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DRAFT SCOPING REPORT

for

RE CAPITAL 11: SOLAR DEVELOPMENT

on

Remainder of the farm Dyasonsklip 454, 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: Re Capital 11 (Pty) Ltd.

By: *Cape EAPrac*

Report Reference: KAI314/05

Department Reference: 14/12/16/3/3/2/705

Case Officer: To be allocated

Date: 8 August 2014

APPOINTED ENVIRONMENTAL ASSESSMENT PRACTITIONER:

***Cape EAPrac* Environmental Assessment Practitioners**

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

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PURPOSE OF THIS REPORT:

Public Review & Comment

APPLICANT:

Re Capital 11 (Pty) Ltd.

CAPE EAPRAC REFERENCE NO:

KAI314/05

DEPARTMENT REFERENCE:

14/12/16/3/3/2/705

SUBMISSION DATE

08 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

RE Capital 11 Solar Development,

Remainder of the Farm Dyasonsklip 454, Upington, Northern Cape

Submitted for:

Stakeholder Review & Comment

Report Issued by:

Cape Environmental Assessment Practitioners

Tel: 044 874 0365
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George 6530

REPORT DETAILS

Title:	**DRAFT SCOPING REPORT** **for proposed 'RE Capital 11 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 Re Capital 11 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, **25 August to 04 October 2014**
Prepared for:	RE Capital 11 (Pty) Ltd.
Published by:	*Cape Environmental Assessment Practitioners (Pty) Ltd. (Cape EAPrac)*
Authors:	Mr Dale Holder
Reviewed by:	Ms Melissa Mackay
Cape EAPrac Ref:	KAI314/05
DEA Case officer & Ref. No:	Enquiries: Ms Mtlala Rabothata (Case officer will be allocated After Scoping Phase) 14/12/16/3/3/2/705
Date:	08 August 2014
To be cited as:	*Cape EAPrac,* 2014. Draft Scoping Report for the proposed RE Capital 11 Solar Development. Report Reference: KAI314/05. 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	RE Capital 11 (Pty) Ltd is a renewable energy developer investigating numerous potential renewable energy projects in the Western Cape
Site Details		
Size of the site	Description and Size in hectares of the affected property.	Remainder of Farm 454, Dyason's Klip. Total Property Size 5725,28ha.
Development Footprint	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, inverter stations and internal roads.	Initial Study Area is 510Ha. The total footprint of RE Capital 13 will not exceed 240ha
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 240ha .
	Structure height	Less than10 meters
	Surface area to be covered (including associated infrastructure such as roads)	Approximately 200 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 are under investigation. All of the grid connections are planned to connect to the planned MTS substation (close to the current Oasis substation location). The facility will connect to the substation via own-built 132kV lines or by a "loop-in;loop-out" line connecting to some of the existing or future lines. The existing line or future line to "loop-in;loop-out" will either be the lines servicing the newly constructed Khi Solar One, the future constructed grid connections on Dyason's Klip RE Capital 3 solar facility or the existing Oasis 132kV line.
	Capacity of substation to connect facility	The planned MTS is expected to have 500MW transformer capacity as a first phase, the total planned capacity of the MTS is 5x500MW transformer capacity.
Power line/s	Number of overhead power lines required	1x132kV line from the on-site grid substation to the "loop-in/loop-out" line or to the main substation. Various grid connection options are however currently been incorporated into the EIA.
	Route/s of power lines	Various scenarios and grid connection options exists. Please refer to layout within the kmz file.
	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 (Webley, 2014)

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DRAFT SCOPING - OVERVIEW

1 PROJECT OVERVIEW

Cape EAPrac has been appointed by **RE Capital 11 (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 '**RE Capital 11 Solar Development** near Upington and Keimoes in the Northern Cape.

RE Capital 11 (Pty) Ltd. Have an option to sub-lease a portion of the remainder of the farm Dyasonsklip from the landowner, Owen Davies Trust, for the purposes of developing the proposed solar facility. A copy of a letter from Owen Davies 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).

RE Capital 11 (Pty) Ltd is one such IPP which intends to generate electricity from the proposed RE Capital 11 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 14/12/16/3/3/2/705).

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, remainder of the farm Dyasonsklip 454, is located in the ZF Mgcawu of the Northern Cape Province, within the jurisdiction area of the Khai Garib Local Municipality. The property is approximately 5725ha is size and is located approximately 22km west southwest of Upington and 15km northeast of Keimoes.

The proposed development site within the property is approximately 500ha in size. Two site

The topography is generally flat and has low relief form. The slope gradient is between 0 and 2% with a concave shape. Higher ground drains towards multiple depressions (seasonal washes), forming waterways towards the Gariep River.

6 DEVELOPMENT PROPOSAL & ALTERNATIVES

The proposed RE Capital 11 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 proposed new Eskom MTS 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 RE Capital 11 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 RE Capital 11 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 **25 August – 04 October 2013**. 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 04 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 **RE Capital 11 (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 '**RE Capital 11 Solar Development** near Upington and Keimoes in the Northern Cape.

RE Capital 11 (Pty) Ltd. Have an option to sub-lease a portion of the remainder of the farm Dyasonsklip 454 from the landowner, **Owen Davies Trust**, for the purposes of developing the proposed solar facility. A copy of a letter from Owen Davies 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: **25 August 2014 – 04 October 2014**

All comments on this report must be submitted to Cape EAPrac by no later than **04 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). **RE Capital 11 (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.)

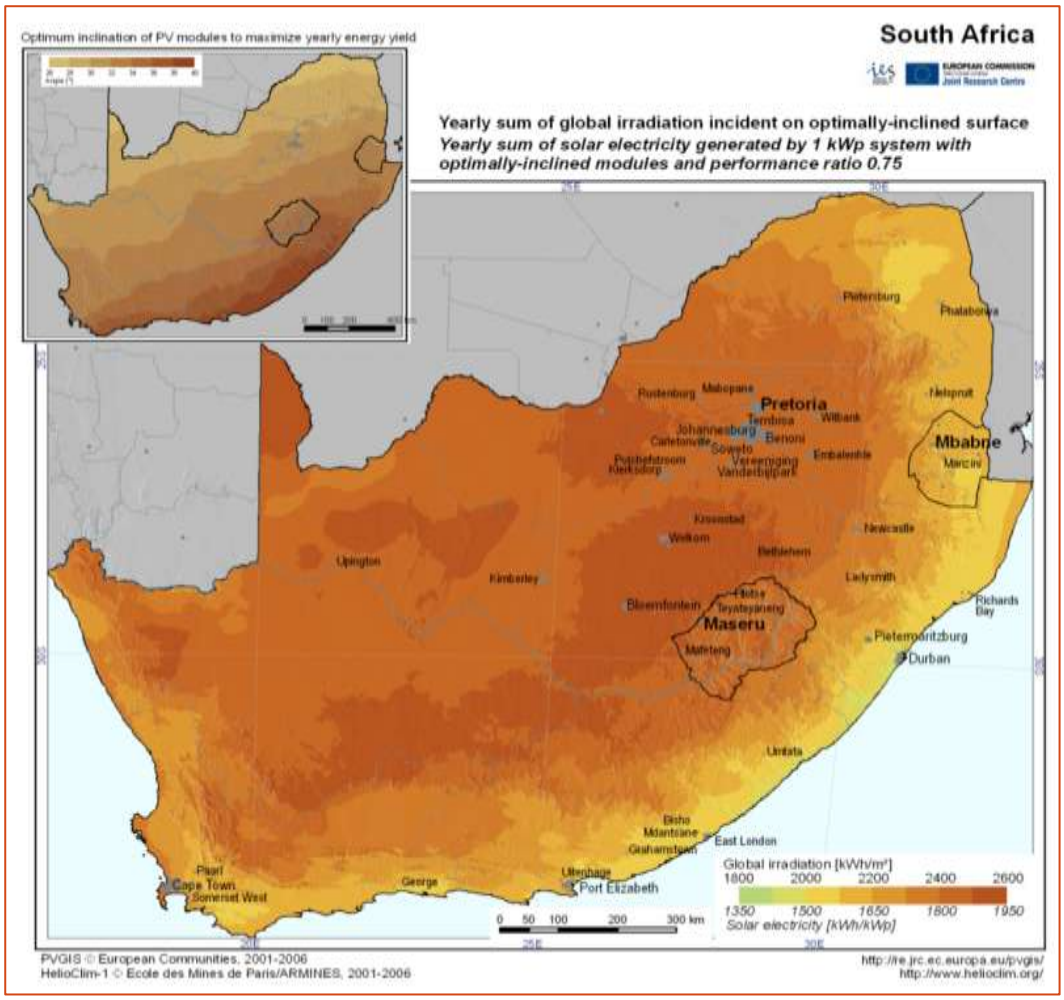

Figure 1: Solar radiation map for South Africa (Source: Solek Engineering Report, 2012).

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 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 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 RE Capital 11 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 RE Capital 11 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 & approved new Major Transmission Substation; and
- Its proximity to other Alternative Energy Facilities (both proposed and currently under construction)
- In August 2013, the CSIR released the DEA national strategic environmental assessment for the efficient and effective rollout of wind and solar photovoltaic energy. The Re Capital 11 facility falls within the high priority grid for PV installations.

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 RE Capital 11 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 RE Capital 11 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 approved Eskom 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 RE Capital 11 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 RE Capital 11 Solar Development on private land, of approximately **250ha**, outside of the urban edge Upington and Keimoes.
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.

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 RE/454 is set back from the N12 highway and thus will be inconspicuous to the public traveling at high speed past it. Site Notices have been placed at the entrance to Farm RE/454 (off the N12), and Notices have been placed at local public venues.

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 report is 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 property lies within the three distinct vegetation types namely **Boesmanland Arid Grassland** on the southern/central portion of the property, **Kalahari Karroid Shrubland** on the northern section of the property and **Lower Gariep Alluvial Vegetation** along the Orange River on the south of the property. The proposed study sites fall within Boesmanland Arid Grassland and Kalahari Karroid Shrubland, both of which are considered **Least Threatened**.

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. The closest focus area is the **Kamiesberg Boesmanland Augrabies** focus area that is situated 60km west of the study site.

The Kamiesberg Bushmanland Augrabies focus area, represents the largest remaining natural area for expansion of the protected area network and forms part of the planned Lower Orange River Trans-frontier Conservation Area (TFCA – extending from Augrabies Falls to the mouth of the Orange River, along the S.A./Namibian border). It provides an opportunity to protect 22 Desert and Succulent Karoo vegetation types, mostly completely unprotected, several river types that are still intact but not protected, and important ecological gradients and centres of endemism.

The proposed RE Capital 11 Solar Facility will **not have an effect** on this or any other **NPAES** focus Area.

2.5 NAMAQUA DISTRICT BIODIVERSITY SECTOR PLAN, 2008.

According the South African National Biodiversity Institute Biodiversity Geographic Information System (SANBI BGIS), 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. The Namaqua District Biodiversity Sector Plan does however include broadly defined critical biodiversity areas, which are described below.

Biodiversity sector plans are intended to help guide land-use planning, environmental assessments and authorisations; and, natural resource management in order to promote development which occurs in a sustainable manner.

The Namaqua District Biodiversity Sector Plan was developed to further the awareness of the unique biodiversity in the area, the value this bio diversity represents to people as well as the management mechanisms that can ensure its protection and sustainable utilisation.

The biodiversity profile information from this plan has been incorporated into the environmental planning section of the Spatial Development Frameworks (SDF's) for each of the six local municipalities in the district (including the neighbouring Khai Ma Municipality).

The Namaqua District Critical Biodiversity Areas (CBA) have however been mapped to include the Khai Garib Municipal area including the study site. A **type 2 CBA** was mapped on the southern portion of the property along the Orange River. Level 2 CBA's are designated to near-natural landscapes including:

- Ecosystems and species largely intact and undisturbed,
- Areas with intermediate irreplaceability or some flexibility in terms of area required to meet biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising our ability to achieve targets, and

- These are landscapes that are approaching but have not passed their limits of acceptable change. .

The proposed RE Capital 11 Solar facility will not affect this level 2 CBA along the Southern section of the property.

