Cape Environmental Assessment Practitioners (Pty) Ltd
Reg. No. 2008/004627/07
Telephone: (044) 874 0365
Facsimile: (044) 874 0432
Web: www.cape-eaprac.co.za
1st Floor Eagles View Building
5 Progress Street, George
PO Box 2070, George 6530

DRAFT SCOPING REPORT

for

JORAM SOLAR DEVELOPMENT

on

Remainder of Portion 62 (Portion of Portion 9 of the farm Vaalkoppies, Upington, Northern Cape

In terms of the

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended & Environmental Impact Regulations 2010

Prepared for Applicant: Joram Solar (Pty) Ltd.

By: *Cape EAPrac*

Report Reference: KHH/320/05

Department Reference: 14/12/16/3/3/2/713

Case Officer: To be allocated

Date: 28 August 2014

APPOINTED ENVIRONMENTAL ASSESSMENT PRACTITIONER:

***Cape EAPrac* Environmental Assessment Practitioners**

PO Box 2070
George
6530
Tel: 044-874 0365
Fax: 044-874 0432

Report written & compiled by: **Dale Holder** (Ndip Nat Con), who has 12 years' experience as an environmental practitioner.

.

PURPOSE OF THIS REPORT:

Public Review & Comment

APPLICANT:

Joram Solar (Pty) Ltd.

CAPE EAPRAC REFERENCE NO:

KHH/320/05

DEPARTMENT REFERENCE:

14/12/16/3/3/2/713

SUBMISSION DATE

28 August 2014

DRAFT SCOPING REPORT

in terms of the

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended &
Environmental Impact Regulations 2010

Joram Solar Development

Remainder of Portion 62 (a portion of portion 9) of the farm Vaalkoppies, Upington.

and potential grid connections on:

Portion 66 of the farm 40, portion 9 of the farm 40 portion 7 of the farm 555, portion 52 of the farm 40, portion 3 of the farm 40, erf 73 and erf 19951.

Submitted for:

Stakeholder Review & Comment

Report Issued by:

Cape Environmental Assessment Practitioners

Tel: 044 874 0365
Fax: 044 874 0432
Web: www.cape-eaprac.co.za

PO Box 2070
5 Progress Street
George 6530

REPORT DETAILS

Title:	**DRAFT SCOPING REPORT** **for proposed "JORAM SOLAR DEVELOPMENT"**
Purpose of this report:	This Draft Scoping Report forms part of a series of reports and information sources that are being provided during the Environmental Impact Assessment (EIA) for the proposed JORAM Solar Development in the Northern Cape Province. In accordance with the EIA Regulations, the purpose of the Scoping Report is to: • Provide a description of the proposed project, including a sufficient level of detail to enable stakeholders to identify relevant issues and concerns; • Describe the local environmental and developmental context within which the project is proposed, to assist further identifying issues and concerns; • Provide an overview of the process being followed in the Scoping Phase, in particular the public participation process, as well as present the Plan of Study for EIA that would be followed in the subsequent EIA phase; • Present the issues and concerns identified to date from the baseline specialist studies and the initial stakeholder engagement process, as well as an explanation of how these issues will be addressed through the EIA process. This Draft Scoping Report is made available to all stakeholders for a 40 day review & comment period, **28 August 2014 to 08 October 2014**
Prepared for:	Joram Solar (Pty) Ltd.
Published by:	*Cape Environmental Assessment Practitioners (Pty) Ltd. (Cape EAPrac)*
Authors:	Mr Dale Holder
Reviewed by:	Ms Melissa Mackay
Cape EAPrac Ref:	KHH320/05
DEA Case officer & Ref. No:	**Enquiries:** Ms Mtlala Rabothata (Case officer will be allocated After Scoping Phase) 14/12/16/3/3/2/713
Date:	28 August 2014
To be cited as:	*Cape EAPrac,* 2014. Draft Scoping Report for the proposed JORAM Solar Development. Report Reference: KHH320/05. George.

TECHNICAL CHECKLIST

The following technical checklist is included as a quick reference roadmap to the proposed project.

Company Details		
Company profile	Name and details of Developer	Joram Solar (Pty) Ltd is a renewable energy developer investigating potential renewable energy projects in the Northern Cape
Site Details		
Size of the site	Description and Size in hectares of the affected property.	Remainder of portion 62 (portion of portion 9) of the farm Vaalkoppies. Total Property Size: 4695,8487.
Development Footprint	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, inverter stations and internal roads.	Initial Study Area is 450Ha. The total footprint of JORAM Solar will not exceed 220ha
Technology Details		
Capacity of the facility	Capacity of facility (in MW	Net generating capacity (AC) of 75MW, Installed capacity (DC) of +/-90MW.
Solar Technology selection	Type of technology	PV and/or concentrated PV with fixed, single or double axis tracking technology.
	Capacity and dimensions of the PV field	75 MWp AC yield. Footprint of not more than 220ha .
	Structure height	Less than10 meters
	Surface area to be covered (including associated infrastructure such as roads)	Approximately 220 ha.
	Structure orientation	North-facing
	Laydown area dimensions	Approximately 2-5ha of laydown area will be required (the laydown areas will not exceed 5ha.)
Grid Connection Details **NOTE: Grid Connection may be removed from this environmental process and included in a separate process.**		
Grid connection	Substation to which project will connect.	Various grid connection options exist. All of the grid connections are planned to connect to the Gordonia substation. The facility will connect to the substation via own-built 132kV lines or by a "loop-in;loop-out" line to the existing Gordonia Kleinbegin 1 or to planned Ilanga CSP project 132 kV Powerlines. The servitude options for the Ilanga CSP Powerlines will be illustrated in the layout report.
	Capacity of substation to connect facility	Still to be confirmed
Power line/s	Number of overhead power lines required	Various grid connection options exist. All of the grid connections are planned to connect to the Gordonia substation. The facility will connect to the substation via own-built 132kV lines or by a "loop-in;loop-out" line to the existing Gordonia Kleinbegin 1 or to planned Ilanga CSP project 132 kV Powerlines. The servitude options for the Ilanga CSP Powerlines will be illustrated in the layout report.
	Route/s of power lines	Various scenarios and grid connection options exists. Please refer to layout report in appendix C.
	Voltage of overhead power lines	132kV expected.
	Height of the Power Line	<25m heights are expected for monopole steel structures.
	Servitude Width	32m or more.
Auxiliary Infrastructure		

Other infrastructure	Additional Infrastructure	Auxiliary buildings of approximately 2ha. The functions within these buildings include (but is not limited to) to ablution, workshops, storage areas and site offices. Perimeter Fencing not exceeding 5m
	Details of access roads	Access roads not exceeding 8m in width. The length of these access roads is dependent on the specific scenarios, as depicted within the layouts.
	Extent of areas required for laydown of materials and equipment	Approximately 2-5ha of laydown areas will be required, but will not exceed 5ha.

ORDER OF REPORT

Report Summary

Draft Scoping Report – Main Report

Appendix A	:	Location, Topographical & Development Site Plans
Appendix B	:	Site Photographs
Appendix C	:	Solar Facility Layout Alternatives & Layout Report(Solek, 2014)
Appendix D	:	Specialist Reports
Annexure D1	:	Ecological Scoping Report (Todd, 2014)
Annexure D2	:	Agricultural Potential Study (Lubbe, 2014)
Annexure D3	:	Archaeology Scoping Report (Nilssen, 2014)
Annexure D4	:	Engineering Report (Solek, 2014)
Appendix E	:	Public Participation Process
Annexure E1	:	I&AP Register
Annexure E2	:	Pre Application Notifications
Annexure E3	:	Initial Notifications
Annexure E4	:	Adverts and Site Notices
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DRAFT SCOPING - OVERVIEW

1 PROJECT OVERVIEW

Cape EAPrac has been appointed by **Joram Solar (Pty) Ltd.**, hereafter referred to as the Applicant, as the independent Environmental Assessment Practitioner EAP), to facilitate the Scoping & Environmental Impact Reporting (S&EIR) process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) for the proposed development of the '**Joram Solar Development** near Upington in the Northern Cape.

Joram Solar (Pty) Ltd. Have an option to sub-lease a portion of the remainder of the farm Vryheid from the landowner, Newhaven Trust, for the purposes of developing the proposed solar facility. A copy of a letter from Newhaven Trust providing consent for the continuation of the EIA is attached in Appendix E.

The total generation capacity of the solar facility will not exceed 75MW for input into the national Eskom grid.

2 NEED AND DESIRABILITY

The supply of electricity in South Africa has become constrained, primarily because of insufficient generation capacity, but also due to constraints on the transmission and distribution of electricity. Considering this situation and the impact that carbon emissions from existing (and future) coal-fired power stations have on the environment (Climate Change), this renewable energy project will contribute to the generation of 'clean' or so-called 'green' renewable electricity for input into the national grid to augment Eskom's power supply.

The South African Government has set a 10 year cumulative target for renewable energy of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro power (White Paper on Renewable Energy Policy, 2003). This amounts to approximately 4% (1667MW) of the total estimated electricity demand (41 539MW) by 2013. The majority of this power will be generated by Eskom. However, in order to meet the increasing power demand within the country, Eskom has set a target of 30% of all new power generation to be derived from independent power producers (IPPs).

Joram Solar (Pty) Ltd is one such IPP which intends to generate electricity from the proposed Joram Solar Development. This will contribute to South Africa's commitment to the Convention on Climate Change through emission-free generation of electricity and working towards an investor-friendly climate in the energy sector.

3 ENVIRONMENTAL REQUIREMENTS

The proposed solar energy facility project is subject to the requirements of the Environmental Impact Assessment Regulations (2010 EIA Regulations) in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended) This Act makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, the national Department of Environmental Affairs, DEA) based on the findings of an EIA. An application for authorisation has been accepted by the DEA (under the Application Reference number 14/12/16/3/3/2/713).

A Scoping and Environmental Impact Assessment process is required in terms of NEMA, 2010. The listed activities associated with the proposed development, as stipulation under Regulations 544, 545 and 546, where applied for as follows:

- Regulation 544 (Basic Assessment): 10(i), 11, 18(i) & 22(ii)
- Regulation 545 (Scoping & EIA): 1, 8, 15 and
- Regulation 546 (Basic Assessment): 4 &14

Before any of the above mentioned listed activities may be undertaken, authorisation must be obtained from the relevant authority, in this case, the National Department of Environmental Affairs (DEA).

5 SITE DESCRIPTION

The property is located in the ZF Mgcawu of the Northern Cape Province, within the jurisdiction area of the Khara Hais Local Municipality. The property is approximately 5695ha is size and is located approximately 15km east of Upington along the N10

The proposed development site within the property is approximately 220ha in size.

The topography is generally flat and has low relief form. The slope gradient is between 0 and 2% with an undulating shape.

6 DEVELOPMENT PROPOSAL & ALTERNATIVES

The proposed Joram Solar Development is to consist of solar photovoltaic panels with a generation capacity of 75MW (megawatts), as well as associated infrastructure, which will include:

- On-site substation;
- Auxiliary buildings (administration / security, workshop, storage and ablution);
- Inverters, transformers and internal electrical reticulation (underground cabling);
- Access and internal road network;
- Overhead electrical transmission line (to connect to connect to the existing Gordonia substation);
- Rainwater tanks; and
- Perimeter fencing.

Various alternatives, in terms of sites, technology of the solar arrays, as well as layout for the solar arrays and associated infrastructure on the development site, have been considered. The alternatives are described in detail in this report.

In the event that the scoping/impact assessment process identify any other feasible/reasonable alternatives other than the above, such will be considered and incorporated as additional alternatives.

7 SPECIALIST STUDIES

The following aspects have been considered by specialists in order determine the current status of the target development site, as well as to identify potential risks and impacts associated with the development of the renewable energy park. These are described in greater detail in the main report, while the full specialist reports are available in Appendix D.

The following baseline specialist studies have been undertaken and used to inform this Draft Scoping Report as well as the project layout and concept:

- Agriculture potential;
- Biophysical (Fauna and Flora) scoping study;
- Heritage (archaeology)

A number of additional studies will be done as part of the Environmental Impact Phase of the development. These will include:

- Archaeology Impact Assessment;
- Heritage Impact Assessment;
- Paleontological Impact Assessment;
- Botanical Impact Assessment;
- Faunal Impact Assessment; and
- Visual Impact Assessment.

The issues and concerns identified through the baseline studies will be further investigated and assessed through detailed specialist impact assessments to follow in the Environmental Impact Reporting (EIR) phase in order to determine the significance of potential impacts possibly associated with the proposed project.

8 PLANNING CONTEXT

A planning specialist will be appointed for this project and will be responsible for undertaking the necessary applications. Further details on the progress with the planning applications are included in this report and will be presented in more detail in the Draft Environmental Impact Report.

9 AVOIDANCE APPROACH

A constraint map has been developed for the proposed Joram Solar Development site. This serves to identify possible contextual constraints for the target solar property as well as regional threshold criteria. The purpose of undertaking the constraints analysis is specifically to comply with the requirement of firstly avoidance of potential impacts, followed by minimisation and then mitigation of impacts. The constraints defined by the participating specialists will be used to develop an additional layout alternative that avoids all constraints as far as possible.

11 CONCLUSIONS & RECOMMENDATIONS

This scoping exercise is currently being undertaken to present concept proposals to the public and potential Interested & Affected Parties and to identify environmental issues and concerns raised as a result of the proposed development alternatives to date. This will allow Interested & Affected Parties (I&APs), authorities, the project team, as well as specialists to provide input and raise issues and concerns, based on baseline / scoping studies undertaken. The Joram Solar Development site has been analysed from Ecological, Agricultural Potential, & Archaeological perspectives, and site constraints and potential impacts identified.

This Draft Scoping Report (DSR) summarises the process to date, reports on the findings of relevant baseline studies.

Cape EAPrac is of the opinion that the information contained in this Draft Scoping Report and the documentation attached hereto is sufficient to allow the general public and key stakeholders to apply their minds to the potential negative and/or positive impacts associated with the development, in respect of the activities applied for.

This Draft Scoping Report (DSR) is made available for stakeholder review and comment for a period of 40-days, extending from **28 October – 08 October 2014**. All comments received, will be considered and addressed, and feedback will be provided to registered stakeholders.

All stakeholders are requested to review this Draft Scoping Report and the associated appendices, and provide comment, or raise issues of concern, directly to *Cape EAPrac* within the specified 40-day comment period.

Comments must be submitted, in writing, to the following address no later than 08 October 2014

Cape Environmental Assessment Practitioners

Att: **Mr Dale Holder**

PO Box 2070, George, 6530

Fax: 044-874 0432 or Email: dale@cape-eaprac.co.za

DRAFT SCOPING - MAIN REPORT

1 INTRODUCTION

Cape EAPrac has been appointed by **Joram Solar (Pty) Ltd**, hereafter referred to as the Applicant, as the independent Environmental Assessment Practitioner EAP), to facilitate the Scoping & Environmental Impact Reporting (S&EIR) process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) for the proposed development of the '**Joram Solar Development** near Upington in the Northern Cape.

Joram Solar (Pty) Ltd. Have an option to sub-lease a portion of the remainder of portion 62 (portion of portion 9) of the farm vaalkoppies 40 from the landowner, **Newhaven Trust**, for the purposes of developing the proposed solar facility. A copy of a letter from Newhaven Trust providing consent for the continuation of the EIA is attached in **Appendix E**. All other land owners where possible grid connection may take place were also notified and copies of these notifications are also included in **Appendix E**.

The total generation capacity of the photovoltaic **power generation facility** will not exceed **75 Megawatts** (MW) for input into the national Eskom grid.

The purpose of this ***Draft*** **Scoping Report** is to describe the environment to be affected, the proposed project, the process followed to date (focussing on the outcome of the initial public participation process and baseline specialist studies), to present the site constraints identified by the various specialist during their initial site assessments, and provide Plan of Study for the Impact Assessment phase of this development.

This Draft Scoping Report is available for review and comment for a period of 40 Days extending from: **28 August 2014 – 08 October 2014.**

All comments on this report must be submitted to Cape EAPrac by no later than **08 October 2014**. Comments must be submitted to:

Cape Environmental Assessment Practitioners

Att: Mr Dale Holder

PO Box 2070, George, 6530

Fax: 044-874 0432 or Email: dale@cape-eaprac.co.za

1.1 OVERVIEW OF ALTERNATIVE ENERGY IN SOUTH AFRICA AND THE NORTHERN CAPE.

South Africa has for several years been experiencing considerable constraints in the availability and stability of electrical supply. Load shedding procedures have been applied since December 2005 due to multi-technical failures, as well as capacity and transmission constraints.

Eskom generates about 95% of South Africa's electricity supply, and has undertaken to increase capacity to meet growing demands. At the moment, the country's power stations are 90% coal-fired, and two huge new facilities are being built to add to this capacity. However, Eskom's plans to increase its national capacity by 40 000 megawatts in the period to 2025 have had to be scaled down due to the global economic recession (Northern Cape Business website).

International best-practice requires a 15% electricity reserve margin to deal with routine maintenance requirements and unexpected shutdowns in electricity supply systems. South Africa has historically enjoyed a large reserve margin (25% in 2002, 20% in 2004 and 16% in 2006), but that has declined over the recent past to 8% - 10%, as a result of robust economic growth and the associated demand for electricity. The spare power available to provide supply at any time of the day is known as the reserve capacity and the spare plant available when the highest demand of the year is recorded is known as the reserve margin (National Response to South Africa's Electricity Shortage, 2008). This has resulted in limited opportunities for maintenance and necessitated that power stations are run harder. This results in station equipment becoming highly stressed and an increase in unplanned outages and generator trips. The expected demand growth will rapidly erode this margin, as well as Eskom's ability to recover after it's already stressed systems shutdown.

This necessitates the additional generation of at least 3 000MW in the shortest possible time, to allow the reserve necessary to bring Eskom's system back into balance (*ibid*). This need can either be addressed from the *supply* or the *demand* side. Where the demand side interventions include short, medium and long term aspects of a national Power Conservation Programme to incentivise the public to use less electricity (as mentioned above), one of the supply side options (besides Eskom building new plants and returning old plants to service) is to allow **Independent Power Producers** (IPPs) to contribute electricity to the national grid (National Response Document, 2008). **Joram Solar (Pty) Ltd.** is one such body, which intends generating electricity from a renewable energy resource, namely solar.

In March 2011, the Cabinet approved South Africa's Integrated Resource Plan 2010, in terms of which energy from renewable sources will be expected to make up a substantial 42% of all new electricity generation in the country over the next 20 years. The government's New Growth Path for the economy also envisages up to 300 000 jobs being created in the "green" economy by 2020 (South Africa info website).

The Northern Cape is suggested by many to be the ideal location for various forms of alternative energy. This has resulted in a number of feasibility studies being conducted, not least of which an investigation by the Industrial Development Corporation in 2010 (R33-million spent) into potential for photo-voltaic, thermal, solar and wind power (Northern Cape Business website).

The area of the Northern Cape that borders on the Gariep (Orange) River and Namibia boasts the highest solar radiation intensity anywhere in southern Africa. Solar energy is therefore likely to be the most viable alternative energy source for the Northern Cape, although wind-power potential is generally good along the coast (State of the Environment, S.A.)

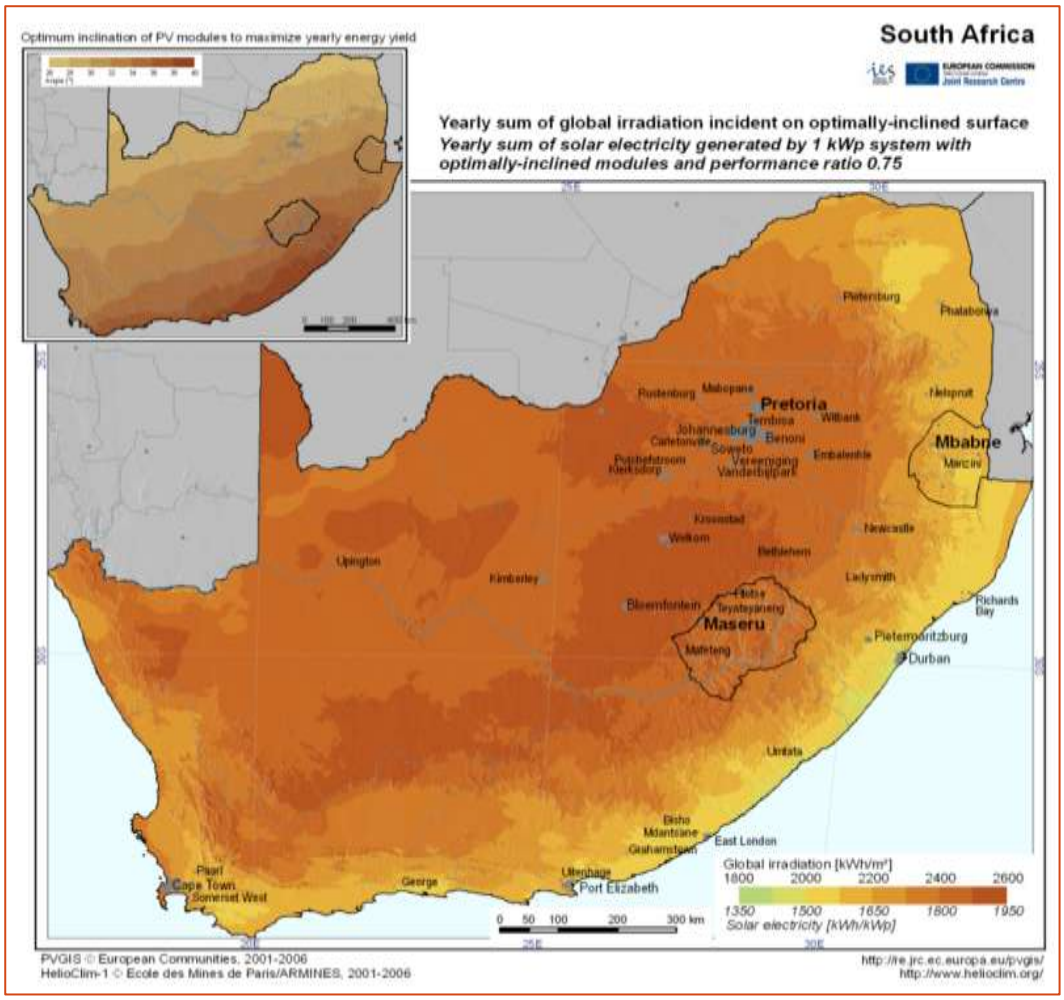

Figure 1: Solar radiation map for South Africa (Source: Solek Engineering Report, 2012).

The Northern Cape area is considered to have extremely favourable solar radiation levels over the majority of the year, making it ideal for the production of solar-power via Photovoltaic (fixed and tracking panels) and Concentrated (solar thermal) Solar systems. Several solar irradiation maps have been produced for South Africa, all of which indicate that the Northern Cape area **high solar irradiation**.

A solar-investment conference was held in November 2010 at Upington and was attended by 400 delegates from all over the world. Dipuo Peters, the previous national Minister of Energy, outlined the competitive advantages of the Northern Cape, over and above its extremely high irradiation levels, amongst others:

- relative closeness to the national power grid compared to other areas with comparable sunshine;
- water from the Orange River;
- access to two airports; and
- good major roads and a flat landscape (Northern Cape Business website – solar power).

The Northern Cape is not too dusty, the land is flat and sparsely populated, and there are little to no geological or climate risks, meaning that the sun can be used year-round (BuaNews online). An advantage that the Northern Cape has over the Sahara Desert is the relatively wind-free environment that prevails in the province. A Clinton Climate Initiative (CCI) pre-feasibility study has found that South Africa has one of the best solar resources on the planet (Northern Cape Business website – solar power).

To take advantage of this potential for the Northern Cape to become a national renewable-energy hub, the groundwork is being done on a mega-project that has the capacity to fundamentally change the structure of South Africa's power sector: to build a massive solar park that will generate an eighth of the country's electricity needs – 5 000MW – in the Northern Cape near Upington. Sixteen square kilometres of land (thousands of hectares) have been identified and Eskom is looking for private partners. The park, which will cost more than R150-billion, will generate 1 000MW in its first phase. A full feasibility study will now be conducted with the support of the Central Energy Fund and the Development Bank of Southern Africa (Northern Cape Business website – solar power). Significant job creation, lucrative private-sector investments, local industry development and a cleaner, more secure power supply are among the benefits of a large-scale park such as this (BuaNews online).

Indeed this potential for solar energy generation plants has resulted in the emergence of smaller solar energy projects throughout the Northern Cape. The previous Energy Minister, Dipuo Peters announced in February 2012 that 16 of the initial 28 preferred projects identified by the Department of Energy (DoE) under the renewable energy independent power producer (IPP) programme were located in the sun-drenched province (Creamer, Feb. 2012). Mining companies in the Northern Cape are looking to concentrating solar power (CSP) to provide power for their operations. Engineering company Group Five announced in 2011 that they were investigating the construction of a 150MW plant near Kathu. The Industrial Development Corporation (IDC) is supporting a number of projects in the province. These include a 100MW plant conceived by Abengoa Solar, a Spanish company with a global presence, and a Solafrica scheme to spend more than R3-billion on a Concentrated Solar Plant at Groblershoop (Northern Cape Business website – solar power).

