landscape feature is the open plains of the Karoo scrub and the Nama Karoo. Surrounding land use is agricultural, predominantly sheep farming. Vegetation is typical of that associated with the Nama Karoo landscape, which is strongly associated with South African cultural heritage. The potential therefore exists that the proposed PV facility and associated infrastructure would be visible from many kilometres away. A photographic survey of the site and parts of the surrounding areas

was carried out and used to determine the extent of the visibility of the site. The findings and recommendations of the study are provided below:

The visibility was determined through establishing viewshed areas. In terms of the specialist methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and the distance of the proposed landscape modification from key points. It must be noted that the preliminary viewshed incorporated a 5m offset height for the entire proposed development area to establish a worst case scenario for the tallest infrastructure, the header tank and raw material silos.

Visual impacts associated with the construction phase (12 months) of the proposed solar park:

- Clearing and stripping of topsoil for site preparation and fencing;
- Construction of the solar park;
- Any associated supporting features like access roads.

From the receptor identification process the following receptors have been identified in this area as the following:

- Agricultural houses 3.24 km south;
- Built up areas 4.1 km south west;
- Motorists on the R369 which connects Orania town and Vanderkloof

There are no tourist routes in the area or any clustered residential areas; however, there is a well established commercial hub within the 5km radius of the proposed development. With this in mind the potential impact of the proposed solar park could be very small.

Table 19: Visual Impact

Impact	Visual Impact
Nature of Impact	Vegetation clearance, vehicle movement and dust, construction of PV arrays, fences and light spillage
Development phase	Construction, operation and maintenance
Status	Neutral
Extent	Local, beyond project boundary
Duration	Long term
Intensity	Low

Probability	Definite	
Reversibility	Permanent	
Irreplaceability	Low	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• Implementation of dust control measures during construction • Site offices and structures should be limited to single-storey and they should be sited carefully to reduce visual intrusion. Colours should reflect shades of the surrounding vegetation and/or the ground. • The developer would be required to ensure that the footprint areas of all the impacted sites utilised in the construction phase, are rehabilitated and restored as near as possible to previous natural vegetation during that phase, and not in the operational phase.	

9.4 Heritage, Cultural and Paleontological Resources

According to the Heritage Impact Assessment undertaken, the site is barren and devoid of archaeological or heritage objects or sites. The field survey indicated that the site is devoid of any archaeological or heritage structures artefacts. For control purposes, the field survey was also conducted outside of the proposed development area and no structures or artefacts were observed either.

No graves have been identified in the project site. However, in the case where graves which are previously unidentified are uncovered during the development process, it is the responsibility of the developer to cease further activity which can impact on these graves and contact SAHRA/Northern Cape Provincial Heritage Authority and the South African Police Service.

Impacts to archaeological heritage resources primarily occur during the construction phase and thereafter remain unchanged through the operational and decommissioning phases. This is because once they are destroyed they cannot be recreated.

In terms of the Paleontological Impact Assessment undertaken, the proposed site development site has no paleontological significance. The presence of the bedrock with possible stromatolite-like structures on rocks should not be disturbed, until further investigation has been carried out. A possible fencing while development takes place should be considered. Paleontological materials usually occur underground and embedded in rocks. The absence of the resources in the surface does not indicate that the area does not have the resources at all. Care should be

given when the area is being worked on. Should any paleontological materials be found during the implementation of the development, relevant authorities at SAHRA should be contacted immediately.

Table 20: Heritage and Paleontological Impacts

Impact	**Heritage and Paleontological Impacts**	
Nature of Impact	Earthworks during construction have the potential to uncover buried artefacts	
Development phase	Construction	
Extent	Site	
Duration	Short term	
Intensity	High	
Probability	Improbable	
Reversibility	Permanent	
Irreplaceability	Low	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• fencing of the bedrock should be considered if it is in very close proximity with the location of the proposed development • consult the relevant authorities should any paleontological and cultural features be uncovered	

9.5 Air Quality

Solar technologies results in negligible emissions since no fuels are combusted. However, air pollution in the form of dust emissions will occur during the construction phase. The handling of topsoil and gravel for construction operations could be a potential significant source of dust generation at the various transfer points. The quantity of dust generated depends on various climatic parameters, such as wind speed and precipitation, in addition to non-climatic parameters such as the nature and volume of the material handled. Fine particulates are most readily disaggregated and released to the atmosphere during the material transfer process, as a result of exposure to strong winds. The impacts are expected to be of moderate impact during construction and will reduce to very low during operation phase.