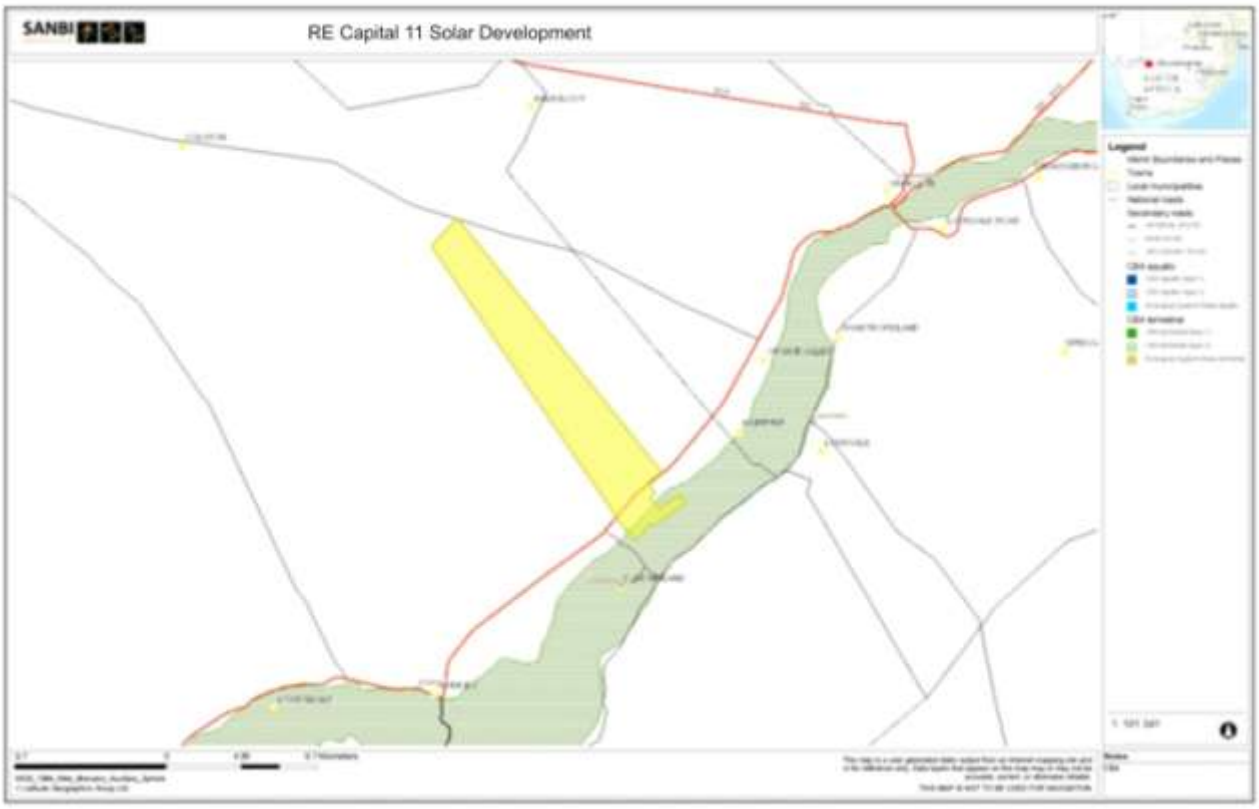

Figure 3: Showing Critical Biodiversity Areas (CBA's) in relation to the Remainder of Dyasonsklip 454.

According to the information provided by the SANBI BGIS system, the environment in the Kai! Garib Local Municipality is mostly untransformed (96% natural areas remaining). The Augrabies National Park covers 45 828ha, which amounts to 6.3% of the municipal area. Two biomes occur within the municipality, which support seven (7) vegetation types, none of which are classified as critically endangered, while one (Lower Gariep Alluvial vegetation) is considered to be Endangered.

This vegetation is however restricted to the banks of the Orange River and would not be affected by the RE Capital 11 Solar Development.

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*. The ecological specialist further confirmed that it is not likely that many *Boscia albitrunca* would be

affected by the development as this species is mostly restricted to the larger drainage lines on the site (These drainage lines will be avoided by the development).

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 RE Capital 11 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 000m² 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 RE Capital 11 Solar Development. This integrated heritage study will include an Archaeological Impact Assessment to be undertaken by ACO associates 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 RE Capital 11 Solar is to be sourced from boreholes on the property, from the storage dam on the property or from the Khai Garib municipality. Please see the Engineering Report in Annexure D4 for additional information in this regard.

Figure 4: Showing potential water sources on the Remainder of Dyasonsklip 454.

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]

It is believed that the proposed 75MW RE Capital 11 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.

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

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

RE Capital 11 (Pty) Ltd as 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 RE Capital 11 (Pty) Ltd. Solar Energy Facility. The project is planned to be located on the Remainder of Farm 454, Dyason's Klip with a planned installed electrical capacity of 75 MW_p.

The proposed facility has a planned peak capacity of be 75 MW_p. with an estimated footprint between 200 and 240ha.

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 RE Capital 11 Solar Development (Solek, 2014)

Component	Estimated extent of each 75 MW plant	Percentage of selected area (± 200 ha)	Percentage of whole farm (±5725 ha)
PV modules	180 ha (1.8 km^2)	90%	3%
Internal roads	18 ha (0.18 km^2)	9%	0.31%
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.

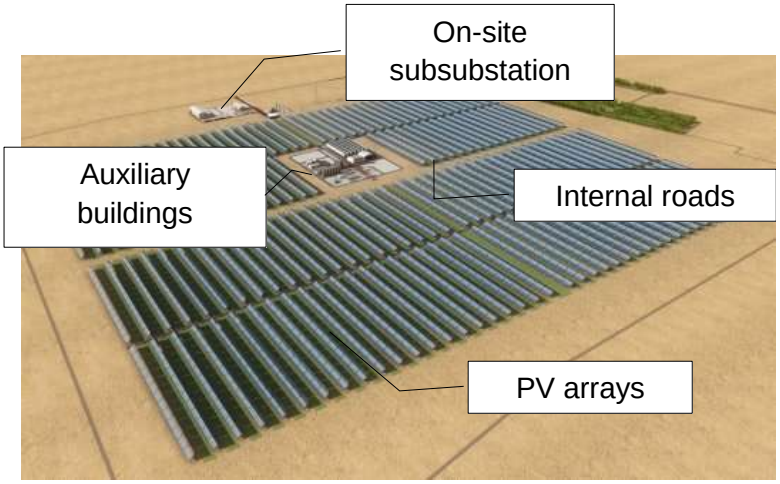

Figure 5: Typical Layout of a solar PV Plant (Solek, 2014)

Figure 6: Typical Layout of a solar PV Plant (Solek, 2014)

Determining the optimal layout is a costly process which would normally take place once an IPP 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. 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 and size**, 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 RE Capital 11 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 RE Capital 11 Solar Development.

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

The RE Capital 3 solar projects (a similar PV solar facility previously developed, and authorised, on the same Remainder of Farm 454, Dyason's Klip) is also shown in the figure below in order to obtain perspective.

The RE Capital 11 solar development (this application) has taken the approved **access roads** and power lines for **grid connection** of the RE Capital 3 projects into consideration in order to reduce cumulative impacts. This scoping phase study site was inspected by the EAP and Technical Experts in order to determine its suitability and to highlight any potential fatal flaws.

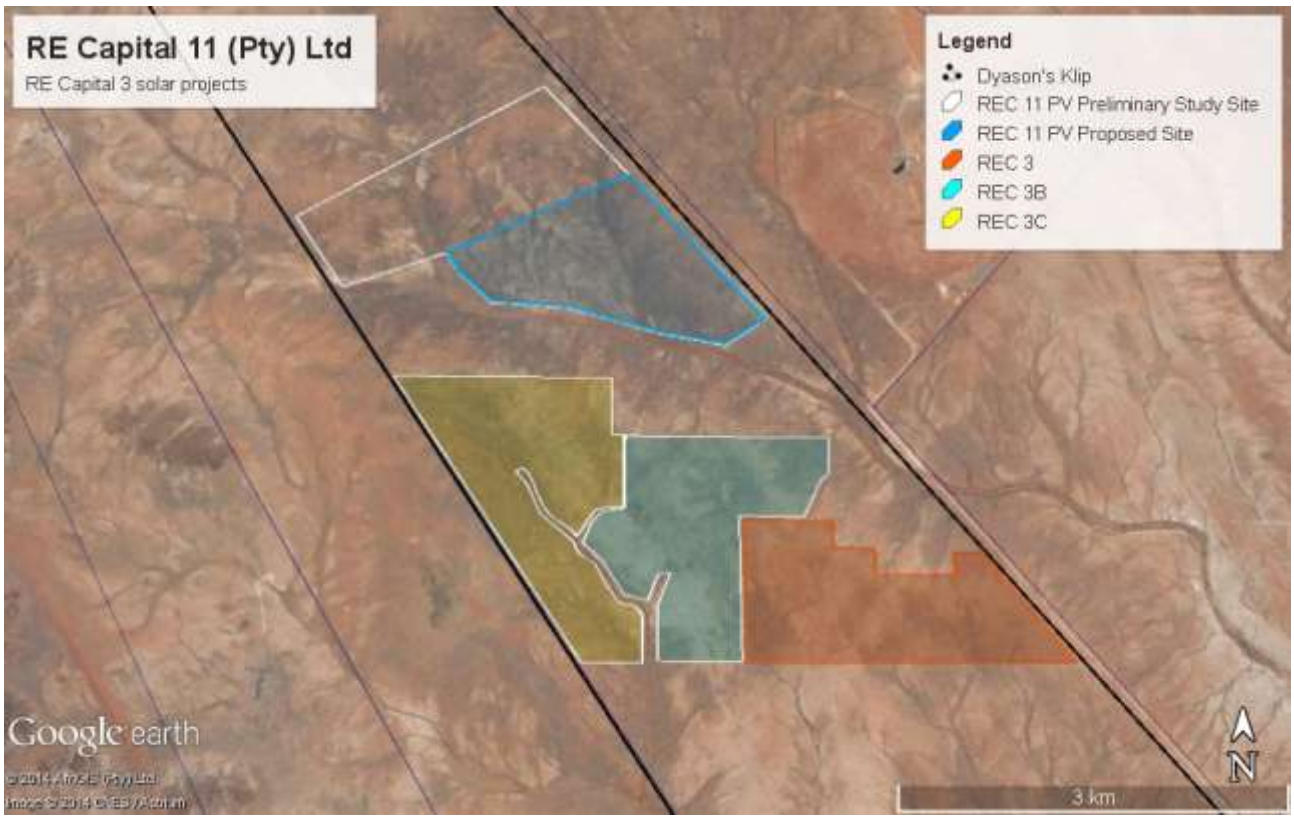

Figure 7: Showing preliminary study in relation to the approved RE Capital 3 Solar Development (Solek, 2014)

4.1.1 Preliminary Study Site

A preliminary study site of 510 ha was identified as part of study area for the scoping phase of the RE Capital 11 (Pty) Ltd project. The 510 ha area was identified because of its level surface, road access alternatives, and distance to the new authorised Eskom Upington MTS. The low rainfall also means that vegetation is not very dense or high, eliminating the chances of casting shadows on the solar arrays. In addition the land is considered to have a low agriculture potential, with limited carrying capacity.

The identified **510 ha study area** has been selected will be referred to as Preliminary Study Site. Please refer to the engineering report (Solek, 2014) in **Annexure D4** for more details regarding the site layout and corresponding expected infrastructure. These components include frames, solar modules, roads, workshop and admin office area, laydown area, and an onsite substation.

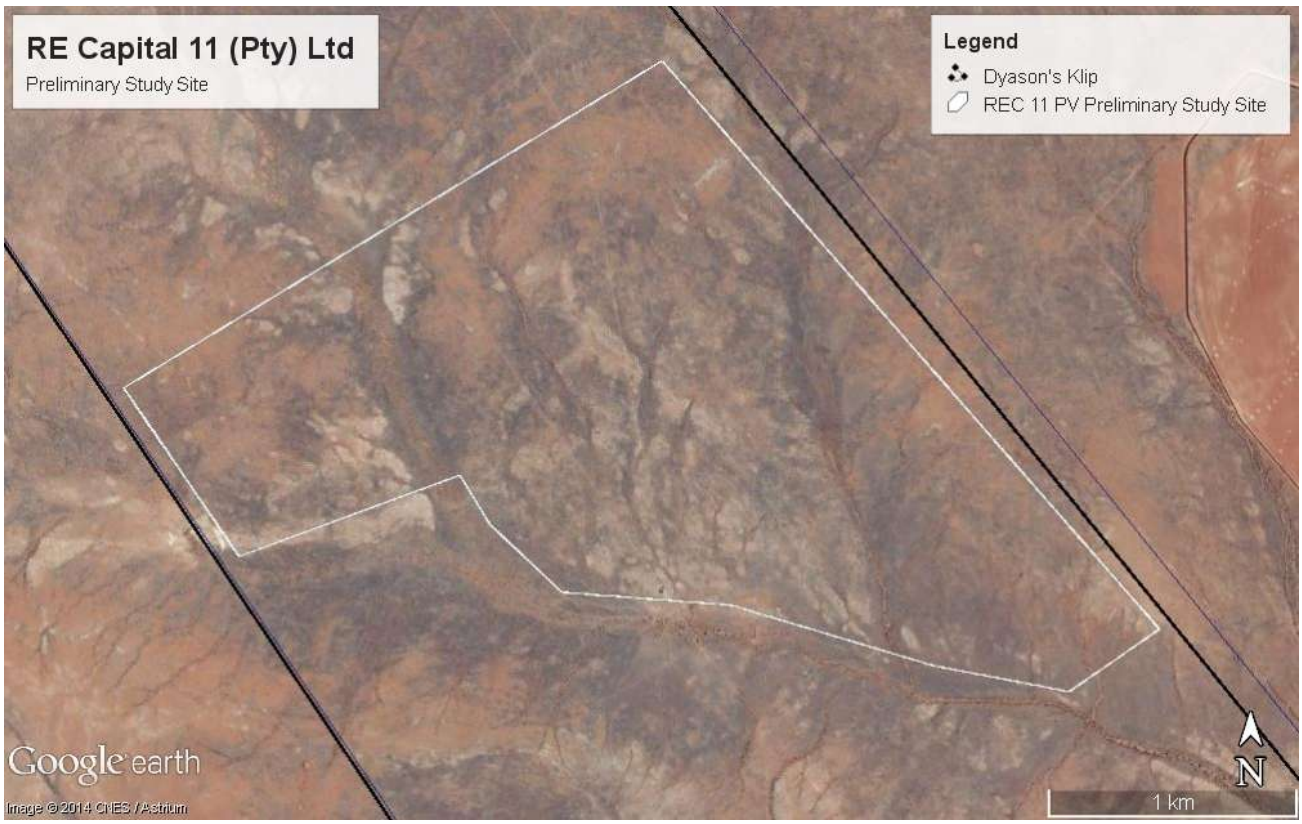

Figure 8: Showing preliminary study site for the RE Capital 11 Solar Development (Solek, 2014)

4.1.2 Layout alternative 1 – Uniform Layout

As a first layout option, the potential sensitive areas were included in the original 510ha preliminary study site. Layout option 1 included as uniform development across the total preliminary study site. These possible drainage lines and sensitive areas will be assessed and confirmed by the specialist studies, especially ecological study.