The Joram Solar Development. is one such IPP solar project which intends to generate 75MW of electricity from solar-energy for inclusion into the National grid. The Joram solar development site is considered ideal, primarily due to:

- The flat topography of the proposed development site and it's the availability for use for an alternative energy generation facility;
- The grid connection potential based in proximity to existing transmission & Existing Gordonia sub station; and
- Its proximity to other Alternative Energy Facilities under consideration (Ilanga CSP project)

The Renewable Energy Independent Power Producer Programme has made 3725 MW of power available to be generated as part of a first phase initiative, after which a number of phases would follow. So far, the first two bidding windows have taken up 2459.4 MW of this target. The Department of Energy (DoE) has set a number of dates for the submission of bid documents for private companies to apply for a licence to generate electricity. The bidding deadlines for the first two stages were as follow:

- 1st Bid Submission: 4 November 2011.
- 2nd Bid Submission: 5 March 2012.
- 3rd Bid submission: 19th of August 2013.
- 4th Bid submission: 18 August 2014.
- 5th Bid Submission: To be confirmed.

NOTE: It is the intention that the **Joram** solar development will submit their Bid for the **5th bidding window.**

2 LEGISLATIVE AND POLICY FRAMEWORK

The legislation that is relevant to this study is briefly outlined below. These environmental requirements are not intended to be definitive or exhaustive, but serve to highlight key environmental legislation and responsibilities only.

2.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measure are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

2.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The current assessment is being undertaken in terms of the **National Environmental Management Act** (NEMA, Act 107 of 1998)[1] . This Act makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the competent authority (in this case, the national Department of Environmental Affairs, DEA) based on the findings of an Environmental Assessment.

The proposed scheme entails a number of listed activities, which require a **Scoping & Environmental Impact Reporting (S&EIR) process**, which must be conducted by an independent environmental assessment practitioner (EAP). Cape EAPrac has been appointed to undertake this process. Figure 2 below depicts a summary of the S&EIR process.

[1] On 18 June 2010 the Minister of Water and Environmental Affairs promulgated new regulations in terms of Chapter 5 of the National Environmental Management Act (NEMA, Act 107 of 1998), viz, the Environmental Impact Assessment (EIA) Regulations 2010. These regulations came into effect on 02 August 2010 and replace the EIA regulations promulgated in 2006.

Figure 2: Summary of Scoping & EIR Process

The listed activities associated with the proposed development, as stipulation under 2010 Regulations **544, 545 & 546** are as follows:

Table 1: NEMA 2010 listed activities for the Joram Solar Development

Listed activity as described in GN R.544, 545 and 546	**Description of project activity that triggers listed activity**
Regulation 544	
GN R544 Item 10: *The construction of facilities or infrastructure for the* ***transmission and distribution or electricity*** *–* ***(i)*** *outside urban areas or industrial complexes with a capacity of more than 33kV, but less than 275kV.*	Construction of a **new 132kV overhead power line** linking the on-site substation to the Existing Gordonia Substation.
GN R544 Item 11: *The construction of:* ***(x)*** *buildings exceeding 50 square metres in size;* ***(xi)*** *infrastructure or structures covering 50 square metres or more* *where such construction occurs within a*	Potentially for the construction of solar related infrastructure (buildings, cables, overhead lines etc.) and access roads **in proximity to seasonal washes**. The relevance and extent of this activity will be determined after completion of the baseline

watercourse or within 32m of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	studies.
GN R544 Item 18: *The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from:* ***(i)*** *a watercourse.*	The possible **construction of roads / tracks & PV arrays across any minor drainage lines and seasonal washes**. The relevance and extent of this activity will be determined during the baseline studies.
GN R544 Item 22: *The **construction of a road**, **outside urban areas**,* ***(i)*** *with a reserve wider than 13.5m or,* ***(ii)*** *where no reserve exists where the road is wider than 8m.*	Construction of **access and internal roads** for the solar facility for construction and operation phases outside the urban edge of Upington.
Regulation 545	
GN R545 Item 1: *The construction of facilities or infrastructure for the **generation of electricity** where the electricity output is **20MW or more**.*	Construction of the Joram Solar Development with a maximum generation capacity **of 75MW.**
***GN R545 Item 15: Physical alteration of undeveloped, vacant or derelict land** to residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is **20ha or more**.*	Development of the Joram Solar Development on private land, of approximately **250ha**, outside of the urban edge Upington.
Regulation 546	
GN R546 Item 4: *The construction of a road wider than 4 metres with a reserve less than 13.5m.* ***(a)*** *In Northern Cape:* ***(ii)*** *All areas outside urban areas.*	Construction of **access and internal roads wider than 4 metres** for solar facility, outside the urban edge of Upington. The extent and relevance of this activity will be determined by the baseline studies.
GN R546 Item 14: *The **clearance of an area of 5ha or more of vegetation** where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for:* ***(3)*** *the undertaking of a linear activity falling below the thresholds mentioned in Listing 1 in terms of GN R.544 of 2010.* ***(a)*** *In Northern Cape:* ***(i)*** *All areas outside urban areas.*	**Vegetation clearing** for the Solar Panels and Associated Infrastructure: access roads, cable trenches and on-site substation & auxiliary buildings etc. The extent and relevance of this activity will be determined by the baseline studies.
GN R546 Item 16: *The construction of:* ***(iii)*** *buildings with a footprint exceeding 10 square metres in size; or*	Possible crossing of **washes / seepage lines** by access or internal road network, as well as PV Solar infrastructure: outside of

(iv) *infrastructure covering 10 square metres or more,* *where such construction occurs within a watercourse or within 32m of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.* ***(a)*** *In Northern Cape:* ***(ii)*** *Outside urban areas, in:*	the urban edge of Upington.
GN R546 Item19: *The widening of a road by more than 4 metres or the lengthening of a road by more than 1 kilometre.* ***(a)*** *In Northern Cape:* ***(ii)*** *All areas outside urban areas.*	Possible widening of existing **access and internal roads** for solar park, outside of urban edge of Upington.

It must noted that these activities are all to be considered at the scoping phase, but certain of the activities listed above may no longer be relevant after the outcome of the specialist studies. In this case, these activities will be excluded from further assessment and the Department will be notified accordingly.

Before any of the above mentioned listed activities can be undertaken, authorisation must be obtained from the relevant authority, in this case the National Department of Environmental Affairs (DEA). Should the Department approve the proposed activity, the Environmental Authorisation does not exclude the need for obtaining relevant approvals from other Authorities who has a legal mandate.

2.2.1 Exemptions and Deviations

The following deviations from the public participation process were applied for in terms of Regulation 54(5) of GN R. 543.

GN R.543 I 54 (2)(a)(i&ii):

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by – (a) Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of (i) the site where the activity to which the application relates is or is to be undertaken, (ii) any alternative site mentioned in the application.

The boundary fence of the site is set back from the N10 highway and thus will be inconspicuous to the public past it. Site Notices have been placed at the entrance to the proposes facility on the farm, but off the N10.

No alternative properties / sites are to be considered for this application.

GN R.543 Item 54 (1)(b)(ii)&(iii):

Giving written notice to – (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken, or (iii) occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken.

Potentially affected landowners and adjacent landowners have been / will be requested (via notification) to inform any labourers / tenants / occupiers residing on their properties of the proposal and their right to register as I&APs.

GN R. 543.10 (2)(d)

Advertising the environmental decision in a newspaper.

Registered I&APs will be directly notified of the environmental decision

2.3 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY (ACT 10 OF 2004)

The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The Draft National List of Threatened Ecosystems (Notice 1477 of 2009, Government Gazette No 32689, 6 November 2009) has been gazetted for public comment.

The list of threatened terrestrial ecosystems supersedes the information regarding terrestrial ecosystem status in the NSBA 2004. In terms of the EIA regulations, a basic assessment may be required for the transformation or removal of indigenous vegetation in a critically endangered or endangered ecosystem regardless of the extent of transformation that will occur. **However, all of the vegetation types on both the study sites are classified as Least Threatened.**

NEMBA also deals with endangered, threatened and otherwise controlled species. The Act provides for listing of species as threatened or protected, under one of the following categories:

- **Critically Endangered**: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered**: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- **Vulnerable**: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- **Protected species**: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as Restricted Activities, are regulated by a set of permit regulations published under the Act. These activities may not proceed without environmental authorization.

According to the national vegetation map (Mucina & Rutherford 2006), the entire development site is restricted to the Kalahari Karroid Shrubland vegetation type, with Bushmanland Arid Grassland being the other major vegetation type present in the wider area. In terms of the conservation status of the various vegetation types of the area, only **Lower Gariep Alluvial Vegetation is of concern and is listed as Endangered**. This vegetation type is however associated with the alluvium along the Orange River and **would not be impacted by the current development** which is some distance from the river itself.

2.4 NATIONAL PROTECTED AREA EXPANSION STRATEGY (NPAES) FOR S.A. 2008 (2010)

Considering that South Africa's protected area network currently falls far short of sustaining biodiversity and ecological processes, the NPEAS aims to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to Climate Change. Protected areas, recognised by the National Environmental Management: Protected Areas Act (Act 57 of 2003), are considered formal protected areas in the NPAES. The NPAES sets targets for expansion of these protected areas, provides maps of the most important protected area expansion, and makes recommendations on mechanisms for protected area expansion.

The NPAES identifies 42 focus areas for land-based protected area expansion in South Africa. These are large intact and un-fragmented areas suitable for the creation or expansion of large protected areas. There are no NPAES expansion areas that have been identified in close proximity to the site.

2.5 CRITICAL BIODIVERSITY AREAS.

According the South African National Biodiversity Institute Biodiversity Geographic Information System (SANBI BGIS) and the Ecological Specialist, Mr Simon Todd, there are no fine-scale conservation planning has been conducted for the region and as a result, no Critical Biodiversity Areas have been defined for the study area.

2.6 NATIONAL FORESTS ACT (NO. 84 OF 1998):

The National Forests Act provides for the protection of forests as well as specific tree species, quoting directly from the Act: "*no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated".*

The ecological specialist, Mr Simon Todd, confirmed that two species protected in terms of the National Forest Act may occur on site, namely *Acacia erioloba* and *Boscia albitrunca*.

Please refer to the Ecological Scoping Report in Appendix D, Annexure D1 for a detailed description of the botanical component of the site.

2.7 CONSERVATION OF AGRICULTURAL RESOURCES ACT – CARA (ACT 43 OF 1983):

CARA provides for the regulation of control over the utilisation of the natural agricultural resources in order to promote the conservation of soil, water and vegetation and provides for combating weeds and invader plant species. The Conservation of Agricultural Resources Act defines different categories of alien plants:

- Category 1 - prohibited and must be controlled;
- Category 2 – must be grown within a demarcated area under permit; and
- Category 3 - ornamental plants that may no longer be planted, but existing plants may remain provided that all reasonable steps are taken to prevent the spreading thereof, except within the flood lines of water courses and wetlands.

The abundance of alien plant species on the Joram Solar site is very low, which can be ascribed mainly to the aridity of the site.

In terms of soil and water resources, the main drainage channels and several pans highlighted as sensitive. Caution would need to be exercised if any development were to take place within these areas.

The Department of Agriculture, Land Reform and Rural Development is guided by Act 43 of 1983.

In their preliminary comment on the development they have advised that the developer must take care of the following:

Article 7.(3)b of Regulation 9238: CONSERVATION OF AGRICULTURE RESOURCES, 1983 (Act 43 of 1983)

Utilisation and protection of vleis, marshes, water sponges and water courses

- 7.(1) "no land user shall utilize the vegetation in a vlei, marsh or water sponge or within the flood area of a water course or within 10 meters horizontally outside such flood area in a manner that causes or may cause the deterioration of or damage to the natural agriculture resources."
- (3)(b) "cultivate any land on his farm unit within the flood area of a water course or within 10 meters horizontally outside the flood area of a water course"

The ecological specialist will consider these requirements in detail during his study.

2.8 NORTHERN CAPE NATURE CONSERVATION ACT, NO. 9 OF 2009:

The Northern Cape Nature Conservation Act provides inter alia for the sustainable utilisation of wild animals, aquatic biota and plants as well as permitting and trade regulations regarding wild fauna and flora within the province. In terms of this act the following section may be relevant with regards to any security fencing the solar development may require.

Manipulation of boundary fences: *19. No Person may –*

(a) erect, alter, remove or partly remove or cause to be erected, altered, removed or partly removed, any fence, whether on a common boundary or on such person's own property, in such a manner that any wild animal which as a result thereof gains access or may gain access to the property or a camp on the property, cannot escape or is likely not to be able to escape therefrom.

It is recommended that the perimeter fencing around the solar development site will be constructed in a manner which allows for the passage of small and medium sized mammals: The biodiversity specialist will make recommendations with regard to the specific fencing configuration during the EIA phase of this project.

There are also likely to be present which are either protected under the National Forests Act such as *Boscia albitrunca* or protected under the Northern Cape Nature Conservation Act of 2009, which includes all *Mesembryanthemacea, Boscia foetida*, all species within the *Euphorbiaceae*. *Oxalidaceae, Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*.

Apart from the above species there may also be other listed species present as the area has probably not been well sampled in the past. Further detailed of protected species on site will be provided in the EIA phase of the project. Please also refer to the Ecological Scoping Report attached in Annexure D1.

2.9 NATURE AND ENVIRONMENTAL CONSERVATION ORDINANCE (19 OF 1974)

This legislation was developed to protect both animal and plant species within the various provinces of the country which warrant protection. These may be species which are under threat or which are already considered to be endangered. The provincial environmental authorities are responsible for implementing the provisions of this legislation, which includes the issuing of permits

etc. In the Northern Cape, the Department of Environment and Nature Conservation fulfils this mandate as per the Northern Cape Nature Conservation Act as described above.

2.10 NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). South African National Heritage Resources Agency (SAHRA) is the enforcing authority in the Northern Cape, and is registered as a Stakeholder for this environmental process.

In terms of Section 38 of the National Heritage Resources Act, SAHRA will comment on the detailed Heritage Impact Assessment (HIA) where certain categories of development are proposed. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activities are relevant:

- *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *any development or other activity which will change the character of a site exceeding 5 000 m² in extent;*
- *the re-zoning of a site exceeding 10 000m^2 in extent.*

Furthermore, in terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority.

Nor may anyone destroy, damage, alter, exhume or remove from its original position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3).

In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority.

Mr Stefan de Kock, of Perception Heritage Planning, has been appointed to undertake an integrated heritage assessment for the proposed Joram Solar Development. This integrated heritage study will include an Archaeological Impact Assessment to be undertaken by Dr Peter Nilssen as well as a Paleontological Desktop Assessment to be undertaken by Dr John Almond.

Please refer to the Archaeological scoping report attached in Annexure D3.

2.11 NATIONAL WATER ACT, NO 36 OF 1998

Section 21c & i of the National Water Act (NWA) requires the Applicant to apply for authorisation from the Department of Water Affairs for an activity in, or in proximity to any watercourse. Such an application may be required for any access road that may cross the main drainage channel. The actual footprint of the solar panels is to be developed to avoid the main drainage channel crossing the property.

Water required for the construction and operation of the Joram Solar development may also require authorisation in terms of the National Water Act as it may to be sourced from boreholes on

the property or from the Khara Hais Garib municipality. Please see the Engineering Report in Annexure D4 for additional information in this regard.

Relevant applications in terms of this act will be submitted to the Northern Cape Department of Water Affairs (DWA).

These applications will be undertaken during the EIR phase of this project.

2.12 SUSTAINABILITY IMPERATIVE

The norm implicit to our environmental law is the notion of sustainable development ("SD"). SD and sustainable use and exploitation of natural resources are at the core of the protection of the environment. SD is generally accepted to mean development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. The evolving elements of the concept of SD *inter alia* include the right to develop; the pursuit of equity in the use and allocation of natural resources (the principle of intra-generational equity) and the need to preserve natural resources for the benefit of present and future generations. Economic development, social development and the protection of the environment are considered the pillars of SD (the triple bottom line).

"*Man-land relationships require a holistic perspective, an ability to appreciate the many aspects that make up the real problems. Sustainable planning has to confront the physical, social, environmental and economic challenges and conflicting aspirations of local communities. The imperative of sustainable planning translates into notions of striking a balance between the many competing interests in the ecological, economic and social fields in a planned manner. The 'triple bottom line' objectives of sustainable planning and development should be understood in terms of economic efficiency (employment and economic growth), social equity (human needs) and ecological integrity (ecological capital).*"

As was pointed out by the Constitutional Court, SD does not require the cessation of socio-economic development but seeks to regulate the manner in which it takes place. The idea that developmental and environmental protection must be reconciled is central to the concept of SD - it implies the accommodation, reconciliation and (in some instances) integration between economic development, social development and environmental protection. It is regarded as providing a "conceptual bridge" between the right to social and economic development, and the need to protect the environment.

Our Constitutional Court has pointed out that the requirement that environmental authorities must place people and their needs at the forefront of their concern so that environmental management can serve their developmental, cultural and social interests, can be achieved if a development is sustainable. "*The very idea of sustainability implies continuity. It reflects the concern for social and developmental equity between generations, a concern that must logically be extended to equity within each generation. This concern is reflected in the principles of inter-generational and intra-generational equity which are embodied in both section 24 of the Constitution and the principles of environmental management contained in NEMA.*" [Emphasis added.]

In terms of NEMA sustainable development requires the integration of the relevant factors, the purpose of which is *to ensure that development serves present and future generations.*[2]

[2] See definition of "sustainable development" in section 1 of NEMA.

It is believed that the proposed 75MW Joram Solar development supports the notion of sustainable development by presenting a reasonable and feasible alternative to the existing vacant land use type, which has limited agricultural potential due the lack of water and infrastructure.

Furthermore the proposed alternative energy project (reliant on a natural renewable resource – solar energy) is in line with the national and global goal of reducing reliance on fossil fuels, thereby providing long-term benefits to future generations in a sustainable manner.

3 ACTIVITY

Joram Solar (Pty) Ltd is a Solar Energy Facility Independent Power Producer (IPP), is proposing the establishment of a commercial solar energy facility on a site within the Northern Cape to be known as Joram Solar Development. The project is planned to be located on the remainder of portion 62 (a portion of portion 9) of the farm Vaalkoppies 40, with a planned installed electrical capacity of 75 MW. Remainder of Portion 62 (a portion of portion 9) of the farm Vaalkoppies, Upington.

Potential grid connections are also being investigated on Portion 66 of the farm 40, portion 9 of the farm 40 portion 7 of the farm 555, portion 52 of the farm 40, portion 3 of the farm 40, erf 73 and erf 19951.

The proposed facility has a planned peak capacity of be 75 MW. with an estimated footprint between 200 and 220ha.

The estimated portion of land each component of the facility will typically occupy is summarised in the table below (with the average area is taken as 200ha):

Table 2: Component sizes of the proposed Joram Solar Development (Solek, 2014)

Component	Estimated extent of 75 MW plant	Percentage of selected area (± 200 ha)	Percentage of whole farm (±4695.8587 ha)
PV or CPV modules	180 ha (1.8 km^2)	90%	3.8%
Internal roads-6m width	18 ha (0.27 km^2)	9%	0.38%
Auxiliary buildings	2 ha (0.02 km^2)	1%	less than 0.1%

The proposed infrastructure that is planned to be constructed includes **CPV modules**, or a series of solar **PV arrays**, **inverters**, **internal electrical reticulation**, and an **internal road network**. It will also be necessary to construct an **onsite substation** which would typically include a **transformer** to allow the generated power to be connected to Eskom's electricity grid. **Auxiliary buildings**, including **ablution**, **workshops**, **storage areas** and **fencing** are planned to be erected. A distribution line will also be required to distribute the generated electricity from the site to the Eskom substation and grid.

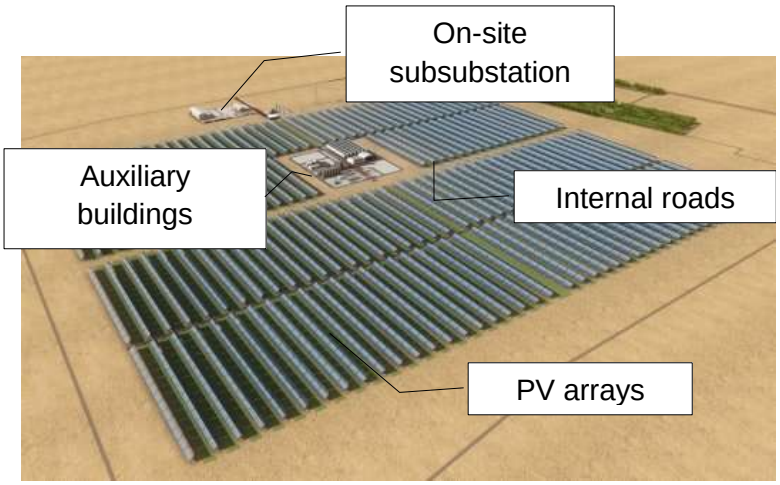

Figure 3: Typical Layout of a solar PV Plant (Solek, 2014)

Determining the optimal layout is a costly process which would normally take place once an REIPP tender has been awarded to the bidder. For the purpose of the environmental impact assessment, a typical layout will be discussed, alternatives will be investigated and a preliminary high level layout will be drafted – This typical layout will include a maximum environmental footprint that will be assessed in the environmental process. The final layout design that will be done after bidding will take into account the site constraints identified and recommendations made by the various EIA specialists. With the actual construction, the **final plant layout will stay the same in terms of footprint size and height**, as assessed in the environmental process, but the exact location of the different components may change within the footprint.

It must be noted that a **larger total study site** is under consideration during the scoping phase for this development. The **preferred footprint** within the study site will be determined once the participating specialists have undertaken their baseline studies and **defined constraints** – The final preferred layout will follow a **risk adverse** approach and will avoid all highly sensitive features as far as possible.

Various layout alternatives for the abovementioned components are under consideration. The preferred alternative (to avoid constraints defined by the specialists) will be determined during the EIR phase of the project. Details regarding the consideration of alternatives is included in the section below.

Please see the **layout report** attached in **Appendix C** for additional supplementary information.

4 CONSIDERATION OF ALTERNATIVES

A number of alternatives, including **activity**, **layout** and **technological** alternatives were considered for the proposed Joram Solar Development. The consideration of these alternatives are detailed below. Please also refer to the Layout report compiled by Solek Renewable Energy Engineers attached in Appendix C.

4.1 FACILITY LAYOUT ALTERNATIVES

A number of layout alternatives have been considered for the proposed Joram Solar Development.

As part of this scoping report, different spatial locations for the proposed facility were investigated

A preliminary study site of 450 ha was identified as part of this scoping phase of the project. The 450 ha area was identified because of its level surface, road access alternatives, and distance to the Gordonia Eskom substation.

The identified 450 ha study area been selected will be referred to as Preliminary Study Site. The detail site layout and infrastructure is included in the Engineering Report attached in Annexure D4.

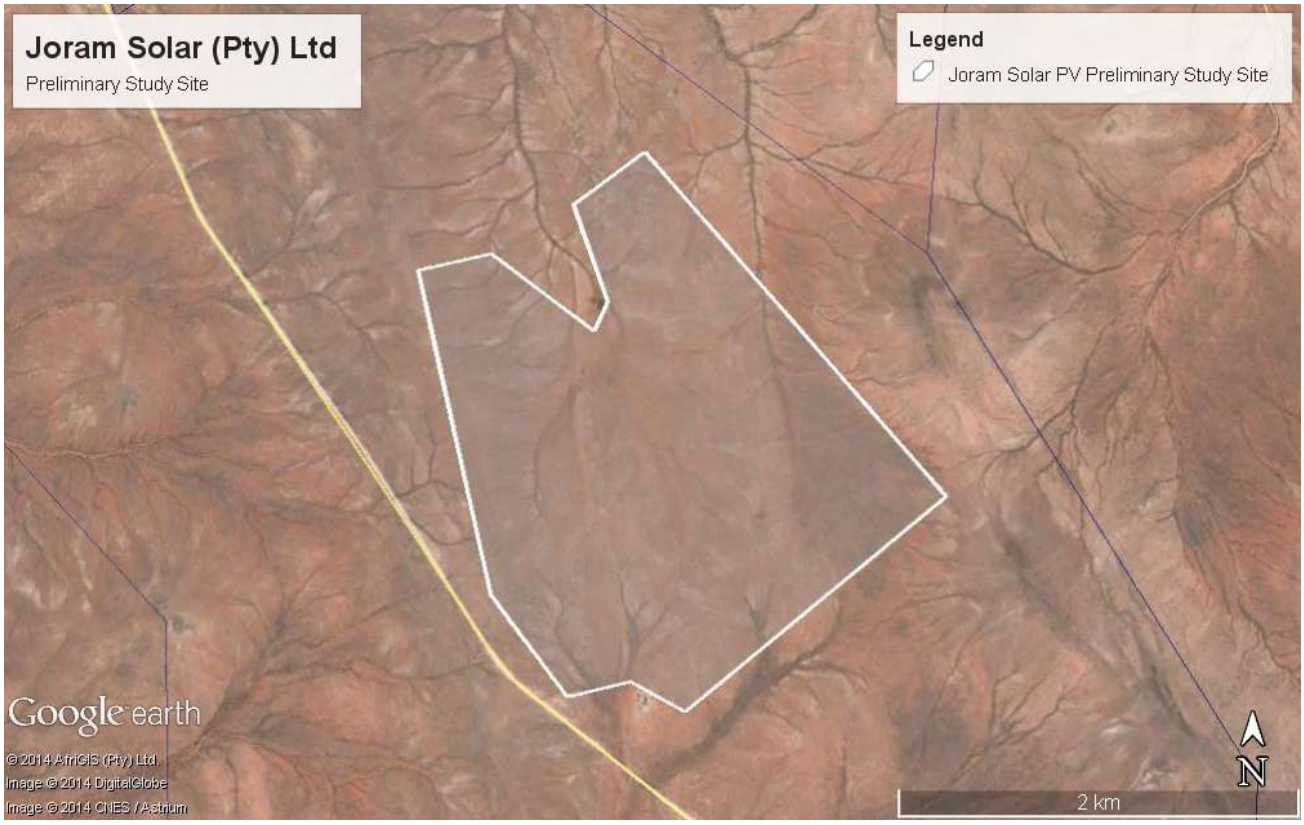

Figure 4: Footprint of initial study site (Solek, 2014)

4.1.1 Possible Sensitive Areas

As part of the Environmental Impact assessment phase the sensitive areas as identified by the participating specialists will be included and mapped in order to evaluate layout alternatives and preferred site layout.