Emissions to air associated with the operational phase would only result from maintenance vehicles and the trucks off-loading fuel. These are regarded as insignificant.

Table 21: Dust impacts

Impact	**Dust impacts**	
Nature of Impact	Dust generated during earthworks, excavation and from open areas	
Development phase	Construction , operation and maintenance	
Extent	Local	
Duration	Long term	
Intensity	Low	
Probability	Definite	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• Dust mitigation measures should be implemented, especially during windy and dry conditions. • Speed restrictions must be implemented for all construction vehicles. • All vehicles transporting friable materials such as sand, rubble etc must be covered	

9.6 Traffic Impacts

Construction vehicles are likely to make use of the existing roads, including the R369, to transport equipment and material to the construction site. These truckloads would be distributed throughout the construction period (12 months). On average 1-2 trucks would access the site daily (excluding weekends). The additional vehicles on the roads could potentially result in more accidents and or traffic congestion. The potential impact of the project on traffic during the construction phase is considered to be of medium magnitude, regional extent with duration limited to the construction phase and therefore of **moderate** significance, without mitigation. Through the implementation of mitigation measures the significance could be reduced to **low**.

Table 22: Traffic Impacts

Impact	**Traffic volume increases**	
Nature of Impact	Increasing number construction vehicles on local roads during construction	
Development phase	Construction	
Extent	Local	
Duration	Short term	
Intensity	Low	
Probability	Probable	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	moderate	Low
Mitigation	• Local farm gates should be inspected on regular basis for possible damage	

9.7 Noise Impacts

Noise will be generated during the construction operation and decommissioning phases of the proposed project. Construction and decommissioning activities are often similar. Potential sources of noise during the construction phase are increased traffic, operation of heavy machinery during the construction period and additional people in the area. No noise will be generated from the solar energy facility during operation phase. Therefore in this case we do not consider Noise as a significant potential aspect and hence no detailed noise impact assessment was undertaken. The impact is assessed as follows:

Table 23: Noise impact

Impact	**Noise impact**
Nature of Impact	Increasing noise levels from construction activities
Development phase	Construction

Extent	Local	
Duration	Short term	
Intensity	Low	
Probability	Probable	
Reversibility	Low	
Irreplaceability	Moderate	
Significance	**With Mitigation**	**Without Mitigation**
	Low	Low
Mitigation	• The contractor must ensure that the noise levels remain within acceptable limits • Address noise complaints from concerned groups if submitted	

9.8 Cumulative Impacts

Assessment of cumulative impacts includes an assessment of the impacts of the proposed project taken in combination with the impacts of other known PV projects for the area (i.e. within a 20km radius) or secondary impacts that may arise from changes in the social, economic or ecological environment.

The cumulative impact of the loss of Northern Upper Karoo vegetation and the establishment and/ or spread of declared weeds and alien invader plants would occur at the site of the proposed PV facility. The construction of the arrays potentially affects a high proportion of natural vegetation on site, which is aggravated by potential degradation of the remaining vegetation on site due to alien invasions. However, the site constitutes only a small proportion of the regional area (beyond 10 km of the site). The impact is assessed at a scale of regional, is of very low magnitude, long term with a **low** significance without and with mitigation.

Table 24: Potential Cumulative Impacts

Potential Impact	Residual Impact After Mitigation	Considered for potential cumulative impact
Air Quality	Minimal	No
Archaeology and cultural heritage	Minimal	No

Paleontological	Minimal	No
Avian	Low	Yes
Flora	Minimal	No
Fauna	Minimal	No
Surface and Groundwater	Minimal	No
Visual impact	Low-Medium	Yes
Noise impact	Low-Medium	No
Traffic	Minimal	No
Local economy	Low-Medium	Yes
Telecommunications and Civil aviation	Low	Yes
Tourism	Minimal	Yes
Loss of agricultural land	Low-Medium	Yes
Health & safety	Minimal	No
Land use	Low-Medium	Yes

9.9 Impact Assessment Statement

Regulation 32(2)(m) of the EIA Regulations requires that the EAP include an opinion as to whether the activity should be authorised or not.