With Layout option 1 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** that will be developed in the EIR phase of the development is further expected to be altered, so as to reduce the environmental impact, according to the outcome of the specialist study.

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

Figure 9: Layout Option 1 showing the preliminary identified sensitive areas.

It is likely that Layout option 1 will be eliminated once the preferred alternative is determined.

4.1.3 Layout alternative 2 - Proposed Site

In order to avoid possible highly sensitive areas a proposed site layout has been selected and excludes the main drainage line. Based on specialist studies, the impact of this this layout on potentially sensitive areas will be evaluated and assessed in order to develop the preferred layout.

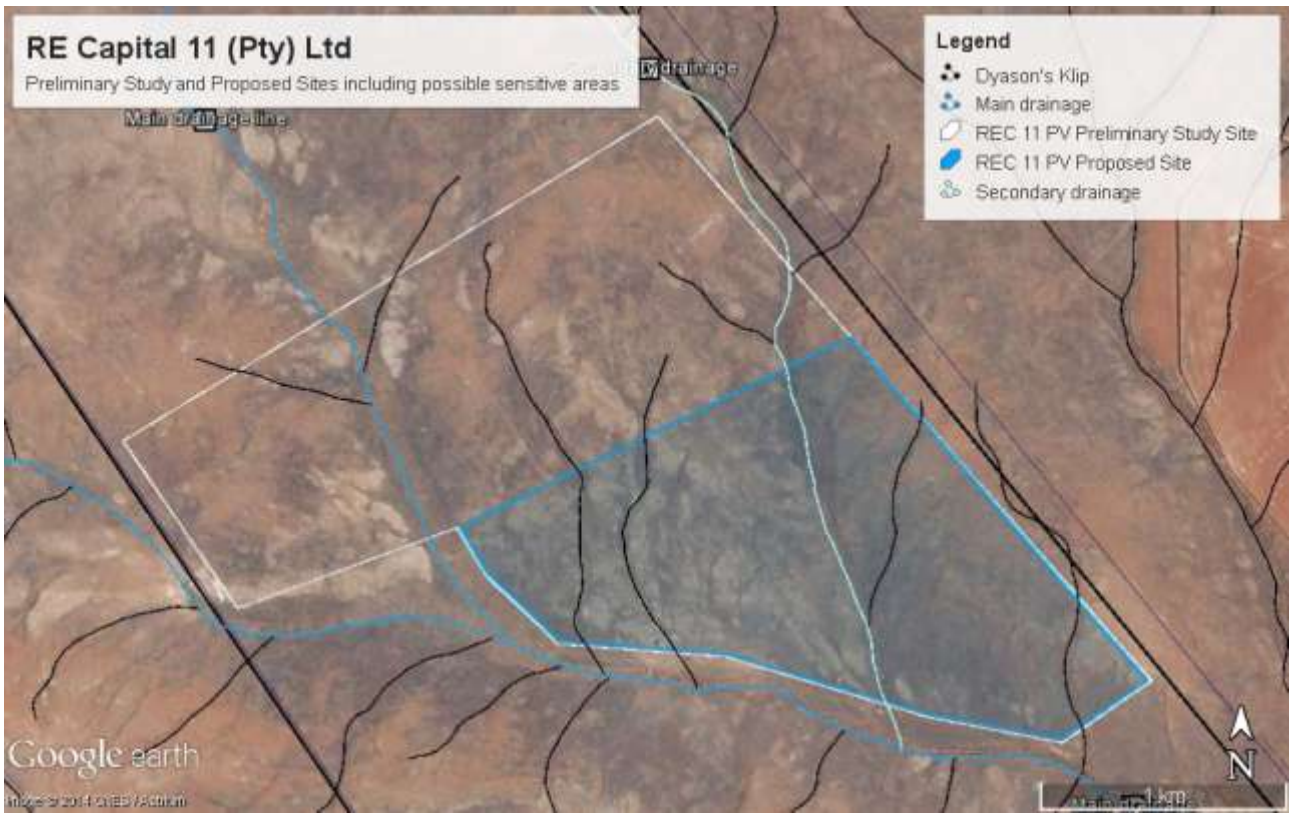

Figure 10: Layout Alternative 2 (Proposed site) that falls within the preliminary study site (Solek, 2014)

As mentioned above, the solar arrays will be placed in such a way that would have the least influence on the drainage lines while avoiding the ecological sensitive areas where practically possible. Although the annual rainfall within this region is extremely low, the drainage lines were carefully considered and the most viable alternative selected.

4.1.4 Layout Alternative 3 – Preferred Layout

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.

Five alternative access roads are currently under investigation and are depicted in the figure below.

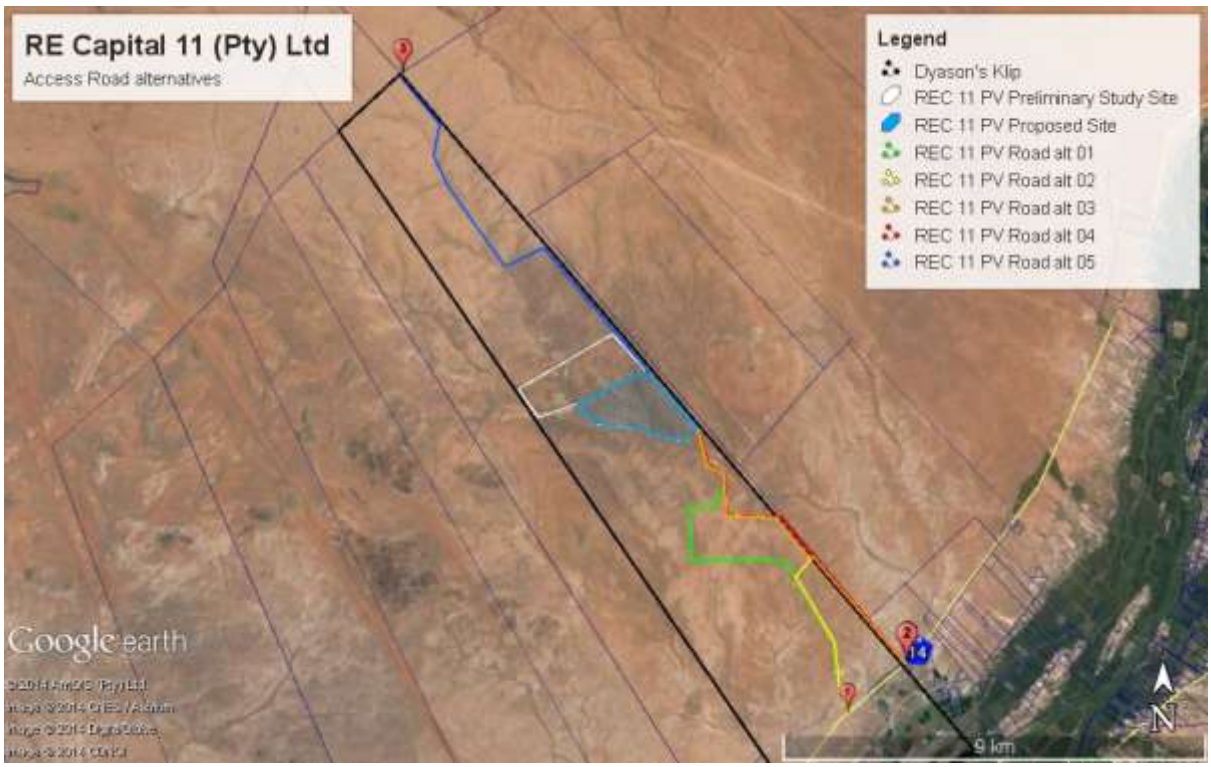

Figure 11: Access road alternatives for the proposed RE Capital 11 Solar Development (Solek, 2014)

As part of the Environmental Impact assessment the access road alternatives will be discussed further with the SANRAL. SANRAL is governed by various laws by which all national roads should be managed. SANRAL is registered as a key stakeholder for this environmental process.

With regard to access from the N14, SANRAL agreed to provide consent for using both of the existing access entrances (Point 1 and 2 on the above plan). This consent was based on REIPPP Round 4 proposed projects namely RE Capital 3, 3A and 3B. These two existing entrances are both from the N14 North to either the project site or via the existing entrance of the adjacent property (Abengoa Khi Solar One).

The proposed entrance at Point 2 is planned to utilise the existing road of Abengoa Khi Solar One project "Access Road alternative 3", hence reducing environmental impacts (additionally to the initial considered options).

With regard to road access **alternative 5** entering the farm and project site from the district road D3276 at north east corner of Dyason's Klip farm boundary, an application and approval process with the provincial roads authority will be required. The Northern Cape Department of Transport and Public Works are registered as a key stakeholder for this environmental process.

4.2.1 Access Alternatives 1 and 2

Access road alternatives 1 and 2 utilise the same planned and assessed access roads than that of the Round 4 REIPPP authorised projects (known as RE Capital 3, 3B and 3C project). The RE Capital 3 projects access road was planned to follow the existing farm road as far as possible in order to minimize the environmental impact.

Access alternative 1 passes the RE Capital 3 development towards the western boundary of RE Capital 3 and pass through the 50 meter separation corridor of RE Capital 3B and RE Capital 3C solar farm development.

Route alternative 2 passes the RE Capital 3 development towards the eastern boundary of RE Capital 3 and pass through the 50 meter separation distance between the RE Capital 3 eastern border and the farm border.

4.2.2 Access Alternatives 3 and 4

Access road alternatives 3 and 4 are planned to utilise the existing Abengoa entrance and access road on the neighbouring farm (eastern side of Dyason's Klip) which was constructed for the Abengoa Khi Solar One project. This neighbouring access road runs through Rooi Punt, Tungsten Lodge entering through the McTaggarts Camp entrance from the N14.

Access road alternative 3 and access road alternative 4 differs from each other in the way by which they cross over to the Dyason's Klip farm property.

Access Road Alternative 3 utilises the Abengoa road up to the southern border of the Abengoa development from where the proposed Alternative 3 route traverse to the west across Rooipunt and onto the Dyason's Klip property from where it joins Route alterative 2 (between the Eastern border of RE Capital 3 development and the farm boundary).

Access Road Alterative 4 utilises the same access route and existing Abengoa road as Alternative 3, but extends this usage further north to the North-western corner of the existing Abengoa development. The proposed alternative 4 crosses the Abengoa border, the Rooipunt farm onto Dyason's Klip in this area due to the fact that less environmental impact is expected on crossing of seasonal washes.

There is a possibility however that the existing Abengoa access route and traversing of their land could not be used due to servitude negotiations and the financers of the REIPPP projects requirement that projects are ring-fenced. This option is however considered due to the possibility of utilising this option in the future.

4.2.3 Access Alternative 5

The 5th alternative access road runs in a northern direction on the Eastern boundary of Dyason's Klip up to the district road D3276 north of the farm Dyason's Klip 454.

4.3 GRID CONNECTION ALTERNATIVES

In the scoping phase of the environmental process, six power line route alternatives are under consideration , including the loop-in loop –out route option.

The **loop-in** option will be **most cost effective**, but this is dependent on the capacity of the existing line. **Options 1 and 2** are the next two preferred options, being the shortest distance to the substation and parallel to the existing 132 kV line. However, the feasibility of most of these options will depend on the neighbouring project's servitude consent as well as the environmental impact assessment. That is also the reason for the large number of alternative options. Negotiations are in progress for all the servitudes.

The routes were all chosen along existing fences or power lines, in order to minimise the additional environmental impact. The environmental impact of these alternatives should all be more or less the same.

Please refer to the figure below showing the grid connection alternatives that are currently under investigation.