In order to develop layout option 1, the possible sensitive areas identified by the EAP on site and from desktop analysis were added to the original 450ha preliminary study site. These possible drainage lines and sensitive areas will be assessed and confirmed by the specialist studies..

In the preliminary study site it is proposed to build across the drainage lines in order to keep the solar design as rectangular as possible. The solar frames can be installed using a ramming method which would have the minimum impact on the environment. As far as practically possible the ramming poles would be driven as far as possible from all drainage lines and sensitive areas to take the ecological constraints into account. The preferred site layout is further expected to be altered, so as to reduce the environmental impact of the solar facility on the area, according to the specialist reports and depicted sensitive areas within the impact assessment phase.

The figure below indicates possible sensitive areas, relating to seasonal washer, within the Preliminary Study Site.

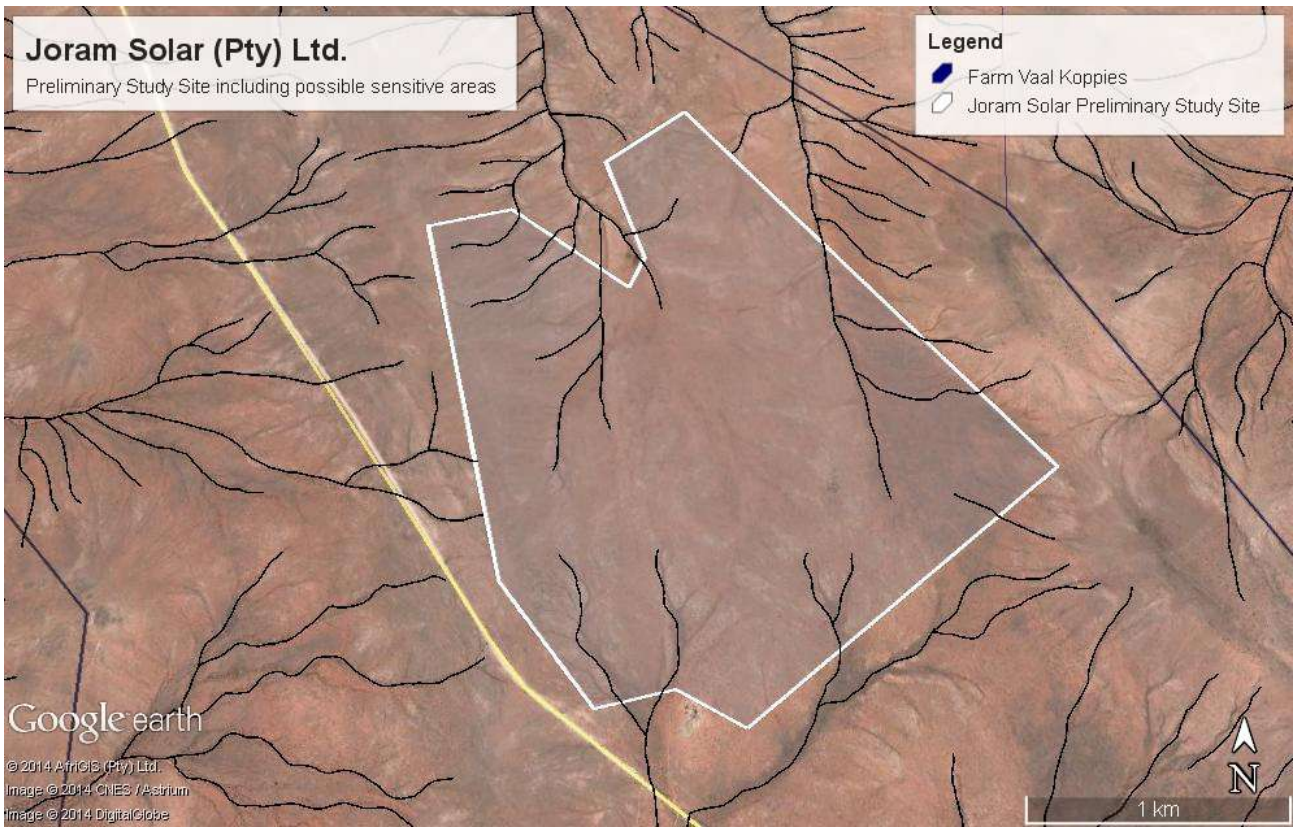

Figure 5: Preliminary study site showing potentially sensitive areas (Solek, 2014)

4.1.2 Layout Alternative 1

The following key points were used to determine the footprint of Layout Alternative 1, within the preliminary Study Site

- Area of approximately 220 ha , to ensure the project would be economically viable, allowing for exclusions of environmental sensitive areas;
- Minimal disturbance to water washes and highly sensitive areas.
- Road access to the site with regard to distance and minimal disturbance to sensitive areas
- Grid connection taking into consideration distance and minimal disturbance to sensitive areas.

The factor having the single biggest influence on the second point is the mounting technology. The preferred technology should allow arrays to be constructed over the wash lines and high sensitivity areas while having a minimal effect on the vegetation, mitigating the chances of erosion.

Should the specialist findings highlight any additional sensitive areas, these will be considered and additional layouts alternatives developed.

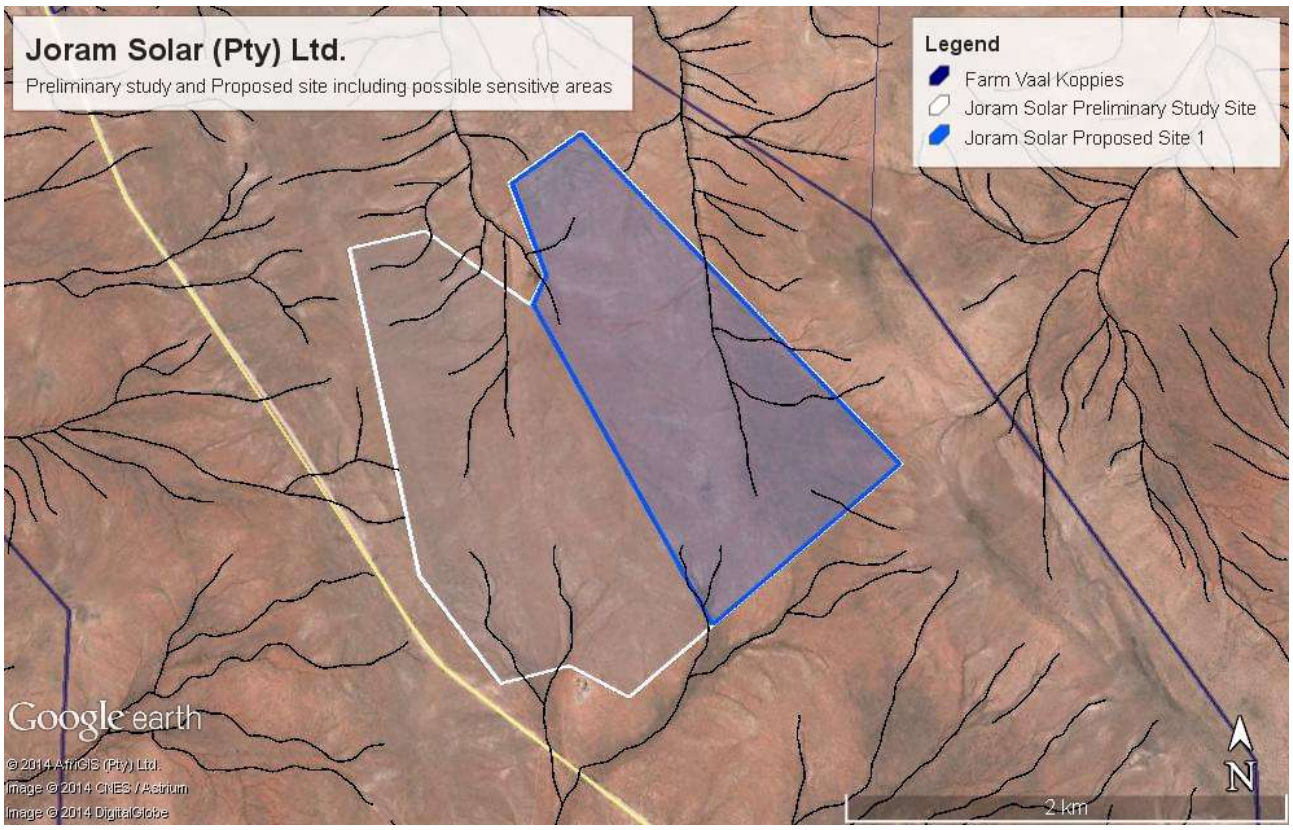

Figure 6: Layout Alternative 1 (Solek, 2014)

4.1.3 Layout Alternative 2

The following key points were used to determine the footprint of Layout Alternative 2, within the preliminary Study Site

- Area of approximately 220 ha , to ensure the project would be economically viable, allowing for exclusions of environmental sensitive areas;
- Minimal disturbance to water washes and highly sensitive areas.
- Road access to the site with regard to distance and minimal disturbance to sensitive areas
- Grid connection taking into consideration distance and minimal disturbance to sensitive areas.

The factor having the single biggest influence on the second point is the mounting technology. The preferred technology should allow arrays to be constructed over the wash lines and high sensitivity areas while having a minimal effect on the vegetation, mitigating the chances of erosion.

Should the specialist findings highlight any additional sensitive areas, these will be considered and additional layouts alternatives developed.

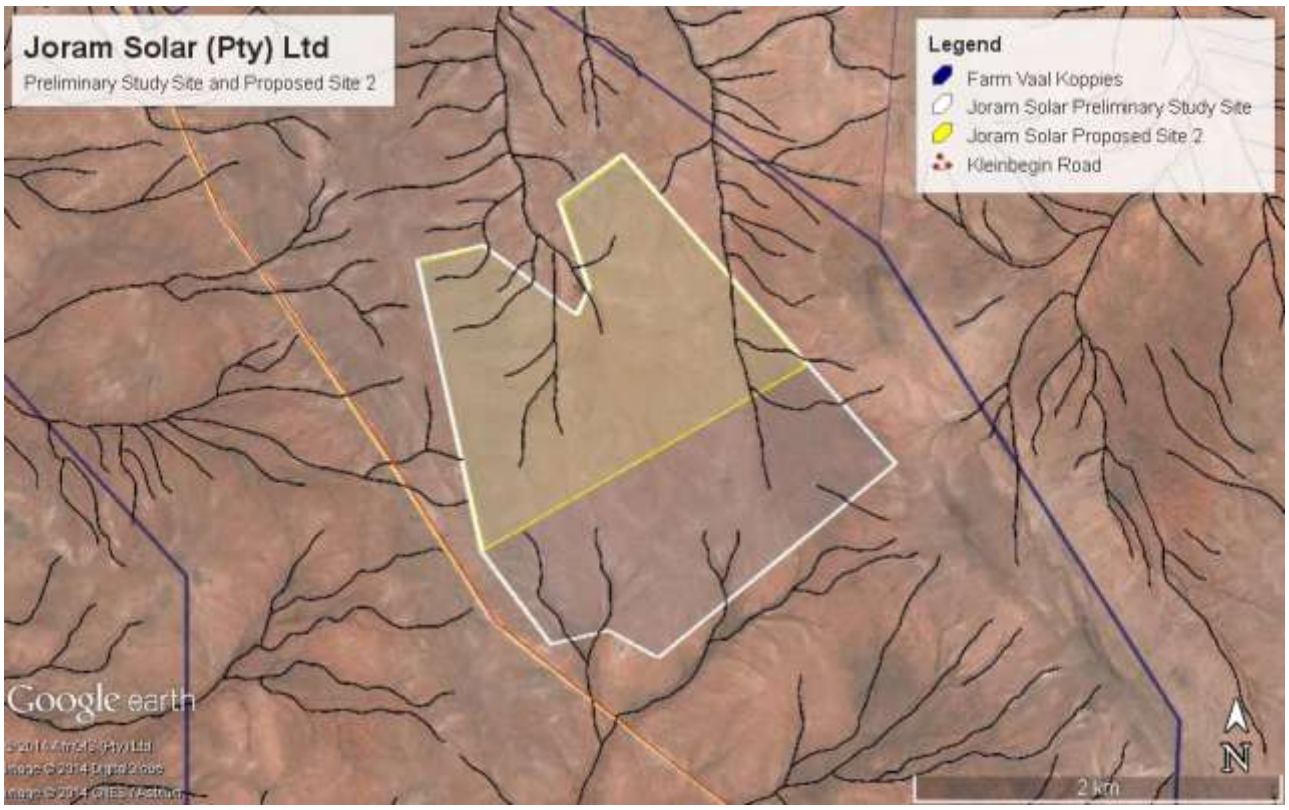

Figure 7: Layout Alternative 2 (Solek, 2014)

4.1.4 Layout Alternative 3 – Preferred Layout (to be developed)

The preferred layout will be developed to be responsive to the constraints defined by the participating specialists, while at the same time achieving technical feasibility. This preferred layout will be developed in the EIR phase of the Environmental Process and will become the layout that is proposed for authorisation.

4.2 ACCESS ROAD AND ENTRANCE ALTERNATIVES.

Access to the site will be along appropriate provincial and local roads. The proposed access roads to the site is from the Kleinbegin district road. The Kleinbegin road intersects the N10, 10km east of Upington.

Three access road alternatives, with three possible entrances are being investigated to determine which one will have the least environmental impact and would be more viable (including in terms of SANRAL's and the provincial roads authority requirements).

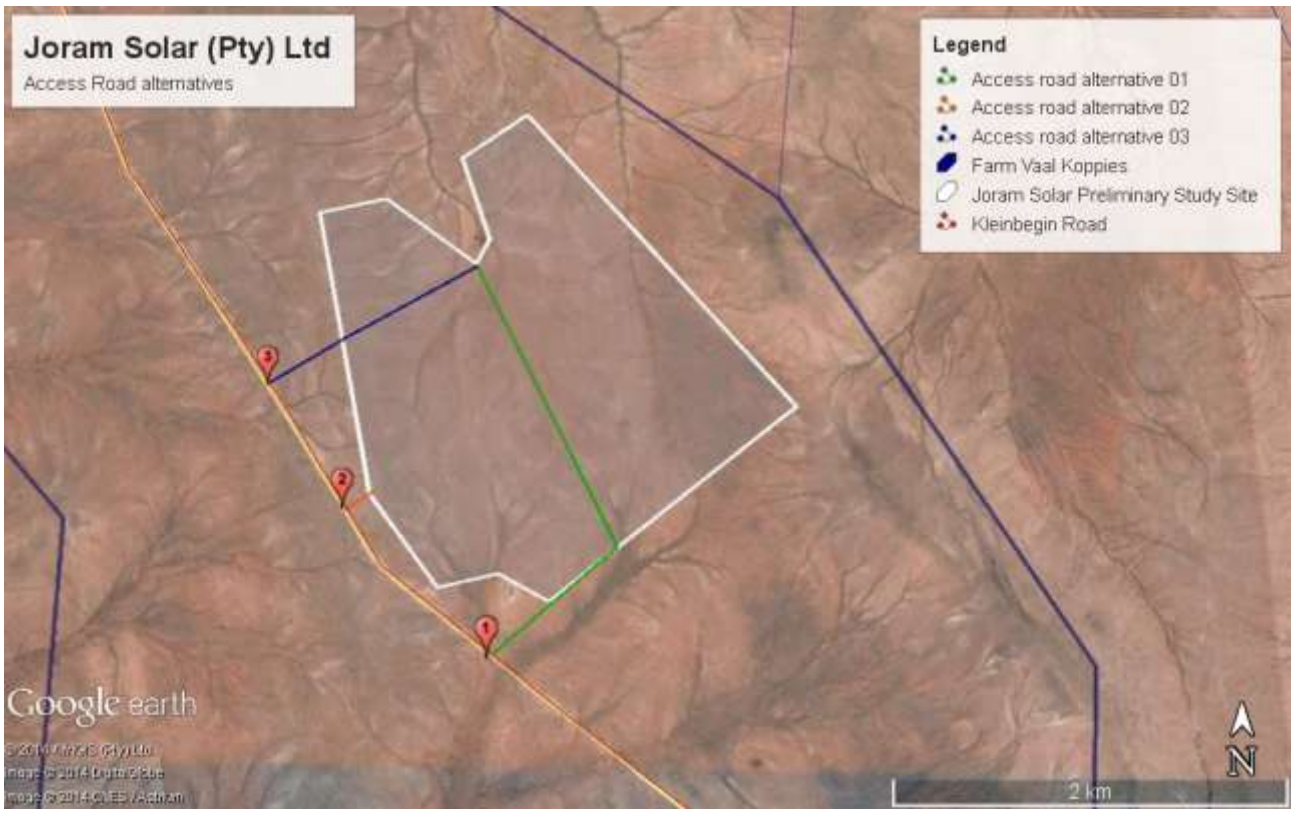

Figure 8: Access road alternatives currently under investigation for Joram Solar (Solek, 2014)

4.2.1 Access Alternative 1

Access road alternative 1 will be investigated and provide direct access to the proposed site from the Kleinbegin road at the existing farm entrance (point 1) parallel to the south boundary of the preliminary study site. This access road will then runs parallel the western boundary of the proposed site providing possible access to the south and north of the proposed Layout Alternative 1.

4.2.2 Access Alternative 2

Access road alternative 2 will be investigated and provide access from the Kleinbegin road at (point 2) to the proposed layout 2 alternative.

4.2.3 Access Alternative 3

Access road alternative 3 will be investigated and provide access from the Kleinbegin road at (point 3) to the proposed Layout Alternative 2 as well as proposed layout alternative 1.

4.3 GRID CONNECTION ALTERNATIVES

In the scoping phase several self-build power line route alternatives are under investigation, including the loop-in loop-out route options. The distances of self-build power lines, upgrading of infrastrusture (Keidebees Eskom substation) and servitude alternatives have been taken into consideration.

The summarised grid connection alternatives and their distances from the onsite substation to the Gordonia Eskom substation or existing Gordonia Kleinbegin 132kV line is illustrated in the table below.

Table 3: Distances of various grid connection alternatives under investigation (Solek, 2014)

Grid Connection Alternatives	Distance (km)
Loop in Loop out Alternatives	
Joram Solar PLine Loop in Loop out sub3_01	2.3 km
Joram Solar PLine Loop in Loop out sub1_02	1 km
Joram Solar PLine Loop in Loop out sub2_01	200 m
Joram Solar PLine Loop in Loop out sub2_02	2.2 km
Joram Solar PLine Loop in Loop out sub3_01	1 km
Self-build Alternatives	
Joram Solar PLine Selfbuild sub1_01	10.8 km
Joram Solar PLine Selfbuild sub1_02	10.1 km
Joram Solar PLine Selfbuild sub1_03	10.6 km
Joram Solar PLine Selfbuild sub3_01	10.3 km

4.3.1 Loop in Loop out Alternatives

The option to loop into the existing Gordonia Kleinbegin 132 kV line is investigated as connection alternative from onsite substations 1, 2 and 3.

The other Loop in Loop out alternatives will be from onsite substations 1, 2 and 3 to Karoshoek Ilanga CSP proposed 132 kV lines. The Ilanga (Karoshoek) CSP project power line servitude alternatives are still to be finalised.

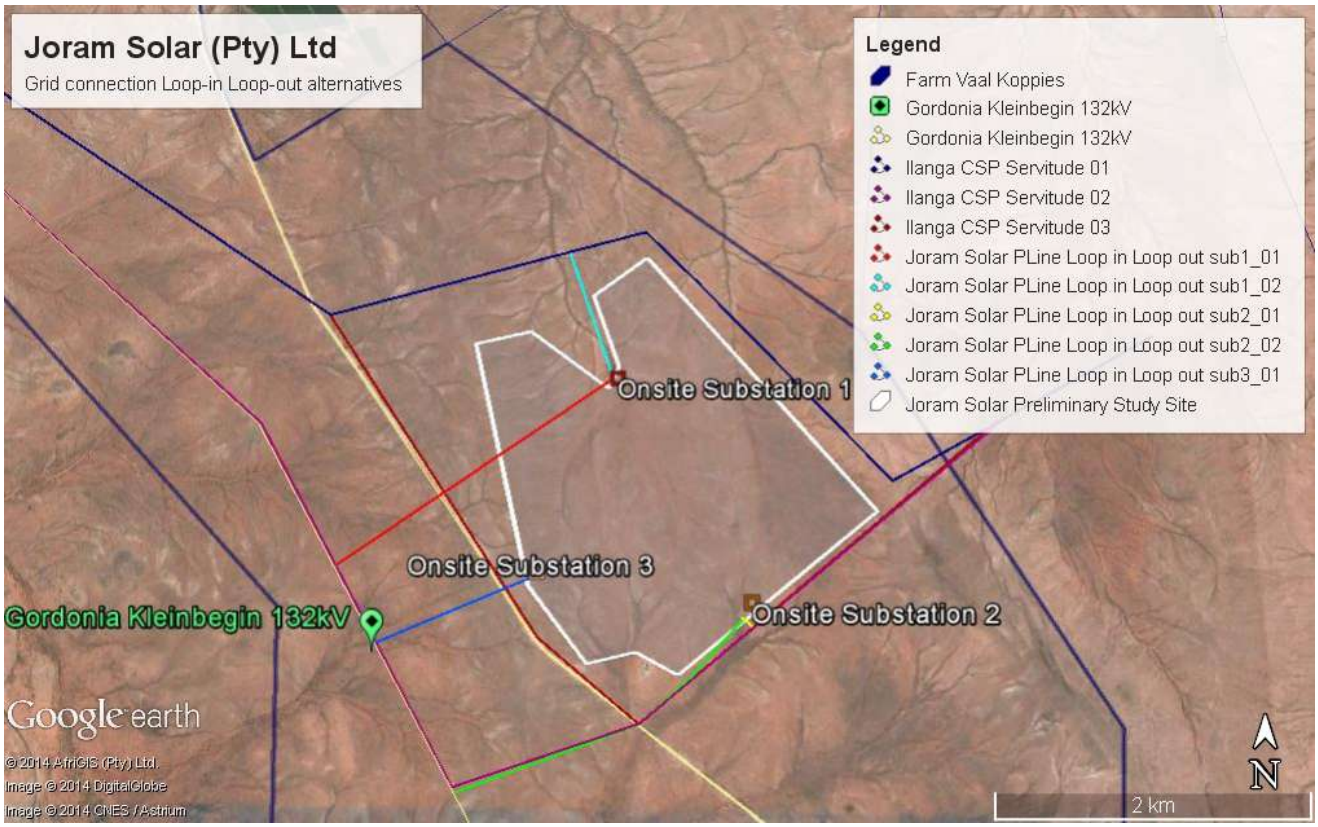

Figure 9: Powerline loop in Loop out alternatives for Jorum Solar (Solek, 2014)

4.3.2 Self-build Alternatives

All the self-build power line alternatives will follow their different routes up to location of the decommsioned Keidebees substation and will then then run parallel the Gordonia Kleinbegin 132kV line connecting to Gordonia Eskom Substation.

The routes were all chosen along existing fences or power lines, in order to minimise the additional environmental impact.