The impacts associated with the proposed project would result in regional impacts (both biophysical and socio-economic) that would negatively affect the area. The significance of these impacts without mitigation is deemed to be of medium or lower significance. However, with the implementation of the recommended mitigation measures the significance of the negative impacts would be minimized and would be low or very low, for all but one impact that of visual which would reduce to medium-low. However given the short duration of the construction period and localised extent the impact is deemed acceptable.

Associated with the proposed project are positive impacts on energy production and local economy (employment) and social conditions of low to medium significance. It is the conclusion, and strong recommendation of the EAP, that areas along drainage line as identified by the Biodiversity Impact Assessment report be left undisturbed.

The proposed site is also conveniently located next to the R369 which will limit the impact of creating new roads, thereby reducing further environmental impacts. The cumulative impacts associated with the proposed project coupled with numerous other renewable energy facilities that have either been proposed, authorised or constructed would result in regional impacts (both biophysical and socio-economic) that would have both negative and positive impacts. Negative impacts on Avifauna and Traffic are deemed to be of a medium significance for the construction phase, but high for the operational phase.

Cumulative impact on Avifauna is also deemed to be moderate. Further positive cumulative impacts will be experienced on production of energy deemed to have a significance of low.

Based on the above, the EAP is of the opinion that the proposed solar energy facility and associated infrastructure being applied for be authorised as the benefits outweigh the negative environmental impacts. The final design of the proposed PV facility will takes cognisance of sensitive environmental features. The significance of negative impacts can be reduced with effective and appropriate mitigation. If authorised, the implementation of an EMPr should be included as a condition of approval.

Chapter 10: Conclusion and Recommendations

The draft BAR has provided an assessment of the potential environmental impacts, identified by the EIA team and I&AP's, associated with the proposed Portion 2 of Farm Roode Pan 150, Hopetown RD, PV solar energy facility. The impact assessment phase included an assessment of the issues identified during the specialist investigations. The significance of the potential environmental impacts associated with the proposed development are summarised in Chapter 9 above. Alternatives that were identified were evaluated in detail and recommendations made thereto. The key findings of the draft BAR are discussed in Chapter 8. In general, the proposed development will have a low impact with effective implementation of the mitigation measures proposed in this draft BAR. The majority of these impacts are easily mitigated and can be reduced to lower significance through appropriate design and mitigation measures. No unacceptably high negative impacts are foreseen once proper mitigation measures are implemented.

There are no environmental flaws and key issues and concerns identified during the basic assessment process associated with the proposed development. Area identified by the specialist as no-go areas have been left out of the possible development area. The following key conclusions are drawn from the impact assessment phase:

- The proposed development is a strategic response towards the implementation of technologies to reduce greenhouse gas emissions and reduce climate change problems in South Africa.
- The project will benefit the local community through increased job creation both during the construction and operation phase.
- Specialist studies undertaken during the impact assessment process have concluded that the proposed 19MW solar energy facility will occur in an already disturbed are and no fatal flaws were identified. Recommendations to avoid certain sections of the study area have been adopted by the applicant.
- Implementation of adequate mitigation measures will reduce all potential impacts to a lower significance.

It is recommended that the environmental authorities approve the proposed development subject to the following conditions:

- The proposed development be approved based on the findings of this impact assessment process.
- The proposed solar energy facility is developed to avoid enhancing negative environmental impacts.
- The applicant, or anyone acting on the applicant's behalf, must comply with the applicable legislation, regulatory and permit requirements from Thembelihle Local Municipality, Pixley ka Seme District Municipality, Northern Cape Nature , Environment and Conservation, DWA and all relevant authorities during the construction and operation phases.
- Public health and safety must be considered during planning and construction phase.
- A complaints procedure must be put in place to ensure that all project complaints are handled efficiently.
- Mitigation measures included in this report and specifications detailed in the Environmental Management Programme must be adhered to.

This report serves as a draft Basic Assessment Report for the proposed development. The final report will be made available to the public for comments before submission to DEA for decision making process. Any concerns or comments received during the public consultation process will be included in the final report. However, no objections have been received against the proposed development. It is for these reasons that the EAP recommends the authorisation of the proposed development.

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Percy Ngidi

Ecocompliance Pty Ltd