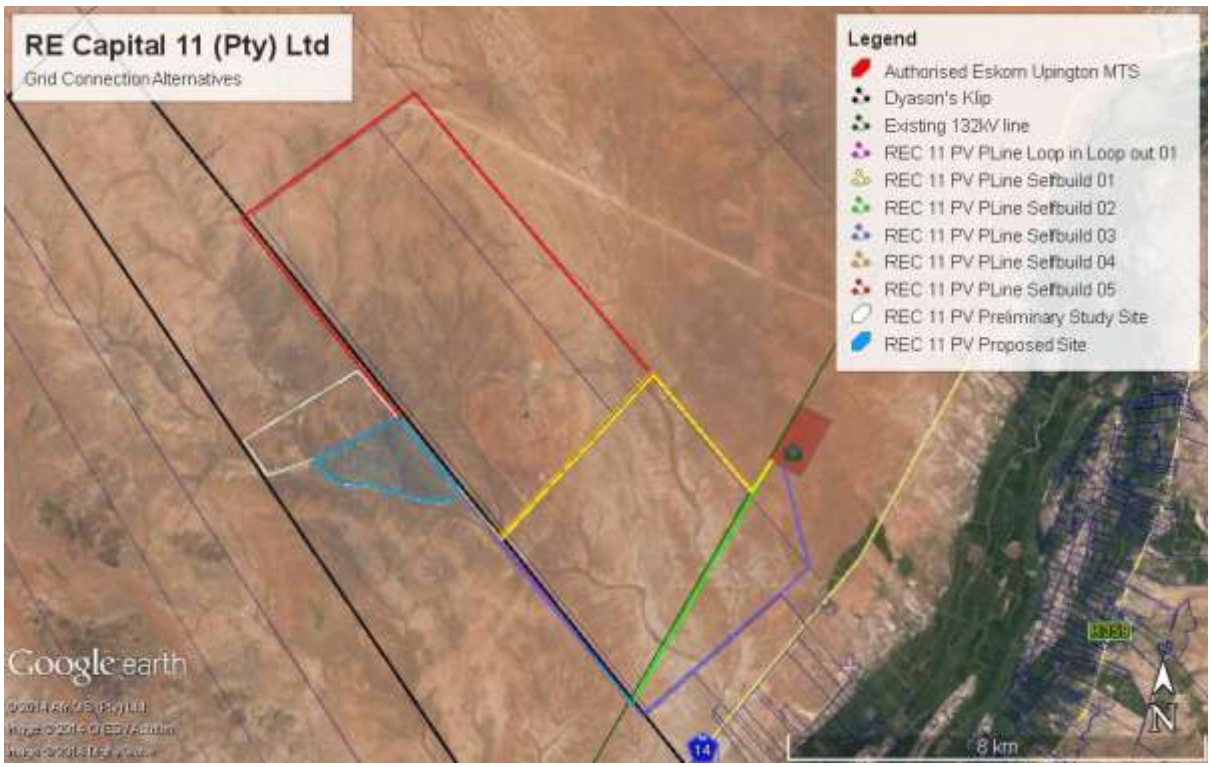

Figure 12: Showing location of Grid connection alternatives currently under investigation (Solek, 2014)

The distance of these alternatives from the Eskom Upington MTS or existing 132kV line is illustrated in the table below.

Table 3: Distance of grid connection alternatives (Solek, 2014)

Alternative grid connection	Distance (km)
REC 11 PV PLine Loop in Loop out 01	5.1 km
REC 11 PV PLine Selfbuild 01	9.5 km
REC 11 PV PLine Selfbuild 02	10.5 km
REC 11 PV PLine Selfbuild 03	11.7 km
REC 11 PV PLine Selfbuild 04	9 km
REC 11 PV PLine Selfbuild 05	20km

4.3.1 Loop in Loop out Alternative

The option to loop into the existing 132 kV line is investigated as one of the primary connection alternatives. This option is indicated as “REC 11 PV PLine Loop in Loop out 01” in the figure above. The other alternative routes will all lead from the individual on-site substations to the authorised Eskom Upington MTS. The ESKOM MTS substation (this MTS substation was authorised on the 14th of February 2014 by the Department of Environmental Affairs).

4.3.2 Self-build Alternative 1

The power line alternative options 1 as illustrated in the figure above runs along the eastern boundary of Dyason’s Klip, crossing the neighbouring Rooipunt portion and the Tungsten Lodge property at the northern boundary of Tungsten Lodge farm, but on the Tungsten Lodge property.

After crossing the Tungsten Lodge farm, the line runs south along the western boundary of Eskom property towards the new authorised Eskom Upington MTS.

4.3.3 Self-build Alternative 2

The power line alternative options 2 as illustrated in the figure below runs along the eastern Dyason's Klip boundary up to the existing 132kV power line crossing the neighbouring Rooipunt portion and runs parallel the existing 132kV power line towards the authorised Eskom Upington MTS location.

4.3.4 Self-build Alternative 3

The power line alternative options 3 as illustrated in the figure below follows the same route as alternative 2 and the crosses neighbouring Rooipunt portion and the Tungsten Lodge property at the southern boundary of Tungsten Lodge farm towards the authorised Eskom Upington MTS location.

4.3.5 Self-build Alternative 4

The power line alternative options 4 as illustrated in the figure below follows the same route as alternative 1, but crossing the neighbouring Rooipunt portion and the McTaggarts Camp property at the southern boundary of McTaggarts Camp. The line is located on the property of Mc Taggarts camp when traversing the property. After crossing the Mc Taggarts Camp property the line runs south towards the authorised Eskom Upington MTS location.

4.3.6 Self-build Alternative 5

The power line alternative options 5, as illustrated in the figure below, crossing Rooipunt farm southern boundary, the line is located on the Rooipunt farm itself, where after the line runs south along the western boundary of Eskom property towards the new authorised Eskom Upington MTS.

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 RE Capital 11 Solar Development not go ahead and that the area in proximity to the MTS 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 MTS Substation and within a renewable energy development zone, 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 240 hectares, although an initial preliminary study site of 510ha has been considered). The area is located 8 - 10 km from the planned new Eskom MTS Substation, on the Remainder of Farm 644, Olyvenhoutdsdrift. The EIA for the new MTS was done independently by Eskom and was authorised on the 14th of February 2014.

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.

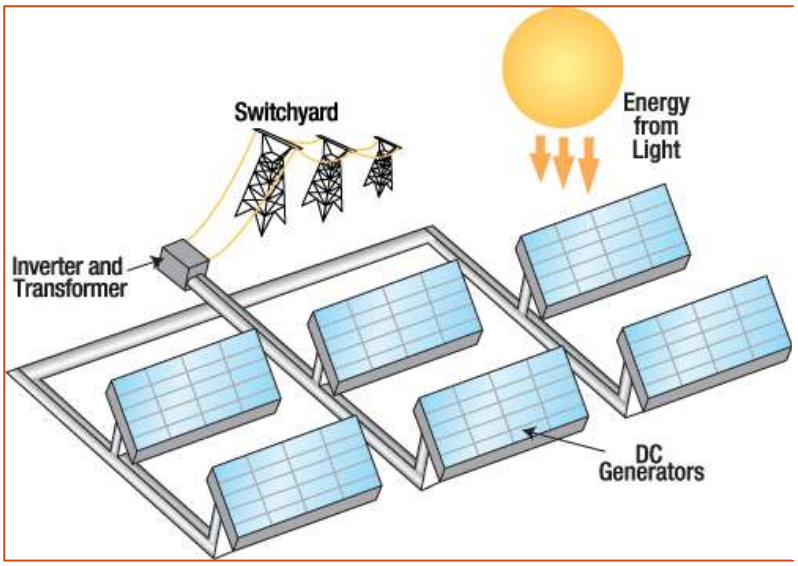

Figure 13: Schematic depiction of a photovoltaic energy generation facility (Solek, 2014)

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 240ha. The initial study area of 510ha 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 240 ha, with a preliminary investigated area of 510ha by specialists (Remainder of Farm 454, Dyason's Klip). 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.

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** Oasis-line or via an own-built line to the planned **Eskom MTS substation** (located to the east of the proposed site). 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.** There is an old tungsten mine on the Dyason's Klip farm. There is still a number of old **gravel heaps** at the mine site. Road surfacing material required (e.g. gravel/base course or stone) **can be sourced** from these heaps if required. 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 240 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. Four boreholes have been identified on the farm of which two boreholes are situated near the proposed site. These boreholes are 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.

The water from the boreholes will probably be pumped to the water tanks through a pipeline. The pipe diameter will be approximately 150mm-300mm. The pipeline will be laid on the ground, or just below the ground by means of manual excavation. This possible water pipeline will not require specific environmental authorisation.

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

5.4.1.2 River water

An additional option is the consumption of river water. The Orange River, a perennial river, is nearby and the consumption of water from the river is a potential water source. Obtaining water from the Orange river for non-agricultural purposes will have to be approved by the Department of Water Affairs. Should such an approval be obtained, it could be considered to construct a pipeline to service the project or to draw water on the Dyason's Klip property which extends up to the Orange River. NOTE: This Environmental Process does not include an assessment for this option.

5.4.1.3 Khai Garib municipality (alternative supply)

Permission to use water directly from the two nearest towns, Upington and Keimoes, will be sought from the Khai Garib and Khara Hhais 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.

5.4.1.4 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)

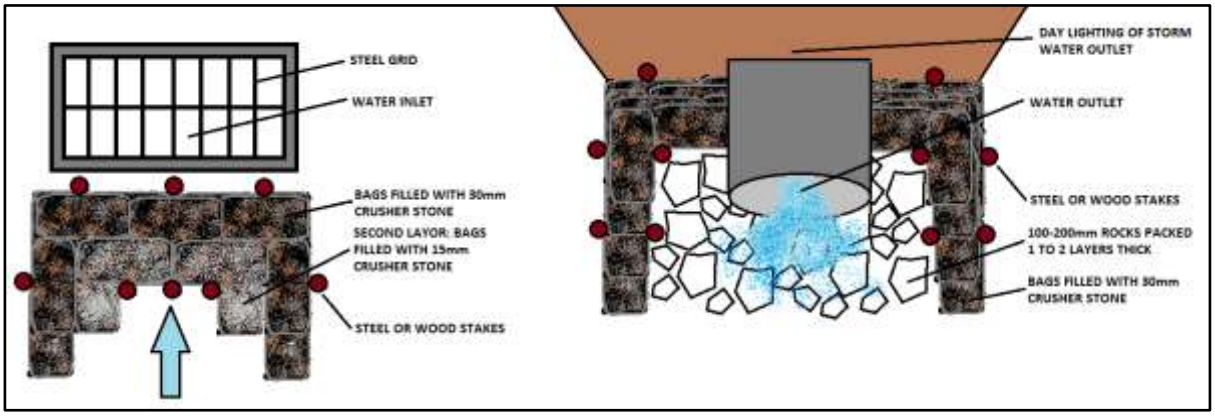

Figure 14: Temporary culvert inlet and outlet (Solek, 2014)

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.

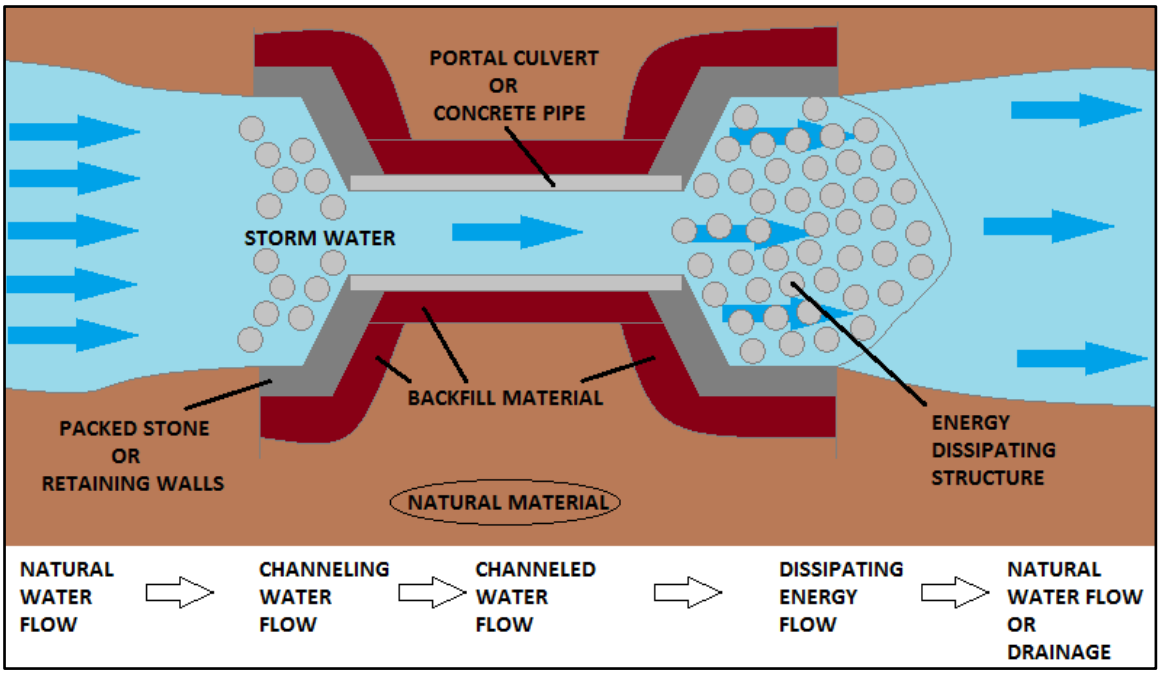

Figure 15: Schematic example of typical drainage line crossing (Solek, 2014)

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.