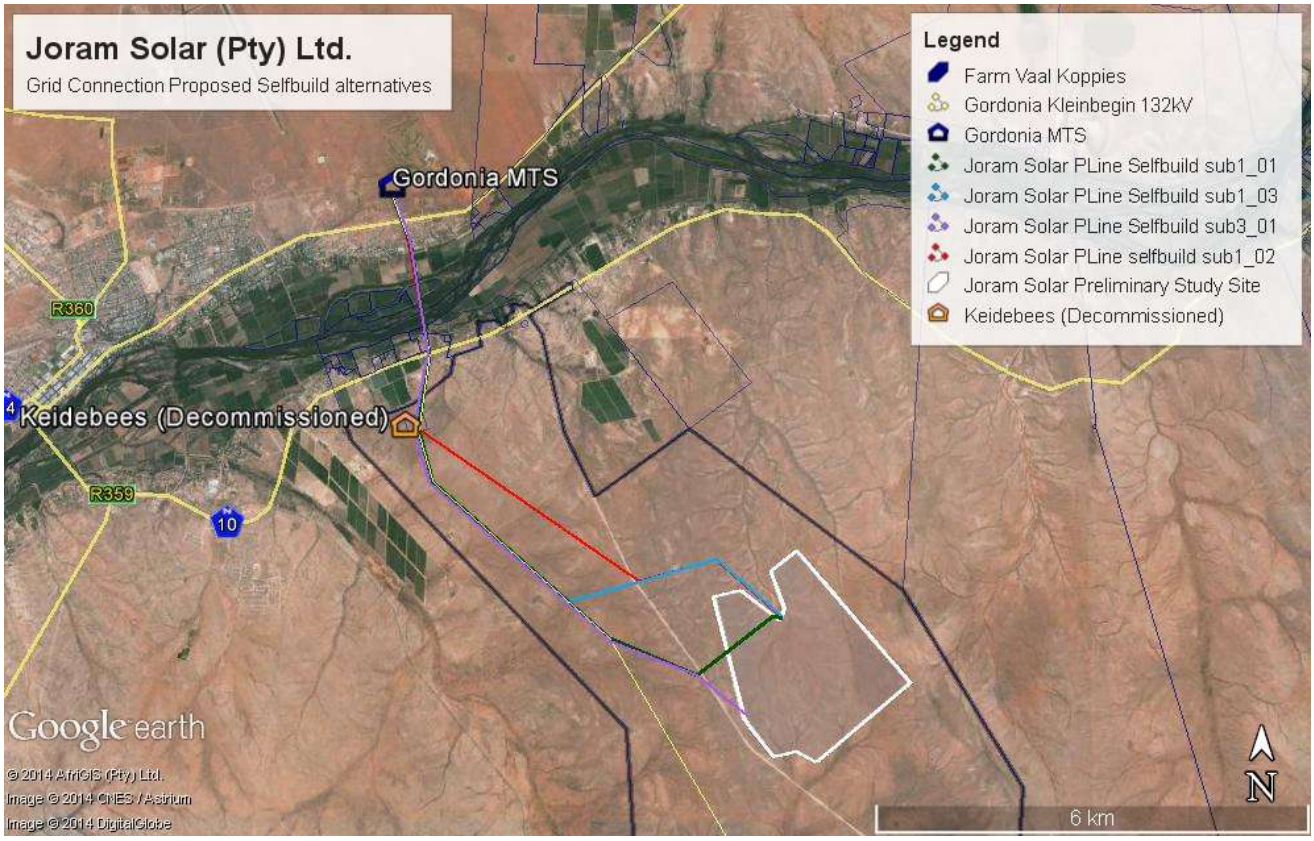

Figure 10: Showing the self build grid connection alternatives for the Joram Solar Project (Solek, 2014).

4.3.2.1 Self-build Alternative 1

The proposed power line alternative option 1 “Joram Solar PLine Selfbuild sub1_01” runs along a east west border fence within the preliminary study site crossing the Kleinbegin road and runs north parallel the existing Gordonia Kleinbegin 132kV power line connecting to Gordonia Eskom Substation. The indicated self-build line connecting Keidebees will be investigated due to possible upgrading of infrastructure as part of Eskom planning specifically on the southern side of the Orange River.

4.3.2.2 Self-build Alternative 2

The proposed power line alternative option 2 “Joram Solar PLine selfbuild sub1_02” runs north to the proposed Ilanga CSP power line servitude 1 alternative and the follows this proposed line connecting to Gordonia Eskom Substation.

4.3.2.3 Self-build Alternative 3

The proposed power line alternative option 3 “Joram Solar PLine Selfbuild sub1_03” follows the same route of option 2, with the only difference of continuing up to the existing Gordonia Kleinbegin 132kV line and runs parallel this power line connecting to Gordonia Eskom Substation.

4.3.2.4 Self-build Alternative 4

The proposed power line alternative option 4 “Joram Solar PLine Selfbuild sub3_01” runs north from onsite substation 3 following the same route as self-build alternative 1 running parallel to the Gordonia Kleinbegin 132kV power line connecting to Gordonia Eskom Substation.

4.4 TECHNOLOGY ALTERNATIVES

The proposed development area will make use of Solar PV or Solar CPV technology. The option of constructing a Concentrated Solar Power (CSP) facility is not considered or assessed within this application.

Two technology alternatives for PV solar facilities have also been considered for this application. An overview of the two PV technologies as well as a summary of their advantages and disadvantages is discussed below.

4.4.1 PV alternative T1: concentrated photovoltaic solar facility (CPV)

CPV technology differs from conventional photovoltaic systems (PV) in that the CPV modules use different solar cells and include **lenses** which **focus light energy** in a more concentrated manner, hence harvesting more energy from the sun. The efficiency of the cells provides benefits relating to capacity per module and reduced spatial requirements and usage. CPV technology systems are much higher than conventional PV technology, with the system reaching a **maximum height** of approximately **10 m**. In some cases CPV installations can require a higher amount of water for cooling, unlike PV panels which only require water for cleaning purposes. However, there are **alternative dry cooling methods** that do not required additional water..

4.4.2 PV Alternative T2: Photovoltaic Solar facility (PV)

Photovoltaic solar power is **solar energy** that is converted into electricity using **photovoltaic solar cells**. The captured light moves along a circuit from positive-type semiconductors to negative-type semiconductors in order to create electric voltage. Semiconductors only conduct electricity when exposed to light, as opposed to conductors, which always conduct electricity, and insulators, which never conduct electricity.

Power is collected through a structure comprised of **many solar cells**, usually a solar power panel (also called a PV module). PV modules/solar panels can be combined into an “array” of panels in order to capture a greater amount of solar energy. PV solar panels can either be fixed (rows of tables) or they can be constructed on a single or double axis tracking system. Such a system will use sun sensors to follow the movements of the sun. With the double axis tracking system the sun can be tracked on more than one axis allowing the maximum radiation over the entire solar module.

The fixed tilt solar technology (table installations of rows) is the less expensive option but it has a much lower energy yield than the axis tracking system (free standing panel installation).

4.4.3 Summary of environmental advantages and disadvantages of CPV and PV technology

The following table depicts the different advantages and disadvantages correlated to PV and CPV technology.

Table 4: Technology comparison between PV and CPV technology

	CPV	PV
Advantages	• Takes up less surface area therefore "footprint" is less, resulting in less impact on soil, agriculture and biodiversity. • More energy can be produced per module. • Because the modules are higher and spread out, the ground in between and under the modules are exposed to more sunlight, allowing vegetation to grow back easier after construction.	• Lower visual impact (range between 2 m and 5 m in height). • Lower impact on birds due to lower height. • Lower impact on bats due to lower height. • Easier to erect PV technology. • Lower impact on heritage/ culture due to lower impact on landscape of visual impacts. • Easier to transport.
Disadvantages	• Higher visual impact, CPV systems can be up to 10 m high. • Higher impact on birds. • Higher impact on bats. • Requires skilled labour because more difficult to erect. • CPV systems utilises more water than conventional PV. • Higher cultural/ historic impact to the landscape. • Harder to transport – abnormal load.	• PV facilities of the same footprint of CPV facilities produce less power. • The tightly packed PV arrays allow little sunlight through, which can cause the vegetation to grow back slower.

The industry is changing very quickly in terms of PV technology types and associated costs. Constraining the project to a particular technology at this stage could be detrimental towards the viability of the project in the light of what will be realistic to construct in 2-3 years from now. Tis environmental process is thus considering both these technologies at potential options for implementation.

4.4.4 Mounting and film alternatives

PV solar power technology has been identified as the preferred technology to generate electricity in this project. There are, however, several alternatives in terms of the specific solar PV technology to be used. These alternatives can be grouped in terms of mounting and film alternatives but should not trigger any major difference in the impact of the project as explained in this report.

Mounting alternatives

There are two major alternatives in terms of solar PV mounting, namely **fixed-tilt** and **tracker mounting technology**. The following figure depicts the two mounting alternatives.

Plate 1: Examples of various mounting alternatives (Solek, 2014)

When **fixed-tilt** solar mounting technology is considered, the solar PV modules are fixed to the ground and do not contain any moving parts. These modules are fixed at a specific north facing angle. This type of technology is **less expensive** than tracker technology, but it has a **lower energy yield** due to the limited exposure to sun radiation.

The preferred technology type is known as **horizontal tracker technology**. This technology is designed to follow the path of the sun across the sky. By using this technology, the modules are exposed to typically 25% more radiation than fixed systems. The design is extremely robust and contains only a few moving parts. It also has more or less the same footprint and infrastructure requirements than that of fixed-tilt designs. The tracker requires approximately **1.8 to 2.3 hectares per megawatt**. The tracking design is based on a simple design and makes use of a well proven off-the-shelve technology that is readily available. If conventional PV modules are used, the maximum height of the trackers is typically less than 2 m, but as previously stated, the CPV trackers are much higher, reaching a maximum height of approximately 10 m. The panels will most probably be mounted on either a single axis or a dual axis tracking system, both of which have a similar impact.

It must be noted that the mounting technology is **unlikely to affect the significance of environmental impacts** and as such **all the mounting technologies** described above are under **consideration.**

Film Alternatives

There are a multitude of different film technologies available within the market. The best solution, according to research conducted, are either thin film (amorphous silicon or cadmium telluride) or -crystalline cells (mono- or poly-crystalline) depending on the space and irradiance of local conditions.

The **film technology will not affect the significance of environmental impacts** and as such all film alternatives are being considered in this environmental process.

4.5 THE NO-GO ALTERNATIVE

The Status Quo Alternative proposes that the Joram Solar Development not go ahead and that the area in proximity to the Gordonia substation remain undeveloped as it is currently. The land on which the proposed project is proposed is currently vacant. It is currently used for limited cattle grazing activities, however due to a combination of poor soil quality, water scarcity and extreme climatic conditions, it has no potential for irrigated crop cultivation. The area in question is also considered too small to generate noteworthy financial benefit from agricultural activities due to its low carrying capacity.

The solar-power generation potential of the Northern Cape area, particularly in proximity to the existing Eskom infrastructure is significant and will persist should the no-go option be taken.

The 'No-go/Status Quo' alternative will limit the potential associated with the land and the area as a whole for ensuring energy security locally, as well as the meeting of renewable energy targets on a provincial and national scale. Should the 'do-nothing' alternative be considered, the positive impacts associated with the solar facility (increased revenue for the farmer, local employment and generation of electricity from a renewable resource) will not be realised.

The no-go alternative is thus not considered a favourable option in light of the benefits associated with the proposed solar facility development, however it will be used as a baseline from which to determine the level and significance of potential impacts associated with the proposed solar development during the Impact Assessment phase of the on-going environmental process.

5 TECHNICAL CONSIDERATIONS

The following details were drawn from the **Engineering Report** (Solek, 2014), attached in **Annexure D4**.

5.1 OVERVIEW OF THE PROPOSED PROJECT

The proposed solar development aligns with the planned generation development by the Department of Energy, under the REIPPP program and the IRP 2010 plans.

The proposed facility is planned and designed for the generation of approximately 75 MW. The developed electricity of this project will be fed into the national electricity grid. The proposed development site covers an area of approximately 200 - 220 hectares, although an initial preliminary study site of 400ha has been considered). The area is located approximately 10 km from the existing Gordonia Substation and in close proximity to the existing Gordonia Kleinbegin 132 KV powerline.

5.2 SOLAR ENERGY AS A POWER GENERATION TECHNOLOGY

5.2.1 Basic understanding of solar PV plants

Photovoltaic (PV) panels convert the energy delivered by the sun to direct current (DC) electric energy. The array of panels is connected to an inverter by means of a network of cables. The DC power is inverted to alternating current (AC) power by a grid-tied inverter. The AC power can then be added to the national electricity network (grid). The voltage at which power is generated is stepped up to the required voltage and frequency of the national grid by using a transformer. The electricity is distributed from the on-site transformers via distribution lines to the nearest Eskom substation. From the Eskom substation the electricity is fed into the Eskom grid.

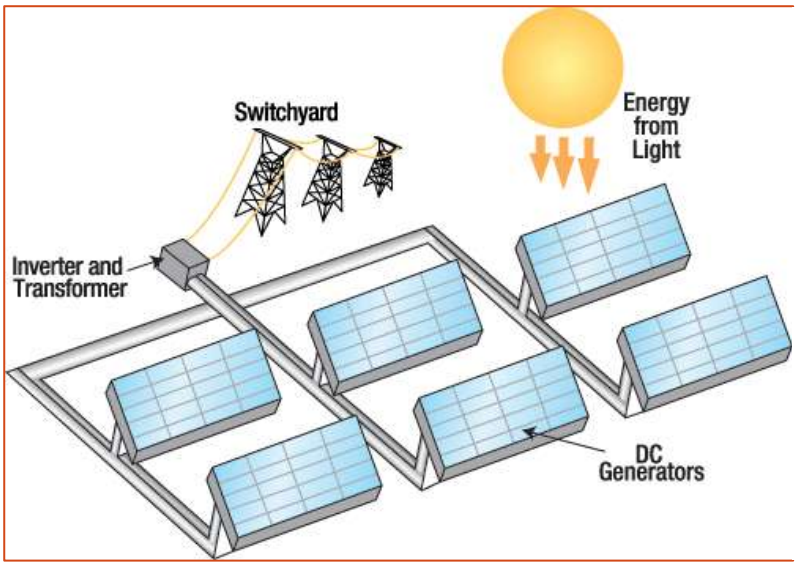

Figure 11: Schematic depiction of a photovoltaic energy generation facility (Solek, 2014)

The **infrastructure** of the facility includes the ground-mounted structures, **panels**, **cables**, **inverter rooms**, **access roads**, **auxiliary roads**, an **on-site substation**, and a **distribution line**.

The primary input of the system is sunlight, which is converted to electricity. In the case of sun tracker technology the facility may also utilise auxiliary electricity from the Eskom grid to power tracker motors in order to optimise the amount of sunlight on the solar PV infrastructure. In addition to auxiliary power being used for powering tracker motors, small amounts of auxiliary power would be used for on-site usage on items such as, but not limited to, security and site office energy requirements.

Installing either a fixed or dual tracking PV system (CPV modules or arrays of PV panels) is proposed. In a fixed system, the PV modules stay in one position, and do not follow the path of the sun. A tracking system is ground-mounted and follows the sun's path with the use of typically single or dual-axis technology in order to maximise the amount of direct sunlight on the Solar PV modules. By following the sun, the tracked array rises quickly to full power and stays there on a clear sunny day, while the fixed array only maintains maximum power for a few hours in the middle of the day.

5.3 TECHNICAL DESCRIPTION OF THE PROPOSED SOLAR FACILITY

The proposed facility has a planned peak capacity of 75 MW_p. with an estimated footprint between 200 and 220ha. The initial study area of 400ha has been identified as the initial study site that will be investigated by the specialists as part of their baseline studies. The footprint of the study site is larger than what is physically required for the proposed development, so as to ensure ample development space are available after potential environmental sensitive areas are excluded, based on specialist studies and recommendations.

5.3.1 Site development components

The final design will consist of different components. A typical description of the components are listed below. For further details please refer to the Layout Report attached in **Appendix C** as well as the Technical Report attached in **Annexure D4**.

5.3.1.1 Position of solar facilities

The final exact position of the solar **PV** or **CPV** module layout will follow a **risk-averse approach** and be determined by the recommendations of the participating specialists in order to avoid all sensitive areas in the positioning of the facility. In addition, the final layout will be influenced by the

final detail design of the project once a tender has been awarded (preferred bidder status has been awarded by the Department of Energy to the project). The footprint of the 75 MW will be located on a proposed site area of 200 - 220 ha, within a preliminarily investigated area of 400ha. The final footprint of the facility is expected to be closer to 200ha, effectively allowing land area to be excluded as sensitive area should this be required.

The following figure depicts a typical layout of PV modules for the two types of PV technology.

Plate 2: Showing typical examples of PV arrays (left) and CPV modules (right) (Solek, 2014)

5.3.1.2 Foundation footprint

The physical footprint of the PV/CPV modules on the ground is formed by a **network** of **vertical poles** (typically 100 mm in diameter), on which the modules are to be mounted (see examples below). The following figure depicts the typical foundation and substructures unto which the frames and PV modules are mounted.

Plate 3: Showing typical foundation structures for mounting of PV panels (Solek, 2014)

Different methods are used to mount the modules to the ground. The **exact mounting structure** choice will be influenced by the **pricing**, **geotechnical properties** and **technology** at the time of construction.

Some of the methods include basic **drilling** or **hammering** with specific tools. The physical process of **ramming** the anchors into the ground is done using special equipment (typically on tracks). In the case where **earth screws** or **rock anchors** would be more suitable, the rammed pole would be replaced by one of the former. Some of the ground covering in the medium sensitivity area will be cleared to do the frame installation accurately. Although the site is very flat, some **minor excavation** may be necessary in certain **medium sensitivity areas** (as defined by Todd, 2014). The modules can also be mounted to the ground in small **concrete foundation blocks**; usage of concrete foundation will be limited as far as possible (function of geology and

other requirements). Removal of such foundations is possible upon de-commissioning of the project.

5.3.1.3 Module height

The PV panel arrays have an approximate height of 3.5 m, whereas the CPV modules have a height of 10m. A **maximum height** of **10 m** will be considered and assessed in the Environmental Impact Assessment Process. This will allow for flexibility to technology changes in the industry. The maximum height listed here is only a precautionary description due to foreseeable future changes in technology. This maximum height of 10 m will be considered by the visual specialist.

5.3.1.4 Solar Panel Area

The solar arrays are put together with strings of **solar modules** connected in series, which can be **fixed** or mounted onto **single** or **double** axis **tracking systems**. These frames are typically installed with the single tracking axis in an east-west direction to maximise the system's output. The standardised length of a solar array would typically be between **50m** and **200m** long. Where a tracker system is used, each of the modules is controlled individually and standardised systems are preferred for economic and practical reasons. The solar modules will be placed in such a way that it would have the least influence on the washes and avoiding the ecological boundaries set where practically possible.

5.3.1.5 Access road to site

An access road of approximately **6m wide** will be required for the facility. The access road alternatives are discussed in more detail under the section dealing with **consideration of alternatives** as well as in **Appendix C** and **Annexure D4** attached.

5.3.1.6 Internal roads indication width

Gravelled internal roads and un-surfaced access tracks are to be provided for. Such access tracks (typically < 6 m wide and limited to the construction site) will form part of the development footprint. Pathways (typically <6 m wide) between the PV/CPV module layout will typically also be provided for to make the cleaning and maintenance of the panels possible. Existing roads will be used as far as possible.

Plate 4: Showing typical example of internal access tracks (Solek, 2014)

5.3.1.7 Inverter Rooms

The DC cabling from the module strings will be connected to the inverters that will be housed within inverter rooms located at specific areas as per solar PV design layouts and cabling diagrams. The footprint of an inverter room will be approximately 56m² (4m x 14m) and height of 3m.

Plate 5: Typical example of inverter room (Solek, 2014)

5.3.1.8 On-site substations and transformers

The step-up substation and its associated infrastructure and internal roads should have a footprint of approximately 0.04 ha (20 m x 20 m). Note that the 0.04 ha is an estimate and included in the entire building footprint of typically < 1 ha.

Plate 6: Typical example of on-site substation (Solek, 2014)

5.3.1.9 Cable routes and trench dimensions

Shallow trenches for electric cables will be required to connect the PV/CPV modules to the on-site substation (such electric cables are planned along internal roads and/or along pathways between the PV/CPV modules).

Plate 7: Typical example of internal cable trenching (Solek, 2014)

5.3.1.10 Connection routes to the distribution/transmission network

Electricity will be transmitted from the **on-site step-up substation** via a **new overhead power line** to either the **existing 132kV** Gordonia Kleinbegin powerline or via an own-built line to the existing Gordonia Substation. A number of possible connection routes are investigated in this

environmental process. The final preferred route will be subject to the negotiations with the neighbouring farmers and the recommendation of the participating specialists.

5.3.1.11 Security fence

A **perimeter security fence** will be constructed around the solar park with a guarded security point. The perimeter security fence is envisioned to include security cameras as well as related and **required infrastructure** (such as cabling, central monitoring etc). Note that energy supply towards these required security infrastructure is envisioned to be obtained from the auxiliary power supply.

5.3.1.12 Cut and fill areas

As far as possible, any **cut and fill** activity along the access roads will be **avoided**. The majority of the proposed access roads are currently being used by construction vehicles and should not need any alternation. Where alternations might be necessary, input from civil construction engineers will be sourced regarding the cut and fill aspects.

5.3.1.13 Borrow pits

As far as possible, the creation of **borrow pits** will also be **avoided.** The current **EIA application does not make provision for new borrow pits**. Should new borrow pits be required on the property, these will have to be licenced/authorised in terms of the Minerals and Petroleum Resources Development Act and the National Environmental Management Act. To avoid this process a licenced borrow pit in the area would rather be used.

5.3.1.14 Soil heaps

As far as possible, the creation of **permanent soil heaps** will be **avoided**. All topsoil removed for the purpose of digging foundations are to be separately stockpiled within the boundaries of the 220 ha development footprint, for later rehabilitation. It is unlikely that major soil heaps will be required for this construction site.

5.3.1.15 Auxiliary buildings (Laydown area)

The auxiliary buildings area will typically include:

- A workshop area
- A storeroom area
- A change and ablution room area
- An administrative and security building
- 10 x 10 kl water tanks

The **infrastructure** for the **auxiliary buildings** should occupy approximately **2 ha**. The **workshop** will be used for general maintenance of parts, etc. and will typically be **20m x 40m**. The **storeroom** will be used for the storage of small equipment and parts and will typically be **20m x 30m**. The change and **ablution facilities** will be very basic and will include toilets, basins and a change area. The administrative and security building will be used as an on-site office and will have a footprint of typically **10m x 10m**.

5.4 WATER RELATED ITEMS

The following section contains discussions pertaining to water, the volumes and seasonality of the project requirements, the sources available, the infrastructure pertaining to water usage, the legislative approvals required for water usage and the corresponding environmental impact risks thereof. Please refer to the Engineering report attached in **Annexure D4**.

1.1.1 Water requirements

The project requires about **8 litres** of water **per panel per annum** for the purposes of construction and maintenance (cleaning of the panels). The capacity of the panels that will be used will therefore determine how much water will be required for a 75 MW plant. If a 250 Watt panel is used, a 75 MW plant will consist of more or less 300 000 panels, which will roughly calculate to 6.6-8 kl of water required per day (**2400-2900 m^3/annum**). The 10 kl capacity tanks will be placed on site in order to store 100 000 litres of water at any given time, effectively providing a storage capacity of two to three days of cleaning water supply.

The water distribution system will distribute water from the ten 10 kl water tanks to a high pressure hose and on to the solar panels. The proposed activity is not a "water intensive activity" (as opposed to CSP technology). Only a limited amount of water is required in low rainfall periods to clean the modules once every quarter so that they can operate at maximum capacity. **No chemicals will be used to clean the panels, only water.**

Weather conditions, traffic and general dustiness at the site play a role in the exact amount of water required to clean the solar PV panels. At present it is assumed that each panel should be washed once every three months.

To further reduce the use of water at the solar facility, the **use of alternative panel cleaning methods is also being investigated**. The most feasible technology under consideration uses compressed air to blow off any debris from the panel's surface. At this stage the technology is being tested and needs refinement before it would be commercially viable. Other cleaning options are currently under development where rotating rubber-based waterless cleaning is used. Cleaning technologies are improving over time and it is expected that more innovative cleaning technology will be developed, further reducing or eliminating water requirements although these are not as yet fully commercially proven.

The development is expected to apply for a water use licence, from the Department of Water Affairs, as part of the development process. A water use licence is expected to be required for any water extraction (boreholes, rivers or channels) or for crossing river beds/washers. The requirements to apply for a water use licence are expected to be confirmed and directed by the appropriate specialists.

5.4.1 Water sources

There are a number of different water sources which can be further investigated to supply water for the project. The following section investigation these options.

5.4.1.1 Boreholes:

The preferred water sources are the existing boreholes on the proposed farm. One borehole has been identified on the farm situated near the proposed site. This borehole is seen as a possible water option for the facility. The small volumes of water required for washing the solar PV modules and for general operational purposes (maximum expected usage of 3'000 m^3/annum) are expected to be sourced from these boreholes. According to the farmer the boreholes are strong enough and the water they supply is drinking water quality.

A full pump-test is expected to be done after preferred-bidder status in order to confirm sufficient water supply potential from the borehole; this will further confirm water availability.

Depending on where on the final design the water tanks will be located, the water from the boreholes will probably be pumped to the water tanks through a pipeline. The pipe diameter will be approximately 50mm-100mm. The pipeline will be laid on the ground, or just below the ground by

means of manual excavation. The water pipeline should not result in any additional environmental impacts outside of the main construction area.

Borehole pump tests and corresponding confirmation of water availability is expected to be conducted after preferred bidder status.

5.4.1.2 Khara Hais Garib municipality (alternative supply)

Permission to use water directly from the nearest town, Upington, will be sought from the Khara Hais Municipality. This water will also have to be transported by trucks to the proposed site. This will be seen as the last alternative as transport costs will be significantly higher compared to the other two options. The usage of municipal water can reduce the requirement of obtaining a water use licence from the Department of Water Affairs in terms of the extraction of water from resources such as groundwater or rivers.

5.4.1.3 Rainwater

As an additional measure, PVC rainwater tanks could also be placed alongside the on-site buildings to collect the rainwater runoff from the roof. These PVC tanks will then form part of the water storage tanks. If necessary, measures can also be put in place to capture the rainwater runoff from the PV modules.

5.4.2 Water buffer

Water storing infrastructure is to be provided as part of the auxiliary building footprint area. Storing capacity for two weeks are planned to be provided for. This will add up to ten x 10 kl water tanks. These tanks will be supplemented by rainwater capture from the auxiliary building.

5.4.3 Water-use permission

The quantity of water required **usually qualifies for a general authorisation**, but the specific quaternary area in which the development site is situated does not allow for general authorisation. Thus, a formal water use licence would have to be applied for. However, as also stipulated in the official REIPPP documentation (RFP, Volume 1, Part 1, Section 4.5) the **DWA will only process water use licence applications from developers who have been selected as Preferred Bidders.**

Therefore a full assessment of the water-use licence application will only be undertaken by the Department of Water Affairs (DWA) once the project is approved. The EIA application can therefore be submitted without a water licence, as long as there is enough confirmation that there are sufficient water available. A Non-binding Water Confirmation Letter for the project has been applied for at the DWA, in which the DWA is asked to confirm that according to their information there should be adequate water available for the project. The DWA are also registered as a key stakeholder in the environmental process and will have an opportunity to provide any additional input.