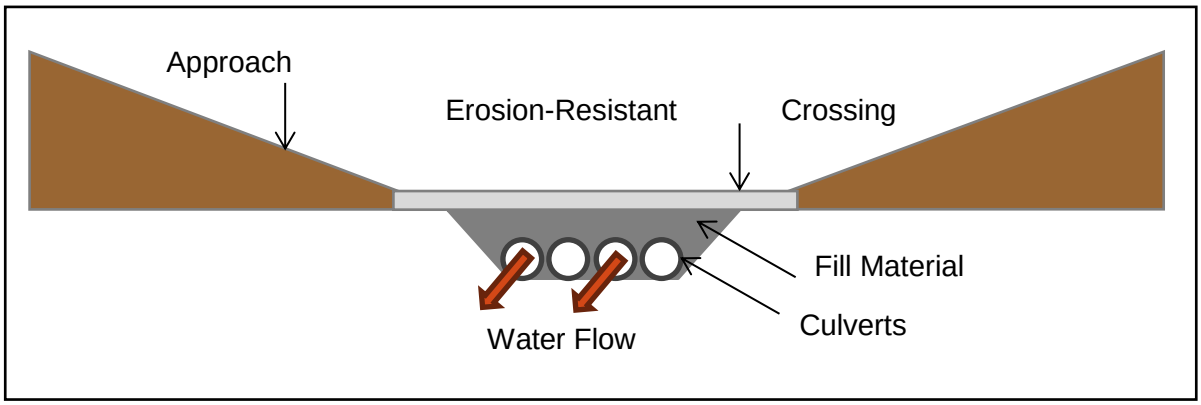

Figure 16: Schematic depiction of causeway (Solek, 2014)

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 Kai Garib 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. The proposed site is approximately 7km away from the nearest Eskom point on the southern part of the Dyason's Klip farm. 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.

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 Khai Garib 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 or Keimoes, along the N14. 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 can be obtained in this regard. .

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

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 new authorised Upington MTS Eskom 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 new planned Eskom MTS substation or to an existing 132kV line (loop-in/loop-out).

According to the official ESKOM TDP 2013-2022 document, Eskom plans to build a **5 x 500 MVA 400/132 kV transmission substation** 5-10 km from the proposed Dyason's Klip Farm and

corresponding project site. The planned MTS substation will be a **key substation** in the Upington and Northern Cape area.

One of the main purposes of the planned Upington MTS substation is to enable exporting of the generated renewable energy from the local distribution network onto the national transmission network. The MTS was planned and designed in such a way to **accommodate the proposed renewable projects in the area**. With a planned 5 x 500 MVA 400/132 kV transformer capacity available in the Upington MTS, the proposed project as well as the surrounding projects in the area will find that there is amble capacity at the Upington MTS substation in order to export the generated energy onto the transmission grid.

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 will 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 or across the neighbouring farm) and the second option is to build a new line directly to the new MTS 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.

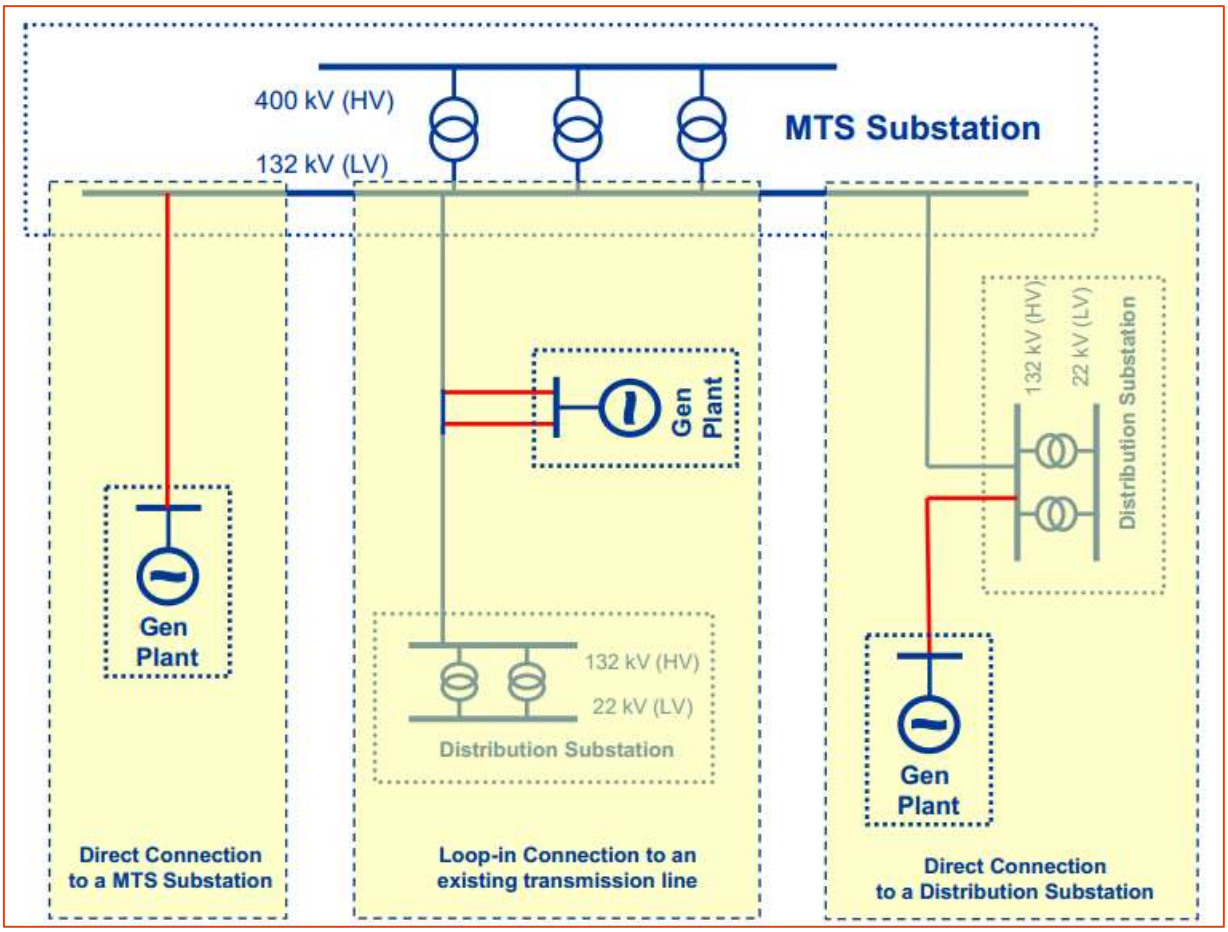

Figure 17: Showing examples of different connection options (Solek, 2014)

Should it not be possible to utilise any of the "loop-in/loop-out" options, a new line will be built to the planned Eskom MTS. This line will be constructed by the developers, but would be handed

over to Eskom for operation and maintenance. 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 Re Capital 11 detail costing has not been completed on the date of submitting this engineering 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 Re Capital 11 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 RE Capital 11 due to the already limited additional time to complete the EIA process. **NB:** The RE Capital 11 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 remainder of the Farm Dyasonsklip 454, with particular focus on site location for the proposed RE Capital 11 Solar Development.

8.1 LOCATION & BUILT ENVIRONMENT

The target property, remainder of the farm Dyasonsklip 454, is located in the ZF Mgcawu district of the Northern Cape Province, within the jurisdiction area of the Khai Garib Local Municipality. The

property is approximately **5300ha** is size and is located approximately 22km west southwest of Upington and 15km northeast of Keimoes.

The proposed RE Capital 11 development site is situated **north** of the **N14 National Road**. The study site is situated approximately 6km from the N14.

No buildings, ruins or any other structures were noted on or within the direct proximity of either 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 site is on the centre portion of the farm Dyasonsklip. The surrounding area has a mixed urban and agricultural character. West of the N14, the land is mostly used for sheep farming. East of the N14 the character change to urban and industrial settlement with intensive irrigated cultivation bordering the Gariep River.

8.2.1 Geology

The area lies in the Kalahari geological group in the Namaqualand metamorphic complex. This is the youngest of the geological groups formed in the past 65 million years.

The lithology (mineralogical composition and texture of rocks) of this area consists of sand and limestone.

8.2.1.1 Sand

During a very dry period in Southern Africa some 100 000 years ago sand was transported from the Namib dessert by strong and continuous wind and distributed over the Kalahari

8.2.1.2 Limestone

Limestone is a sedimentary rock consisting largely of calcium carbonate, which is usually derived from the shells of minute marine or fresh-water animals. Sand, clay and minerals such as magnesia or iron oxide are also present.

Sedimentary and Volcanic rocks (parent material of soils) found in the area include Schist, Gneiss, Kinzigite and granite.

8.2.2 Climate

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

Table 6: Climatic parameters for RE Capital 11 solar development (Lubbe, 2014)

Rainfall	
Annual rainfall	0-200mm
Summer rainfall	<62.5mm
Winter rainfall	<62.5mm
Variation in rainfall	40 to 50%
Temperature	
Mean maximum temperature	>35ºC
January Temperature	>27.5ºC

Mean minimum temperature	2.1 to -4ºC
July temperature	<7.5ºC
Temperature range	>15ºC
First frost expected	21 to 31 May
Last frost expected	21 to 30 September
Hours of sunshine	>80%
Evaporation	>2400 mm
Humidity	<30%

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 a convex shape. 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), there are three vegetation types within the boundaries of the site but only two within the current study area (Please refer to figure below). An additional two vegetation types are common in the wider area, but do not occur in the vicinity of the affected 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.

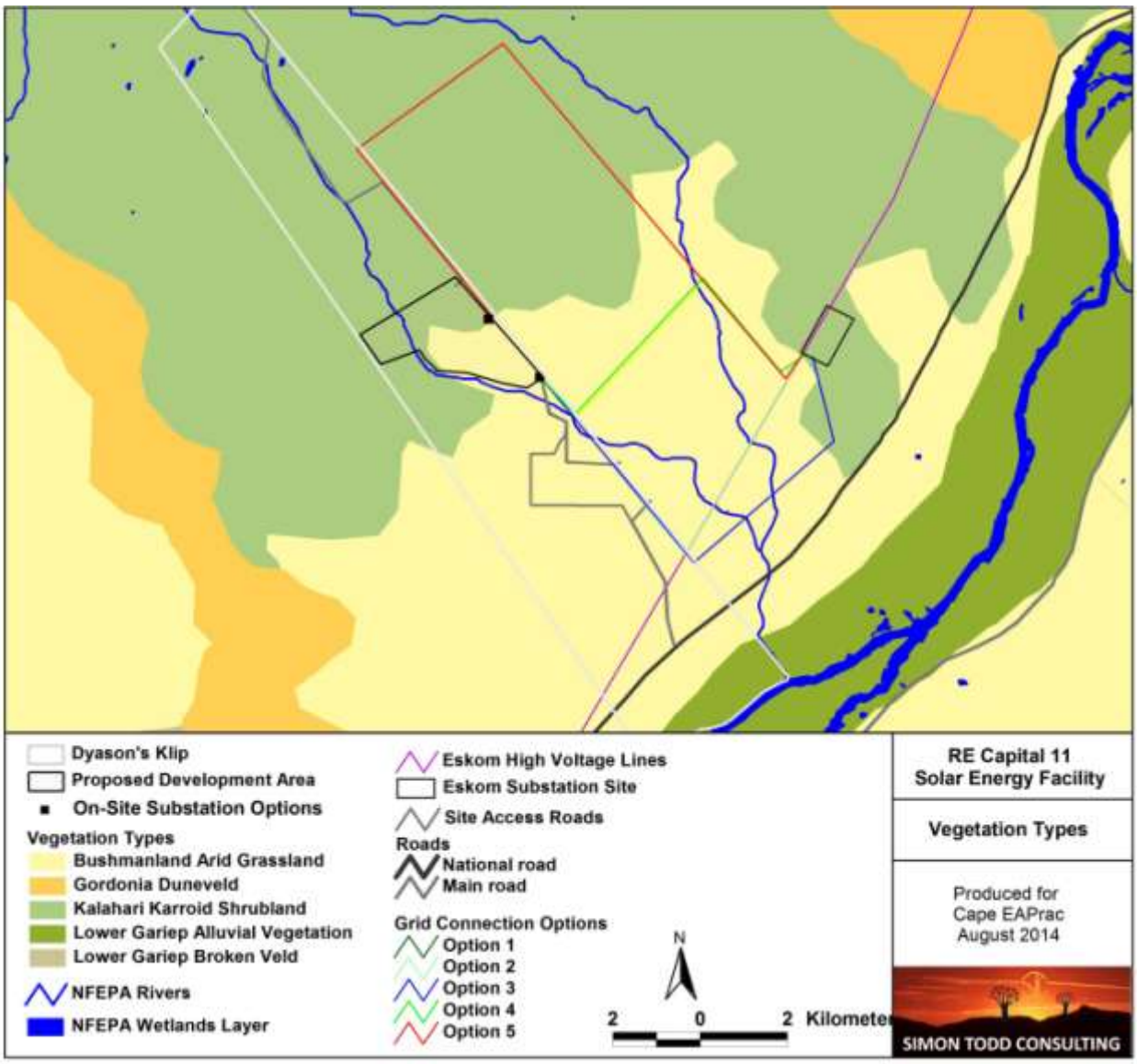

Figure 18: Broad-scale overview of the vegetation in and around the RE Capital 11 Solar Energy Development (Todd, 2014).

Within the area affected by the proposed development, the two vegetation types that occur are **Kalahari Karroid Shrubland** and **Bushmanland Arid Grassland**. Both Kalahari Karroid Shrubland and Bushmanland Arid Grassland are classified as **Least Threatened** and have been little impacted by transformation and more 99% of their original extent is still intact (See Table below). Both are considered Hardly Protected within formal conservation areas. Mucina & Rutherford (2006), list 6 endemic species for Bushmanland Arid Grassland, while no vegetation-type endemic species are known from Kalahari Karroid Shrubland.

The **biogeographically important and endemic species** known from these vegetation types tend to be **widespread** within the vegetation type itself and local-level impacts are not likely to be of significance for any of these vegetation types or species concerned. Bushmanland Arid Grassland is widely distributed and represents one of the most extensive vegetation types in South Africa. Kalahari Karroid Shrubland is less extensive, but represents a transitional vegetation type between the northern Nama Karoo and Kalahari (Savannah) vegetation types.

Table 7: 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).

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
Lower Gariep Broken Veld	4538	99.5%	21%	3.9%	Least threatened
Bushmanland Arid Grassland	**45479**	**99.4%**	**21%**	**0.4%**	**Least threatened**

Note: Only Kalahari Karroid Shrubland and Bushmanland Arid Grassland (highlighted in red) occur within the proposed development area.

8.3.2 Fine-Scale Vegetation Patterns

In this section, the different habitats observed at the site as described in detail. It is however important to note, that these descriptions apply to the site in general and not all of the species or habitats observed may be present within the current study area. These descriptions are however based on the specific characteristics of the site and serve to place the current development in context and are significantly more reliable and representative than the broad-scale vegetation-type descriptions available in the literature. The spatial extent of the fine scale vegetation patterns on site are shown in the figure below.

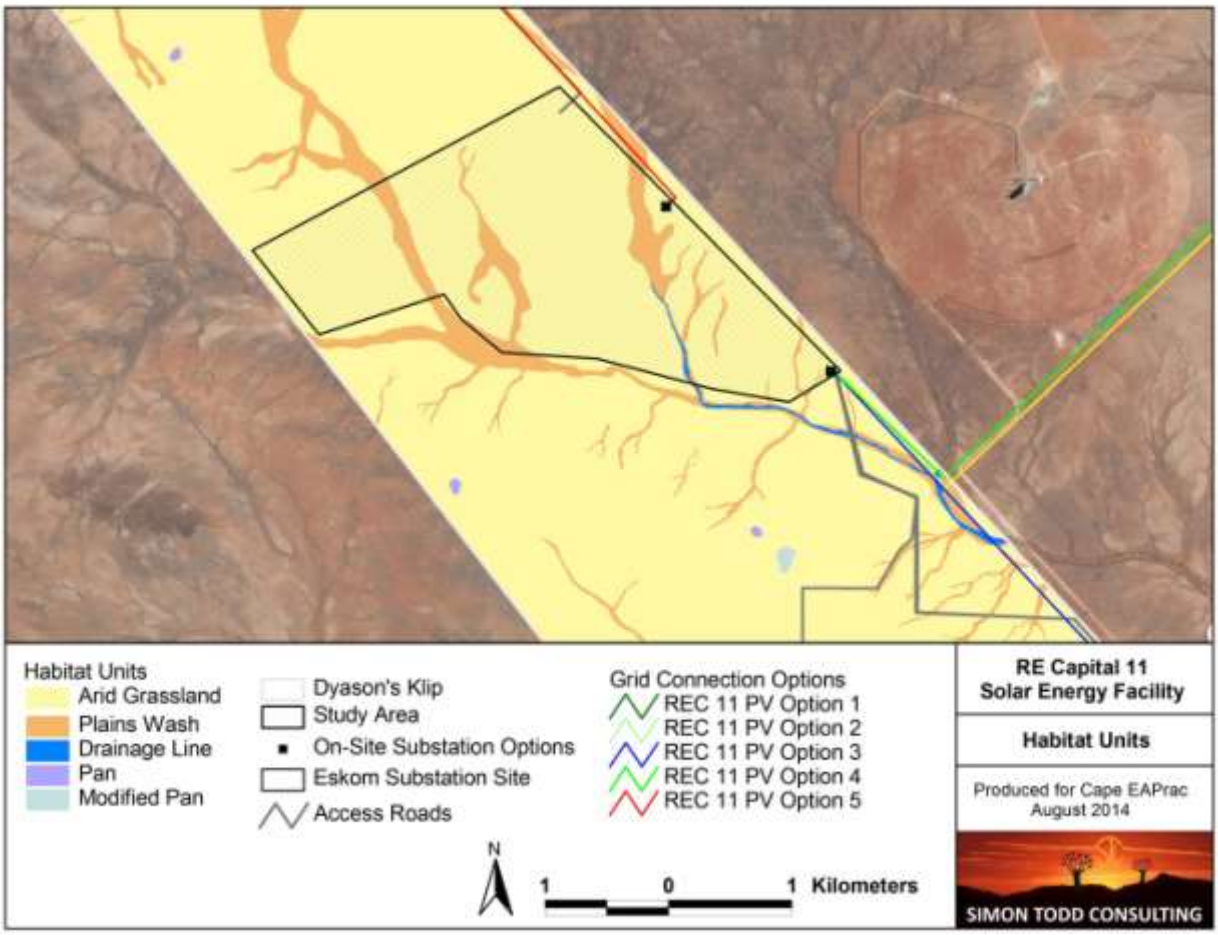

Figure 19: Habitat map of the proposed development area of the RE Capital 11 Solar Energy Facility (Todd, 2014)

8.3.2.1 Bushmanland Arid Grassland

Although the national vegetation map lists two vegetation types within the study area, with Bushmanland Arid Grassland towards the Orange River and Kalahari Karroid Shrubland within the more distant half of the site, this is a very poor reflection of the vegetation patterns on the ground. There is not a clear differentiation of the northern and southern halves of the site into grassland and shrubland, but rather a mosaic of more grassy or more shrub-dominated vegetation related to soil depth, with a greater abundance of shrubs in areas of gravel or shallow soils associated with the tops of the low hills and ridges of the site. The vast majority of lowlands of the site are dominated by perennial grasses and have greater affinity with the Bushmanland Arid Grassland vegetation type than the Kalahari Karroid Shrubland vegetation type.

Plate 12: Example of Bushmanland Arid Grassland type vegetation from the study area

Bushmanland Arid Grassland is the predominant vegetation type at the site and is not restricted to the southern half of the site as suggested by the national vegetation map.

The areas of **Bushmanland Arid Grassland** are **widespread** at the site and the majority of plains and lowlands correspond to this type of vegetation. Common and dominant species include *Stipagrostis ciliata*, *S.obtusa*, *S.uniplumis* and *S.amabilis*. Species of conservation concern were not abundant in this habitat and the only species of concern that was observed in this habitat type was *Hoodia gordonii*, which was rare and the number of potentially affected individuals would be very low. Protected species which occur in this habitat type include *Boscia foetida*, *Boscia albitrunca* and *Acacia erioloba*. *Boscia albitrunca* and *Acacia erioloba* are generally restricted to drainage lines and would be little impacted by the development, while *Boscia foetida* is more widespread and although greater numbers of this species are likely to be affected by the development, this would not be considered highly significant.

8.3.2.2 Kalahari Karroid Shrubland

The **stony hilltops** and **low ridges** of the site are typically shrub-dominated and correspond loosely with the **Kalahari Karroid Shrubland** vegetation type. Typical species include *Leucosphaera bainesii*, *Hermannia spinosa*, *Monoechma genistifoilium*, *Salsola rabieana*, *Aptosimum albomarginatum*, *A.spinecens*, *Kleinia longiflora*, *Limeum argute-carinatum*, *Phyllanthus maderaspatensis*, *Zygophyllum dregeanum* and grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana*, *S.uniplumis* and *Schmidtia kalariensis*. As this habitat occurs on the more exposed parts of the topography, areas of exposed calcrete or quartz outcrops may be present and it is in these areas that species of conservation concern are usually located. Although such areas were searched, **no species of conservation concern were located**. Some of these species such as *Lithops* spp. are however cryptic and given the very dry conditions at the time of the site visit would be very difficult to locate. Therefore, the possibility that such species occur at the site is not eliminated at this point.

Plate 13: Examples of areas within the site which correspond with the Kalahari Karroid Shrubland vegetation type

Kalahari Karroid Shrubland vegetation type occurs throughout the site and is not restricted to any particular area, but is associated with areas of shallow or gravelly soils which usually occur in the higher-lying parts of the landscape.

It is important to note that the areas of Kalahari Karroid Shrubland within the site are not very clearly defined and have not been mapped separately from the Bushmanland Basin Grassland vegetation type. There is a continuum in vegetation composition between the two vegetation extremes with large parts of the site falling variously along a gradient in composition between the two endpoints. Furthermore, there is little basis on which to differentiate the sensitivity of the two vegetation types and so an attempt to map the two vegetation types at the site has not been made as there would be little utility in doing so and there is not a natural differentiation of the vegetation types within the study area.

8.3.2.3 Plains Wash

In several parts of the current site, there are **large flat drainage areas**, which unlike drainage lines, do not have a well-defined bed and associated vegetation, but rather form open, often tree-less wash areas. These areas are usually dominated by perennial grasses such as *Stipagrostis anomala*, *S.ciliata*, *S.uniplumis*, *S.hochstetteriana*, *S.uniplumis* and *Schmidtia kalariensis*. Taller woody species may be present such as *Phaeoptilum spinosum*, *Rhigozum trichotomum* and *Lycium oxycarpum*, but there is often little differentiation of the grass and low shrub layer from the surrounding vegetation. From a functional perspective, these features tend to develop in areas where there is a sandy substrate and low slope. Due to the characteristics of these areas, overland flow in these areas is low and is a lot less common than in the more stony parts of the site, where more typical confined drainage lines tend to develop. Aside from *Boscia foetida* which is fairly common in these areas, there are few listed or protected species which were observed in this habitat type.

Plate 14: Examples of the plains wash habitat type (Todd, 2014)

In these examples above, the wash areas are indicated by the higher density of woody species such as *Phaeoptilum spinosum* and Boscia *foetida*, but there is not a well-defined drainage channel or bed present.

8.3.2.4 Drainage Lines

The large drainage area which leaves the southern boundary of the development area is the **Helbrandkloofspruit**. This is by far the largest and most well-developed drainage feature within the site. It is characterised by the presence of large trees such as *Acacia erioloba*, *Boscia albitrunca*, *Zizyphus mucronata* and *Searsia lancea* with a grass layer dominated by *Stipagrostis namaquensis*.

The smaller less-well developed drainage lines do not have a similar abundance of large trees but are rather dominated by species such as *Acacia mellifera*, *Boscia foetida* and *Phaeoptilum spinosum*. This is considered a high sensitivity feature that should be avoided as much as possible. It should also be appropriately buffered from development as riparian corridors are important for faunal movement and landscape connectivity.

Plate 15: The Helbrandkloofspruit river, with large Acacia erioloba, Searsia lancea and Boscia albitrunca trees

Plate 16: Minor Drainage line dominated by Stipagrostis namaquensis.

8.3.2.5 Pans

There are a number of small pans scattered across the site. Some of these have been modified to make them deeper, which has impacted their ecological value. The smaller pans are not very large and may be as little as 10 m across including the flanking vegetation. In the broader context these smaller pans are not highly significant as they do not hold water for long enough to provide habitat for species which utilise pans such as Giant Bullfrogs or temporary water organisms such as cladocerans and copepods. The larger pans are bordered by large numbers of *Boscia foetida*, but no other plant species of concern were noted in these areas. No pans were observed to be present within the current development area and as these are relatively conspicuous features, it is not likely that any pans are present within the site.

Plate 17: Typical example of the smaller pans at the site (Todd, 2014)

8.4 FAUNAL COMPONENT OF THE SITE

The following faunal communities were identified on site by the ecological specialist, Mr Simon Todd.

8.4.1 Mammals

The site falls within the distribution range of **46 terrestrial mammals**, indicating that the **mammalian diversity** at the site is **potentially moderate**. Given the relative homogenous nature of the site and the lack of rocky outcrops and other forms of habitat diversity, actual mammalian diversity at the site is **likely to be low**.