5.5 EROSION AND STORM WATER CONTROL

The risk of **water erosion** is **low** because of the extremely low annual rainfall in the area. The ground condition in the Upington area is such that any surface water is very quickly absorbed into the soil. This avoids water build up on the surface and quickly reduces any water flow which might cause water erosion.

On large structures or buildings appropriate **guttering** could be used around the building to avoid water erosion where roof water would be flowing off the roof. Wherever practically possible **rainfall**

run-off from the roofs/gutters will be **captured** and **stored** in rainwater tanks. If this water cannot be captured, water will be channelled into energy dissipating structures to spread the water and slow it down to reduce the risk of erosion. Such a structure could be moulded from precast concrete, loosely packed rock or perforated bags filled with stone.

Any rainfall on the solar modules would be welcomed due to its cleaning effect, but as mentioned before the annual predicted rainfall is very low and would not likely cause any erosion worth discussing.

The solar module surfaces are installed at a **relatively large incline** with **gaps between modules**. This does **not allow** significant **water build up** on the modules while also reducing the energy in falling droplets. Should a tracking technology be used this implies that droplets leaving the solar module surface would not drop onto the same ground areas all the time.

The construction area might cross over a number of seasonal washes. To avoid erosion in these washes recognised building practices will be followed to keep the natural flow of water within its natural borders. It is in the interest of the solar operator to keep the area clean and free of erosion to avoid any damage to the equipment. The solar modules would be installed on frames, allowing for natural water flow underneath the structure.

During the **construction phase** of the project there might be a risk of **wind erosion** where natural vegetation is removed. This might increase the risk of damaging sensitive equipment with a sandblasting effect. Details of stormwater management during construction will be included in the environmental management programme that will be included in the Draft Environmental Impact Report.

Access roads and internal roads would also be designed and build using recognised erosion and storm water management systems. During the construction phase of the solar PV facility temporary solutions would be implemented to ensure erosion does not occur. The following figure shows a typical temporary solution that would be implemented during the construction phase, basically consisting of an inlet, channel and outlet. During outflow of the water energy is dissipated allowing any particles to sink to the ground which also avoids fast flowing water to sweep particles up from the ground avoiding erosion, by flowing though packed stones acting as a filter.

Plate 8: Installed concrete pipes and culverts (Solek, 2014)

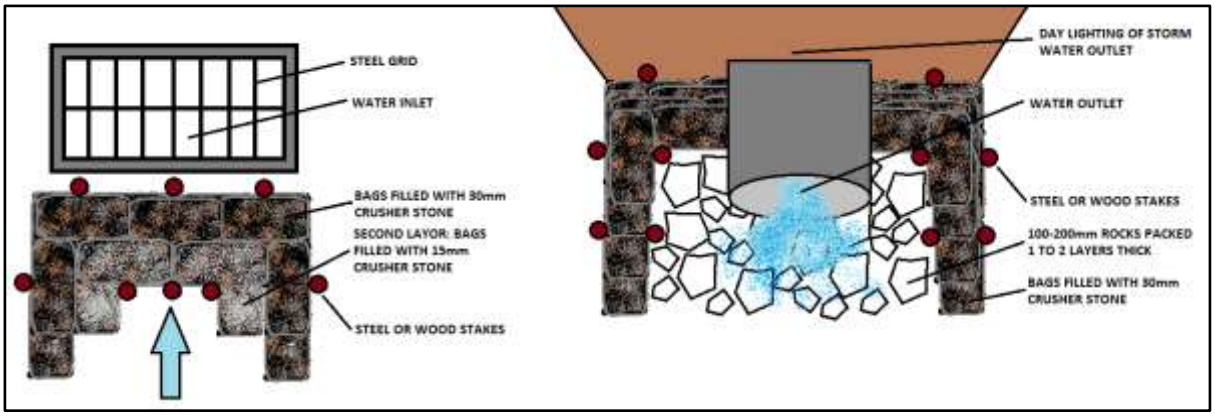

Figure 12: Temporary culvert inlet and outlet (Solek, 2014)

After construction, more permanent solutions would be designed by the consulting engineers to keep storm water under control in a sustainable way. Depending on the situation which is influenced by the type of water control most probably being stream crossing (in this particular case it would be a dry water wash for most of the year) or a culvert for water runoff management, either portal culverts with bases or reinforced precast concrete pipes would be used as the channelling.

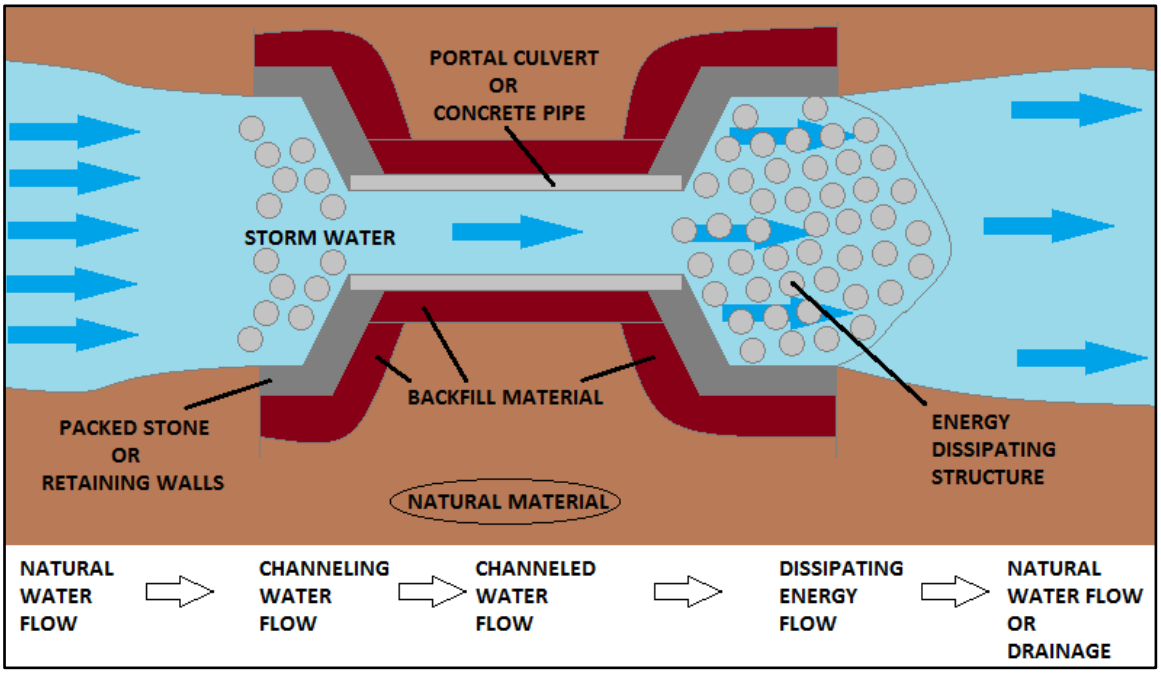

Figure 13: Schematic example of typical drainage line crossing (Solek, 2014)

An alternative to culverts considering drainage line crossings, Low-level River Crossings (LLRC) can be used. A LLRC is a structure that is designed in such a way to provide a bridge when water flow is low, while under high flow conditions water runs over the roadway, without causing damage.

Two types of LLRC can be used depending of the particular situation. A “Causeway” contains openings underneath the surface, which allows passing water through where a “Drift” does not.

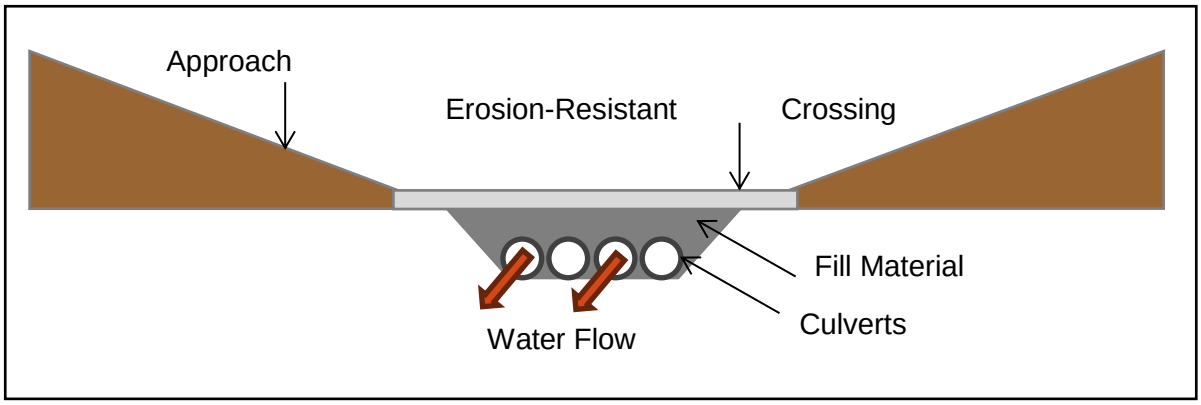

Figure 14: Schematic depiction of causeway (Solek, 2014)

The same type of erosion control methods discussed with the culverts is taken into account when designing a LLRC. Because a LLRC is designed for water to flow over it, erosion protection is very important. Rock filled baskets, loosely packed rock or perforated bags filled with stone are some of the methods usually considered with LLRC.

The water use licence application process will include application for potential crossings of water courses in terms of Section 21(i)&(c) of the National Water Act. This application process will likely only commence if the project is selected as a preferred bidder.

5.6 SERVICES REQUIRED

Due to the remote location of the proposed site, making use of municipal services is very difficult. It is therefore proposed to manage the Water and Electricity, Sewage and Waste Removal aspects independently.

5.6.1 Water

Water will be sourced from either the two boreholes close to the site, the Kai Garib municipality or other third party suppliers. Permission has been obtained from the farmer in the lease agreement, that the borehole water may be used. According to the farmer the water is drinking water quality. The water will be stored on site in standard 10kl water tanks. Due to the small amount of water needed, water can also be obtained for the Khara Hais municipality and transported to the site by standard water trucks, should the borehole water not be sufficient. All legislative requirements with regard to water provision will be followed.

5.6.2 Electricity

Electricity will be needed during the construction period as well as the operation period in the support offices, security systems etc. It is proposed to either use generators for electricity, or alternatively make use of a number of PV panels during the construction period. As part of the infrastructure installed, it is proposed to utilise on-site electricity reticulation from the on-site substation towards the required areas by utilising the accounted infrastructure. As an additional option it is proposed to make provision for the utilisation of an off-grid, on-site solar system for the required on-site electricity.

All these options are likely to have similar environmental impacts.

5.6.3 Waste effluent, emission and noise management

5.6.3.1 Solid waste management

During the construction phase an estimated amount of less than 5 m^3 non-hazardous solid construction waste are to be produced per month, for the expected 12-18 month construction period. An independent service provider will be used to safely store all construction waste, and remove it from the site on a scheduled (weekly or bi-weekly) basis. The construction waste, where applicable, will be disposed at a municipal landfill site that is appropriately licenced. As far as possible the waste hierarchy should be applied in order to reduce, re-use and recycle waste. The Environmental Management Programme will address solid waste management during construction.

During the operational phase after construction, the facility is not expected to produce any solid waste.

5.6.3.2 Liquid effluent (sewage)

The liquid effluent generated is expected to be minimal and limited to the ablution facilities. All workers will be transported to site on a daily basis should the workers not be housed on site. Chemical toilets will be provided during the construction phase. These chemical toilets will be serviced and emptied on a weekly basis by a private independent contractor. The sewage will be transported to a nearby Waste Water Treatment Works for treatment.

The on-site permanent sewage solution for the operation period of the facility is expected to either utilise a combination of a septic tank or a conservancy tank, as determined by the local authority. Due to the locality of the farm, sewage cannot be disposed in a municipal sewage system.

5.6.3.3 Emissions into the atmosphere and noise generation

Very little emissions should be released into the atmosphere and no significant noise should be generated, except during the construction period with drilling and hammering. Due to the site location this should not pose any issue as no residential area is located nearby. Further mitigation measures in this regard will be included in the Environmental Management Programme.

5.7 CONSTRUCTION OF THE PROPOSED FACILITY

The planned **construction period** is estimated to be between **14-18 months**. During the construction activities an estimated **5 jobs** will be created **per MW** of installed capacity. Therefore an **estimated job creation** of **375-450** employees are expected during the construction of the facility, mechanisms for ensuring that these employment opportunities are sourced from the Khara Hais Municipal Area will be included in the Environmental Management Programme.

Should the project be approved, and all required approvals and licences are obtained from the

5.8 TRAFFIC MANAGEMENT AND TRANSPORTATION

All solar plant components and equipment are to be transported to the planned site by road. Construction is expected to stretch over a period of approximately 18 months. During this period the majority of the solar PV panels and construction components will be **transported by utilising container trucks** (e.g. 2 x 40 ft container trucks or a similar option).

Less than 30 containers will be required **per installed MW**. This will typically include all solar PV components and additional construction equipment. Over the period of 18 months, **2250-2700 containers** will therefore be **transported** to the proposed site. Roughly estimated this amounts to approximately **three container trucks per day**.

Normal construction traffic will also need to be taken into account. The usual civil engineering construction equipment will need to be transported to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.). The components required for the establishment of the

on-site substation power line will also need to be transported to the site. Some of this power station equipment may be defined as abnormal loads in terms of the Road Traffic Act (Act No.29 of 1989). Input and approval are to be sought from the relevant road authorities for this purpose.

Transport to the site will be along appropriate national, provincial and local roads. The access roads to the site will be from Upington along the N10. This is a tarred national road and no alterations should be necessary to handle construction traffic and traffic involved in the operation phase.

In some instances, the smaller farm roads may require some alterations (e.g. widening of corners etc.), due to the dimensional requirements of the loads to be transported during the construction phase (i.e. transformers of the on-site substation). Permission from the local authorities will be obtained in this regard.

The exact access routes that are considered is discussed in more detail within the layout report.

A detailed traffic and transportation management plan will be undertaken for the proposed Joram Solar Development

5.9 ESTABLISHMENT OF INTERNAL ACCESS ROADS ON THE FARM

Minor internal maintenance roads on the farm and proposed construction site are to be constructed. Where necessary, gravel may be used to service sections of the existing road on the farm itself. In order to form an access track surface some of the existing vegetation and level the exposed ground surface might need to be stripped off. The impact of this will be assessed by the participating specialists. These access tracks (typically 6 m wide or less) will form part of the development footprint. In order to allow enough space for the larger vehicles to turn easily a width of 6m will be proposed. The layout and alignment of these internal roads will be planned and influenced by the recommendations made by the botanical specialist, as well as the topographical survey. Pathways (typically less than 6 m wide) between the solar PV modules are to be provided for ease of maintenance and cleaning of the panels.

In addition, a fire break (buffer area) that can also serve as an internal road will be constructed around the perimeter edges of the entire proposed site. All gravel access roads constructed will be more or less 6 m wide.

5.10 SITE PREPARATION

Cleaning of the surface areas is necessary in order to construct the solar PV plant. This will include clearance of vegetation at the footprint of the solar PV modules, the digging of the on-site substation and workshop area foundations and the establishment of the internal access roads and lay-down areas. Where stripping of the topsoil is required, the soil is planned to either be stockpiled, backfilled and/or spread on site as part of the rehabilitation. The environmental management plan will provide specifications for this vegetation re-establishment.

To reduce the risk of open ground erosion, the site preparation will typically be undertaken in a systematic manner. Where any floral species of concern or sites of cultural/heritage value are involved, measures are to be put in place to attend to the preservation or restoration of these elements as recommended by the botanical specialist.


Plate 9: Typical example of site preparation activities (Solek, 2014)

1.2 ERECTING OF SOLAR PV MODULES

Once the site preparation has been done, and all necessary equipment has been transported to the site, the solar PV modules and structures are assembled on site. Each solar PV module consists of a number of cells, forming a single panel. Each module is capable of generating typically **200 W - 300 W** of DC electrical power. If conventional Solar PV technology is used, the solar PV modules are assembled in blocks of rows, forming a network of strings, across the solar PV array.

There is a separation distance between the rows of approximately 5 m. The exact amount of modules in each solar PV array is subject to the final facility design and will be finalised as part of the detailed design phase.

If CPV technology is to be used, the distance between the modules are carefully calculated to ensure the trackers have enough room to rotate and the shadows are taken into account. Foundation holes for the solar PV modules are to be mechanically quarried to a depth of approximately 400 - 800 mm. Driven piers and screws are recommended in order to minimise the environmental impact of the facility, but will be dependent on mechanical specifications.

If concrete foundations are used, foundation holes will be mechanically excavated to a depth of about 400 - 600 mm. The concrete foundation will be poured and be left for up to a week to cure.

Plate 10: Showing typical erection of Solar PV modules

5.11 CONSTRUCT ON-SITE SUBSTATION

An on-site **substation** will be necessary to enable the connection between the solar energy plant and the National Eskom electricity grid. The generated voltage is planned to be **stepped up** to **132 kV** by means of an **on-site substation** in order to be fed to the Eskom grid via a planned connection to the existing Gordonia substation. The on-site substation and its associated infrastructure and internal roads should have a footprint of approximately 0.04 ha (20mx20m).

The on-site substation is constructed in a few sequential steps. First a site is determined by the recommendations from the reports of the environmental specialists to avoid the most sensitive areas in the positioning of the substation (a geological study is expected to be conducted prior to the finalisation of the on-site substation and is expected to be taken into account for this purpose).

Once the site is approved, the site clearing and levelling is to be done, after which the access roads to the substation is constructed. Next the substation foundation is laid. Once the foundation is constructed, the assembly, erection and installation of all equipment, including the transformers, are to be completed.

The final step is the connection of the conductors to the equipment. The post-construction phase includes the rehabilitation of disturbed areas and protection of erosion sensitive areas. Below is typical on-site substation that connects to the existing Eskom substation.

Plate 11: Typical example of on-site substation (Solek, 2014)

5.12 ESTABLISHMENT OF ADDITIONAL INFRASTRUCTURE

To minimise the potential ecological impact a project of this scope, a decision was made to limit all activities and storage of equipment to one nominated area. A dedicated construction equipment camp and lay-down area are planned to be established (further referred to as the "laydown area"), which will then form part of the auxiliary building area.

The laydown area for the construction period will be approximately 2ha. This area will typically be used for the assembly of the solar PV modules and the generation placement/storage of construction equipment. A temporary facility is planned to be used to secure the storage of fuel for the on-site construction vehicles. The volume of fuel stored will be below the threshold defined in legislation and management of this storage area will be included in the Environmental Management Programme.

The auxiliary building area will typically consist of a workshop area; storeroom area; change and ablution room area; administrative and security building; 10 x 10'000 L water tanks.

5.13 CONNECT ON-SITE SUBSTATION TO POWER GRID

In order to evacuate the power generated by the proposed facility and feed it into the ESKOM grid, a distribution line would have to be constructed between the proposed on-site substation and the grid connection point, either the Gordonia Eskom substation or to an existing 132kV line (loop-in/loop-out).

A grid feasibility application will be submitted to ESKOM, in order to confirm the connection possibilities of this project.

The following figure depicts the different alternatives of connecting to the existing ESKOM grid. Two of the options which can be investigated for grid connection are either the first of a "loop-in/loop-out" into one of the existing 132 kV lines (currently running over the farm) and the second

option is to build a new line directly to the Gordonia Eskom substation. The “loop-in/loop-out” option will be subject to the available capacity on the existing 132 kV line, which shall be further investigated and discussed with ESKOM as part of the cost estimate letter request.

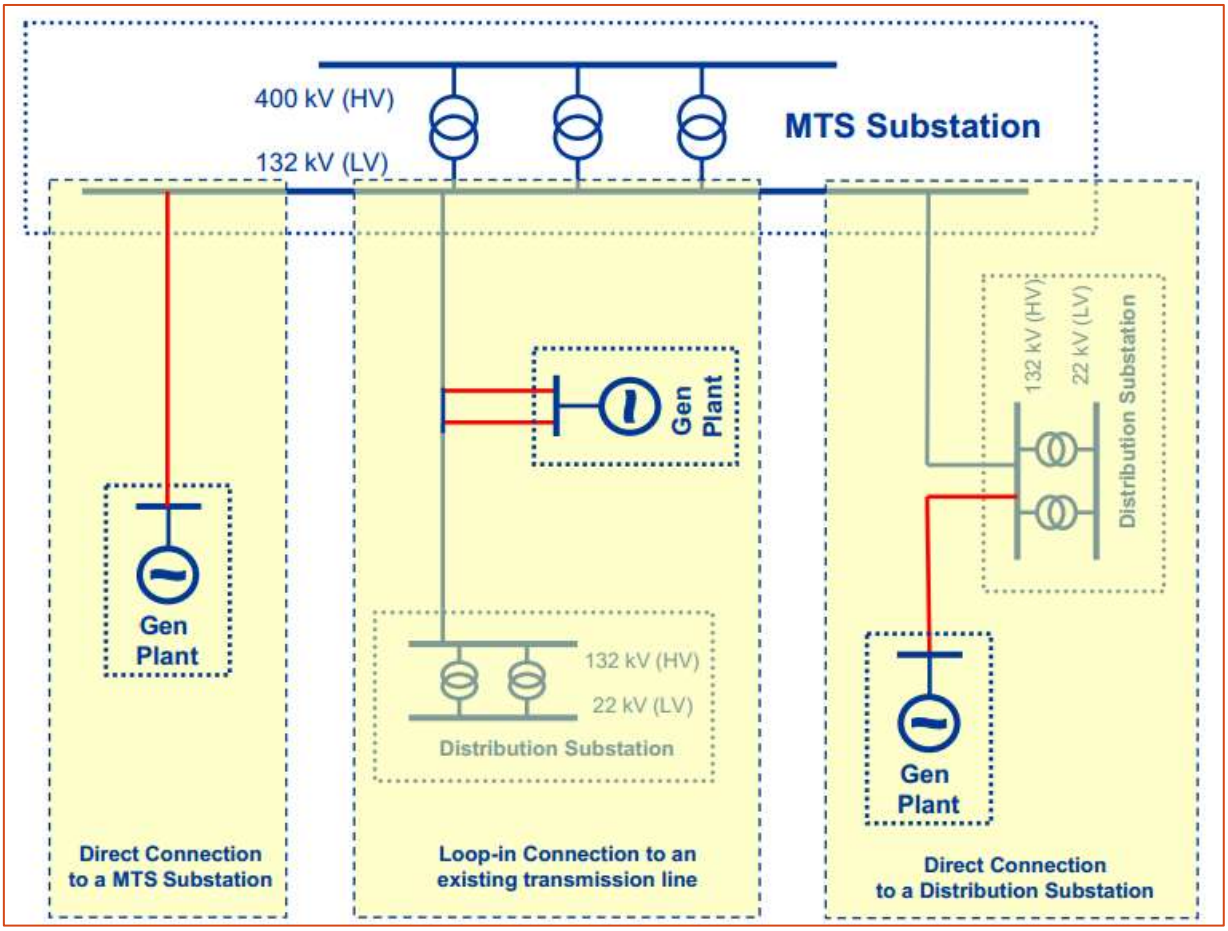

Figure 15: Showing examples of different connection options (Solek, 2014)

Application for the new line(s) is considered within this Environmental Process and also depicted, although a separate “Basic Assessment” (BA) may be initiated for the grid connection options.

As part of the environmental impact assessment and the engagement with ESKOM pertaining to a grid connection application, feedback from Eskom is expected to provide guidance towards the planned expansions, possible loop-in/loop-out options and the potential scenarios within the final Cost Estimate letter. Eskom’s recommendations will be taken into account and used within the environmental impact assessment phase as far as possible.

6 ECONOMIC CONTEXT

The following economic context was provided by Solek Renewable Energy Engineers.

6.1 PROJECT COST OVERVIEW

Renewable energy projects, such as the proposed solar facility, require significant capital investment. Funds of equity and debt investors either from foreign or domestic sources are obtained. The cost requirements and potential revenue are discussed in this section, sketching a business case for the development of renewable energy projects within South Africa (specifically solar farms in the Northern Cape).

The project costs consist of two parts, capital cost and running cost. The capital cost pertains to all costs incurred for the establishment of a producing facility. The running cost relates to those costs incurred to ensure that the facility operates as it should throughout its expected lifetime.

Solar PV installations can operate for many years with little maintenance or intervention. Therefore after the initial capital outlay required for building the solar power plant, further financial investment is limited. Operating costs are also limited compared to other power generation technologies.

6.1.1 Project specific costs

The Joram Solar development detail costing has not been completed on the date of submitting this scoping report. The project is, however, based on the industry standard cost with capital expenditure that can amount to more or less R20-25M per megawatt installed capacity. The running cost of a solar PV facility is minimal related to the initial capital cost, contributing to the most significant cost of constructing and running a solar PV facility.

6.1.2 Revenue streams

The payback of the facility results mainly from electricity sales, intended under the current governmental subsidy, known as the "Renewable Energy Independent Power Producer Procurement Programme" (REIPP Procurement Programme).

The IPP procurement programme portrays fixed ceiling prices for bidders to tender against. The establishment of these ceiling prices is based on industry standard return on investments. The governmental study performed identified the feed-in tariff per technology related to the capital cost required per technology against its revenue potential, identifying the required subsidy per technology to be paid in order to create a lucrative investment and attract investors.

In short the subsidy offered by the governmental procurement programme (IPP procurement programme) enables the project to be financially viable by selling electricity at a subsidised price, while the costs of such a facility relates to the industry standard.

As part of the IPP procurement programme preferred bidders will enter into a power purchase agreement between the IPP generator and the Single Buyers Office/Department of Energy. National treasury provides surety, while NERSA regulates the IPP licences.

The bidding and tender procedure of the IPP procurement programme requires an approved EIA Environmental Authorisation/Record of Decision as a gate keeping criteria, where no project would be considered without the EIA Environmental Authorisation being given.

7 PROJECT PROGRAMME AND TIMELINES

As mentioned previously the Joram solar development is intended to be lodged under the IPP procurement programme. The programme has definite and stringent timelines, which the project should meet:

Table 5: Proposed implementation schedule (Solek, 2014)

	Description	**Timeline**
1	Expected IPPPP submission date (5th round)	May 2015
2	Preferred bidders selected	October 2015
3	Finalisation of agreements	November 2015 – July 2016

4	Procurement of infrastructure	August 2016 – September 2016
5	Construction	October 2016 – March 2017
6	Commissioning	March 2017 – July 2017

The table above clearly depicts the dependence of the project on the IPP procurement programme's timelines. Any delay within the IPP procurement programme will have a corresponding effect on the timelines of the projects timelines.

Although no official public submission date for Round 5 has been communicated by the Department of Energy, there have been reports of an accelerated Round 5 timelines, with the submission date potentially brought forward to May/June 2015.

The impact of such an accelerated timeline could have a significant impact on Joram Solar due to the already limited time available to complete the EIA process. **NB: The Joram Solar Development intend submitting their bid during the 5th bidding window.**

8 SITE DESCRIPTION AND ATTRIBUTES

The following sections provide a description of the environmental and built environment context of the property, with particular focus on site location for the proposed Joram Solar Development.

8.1 LOCATION & BUILT ENVIRONMENT

The target property, remainder of portion 42 (portion of portion 9) of the farm 40 Vaalkoppies, is located in the ZF Mgcawu district of the Northern Cape Province, within the jurisdiction area of the Khara Hais Local Municipality. The property is approximately **4700ha** in size and is located approximately 14km east of Upington.

The proposed Joram Solar development site is situated **south** of the **N10 National Road**.

No buildings, ruins or any other structures were noted on or within the direct proximity of the proposed solar development site.

Additional information on regarding the built environment will be included in the Heritage impact assessment that will be included in the Draft EIR.

8.2 GEOLOGY & CLIMATE

The geology and climate of the proposed Joram Solar Development is detailed below.

8.2.1 Geology

The geology is that of the Bushmanland sequence. Sedimentary and Volcanic rocks of this sequence include schist, quartzite and amphibolites

8.2.2 Climate

The region is classified as an arid zone with desert climate. The following specific parameters are applicable:

Table 6: Rainfall and Temperature associated with Joram Solar (Lubbe, 2014)

Rainfall	
Annual rainfall	0-200 mm
Summer rainfall	<62.5 mm
Winter rainfall	<62.5 mm

Variation in rainfall	40 to 50%
Temperature	
Mean maximum temperature	31 to 33ºC
Mean minimum temperature	Minus 2ºC
First frost expected	01 to 10 May
Last frost expected	11 to 20 September
Hours of sunshine	>80%
Evaporation	2200 2400 mm

8.2.3 Soils

Soils in this region usually show the following characteristics:

- Soils have minimal development, are usually shallow, on hard or weathering rock, with or without intermittent diverse soils.
- Lime is generally present in part or most of the landscape.
- Red and yellow well-drained sandy soil with high base status may occur.
- Freely drained, structure less soils may occur.
- Soils may have favourable physical properties.
- Soils may also have restricted depth, excessive drainage, high erodability and low natural fertility.

8.2.4 Topography

The topography has low relief. The slope gradient is between 0 and 2% with an undulating shape. The visual specialist, VRMA will develop a slope analysis of the site which will be included in the Draft Environmental Impact Report.

8.3 BOTANICAL COMPOSITION OF THE SITE

Mr. Simon Todd, of Simon Todd Consulting, conducted an Faunal and Flora scoping study of the proposed Solar development sites (see Annexure D1 for full report), from which the following is drawn with regard to the vegetative component of the site.

8.3.1 Broad-Scale Vegetation Patterns

According to the national vegetation map (Mucina & Rutherford 2006), the entire development site is restricted to the Kalahari Karroid Shrubland vegetation type, with Bushmanland Arid Grassland being the other major vegetation type present in the wider area. In terms of the conservation status of the various vegetation types of the area, only Lower Gariep Alluvial Vegetation is of concern and is listed as Endangered. This vegetation type is however associated with the alluvium along the Orange River and would not be impacted by the current development which is some distance from the river itself.

Kalahari Karroid Shrubland occurs in the Northern Cape Province, typically forming belts alternating with Gorgonia Duneveld on the plains north-west of Upington through Lutzputs and Noenieput to the Rietfontein/Mier area in the north. There are also other patches around Kakamas and north of Groblershoop. This vegetation type is associated with flat gravel plains and represents a transitional vegetation type between the karoo and northern floristic elements associated with sandy soils. Kalahari Karroid Shrubland is classified as Least Threatened and has been little impacted by transformation and more 99% of its original extent is still intact (Table 2), it is however Hardly Protected within formal conservation areas. Mucina & Rutherford (2006) list no vegetation-type endemic species for Kalahari Karroid Shrubland, suggesting that most species

associated with this vegetation are relatively widespread species, which correlates with the transitional nature of the vegetation type.

Typical species include include shrubs such as *Rhigozum trichotomum*, *Leucosphaera bainesii*, *Hermannia spinosa*, *Monoechma genistifoilium*, *Salsola rabieana*, *Aptosimum albomarginatum*, *A.spinecens*, *Kleinia longiflora*, *Limeum argute-carinatum*, *Phyllanthus maderaspatensis*, grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana*, *S.uniplumis* and *Schmidtia kalihariensis*. Drainage lines in the area are dominated by woody species such as *Acacia mellifera*, *Boscia foetida*, *Phaeoptilum spinosum*, *Cadaba aphylla* and *Parkinsonia africana*, with an understorey of low shrubs and grasses such as *Zygophyllum rigidum*, *Monechma spartioides*, *Indigofera heterotricha*, *Fingerhutia africana* and *Cenchrus ciliaris*. Soils within the study area are generally shallow and areas of very shallow soils or exposed calcrete are common, with deeper soils present in depressions and along drainage lines. In general, the areas of deeper soils have a higher proportion of perennial bunchgrasses such as *Stripagrostis*. It is likely that despite the site being classified entirely as Kalahari Karroid Shrubland, that there are areas within the site which have greater affinity with Bushmanland Arid Grassland, such as the eastern corner of the site which has , more loamy soils than the rest of the site. There may also be some areas of exposed quartz along ridges or higher-lying ground and species of conservation concern are frequently located within such areas and may include species such as *Lithops* and *Adenium oleifolium*. Protected species frequently encountered in this area include *Hoodia gordonii* and *Boscia foetida* and *Boscia albitrunca*.

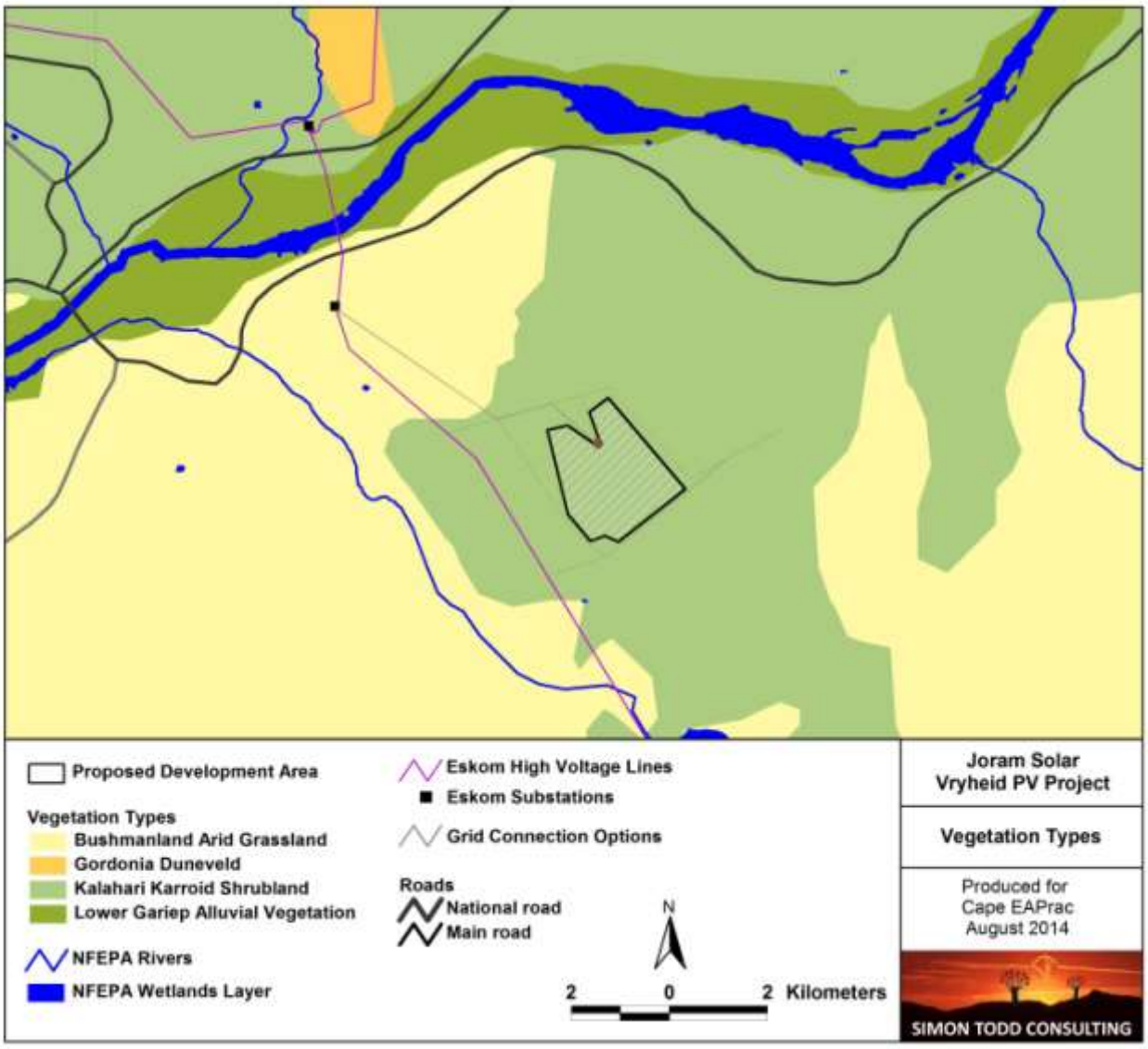

Figure 16: Broad-scale overview of the vegetation in and around the Joram Solar Project (Todd, 2014)

The vegetation map above is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers and wetlands delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

The table below shows the vegetation types that occur within or near the site with their basic conservation statics and status according to the National List of Threatened Ecosystems (2011). Only Kalahari Karroid Shrubland occurs within the proposed development area.

Table 7: Vegetation types on or near Joram Solar (Todd, 2014)

Name	Extent km^2	Remaining	Conservation Target	Protected	Status
Kalahari Karroid Shrubland	**8284**	**99.2%**	**21%**	**0.1%**	**Least threatened**
Gordonia Duneveld	36772	99.8%	16%	14.2%	Least threatened
Lower Gariep Alluvial Vegetation	752	50.3%	31%	5.8%	Endangered

Name	Extent km^2	Remaining	Conservation Target	Protected	Status
Lower Gariep Broken Veld	4538	99.5%	21%	3.9%	Least threatened
Bushmanland Arid Grassland	45479	99.4%	21%	0.4%	Least threatened

Plate 12: The proposed Joram Solar study site as seen from the public road (Todd, 2014)

The photograph above was taken from near to the public road which runs along the southwest of the site. The facility would be located on the plains in the foreground and middle ground and does not reach the hills in the distance. The vegetation is dominated by grasses and shrubs, with *Rhigozum trichotomum* the dominant shrub and scattered *Acacia mellifera* visible along the drainage lines.

8.3.2 Listed and Protected Plant Species

According to the SANBI SIBIS database, 221 indigenous plant species have been recorded from the quarter degree squares 2821 AD, BC, CB and DA. This includes only 4 species of conservation concern, but those known from a somewhat wider area are listed below in Table 3 as the immediate area has not been well sampled and is not likely to be representative. It is not likely that many of these species are present at the site, or if they are, they would be localised within the site. There are also additional species which may be present which are either protected under the National Forests Act such as *Boscia albitrunca* or protected under the Northern Cape Nature Conservation Act of 2009, which includes *Boscia foetida*, all *Mesembryanthemaceae*, , all species within the *Euphorbiaceae*. *Oxalidaceae*, *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. It is not likely that many *Boscia albitrunca* would be affected by the development as this species is mostly restricted to larger drainage lines in the area and these do not occur within the site. *Boscia foetida* is however more common and may occur along the smaller drainage lines as well as in the open veld, and it is likely that at some of these will be present within the site. The number of affected individuals is however likely to be low and it is not likely that the development would generate a significant impact on this or any of the other listed and protected species.

Table 8: Listed species which may occur within the Joram Solar Development (Todd,2014)

Family	Species	IUCN Status	Likelihood
ASPHODELACEAE	*Aloe dichotoma*	VU	Low

Family	Species	IUCN Status	Likelihood
MESEMBRYANTHEMACEAE	*Dinteranthus wilmotianus*	NT	Low
AMARYLLIDACEAE	*Crinum bulbispermum*	Declining	Low
FABACEAE	*Acacia erioloba*	Declining	Low
APOCYNACEAE	*Hoodia gordonii*	DDD	Moderate
GERANIACEAE	*Pelargonium reniforme subsp. reniforme*	DDD	Low
ASTERACEAE	*Gymnostephium ciliare*	DDT	Low
ASTERACEAE	*Senecio monticola*	DDT	Low

8.3.3 Critical Biodiversity Areas & Broad-Scale Processes

No fine-scale conservation planning has been conducted for the region and as a result, no Critical Biodiversity Areas have been defined for the study area. In terms of other broad-scale planning studies, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region. The development would however contribute to cumulative impacts in the area, which are becoming increasingly large given the concentration of renewable energy facilities in the area. Although there are currently no other developments in the immediate area, the Ilanga CSP project is located east of the site. The concentration of development within the area will increase the fragmentation of the landscape and potentially impact landscape connectivity.

8.4 FAUNAL COMPONENT OF THE SITE

The following input into the faunal component of the study site was provided by Mr Simon Todd. Please refer to **Annexure D1** for the full copy of the Fauna and Flora Scoping Report.

8.4.1 Mammals

The site falls within the distribution range of 46 terrestrial mammals, indicating that the mammalian diversity at the site is of moderate potential. There do not appear to be any specialised faunal habitats within the site, which is relatively homogenous and it is only the drainage lines which are likely to be differentially utilised by mammals on account of their high cover and productivity. Overall, the site would not be not considered highly sensitive from a faunal perspective as similar habitat is widely available in the area.

Three listed terrestrial mammals may occur at the site, the Honey Badger *Mellivora capensis* (Endangered), Brown Hyaena *Hyaena brunnea* (Near Threatened) and Black-footed cat *Felis nigripes* (Vulnerable). Although the area is used for livestock production, human activity in the area is currently low and it is likely that all three listed species occur in the general area. As these species have a wide national distribution, the development would not create a significant extent of habitat loss for these species, a single individual of which has a home range far exceeding the extent of the current development.

The site lies within the distribution range of 6 bat species, indicating that the richness of bats at the site is probably quite low. Bat activity is probably focused along the Orange River, where there is ample food as well as an abundance of natural and artificial shelter. The lack of wetlands and

large drainage lines away from the Orange River suggests that bat activity patterns within the site are likely to be low. There are also no pans within or near the site that would attract bats.

Overall there do not appear to be any highly significant issues regarding mammals and the development of the site. In general the major impact associated with the development of the site for mammals would be habitat loss and potentially some disruption of the broad-scale connectivity of the landscape.

8.4.2 Reptiles

According to the SARCA database, 39 reptile species are known from the area suggesting that the reptile diversity within the site is likely to be moderate to low. Species observed in the area include the Karoo Girdled Lizard *Karusasaurus polyzonus* which is usually associated with rocky outcrops, the Namaqua Mountain Gecko *Pachydactylus montanus* which shelters under rocks and the Spotted Sand Lizard *Pedioplanis lineoocellata* which is usually the most common reptile in the area.

Within the proposed development area, there are no large rocky outcrops or other specialised reptile habitats. As with mammals, the development is likely to result in local habitat loss for reptiles but as there are no listed or range-restricted reptiles that are likely to occur at the site the impacts are not likely to be of broader significance.

8.4.3 Amphibians

The site lies within the distribution range of 10 amphibian species. The only listed species which may occur at the site is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. There are no pans within the development area which would represent habitat for this species and so it is highly unlikely that the development would generate an impact of this species. There are no other natural perennial water sources at the site and amphibian abundance in the vicinity of the development area is likely to be low. As a result impacts on amphibians are likely to be local in extent and of low significance.

8.4.4 Avifauna

According to the SABAP 1 and 2 data sets, 190 bird species are known from the broad area surrounding the site. This includes 7 IUCN listed species (Table 3), all of which except for the Black Stork are likely to occur at the site. All of the listed species are susceptible to some degree to either or both electrocution or collision from power-line infrastructure. Larger raptors are susceptible to both collision and electrocution, while storks and bustards are all vulnerable to collision with power lines. This is a significant source of impact for these species in the country. At worst, the grid connection for the development would be about 10 km long, a proportion of which would be located on the outskirts of Upington where the abundance of vulnerable species is likely to be low. Overall impacts on avifauna are not likely to be highly significant.

Table 9: Listed bird species known to occur in the vicinity of the proposed Joram Solar Project (Todd, 2014)

Species	Common Name	Status	Collision	Electrocution
Falco biarmicus	Lanner Falcon	NT	High	Moderate
Falco naumanni	Lesser Kestrel	VU	High	Moderate
Ciconia nigra	Black Stork	NT	High	

Species	Common Name	Status	Collision	Electrocution
Falco peregrinus	Peregrine Falcon	NT	High	Moderate
Ardeotis kori	Kori Bustard	VU	High	
Neotis ludwigii	Ludwig's Bustard	VU	High	
Polemaetus bellicosus	Martial Eagle	VU	Moderate	High

9 PLANNING CONTEXT

A Planning specialist will be appointed in order to consider the planning implications of the proposed facility. The results of the findings of the planning specialist will be presented in the Draft EIR The following key components will likely take place from a planning perspective.

- A **land use change application** for the rezoning of 220ha, from **Agricultural Zone I to Special Zone**, will be lodged at the Khara Hais Local Municipality, in accordance with the Northern Cape Planning and Development Act (Act 7 of 1998).
- If there are restrictive Title Deed conditions burdening the proposed development, an application for the removal thereof will be lodged at the Government of the Northern Cape Province, Department: Corporate Governance and Traditional Affairs, in accordance with the Removal of Title Deed Restriction Act (Act 84 of 1967).
- Parallel to the rezoning application, a **long term lease application will be lodged at the National Department of Agriculture**, in accordance with the Subdivision of Agricultural Land Act (Act 70 of 1970).
- Relevant planning documents, on all spheres of Government, will be evaluated before any land use change application is launched. These documents include, but are not limited to the following: **NSDP** (National Spatial Development Perspective); **PGDS NC** (Provincial Growth and Development Strategy), Northern Cape Province; **IDP** (Integrated Development Plan); **SDF** (Spatial Development Framework).

The planning specialist will furthermore engage with the following authorities as part of the planning process. Where relevant, these authorities will also be engaged with as part of the Environmental Process and will be given an opportunity to provide input and comment on this

- **Upington Municipality** for approval in terms of the relevant Zoning Scheme;
- **Northern Cape Department of Agriculture** as well as the **National Department of Agriculture, Forestry & Fisheries** (DAFF) for approval in terms of Act 70 of 70 (SALA) and Act 43 of 83(CARA);
- **District Roads Engineer** for comment on the land use application;
- **Department of Water Affairs** (DWA) for comment in terms of the National Water Act and the land use application;
- **Department of Mineral Resources** for approval in terms of Section 53 of Act 28 of 2002;
- **Department of Transport & Public Works** for comment on the land use application;
- **South African Heritage Resource** (SAHRA) Agency for comment on the land use application;
- **Civil Aviation Authority** for comment on the land use application;
- **Eskom** Northern Cape for comment on the land use application; and
- **Northern Cape Nature** Conservation for comment on the land use application.

10 AGRICULTURAL POTENTIAL OF THE STUDY SITE

Mr Christo Lubbe, an agricultural specialist, undertook an agricultural potential study of the proposed Joram Solar Development from which the following is drawn. A full copy of the agricultural potential study is attached in Appendix D, Annexure D2 of this report.

The objectives of Mr Lubbe's study were to consider the possibility of temporary and permanent impacts on agricultural production that may result from the construction and operation of the PV Power Plant.

The key findings of this study are summarised below.

10.1 STRUCTURES ON SITE

There are no building structures on site, except for a borehole pump and reservoir At the entrance on the South western corner a gravel borrow pit exists.

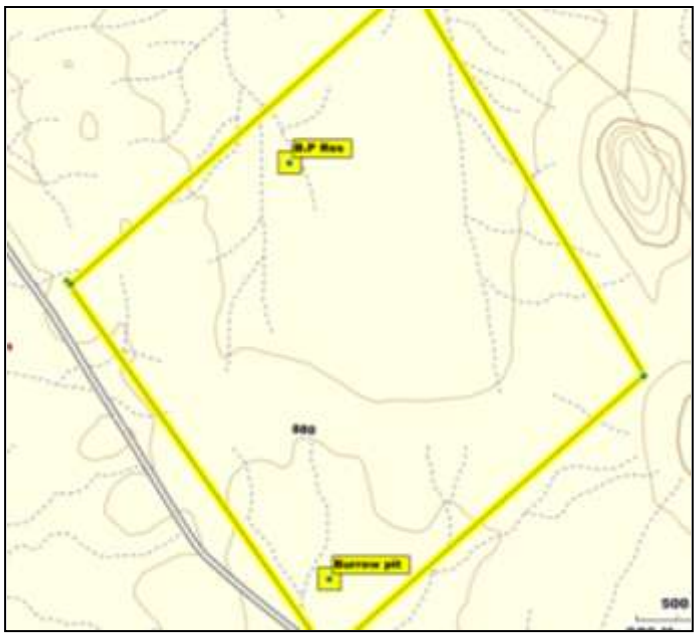

Figure 17: Showing existing structures on site (Lubbe, 2014)

10.2 SURROUNDING LAND USE

The site is surrounded by various stock farming activities.

10.3 PAST AND CURRENT AGRICULTURAL ACTIVITIES ON SITE

The site is currently utilised for extensive sheep farming. There is no evidence of past or current cultivation.

10.4 SOIL CLASSIFICATION

An augering survey was carried out by Mr Christo Lubbe, as indicated in the figure below. At each augering point, an observation record was completed.

The soil observation records were used to determine soil forms. These soil forms were then grouped in uniform utilization polygons, as illustrated.