No species associated with rocky outcrops are likely to occur within the proposed development areas, which would significantly reduce the number of the species that would be directly affected. As the affected habitat is widely available in the local area, as well as at a broader scale, impacts on mammals would be local in nature. 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 possible that all three listed species occur in the 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**. 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**. The pans would also be areas that would attract bats when they had water, but this is likely to be infrequently and so the pans are not likely to be significant in terms of providing long-term habitat and foraging grounds for 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

The site lies within the distribution range of **34 reptile species**, suggesting that the reptile diversity in the area is likely to be **quite low**. Within the affected plains habitat of the site, the reptile composition is likely to be dominated by species which inhabit open areas, such as Horned Adders, Sand Lizards, Ground and Barking Geckos. There do not appear to be any large rocky outcrops within the proposed development areas with the result that species associated with such habitats are not likely to be affected by the development. 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.

The construction of the solar panels with supporting structures and electrical connections would **significantly alter the habitat structure** within the development area as compared to the original open vegetation. This is likely to **change the reptile composition** within the affected area and species able to tolerate or utilise the conditions will increase at the expense of those species associated with the open vegetation. Functionally this is likely to represent an **increase in geckos** and other climbing species at the **expense of diurnal ground-foraging species**. This effect is likely to be of **local extent** and given that there are few listed species that might be affected, of relatively **low significance** as well.

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. The **larger pans** in the northern section of the site represent the only **potentially suitable breeding habitat** for this species. As these **pans** are **ecologically sensitive** from an amphibian perspective as well as for other fauna, the **development should avoid** these areas including an appropriate buffer around the pans to maintain their ecological functioning. Those amphibians which require perennial water are likely to be restricted to the vicinity of the Orange River and the plains of the site are likely to contain low amphibian diversity and are not likely to be highly significant from an amphibian perspective. Apart from the pans, it is unlikely that there are any highly significant amphibian habitats at the site and impacts on amphibians are likely to be local in nature and of low magnitude.

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**. 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 potentially significant source of impact for these species. The new Eskom MTS substation is however in close proximity to the site and the length of the new transmission lines required for the development will be **less than 10km long**. In addition, the use of mitigation measures such as fitting **bird flight diverters** can significantly reduce the impact of transmission lines and is a recommended standard practice for new transmission line infrastructure. Although the habitat loss resulting from the construction of the facility is the most obvious avifauna-related impact, power lines may generate a more significant long-term cumulative impact as slow breeding species are often affected and without mitigation, the impact persists for the lifetime of the power line.

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 500, from **Agricultural Zone I to Special Zone**, will be lodged at the Khai-Garib 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 RE Capital 11 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 AGRICULTURAL RELATED STRUCTURES ON SITE

Structures on site include internal fencing, an earth dam, borehole, reservoir and solar borehole pump.

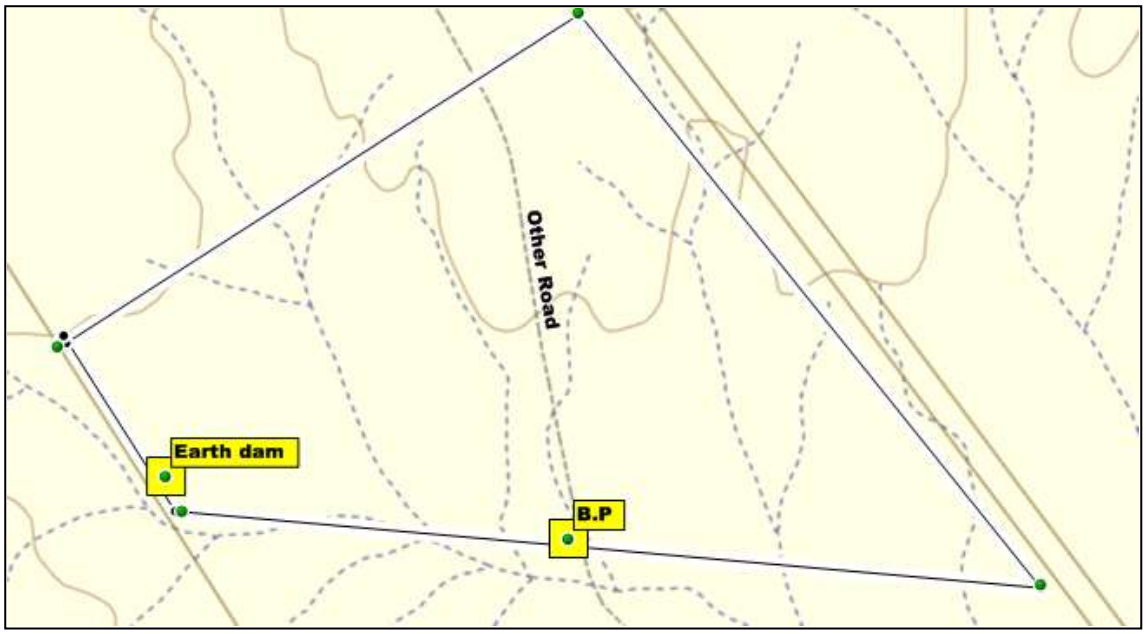

Figure 20: Showing agriculture related structures currently on site (Lubbe, 2014)

10.2 PAST AND CURRENT AGRICULTURAL ACTIVITIES ON SITE

The site is utilised for extensive cattle farming, There is no evidence of past or current cultivation on the site. Intensive agricultural practices are limited to the section of the farm bordering on the Orange river, which will not be affected by the proposal.

10.3 SOIL CLASSIFICATION

The specialist undertook an augering survey to determine soil classifications as indicated in the figure below. At each augering point, an observation record was completed. Please refer to the Agricultural potential study in Annexure D3 for further information regarding the observation records and soil types

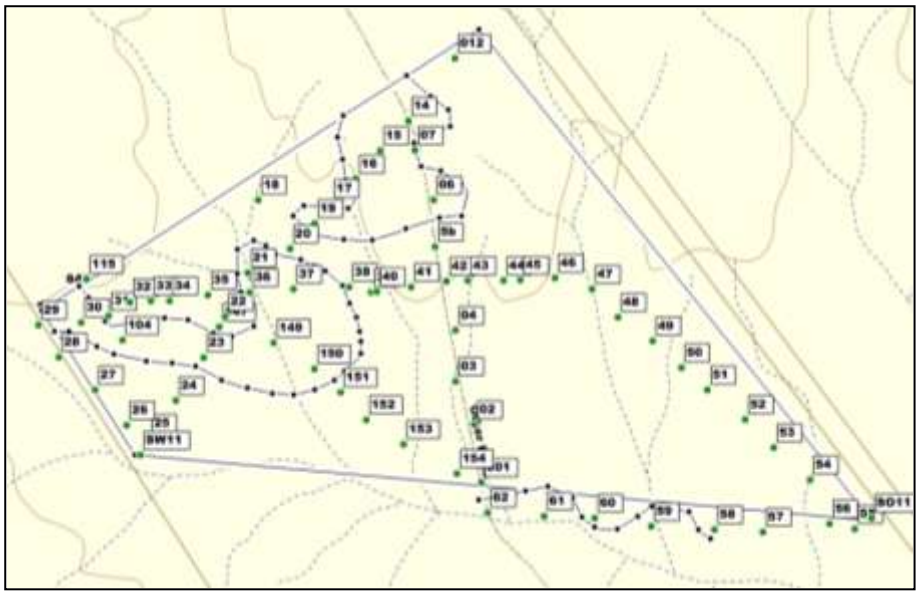

Figure 21: Soil Augering points as undertaken by agricultural specialist (Lubbe, 2014)

The agricultural specialist then grouped the soils in uniform utilization polygons, as illustrated in the figure below.

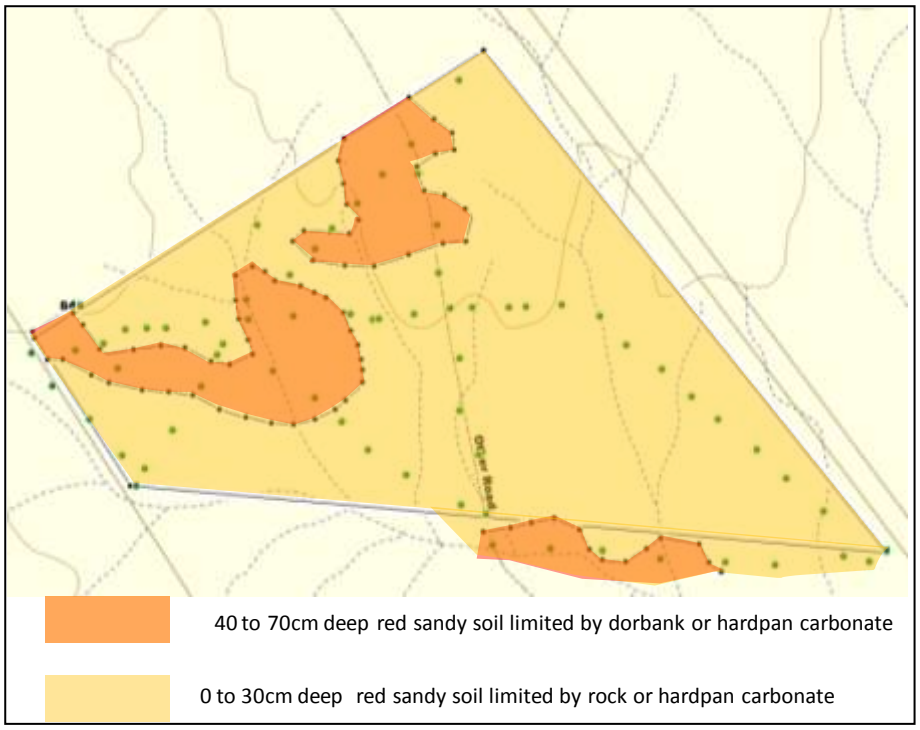

Figure 22: Spatial depiction of soil groups (Lubbe, 2014)

10.4 VELD CONDITION ASSESSMENT

A veld condition assessment was also undertaken by the specialist in conjunction with the soil classification assessment

The object was to assess the condition of the veld in terms of

- Plant cover
- Most common types of grasses
- Soil surface condition
- Presence of invader plants

The cover is sparse with large bare areas, especially where hard carbonate surfaces occur. Moderate to severe erosion was observed by the specialist. The common grasses appearing on site include *Stipagrostis cilata* and *Stipagrostis obusta*. These are palatable and valuable grasses with high nutritional value and important sand binders. Its ecological status is a decreaser, meaning that the population declines when veld is overgrazed.

The three thorn (*Rhigozum trichtomum*), present on site, is an indigenous plant which gets invasive when veld is overgrazed, which is the case here.

The outcome of the veld condition assessment is shown in the table below and is substantiated by the photos in the figure below.**Error! Reference source not found.**

Table 8: Outcome of veld condition assessment (Lubbe, 2014)

ASSESSMENT CATEGORY	FINDING	SCORE
PLANT COVER	Plant cover is very sparse with some bare areas	7
COMMON GRASSES	Moderate and poor grazing grasses mixed	7
SURFACE CONDITION	Moderate levels of top soil loss	3
BUSH ENCROACHMENT	Medium to light bush encroachment present	4
SOIL TYPE	Sandy soil	2

TOTAL	23

The plates below show the veld condition on site as observed by the agricultural specialist.

Basal cover shallow soil

Basal cover deeper soil

Invasive *Rhigosum sp*

Basal cover rocky surface

Plate 18: Veld conditions on site (Lubbe, 2014)

10.5 LAND CAPABILITY AND SUITABILITY FOR AGRICULTURE

According to the agricultural specialist, land capability involves the consideration of:

- the risk of land damage from erosion and other causes and
- the difficulties in land use owing to physical land characteristics, including climate.

The physical properties of the soil represent the worst scenarios used in criteria to depict class limits. This includes low clay percentage, shallow effective depth, low water holding capacity and severe climatic conditions.

In this case, land capability is classified as non-arable low potential grazing land. This is due to the arid climate and limiting soil properties.

The land capability and suitability for crop production **as well as** capability and suitability for grazing is set out in **the tables below.**

Table 9: 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 Hu <30cm	Very low	Low water holding capacity Shallow rooting zone Severe climate Severe erosion hazard	420	83
Class lV Py >40cm	Low	Low water holding capacity Severe climate	90	17

Table 10: Land capability and suitability for grazing (Lubbe, 2014)

Area Description	Suitability Rating	Major Limitation to Grazing	Area (ha)	% of Local Study Area
Cattle	Low	Very shallow rooting depth low clay content, low rainfall, with a carrying capacity of 16-25ha /LSU	510	100

As can be seen from the tables above, the land capability and suitability for crop production and grazing is **Low – Very Low**.

10.6 WATER AVAILABILITY/PROVISION

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

10.7 EROSION POTENTIAL

In this arid climate the **erosivity** (The potential ability of rain to cause erosion) is **low** but the **erodability** (vulnerability of the soil to erosion),is **high** due to the low clay percentage and shallow soil depth.