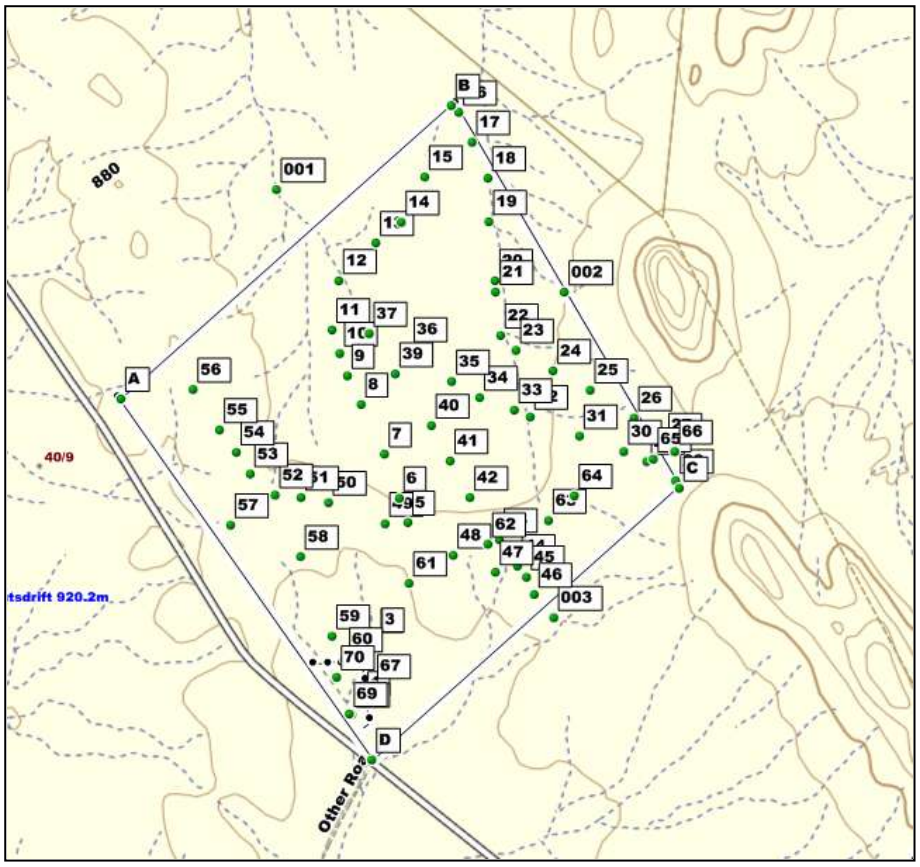

Figure 18: Showing soil augering points (Lubbe, 2014)

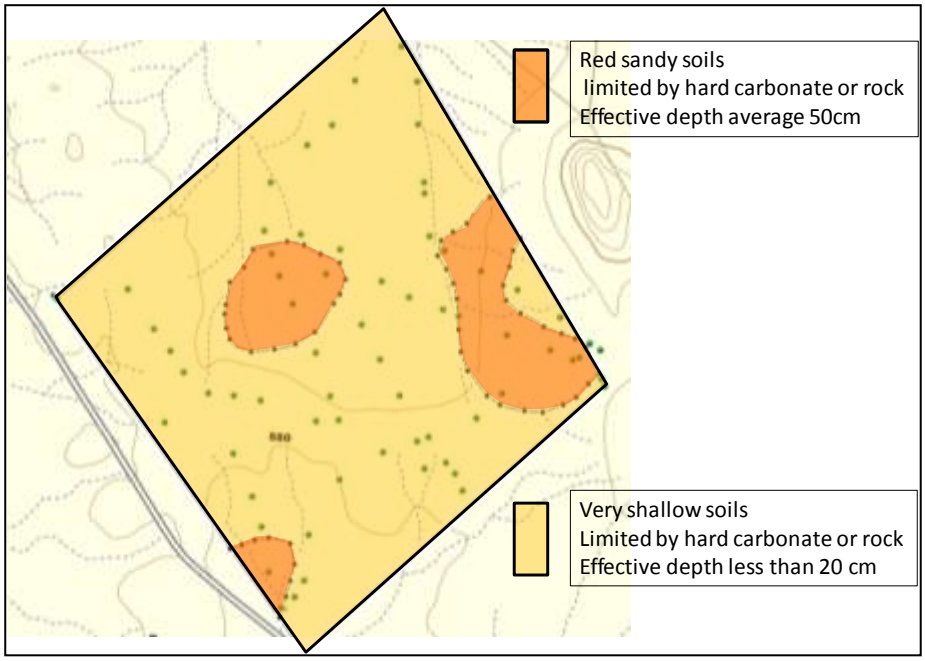

Figure 19: Soil Groups on the Joram Solar Study Site (Lubbe, 2014)

Figure 20: Soil Groups on the Joram Solar Study Site (Lubbe, 2014)

More than 80% of the soil on the site has an effective depth less than 20cm. The restriction is rock and hard carbonates sub surface layers. The top surface also is rough with a high level of surface rock. **Cultivation is not possible** because of these mechanical restrictions.

Some deep pockets of sandy soil with a depth up to 120cm occur and contribute to 18 % or 80 ha of the 450 ha unit.

10.5 VELD CONDITION ASSESSMENT

A veld condition assessment was done simultaneous with the soil survey, by visual acknowledgement and random sampling on 1m² grids. The outcome of the veld condition assessments is shown in the table below.

The photos in the plate below also show that the basal cover is low; consisting mainly of shrubs and poor grazing grasses. There is a moderate level of invasion of three thorn shrubs and *Acacia mellifera*.

Table 10: Outcome of veld condition assessment (Lubbe, 2014)

ASSESSMENT CATEGORY	FINDING	SCORE
PLANT COVER	Plant cover is very sparse with large bare areas	4
COMMON GRASSES	Mainly poor grazing grasses mixed with Karoo succulents	4
SURFACE CONDITION	Severe levels of top soil loss	1
BUSH ENCROACHMENT	Medium encroachment present Three thorn *Rhigozum and Black thorn Acacia mellifera*	3
SOIL TYPE	Sandy soil	2
TOTAL		**14**

Shrub veld with Three thorn and Black thorn invasion | Cover spars with mostly shrub vegetation and large bare and stony areas | Cover on soils deeper than 40 cm

Plate 13: Examples of veld conditions (Lubbe, 2014).

10.6 LAND CAPABILITY AND SUITABILITY FOR AGRICULTURE

The land surveyed falls in capability **class VI, generally not suited for cultivation**. Very severe limitations restrict land use to grazing, woodlands or wildlife - see tables below.

Table 11: Land Capability and Suitability Assessment for Crop Production (Lubbe, 2014)

Land capability class	Suitability Rating	Major Limitation to Crop Production	Area (ha)	% of Local Study Area
Class VI Cg and Hu <30 cm	Very low	Low water holding capacity Shallow rooting zone Severe climate Severe erosion hazard	370	82
Class lV Py >40cm	Low	Low water holding capacity Severe climate	80	18

Table 12: Land Capability and Suitability Assessment for Grazing (Iubbe, 2014)

Area Description	Suitability Rating	Major Limitation to Grazing	Area (ha)	% of Local Study Area
Cattle /Sheep	Low	Very shallow rooting depth on carbonate hard setting, low clay content, low rainfall, with carrying capacity of 41-60 ha /LSU	450	100

10.7 WATER AVAILABILITY/PROVISION

Water is provided to livestock from a borehole pumped by windmill and stored in a reservoir and troughs.

10.8 SUMMARY OF FINDINGS

According to the agricultural specialist, the site is largely unsuitable for cultivation due to the following limiting factors:

- Low annual rainfall, high evaporation and extreme temperatures restrict dry land cultivation.
- The very shallow soil depth with its limited water holding capacity restricts root development
- The soils have carbonate-rich B-horizons. The use of Calcic soils is limited by climate (low rainfall and high evaporation), shallow soil depth, high pH, low plant available P and trace elements (especially Fe), toxic levels of extractable B and stoniness. All calcic soils are highly susceptible to water erosion.
- The very fine sand grade of top soil influences the stability and increases erodability potential.
- Low clay percentage results in low water holding capacity and low nutrient availability, resulting in low soil fertility.

The area could be utilised as grazing, but it should be noted that the grazing potential is very low.

Due to the low agricultural potential of the site, no additional studies are deemed necessary.

11 ECOLOGICAL SENSITIVITY OF THE STUDY SITE

Mr. Simon Todd, of Simon Todd Consulting, conducted an Ecological Sensitivity Analysis of the proposed Joram Solar Development (see **Appendix D, Annexure D1** for full report), from which the following is drawn.

The sensitivity map for the proposed development area of the Joram Solar Energy Project site is illustrated in the figure below.

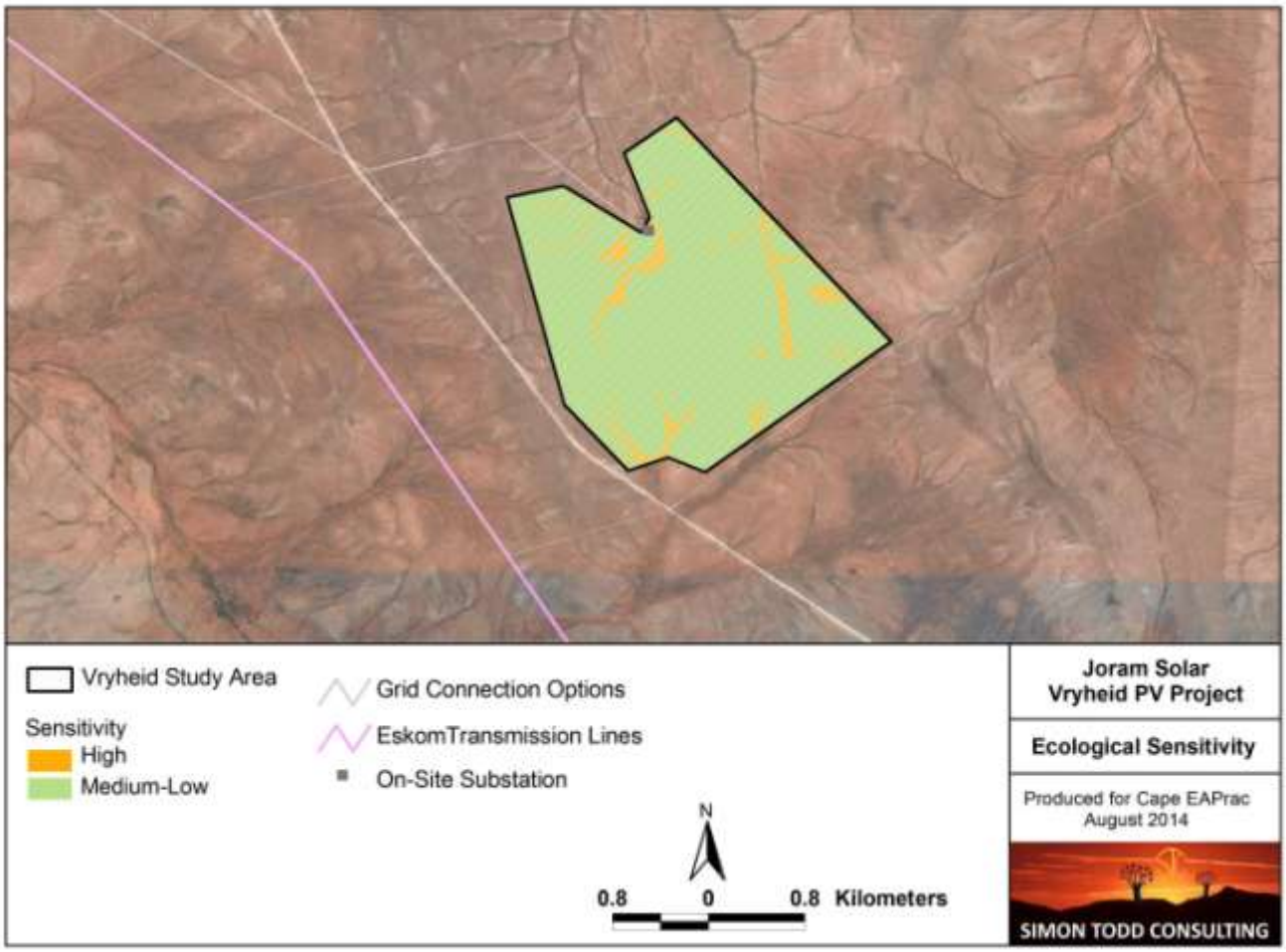

Figure 21: Ecological sensitivity map of the proposed development area of the Joram Solar Project (Todd, 2014)

The majority of the site consists of low open shrubland or arid grassland on gently undulating plains considered to be of moderate to low sensitivity. Within this habitat type there are usually few listed or protected species present and the significance of impacts on vegetation within these areas are likely to be relatively low. There may however be some calcrete outcrops or quartz patches present which cannot be verified at this point, but which would be considered to be of higher sensitivity if they contained species of conservation concern. The abundance of protected tree species at the site is certainly relatively low and species such as *Acacia erioloba* and *Boscia albitrunca* are either not present at the site or occur in very low numbers.

Although there are no features present which are considered very high sensitivity, there are a number of drainage lines present which are considered to be of moderate to high sensitivity. Some of these are broad and open and dominated by grasses and shrubs such as Rhigozum *trichotomum* and *Phaeoptilum spinosum*, while others are more incised and narrow and dominated by *Acacia mellifera*, *Cadaba aphylla* and *Parkinsonia africana*. These areas are significant as they receive runoff during large rainfall events and the increased cover and productivity of these areas contributes to habitat diversity and represents important faunal habitat. Although, development within these areas should be avoided, where this is not possible, some impingement on the smaller drainage features is not likely to generate a highly significant impact. Overall, there do not appear to be highly sensitive features present within the proposed development area and the site appears to be relatively favourable for development.

11.1 IDENTIFICATION & NATURE OF POTENTIAL FAUNAL AND BOTANICAL IMPACTS

In this section, the potential impacts and associated risk factors that may be generated by the development are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the development are listed. The relevance and applicability of each potential impact to the current situation are then examined in more detail in the next section.

Potential ecological impacts resulting from the development of the Joram Solar Vryheid Project would stem from a variety of different activities and risk factors associated with the preconstruction, construction and operational phases of the project including the following:

11.1.1 Preconstruction Phase

- Human presence and uncontrolled access to the site may result in negative impacts on fauna and flora through poaching of fauna and uncontrolled collection of plants for traditional medicine or other purpose.
- Site clearing & exploration activities for site establishment would have a negative impact on biodiversity if this was not conducted in a sensitive manner.

11.1.2 Construction Phase

- Vegetation clearing for the PV arrays, access roads, site fencing etc could impact listed plant species as well as high-biodiversity plant communities. Vegetation clearing will also lead to habitat loss for fauna and potentially the loss of sensitive faunal species, habitats and ecosystems.
- Increased erosion risk would occur due to the loss of plant cover and soil disturbance created during the construction phase. This may impact downstream riparian and wetland habitats if a lot of silt enters the drainage systems.
- Presence and operation of construction machinery on site. This will create a physical impact as well as generate noise, pollution and other forms of disturbance at the site.
- Increased human presence can lead to poaching, illegal plant harvesting and other forms of disturbance such as fire.

11.1.3 Operational Phase

- The operation of the facility will generate noise and disturbance which may deter some fauna from the area.
- The areas inside the facility will requirement management and if this is not done appropriately, it could impact adjacent intact areas through impacts such as erosion, alien plant invasion and contamination from pollutants, herbicides or pesticides.
- Overhead power lines will pose a risk to avifauna susceptible to collisions and electrocution with power line infrastructure.

11.1.4 Cumulative Impacts

- The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets.
- Transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for fauna and flora and impair their ability to respond to environmental fluctuations.

12 HERITAGE CONSIDERATIONS

Mr Stefan de Kock of Perception heritage consultants have been appointed to undertake an integrated heritage assessment of the proposed Joram Solar development. The integrated specialist study will encompass three studies (undertaken by separate specialists) that will be collated into a single study. The key disciplines in this study include:

- **Built Environment** and **Landscape considerations** – Mr Stephan de Kock (Perception Heritage Consultants)
- **Archaeology** – Dr Peter Nilssen (CARM)
- **Palaeontology** – Dr John Almond (Natura viva)

For the scoping phase of this development, only a baseline archaeological study has been undertaken. The paleontological and archaeological impact assessments will be undertaken during the EIR Phase of the environmental process.

The integrated heritage study will be provided to the competent heritage authority, SAHRA, to inform their decision making process.

12.1 ARCHAEOLOGICAL SCOPING STUDY

The following information was provided by Dr Nilssen as input into the Scoping Phase for the proposed Joram Solar Development. A copy of the Archaeological scoping study is included in Appendix D3

12.1.1 Study Area

The following description of the surroundings and geological context is drawn from this author's work a few kilometres east of the study area (Nilssen 2012). The E-W flowing Orange River and associated canal system is situated to the north and the surrounding land use is rural and agricultural.

Apart from some rocky outcrops, the topography consists of gentle to moderate sloping hills with intervening drainage lines that slope down to the Orange River in the north. Vegetation is open and sparse, and dominated by Karoo shrubs, grasses and small/short trees of mostly *Acacia* species. Consequently, archaeological visibility is excellent. Surface sediments are mostly stony with quartz dominating and these lie in and atop beige to brown sand that is variable in coarseness. These geological deposits appear to be alluvial gravels that are also exposed in stream cuttings and geotechnical test holes. Outcrops of calcrete also occur in the area.

12.1.2 Overview of Previous Studies

Very little archaeological research has been conducted in this portion of South Africa and the bulk of information concerning the history and archaeology of the area was obtained through heritage and archaeological studies associated with environmental impact assessments for a variety of development activities. No previous archaeological or heritage related work has been done on the affected properties for the proposed Joram Solar Facility.

Structures, graves as well as remnants of the Anglo-Boer War characterize the archaeological record of the historic period in the surroundings of Upington. The bulk of human occupation of the general surroundings, however, relates to the pre-historic period where Rock Art and herder sites as well as artefacts of the Early, Middle and Later Stone Ages are represented. No significant archaeological sites were identified in the immediate surroundings of the affected area and stone artefacts - made in a variety of raw materials - are most commonly found in low density scatters

across the landscape. Overall, the Stone Age finds made in the area are considered to be of low to little archaeological significance because of their low frequencies, temporally mixed nature as well as their disturbed, derived and unstratified contexts (Beaumont 2006a, b, c, d & e, Beaumont 2008, Dreyer 2006, Kaplan 2008, Morris 2006 & 2013, Nilssen 2012, Pelser 2012, Webley and Halkett 2010).

12.1.3 Potential Impacts on Archaeological Resources

Because tangible heritage resources are non-renewable and each archaeological occurrence is unique, it is important that areas affected by development are assessed for the presence and sensitivity of such resources prior to development. The Joram Solar Facility will involve both area and linear developments that could have a permanent negative impact on archaeological resources if they were to occur in the area. This scoping study has shown that archaeological resources do occur in the surrounding environment and are therefore likely to occur on the properties in question. The purpose of the broader EIA process is to assess the sensitivity of environmental resources in the affected area, to determine the potential impacts on such resources, and to avoid and/or minimize such impacts by means of management and/or mitigation measures. The future AIA will serve the same purpose concerning archaeological resources.

Because the planning and design phase of the development will be informed by the AIA and broader EIA, any direct negative impacts on significant archaeological and environmental resources can be avoided or minimized by altering the design and layout plans accordingly. A construction phase Environmental Management Plan (EMP) will further avoid or minimize direct negative impacts.

Potential direct negative impacts on archaeological and tangible heritage resources will occur during the construction and installation phase of the proposed development. Indirect and cumulative impacts may occur during the operational phase, but these can be avoided or minimized by means of an EMP that should be implemented during the operational phase of the development.

Based on results from previous heritage impact studies in the surrounding environment, including this author's work conducted a few kilometres to the east, it is unlikely that significant archaeological sites will be identified by the AIA. Nevertheless, the presence of significant sites in the study area cannot be ruled out entirely and therefore a ground truthing study is needed.

13 SOCIO ECONOMIC CONTEXT OF THE KHARA HAIS MUNICIPAL AREA

Information displayed in this section, unless otherwise indicated, was obtained from the 2013/14 Integrated Development Plan (IDP) of the Khara Hais Municipality (Khara Hais IDP, 2013/14).

According to the Khara Hais Municipal IDP, there are approximately 23 245 households in the Municipal area. The 2011 census conducted by Stats-SA reported that the total population of Khara Hais is 93 494. The population of the Municipality has increased by 2.5% between 2002 and 2012. The IDP states that the increase in population figures from 78 393 in 2008 to 93 494 in 2011 is a result of an overall influx of people from other parts of South Africa and Africa. It is expected that with a further increase of 2.5% between 2012 and 2022, the population will be ±116 868. Currently the population constitute 49.3% male and 50.7% female.

According to the IDP 26.9% of the inhabitants are economically active and 14 486 households are subsidized by the services subsidy scheme. Approximately 23% of the labour force is unemployed

and a large number of residents are dependent on government pensions, which mean that they earn less than R1 280 per month. This has a negative impact on payment of services.

The Khara Hais Spatial Development Framework (SDF) of 2009 indicates the racial composition of the Municipal area to be as follows:

- 66.3% Coloured;
- 19.2% Black;
- 14.4% White; and
- 0.1% Indian.

The potentially economically active population of Khara Hais comprises approximately 67% of the total population. The fastest growing economic sectors which can be exploited for future job creation in the Municipal area are:

- Agriculture;
- Electricity and Water; and
- Mining.

The table below shows the employment status of the potentially economically active population of Khara Hais:

Table 13: Employment statistics for the Khara Hais Municipal area

Total Potential Economically Active Population (Ages 15-64)	**67 127**
Employed	45%
Unemployed	16%
Not working / other	39%
Total economically active population	**40 894**
Employed	75%
Unemployed	25%

The following service backlogs are indicated in the //Khara Hais IDP (2013/14):

- ±5% of households have are not services for sewerage and sanitation;
- 3% of households are not serviced for water; and
- 4% of households do not have waste removal

The housing statistics for Khara Hais are as follows:

Table 14: Housing statistics for Khara Hais Municipal Area

Number of Households	
Formal Structures	17 479 (72%)
Informal Structures	6 182 (35%)
Informal Back Yard	718 (3%)

According to the Khara Hais IDP (2013/14) there are no houses within the 14 Wards of the Municipal area that are not serviced for electricity.

Various solar development opportunities have been identified for the Khara Hais Municipal area, which the Municipality identified as Anchor economic activities. The Uppington area is regarded to be one of the most ideal areas for solar energy generation and by utilising these opportunities the Municipality would be able to create substantial job opportunities for local communities.

14 CONSIDERATION OF POTENTIAL CUMULATIVE IMPACTS

When considering South Africa's irradiation distribution, the Northern Cape Province, and Upington in particular, is known to be one of the most preferred areas for the generation of solar energy in South Africa and even in the world. This can be ascribed to the advantageous sun radiation specifications and the flat planes which are not intensively used except for low scale grazing. The global irradiation in the specific area is between 2400 and 2600 kWh/m^2.

In order to consider the project cumulatively, the Environmental Impact Reporting phase of the Environmental Process will need to consider cumulative of the proposed facility in addition to the other projects that are proposed in the immediate area.

There are at least two known projects in the vicinity of the Joram Solar Development Site.

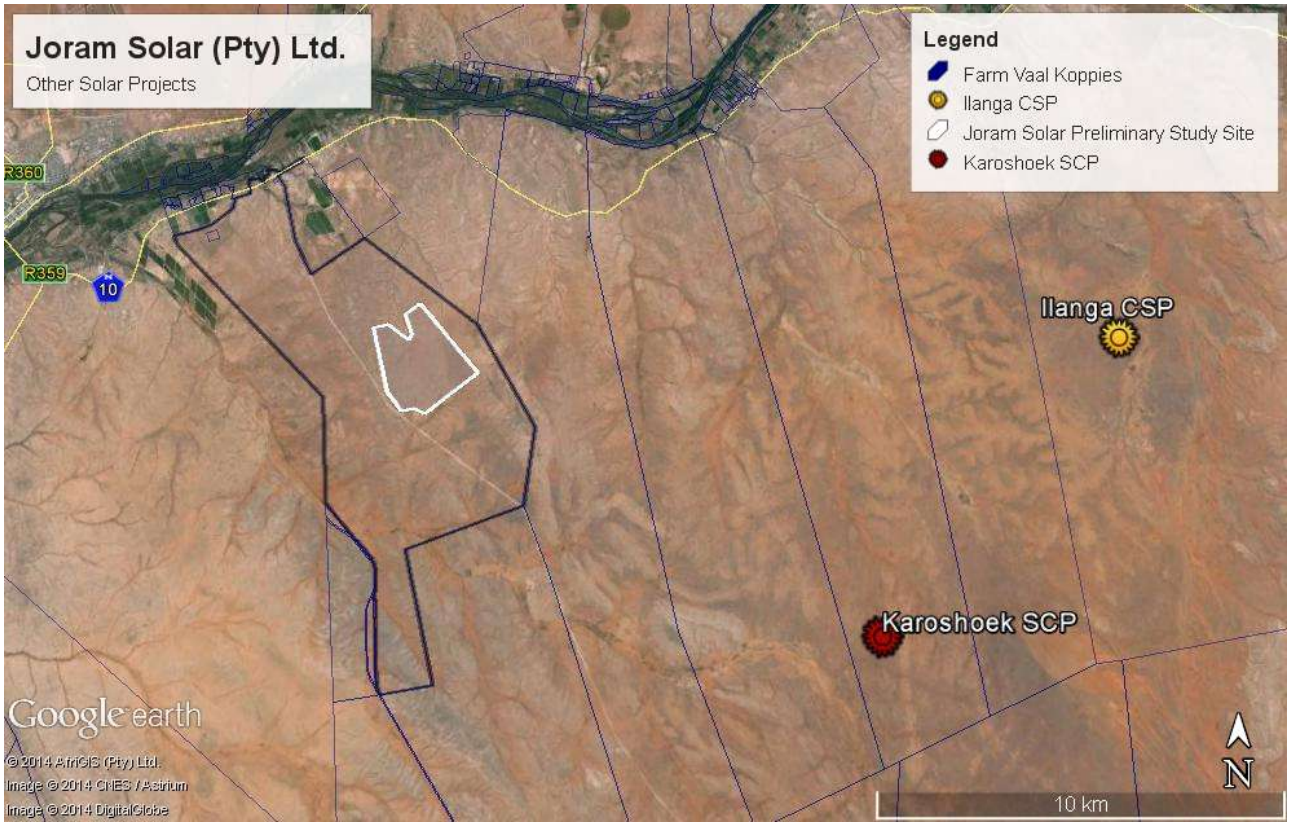

Figure 22: Showing other proposed solar generation facilities in close proximity to the proposed Joram Solar (Solek, 2014).

15 SUMMARY OF POTENTIAL SITE CONSTRAINTS

The following site-specific constraints were identified by various specialists during this scoping / baseline phase of the environmental process. As part of the risk adverse approach, these site constraints will be used to further refine the proposed solar facility layout – The preferred layout will be developed taking all of these constraints into consideration.

15.1 FLORA:

- **Seasonal washes**;
- ***Protected*** plants species and communities;
- **Pans;**
- **Cumulative impact** of loss of vegetation considering the other renewable energy projects on and adjacent to the site.

15.2 FAUNA:

- **Seasonal washes**;
- Potential **collision and electrocution from power-line infrastructure** are significant causes of mortality for bustards, flamingos, eagles and vultures.

15.3 AGRICULTURAL POTENTIAL:

No specific constraints in terms of agricultural potential were identified. However specific mitigation measures to prevent erosion will be required.

15.4 HERITAGE:

- **Potential Archaeological sites** to be determined by Dr Nilssen during the Archaeological Impact Assessment.

15.5 VISUAL:

- None identified to date. Mr Stephen Stead of Visual Resource Management Africa (VRMA) have been appointed to undertake a Visual Impact Assessment of the proposed facility. The results of this assessment will be presented in the Draft EIR.

16 PUBLIC PARTICIPATION PROCESS TO DATE

As part of the public participation process the following steps were taken to ensure compliance with the legislation and to allow ample opportunity for members of the public and key stakeholders to be involved and participate in the environmental process. Please see **Appendix E** for evidence of this Public Participation process. The Public Participation Process has been undertaken according to the requirements of the new NEMA EIA regulations. The following requirements i.t.o the scoping process have been undertaken and complied with in terms of Regulation 56:

Table 15: Summary of Public Participation Process to date.

CHRONOLOGY OF EVENTS	
DATE	**ACTION**
03 June 2014	**Notifications** were sent to the Landowners for the proposed Joram Solar Facility as well as those where potential Grid Connections may be required..
4 July 2014	**Call for registration advert** placed in Die Gemsbok local newspaper.
28 July 2014	**Notifications** were sent to neighbouring landowners informing them of the development proposal and the environmental process. They were automatically registered as Interested and Affected Parties
28 July 2014	The **ZF Mgcawu District Municipality** and the **Khara Hais Local Municipality** (which have jurisdiction over the area) were notified and automatically registered as key stakeholders.
28 July	**Organs of state** (including, Northern Cape Nature Conservation, Department of Agriculture,

2014	Forestry & Fisheries, Department of Minerals and Energy, Department of Water Affairs, SAHRA, Eskom, Civil Aviation Authority etc.), were notified and registered as key stakeholders.
10 June 2014	**Notice Boards** (English & Afrikaans) were placed on the boundary of the study site.
May 2014	A **Stakeholder Register** was opened and the details of all registered stakeholders entered for future correspondence.
27 August 2014	Hard copies of the Draft Scoping Report (DSR) have been placed at the Khara Hais Municipality offices (Upington) and the Upington Public Library (Mutual Street Upington), to inform the public of the proposal and EIA process, and invite them to review the document and provide comment (**28 August 2014 to 08 October 2014.**). The DSR has also been made available on the *Cape EAPrac* website: www.cape-eaprac.co.za/active
22 August 2014	Registered Stakeholders and I&APs were sent notifications informing that of the availability of the DBAR for a review and comment period of 40-days, extending from **28 August 2014 to 08 October 2014.**

Copies of all comments received during the initial registration period are included in **Appendix E** of this report. Comments received in response to the Draft Scoping Report will be included in the Final Scoping Report, to be submitted to the Department of Environmental Affairs (DEA) for consideration.

16.1 PRE-APPLICATION NOTIFICATIONS

Prior to submission of the application to the Department of Environmental Affairs, notifications were submitted to potentially affected landowners. The following parties were notified as affected landowners.

Table 16: Affected landowners notified at the pre-application phase of the environmental process

Owner	Property
Newhaven Trust	Portion 62 of the farm Vaalkoppies
Eskom Holdings	Gordonia Substation
ISF Trust	Portion 3 of farm 40
Alko Verhuurings	Erf 73 & Erf 19951
Gerrit David de Vries	Portion 52 of Farm 40
Joseph van der Merwe	Portion 7 of the Farm 555

16.2 SITE NOTICES

Site notices printed in English as well as Afrikaans were placed on the boundary of the Joram Solar Development Site.

Plate 14: Site notices placed on the boundary of the Joram Solar study site.

16.3 BACKGROUND INFORMATION DOCUMENT

With the initial stakeholder registrations background information documents (BID's) were made available to stakeholders. All key stakeholders were provided with hard copies of the BID along with the notification letters. BID's were also made available at the Upington Library and the Khara Hais municipality. The BID's were also made available on the Cape EAPrac Website.

16.4 REGISTRATION OF KEY STAKEHOLDERS

A number of key stakeholders were automatically registered and will be given an opportunity to comment on this Draft Scoping Report. Copies and proof of these notifications are included in **Appendix E**. A list of key stakeholders registered for this process included in the table below.

Table 17: Key Stakeholders automatically registered as part of the Environmental Process

Stakeholders Registered		
Neighbouring property owners	Department of Environmental Affairs and Nature Conservation	Department of Water Affairs
Khara Hais Municipality: Municipality.	SENTECH	Department of Science and Technology
Department of Mineral Resources	South African National Roads Agency Limited	The Council for Scientific and Industrial Research
South African Heritage Resources Agency	Department of Transport and Public Works	The South African Square Kilometre Array
Northern Cape Heritage Resources Authority	Department of Health	The South African Civil Aviation Authority
Department of Agriculture, Forestry and Fisheries	Department of Minerals and Energy	Department of Science and Technology
Provincial Department of Agriculture	Eskom	Department of Communications
Khara Hais Municipality Ward councillors		

16.5 PRELIMINARY COMMENTS RECEIVED.

Preliminary comments were received from the following stakeholders:

- Eskom.

Copies of these comments as well as the responses thereto are included in **Appendix E** of this Report.

16.6 NOTIFICATION OF AVAILABILITY OF DRAFT SCOPING REPORT

Registered I&AP's were notified of the availability of the Draft Scoping Report for review and comment. The Draft Scoping Report was made available at the Upington Public Library as well as the Khara Hais municipality for review and comment. A digital copy of the report was also placed on the Cape EAPrac website. In order to facilitate effective comment, all State Departments and key stakeholders have been provided with digital copies of the report on CD.

NOTE: IF AGREED WITH DEA, THE FINAL SCOPING REPORT MAY BE SUBMITTED TO DEA AND TO I&AP's AT THE SAME TIME.

17 ASSUMPTIONS & LIMITATIONS

This section provides a brief overview of *specific assumptions and limitations* having an impact on this environmental application process:

- It is assumed that the information on which this report is based (specialist studies and project information, as well as existing information) is **correct, factual and truthful.**
- The proposed development is **in line** with the statutory planning vision for the area (namely the local Spatial Development Plan), and thus it is assumed that issues such as the cumulative impact of development in terms of character of the area and its resources, have been taken into account during the strategic planning for the area.
- It is assumed that all the relevant **mitigation measures** and agreements specified in this report will be implemented in order to ensure minimal negative impacts and maximum environmental benefits.
- It is assumed that due consideration will be given to the **discrepancies in the digital mapping** (PV panel array layouts against possible constraints), caused by differing software programs, and that it is understood that the ultimate/final positioning of solar array will only be confirmed on-site with the relevant specialist/s.
- The Department of Water Affairs **may consider the submission of a water use application** necessary for allowing the use of water from the farm boreholes and possible the crossing of the on-site drainage lines by the infrastructure associated with the solar facility. The assumption is made that on review of this Draft Scoping Report the Department of Water Affairs will provide prompt confirmation and recommendations in this regard.
- It is assumed that Stakeholders and Interested and Affected Parties notified during the initial public participation process will submit all relevant **comments within the designated 40-days** review and comment period, so that these can included in the Final Scoping Report can be timeously submitted to the delegated Authority, the Department Environmental Affairs for consideration.

The assumptions and limitations of the various specialist studies are included in their respective reports attached in **Appendix D**.

18 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT REPORT

This section outlines the assessment methodology and legal context for specialist studies. Based on the issues raised by the project team, specific impact assessments are required to address issues that may result in significant impacts. For these specialist impact assessments, the specialists have been provided with a set of criteria for undertaking their assessments, to allow for comparative assessment of all issues. These criteria are detailed in the Terms of Reference to each specialist and summarised below.

18.1 CRITERIA FOR SPECIALIST ASSESSMENT OF IMPACTS

These criteria are based on the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989, as well as the Specialist Guidelines drawn up in terms of the NEMA Regulations.

All possible impacts need to the assessed – the **direct, in-direct as well as cumulative impacts**. Impact criteria should include the following:

- **Nature of the impact**
  This is an appraisal of the type of effect the construction, operation and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.
- **Extent of the impact**
  Describe whether the impact will be: local extending only as far as the development site area; or limited to the site and its immediate surroundings; or will have an impact on the region, or will have an impact on a national scale or across international borders.
- **Duration of the impact**
  The specialist should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long terms (16-30 years) or permanent.
- **Intensity**
  The specialist should establish whether the impact is destructive or benign and should be qualified as low, medium or high. The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.
- **Probability of occurrence**
  The specialist should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

The impacts should also be assessed in terms of the following aspects:

- **Status of the impact**
  The specialist should determine whether the impacts are negative, positive or neutral (“cost – benefit” analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.
- **Cumulative impact**
  Consideration must be given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts must be evaluated with an assessment of similar developments planned and already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.
- **Degree of confidence in predictions**

The specialist should state what degree of confidence (low, medium or high) is there in the predictions based on the available information and level of knowledge and expertise.

Based on a synthesis of the information contained in the above-described procedure, the specialists are required to assess the potential impacts in terms of the following significance criteria:

- **No significance**: The impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: The impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Moderate significance**: The impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: The impacts will have a major influence on the proposed development and/or environment.

The final impact assessment report should as a minimum include the following sections:

- Executive Summary;
- Introduction And Description Of Study;
- Methodology;
- Results;
- Assessment of Impacts (Direct, In-direct & Cumulative, including mitigation measures to reduce negative impacts and measures to enhance positive impacts and the completion of impact tables);
- Comparative Assessment between project Alternatives;
- Discussion and Recommendation for Preferred Alternative;
- Specialist recommendation for Pre-Construction, Construction and Operational Phases); and
- Conclusion.

18.2 BRIEF FOR SPECIALIST STUDIES TO BE UNDERTAKEN AS PART OF THE EIA

- Each specialist is required to consider the project in as much detail as is required to inform his/her impact assessment.
- Specialists must ensure that they are aware of the necessary **planning, environmental and service requirements** associated with the proposal.
- Specialists must ensure that they **liaise with other relevant specialists** (via the EAP) if it seems necessary to use information from another discipline.
- Impact Assessments must **consider all the identified alternatives** in order to provide a comparative assessment of impacts **as well as the no-go option.**
- Specialists should consider **national and international guidelines and standards** relevant to their respective focus area. For example: *The Environmental, Health and Safety Guidelines (2007) IFC, World Bank Group* etc.
- Any **assumptions** made and any uncertainties or **gaps in knowledge**, as well as **limitations** regarding the specialist studies, must be clearly described and explained.
- The proximity of the site in relation to **key features** must be considered.

- The **Draft Impact Assessment report** of each specialist are subject to public/stakeholder review and comment – all relevant comments received will be considered by each specialist, responded to and the final impact assessment report updated accordingly.

19 PLAN OF STUDY FOR SPECIALIST IMPACT ASSESSMENTS

The relevant participating specialists will undertake impact assessments of the proposal in their specific field of expertise.

19.1 TERMS OF REFERENCE FOR SPECIALIST IMPACT ASSESSMENTS

Please refer to the table below for a summary of the terms of reference that specialists will consider as part of their studies. Please also refer to the detailed plans of study for each specific specialist in the sections below.

Table 18: Terms of reference for specialist assessments

Specialist Study	Aim of the Study / Input	Terms of Reference
Ecological / Biophysical	Determine the impacts that the construction, operation and decommissioning of the Proposed Joram Solar development, substation / auxiliary building site, transmission line and associated infrastructure will have on vegetation and fauna. The above assessment must include the NO-GO alternative and include a cumulative assessment.	• Approximately 220ha will be disturbed during construction and shaded during operation. • A six metre wide access road will be required to access the facility • 4m wide access gravel roads and internal road network will need to be constructed to and between the PV panel arrays. These roads may cross small drainage lines, which may require Low-Level-Crossing-Structures / drifts, with associated anti-erosion gabion structures, where necessary. • An on-site substation of approx. as well as auxiliary buildings with a footprint of approximately 1ha will be constructed. • A transmission line of approximately from the on-site substation to the Gordonia substation will be required. • Based on the findings of the Scoping Ecological Report assess potential impacts on fauna & flora from the construction, operation and decommissioning activities. • Describe avoidance measures required, as well as mitigation / management measures that may be implemented to avoid or reduce any negative impacts on vegetation and fauna.
Heritage	Assess the Proposed Joram Solar Development and associated infrastructure (on-site substation, auxiliary buildings, transmission line, roads etc.) during construction, operation and decommissioning on Heritage Resources and the Cultural Landscape and provide recommendations for avoidance &/ mitigation.	• On the basis of the public participation process for the Scoping phase, conclude the Heritage Impact Assessment, which includes: • Analysis of Cultural Landscape, Visual – Spatial and Cumulative Impacts; • Liaison with other specialists regarding the Archaeological and Paleontological and Impact Assessments. • Describe mitigation / management measures that may be implemented to

		avoid or reduce any negative impacts.
Archaeological	Assess the Proposed Joram Solar Development and associated infrastructure (on-site substation, auxiliary buildings, transmission line, roads etc.) during construction, operation and decommissioning on Archaeological Resources and provide recommendations for avoidance &/ mitigation.	• Outline the requirements for the Archaeological monitoring (should this be necessary) during earthmoving activities so as to avoid or minimize negative impact on potential subsurface archaeological resources. • Describe mitigation / management measures that may be implemented to avoid or reduce any negative impacts.
Palaeontology	Undertake a Paleontological desktop assessment of the study site	• Determine the significance of the site in terms of potential paleontological resources. • Provide recommendation for the conservation of any resources identified.
Planning	Re-zoning and Long-term Lease Applications.	• Start preparing Re-zoning & Lease Applications based on preferred, mitigated layout of the solar facility. • Follow-up with Khara Hais Municipality and Department of Agriculture regarding progress of the Re-zoning & Lease Applications for the Solar Facility on Agricultural land.
Visual	Undertake a Visual Impact assessment of the proposed Joram Solar Facility.	• Determine sensitive visual resources in the surrounding. • Undertake a view shed analysis of the proposed development. • Assess the visual significance of the proposed project. • Provide mitigation measures if necessary.

19.2 PLAN OF STUDY FOR ECOLOGICAL IMPACT ASSESSMENT

The Ecological specialist, Mr Simon Todd will undertake the following activities as part of the ecological impact assessment.

19.2.1 Assessment methodology

Direct, indirect and cumulative impacts of the issues identified above, will assessed during the Impact Assessment phase of the project according to the following standard methodology:

- The **nature** which shall include a description of what causes the effect what will be affected and how it will be affected.
- The **extent** wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration** wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0- 1 years).
    - the lifetime of the impact will be of a short duration (2-5 years).
    - medium-term (5-15 years).
    - long term (> 15 years); or
    - permanent
- The **magnitude** quantified as small and will have no effect on the environment, minor and will not result in an impact on processes, low and will cause a slight impact on processes, moderate and will result in processes continuing but in a modified way, high (processes are

altered to the extent that they temporarily cease) and very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which shall describe the (likelihood of the impact actually occurring. Probability will be estimated as very improbable (probably will not happen), improbable (some possibility, but of low likelihood), probable (distinct possibility), highly probable (most likely) and definite (impact will occur regardless of any prevention measures).

The significance which shall be determined through a synthesis of the characteristics described above and will be assessed as follows:

- **No significance**: the impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Moderate significance**: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment and will result in the "no-go" option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

and;

- the status, which will be described as either **positive**, **negative** or **neutral**.
- the degree to which the impact can be **reversed**.
- the degree to which the impact may cause **irreplaceable loss of resources**.
- the degree to which the impact can be **mitigated**.

19.2.2 Proposed activities for the EIA phase

Although the current study includes information collected on-site as well as a desktop assessment, the proposed development area has been specifically investigated and fieldwork during the EIA phase will be an important activity required to validate and refine the findings of this report. This will include the following studies and activities:

- **Ground-truth** and **refine** the ecological sensitivity map of the site. Particular attention will be paid to the larger drainage lines which form the Helbrandkloofspruit.
- **Characterise** the vegetation and plant communities present within the site in greater detail. On-site surveys will be conducted to generate a species list for the site as well as identify and where necessary map different plant communities present at the site if they are associated with different sensitivity classes.
- **Identify and map** the presence of any **unique** and special habitats at the site such as gravel patches, rock fields and other localised habitats.
- **Locate, identify and map** the location of **significant populations** of species of conservation concern, so that the final development footprint can be adjusted so as to avoid and reduce the impact on such species. Some species of concern may be widespread and others localised and the distribution of such species will be established during the site visit.
- Evaluate the likely **presence** of listed **faunal** species at the site such as the Giant Bullfrog, and identify associated habitats that should be avoided to prevent impact to such species.

- Evaluate, based on the site attributes, what the most applicable **mitigation measures** to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.
- **Assess** the **impacts** identified in the scoping phase in light of the site-specific findings and the final layout to be provided by the developer.

19.3 PLAN OF STUDY FOR ARCHAEOLOGICAL / HERITAGE IMPACT ASSESSMENT

The integrated Heritage specialist and the remainder of his team will undertake the following activities as part of the Archaeological / Heritage Impact Assessment.

The purpose of an AIA is to conduct a survey of the affected area to identify, record and rate the significance of archaeological resources, to assess the impact of the proposed area and linear development on such resources and to recommend mitigation measures where necessary.

To assess the nature and significance of the archaeological record in the affected area, it is necessary to conduct a comprehensive foot survey. Initially, the latter will focus on the provisional development layout plan including the footprint area for the solar panels, own built power line route and access road (Figure 2). In the unlikely event that these areas prove to be archaeologically sensitive, the search area will be expanded to identify areas that are not archaeologically sensitive and that are suitable for development purposes.

Open vegetation, exposed ground surfaces and considerable areas of erosion provide excellent archaeological visibility and will allow for a good understanding of the archaeological record in the area based on surface observations and those of exposed sedimentary profiles in erosion gullies. Due to good archaeological visibility, survey walk tracks will be spaced some 30m apart and will be fixed with a hand held GPS to record the search area. The position of archaeological occurrences, observations and photo localities will also be fixed by GPS. Digital audio notes of observations will be kept and a comprehensive, high quality digital photographic record will be made.

The potential for different landforms, sediments or landscape features to contain archaeological traces is assessed according to type, such as rocky surfaces, sandy surfaces, cultivated areas, previously developed or disturbed areas, rock shelters, and so on. Overall, the significance of archaeological occurrences or sites will be evaluated in terms of their content and context. Attributes to be considered in determining significance include artefact and/or ecofact types, rarity of finds, exceptional items, organic preservation, aesthetic appeal, potential for future research, density of finds and the context in which archaeological traces occur.

Once archaeological traces have been identified, recorded and assessed in terms of their significance, the aim of the AIA is to assess the potential negative impacts of development on such resources and to make recommendations in mitigation. In the unlikely event of finding highly significant sites, it may be required to alter the development layout plans in order to avoid such sites, and so that they can be protected and conserved in perpetuity. In other cases it may be sufficient to record and/or retrieve samples from archaeological occurrences with a permit from the relevant heritage authority. In the event that an archaeological site, after being recorded and/or sampled, will be disturbed, damaged, or destroyed by development activities, then a destruction permit must be obtained from the relevant heritage authorities. Having said this, it is anticipated that the archaeological record in the affected area will be of low significance and that these measures will not be required.

The end product of the AIA is a report that forms part of the Integrated Heritage Impact Assessment and that meets standards required by the South African Heritage Resources Agency (SAHRA) in terms of the National Heritage Resources Act, No. 25 of 1999. The AIA report will

detail results from the literature review and fieldwork, and will assess potential negative impacts associated with the proposed development and make recommendations in mitigation where necessary.

19.4 PLAN OF STUDY FOR VISUAL IMPACT ASSESSMENT

The Visual specialist, Mr Stephen Stead of VRMA will undertake the following activities as part of the Archaeological / Heritage Impact Assessment.

The International Finance Corporation (IFC) prescribes eight performance standards (PS) on environmental and social sustainability, the first of which is to identify and evaluate environmental and social risks and impacts of a project, as well as to avoid, minimize or compensate for any such impacts. Performance Standard 6 refers to the nonmaterial benefits people obtain from Cultural Ecosystems. These are the emotional enrichment that people experience is a non-material benefit that people obtain from cultural ecosystems services, as described by The Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis report: "Cultural ecosystems services: the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.

The process that VRM Africa follows when undertaking a Visual Impact Assessment (VIA), is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method. This map and GIS based method of assessing landscape modifications allows for increased objectivity and consistency by using a standard assessment criteria and involves the measurement of contrast in the form, line, texture and colour of the proposed landscape modification brought about by a project, against the same elements found in the existing natural landscape.

VRM Africa makes use of a team of professionals to meet the unique requirements for each assessment. The consultants that VRMA makes use of are:

- Liesel Stokes Design and Mitigation: SACLAP Landscape Architect
- Heather Stead Research/ Assistant: Bachelor of Arts
- Lisa Schultz Contrast rating and editing: Bachelor of Arts, Fine Art

The following topics will be discussed in the Visual Impact Assessment

- The Scoping Study
- Field survey and Baseline Study
- 3D Visualisation and Photo Montages
- Visual Impact Assessment and mitigation criteria
- A Photo Montage example

20 PROCESS TO BE FOLLOWED

The following process is to be followed for the remainder of the environmental process:

- This Draft Scoping Report is made available for public review and comment for a period of 40 days. Comments received on this document will be responded to and included in the Final Scoping Report. Should there be substantial changes between the Draft and Final Scoping Report, this Report will be made available for review and comment for a further 21-day period. Should there be no substantial changes between the draft and final documents the Final Scoping Report will be submitted directly to the Department of Environmental Affairs (DEA) and to registered I&AP's at the same time. Registered Interested and Affected Parties will be

notified when the Final Report is available on the *Cape EAPrac* website and/or be provided with digital copies of the FSR.

- Once the DEA accepts the Final Scoping Report and Plan of Study for Environmental Impact Report, the relevant specialists will undertake and complete their respective impact assessments;
- Discussions will be held with the various specialists and project team members in order to determine how best the development concept should be amended / refined to avoid significant impacts;
- In the event that amendments to the development plan are not required, the Draft Environmental Impact Report (DEIR) can be concluded;
- However, if an amendment becomes necessary, changes can be made to the layout plan to form another development alternative that will address and/or avoid any significantly detrimental impacts;
- Such an alternative will be circulated to all the relevant specialists in order for them to complete their comparative assessments and final impact assessment reports;
- The DEIR will be made available for public review and comment period of 40-days;
- All comments and inputs received during the comment & review period will be included with the Final EIR;
- The Final EIR will be submitted to the DEA for consideration and decision-making;
- The DEA's decision (Environmental Authorisation) on the FEIR will be communicated with all registered I&APs.

The competent Authority will be involved through continuous email and report **updates** on the process, in particular, when the **draft and final Environmental Impact Reports** have been completed. Should any unforeseen problems occur during the course of the impact assessment phase the competent authority will also be **contacted** for an **update and/or advice**.

21 CONCLUSION & RECOMMENDATIONS

This scoping exercise is currently being undertaken to present concept proposals to the public and potential Interested & Affected Parties and to identify environmental issues and concerns raised as a result of the proposed development alternatives to date. This will allow Interested & Affected Parties (I&APs), authorities, the project team, as well as specialists to provide input and raise issues and concerns, based on baseline / scoping studies undertaken. The Joram Solar Development site has been analysed from Ecological, Agricultural Potential, Heritage, perspectives, and site constraints and potential impacts identified.

This Draft Scoping Report (DSR) summarises the process to date, reports on the findings of relevant baseline studies.

Cape EAPrac is of the opinion that the information contained in this Draft Scoping Report and the documentation attached hereto is sufficient to allow the general public and key stakeholders to apply their minds to the potential negative and/or positive impacts associated with the development, in respect of the activities applied for.

This Draft Scoping Report (DSR) is made available for stakeholder review and comment for a period of 40-days, extending from **28 August 2014 to 08 October 2014**. All comments received, will be considered and addressed, and feedback will be provided to registered stakeholders.

All stakeholders are requested to review this Draft Scoping Report and the associated appendices, and provide comment, or raise issues of concern, directly to *Cape EAPrac* within the specified 40-day comment period.

Comments must be submitted, in writing, to the following address no later than 08 October 2014

Cape Environmental Assessment Practitioners

Att: **Mr Dale Holder**

PO Box 2070, George, 6530

Fax: 044-874 0432 or Email: dale@cape-eaprac.co.za

22 ABBREVIATIONS

AIA	Archaeological Impact Assessment
BGIS LUDS	Biodiversity Geographic Information System Land Use Decision Support
CBA	Critical Biodiversity Area
CDSM	Chief Directorate Surveys and Mapping
CEMPr	Construction Environmental Management Programme
DEA	Department of Environmental Affairs
DEA&NC	Department of Environmental Affairs and Nature Conservation
DME	Department of Minerals and Energy
EAP	Environmental Impact Practitioner
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GPS	Global Positioning System
GWh	Giga Watt hour
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
LUDS	Land Use Decision Support
LUPO	Land Use Planning Ordinance
MW	Mega Watt
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NPAES	National Protected Area Expansion Strategy
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act

PM	Post Meridiem; "Afternoon"
PSDF	Provincial Spatial Development Framework
S.A.	South Africa
SACAA / CAA	South African Civil Aviation Authority
SAHRA	South African National Heritage Resources Agency
SANBI	South Africa National Biodiversity Institute
SANS	South Africa National Standards
SDF	Spatial Development Framework
TOPS	Threatened and Protected Species

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