Possible erosion caused by water is low, due to the characteristics of the terrain as follows:

- Regular slope of 1.6%.
- Length of slope is short
- Small catchment area, because water drain naturally away from the ridge.

This is depicted in the figure below.

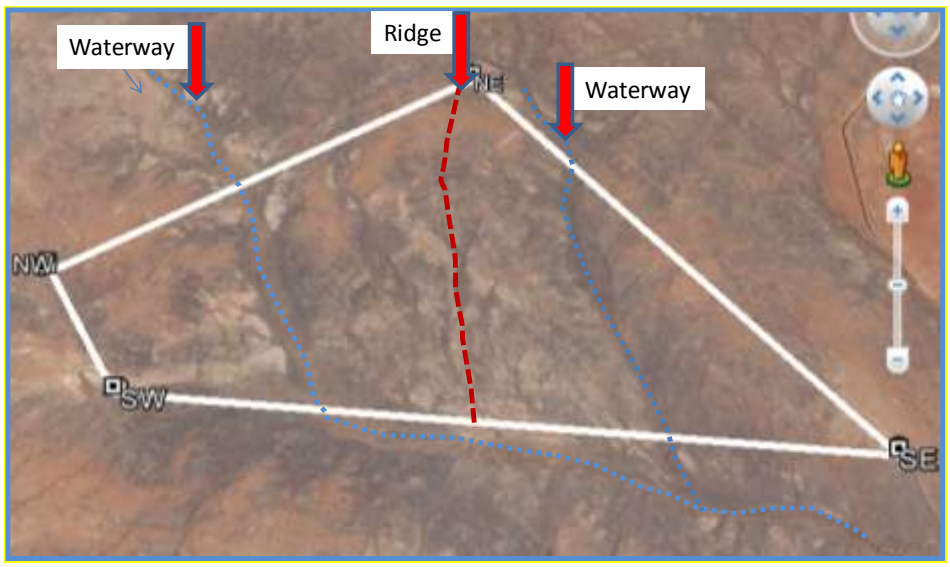

Figure 23: Main drainage channels on site that affect erosivity of the site (Lubbe, 2014)

According to Lubbe, 2014, the risk of **erosion** caused by **wind** is **high** due to the low clay percentage of the soil and the fact that the soil is usually dry - therefore prone to blow away. To combat this erosion, vegetation is needed, but the severe climatic conditions prevent possible mechanical conservation measures. However, **this erosion risk already exists** and proposed facility **will not increase the risk**. Furthermore, the **cover** provided by the solar panels may **reduce** the **wind impact**.

10.8 SUMMARY OF SPECIALIST FINDINGS

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**.

10.9 CONCLUSION

The findings of this study indicate that the site's **agricultural potential** is **low**. Due to poor soil properties and extreme climatic conditions, farming activities consist of grazing for cattle, but due to the low grazing potential of the region, the loss of the small area of grazing land is negligible.

The proposed power plant will have a very small impact on agriculture, locally and on site, and will have no influence on the current commercial farming in the region.

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 RE Capital 11 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 RE Capital 11 Solar Energy Facility site is illustrated in the figure below.

The majority of the site consists of **arid grassland** or grassy shrubland on **open plains** considered to be of **moderate to low sensitivity**. Within this habitat type there are **few listed** or **protected species** present and the **significance of impacts** on vegetation within these areas are likely to be **relatively low**.

The two tributaries of the Helbrandkloofspruit are the dominant sensitive features present in the proposed development area. While these drainage lines are dry the majority of the time, they would on occasion carry significant amounts of water. They are also important as corridors for faunal movement, especially between the Orange River in the south and the northern interior. Species such as Cape Clawless Otter and Water Mongoose use these corridors to access the larger pans in the area during wet years when the pans contain frogs and other food resources. As such, **a corridor of at least 100m** total width should be included with the drainage line and excluded from development. In terms of the major impact sources, the cumulative disruption of landscape connectivity and impacts on protected plant species are likely to represent the impacts of greatest concern, where mitigation is not likely to be able completely avoid or mitigate the impact. Provided that the larger drainage systems are avoided, then these impacts are **not likely to be considered highly significant** and at this stage there are **no apparent fatal flaws** or highly significant impacts that cannot be reduced to an acceptable level.

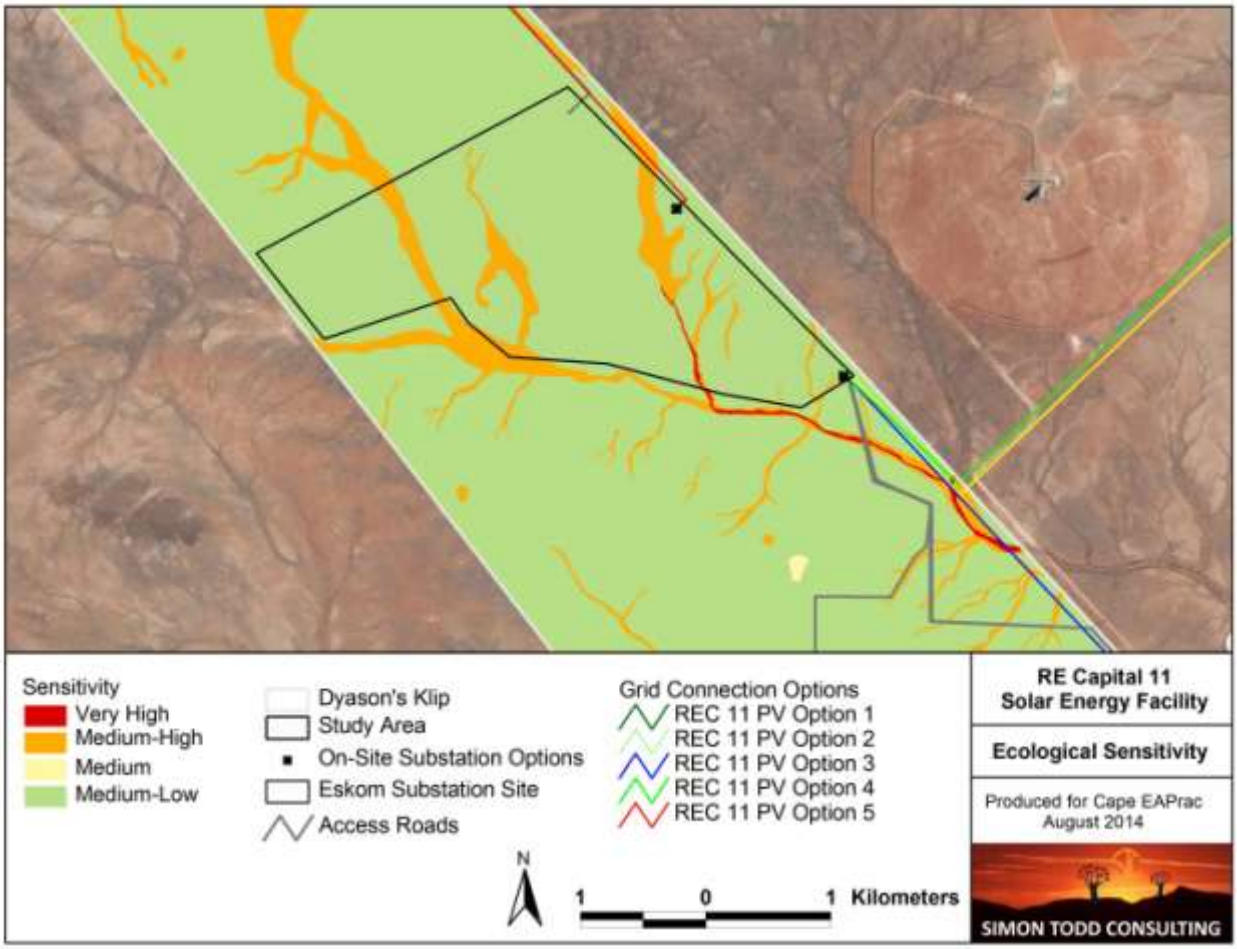

Figure 24: Ecological sensitivity map of the proposed development area of the RE Capital 11 Solar Energy Project (Todd, 2014)

The ecological specialist has identified the potential impacts and associated risk factors that may be generated by the development. Although the specialist has alluded to the likely significance of these impacts, the detailed assessment will take place as part of the EIR phase of the Environmental Process. The potential impacts are highlighted below.

11.1 IDENTIFICATION OF POTENTIAL IMPACTS AND DAMAGING ACTIVITIES

Potential ecological impacts resulting from the development of the RE Capital 11 Solar Energy Facility at Dyason's Klip 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.

11.2 IDENTIFICATION OF ECOLOGICAL IMPACTS TO BE ASSESSED IN THE EIA PHASE

Each of the potential impacts identified above is explored by the specialist in more detail with reference to the features and characteristics of the site and the likelihood that each impact would occur given the characteristics of the site and the extent and nature of the development.

11.2.1 Impacts on vegetation and protected plant species

There are a number of listed and protected species present at the site and it is **highly likely** that **some** of these would be **impacted** by the development. Vegetation clearing during construction will lead to the **loss of** currently intact **habitat** within the development footprint and is an inevitable consequence of the development. As this impact is certain to occur it will be assessed for the construction phase, for the facility and for the grid connection.

11.2.2 Soil erosion and associated degradation of ecosystems

The large amount of **disturbance** created during construction would potentially leave the site **vulnerable** to **soil erosion**. The site is gently sloping and disturbance leading to the loss of plant

cover over large parts of the site will certainly increase the risk of wind and water erosion at the site. Soil erosion is therefore considered a likely impact and will be assessed for the construction phase.

11.2.3 Direct faunal impacts

Increased levels of **noise**, **pollution**, **disturbance** and human presence during construction will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some impact on fauna is highly likely to occur during construction as well as operation and this impact will therefore be assessed for the construction phase and operational phase.

11.2.4 Alien Plant Invasion

The disturbance created during construction is highly likely to **encourage** the **invasion** of the disturbed areas by **alien species**. Although there were not a lot of alien species present within the undisturbed parts of the site, there were some aliens present in disturbed areas such as around watering points. Such species will rapidly increase in abundance and expand into the disturbed areas if given the opportunity. This impact is deemed highly likely to occur and will be assessed as a likely impact associated with the development.

11.2.5 Reduced ability to meet conservation obligations & targets

The **loss of unprotected vegetation** types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets. The receiving vegetation types in the study area are classified as Least Threatened and are still more than 98% intact. As these are widespread vegetation types and there is no indication that there are any rare or restricted habitats within the development footprint, this is **not likely** to be a **significant impact** resulting from the development of a single 75 MW PV facility.

11.2.6 Impact on broad-scale ecological processes

Transformation of intact **habitat** on a cumulative basis 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. Due to the **large amount of development** in the area, this is a **likely** cumulative impact of the development that will be assessed during the EIA.

12 HERITAGE CONSIDERATIONS

Mr Stefan de Kock of Perception heritage consultants have been appointed to undertake an integrated heritage assessment of the proposed RE Capital 11 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 Lita (AC Associates)
- **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 purpose of the archaeological scoping study undertaken by ACO associates is to provide a brief baseline description and an attempt to predict the possible range of impacts of the facility in terms of accumulated knowledge of the area.

12.1.1 Receiving Environment

The study area is located on the northern banks of the Orange River. Morris (2013) describes the environment of the farm as an arid, gently sloping plain with shallow drainage lines running through it. He also observed low outcrops of bedrock in places on the farm. The landscape is very sparsely vegetated and surface archaeological material is therefore highly visible.

12.2 ARCHAEOLOGICAL BACKGROUND

The following background to potential archaeological resources was provided by the specialist.

12.2.1 Early and Middle Stone Age

Beaumont et al. (1995) has reported on the widespread, but low density, distribution of stone artefacts of Pleistocene age across large areas of Bushmanland to the south of the Orange River.

These artefacts are made mainly on quartzite cobbles derived from the Dwyka glacial till. Systematic collections have suggested that these industries can be distinguished by their degree of weathering. Morris (2013) describes the ESA from the area as including Victoria West cores on dolerite and quartzite while the assemblages included a very low incidence of handaxes and cleavers.

Van der Walt (2011) recorded an open scatter of MSA artefacts on the farm Geel Kop 453 to the west of Dyason's Klip. The artefacts were predominantly on banded ironstone and included convergent flakes and small retouched blades. Artefact densities of 4 per m² were recorded over an area of 100 m x 50 m.

Morris (2013) recorded a low density surface scatter of MSA material on McTaggarts Camp in 2010 and this was sampled in Phase 2 mitigation (Morris 2012). The artefacts were concentrated around a bedrock exposure where water would be held for a time after good rain. Dreyer (2006) mentions the presence of stone artefact scatters on the farm Olyvenhout's Drift to the east of Dyason's Klip – his description includes references to points with convergent ends and flakes with facetted platforms made on quartzite, chalcedony and banded ironstone. "The material could arbitrarily be classified as Middle Stone Age", he concludes

12.2.2 Later Stone Age

Late Stone Age sites dating to the Late Holocene are frequently recorded in surveys to the south and south-west of this stretch of the Orange River (eg. Morris & Beaumont 1991; Beaumont et al. 1995). These sites tend to cluster around certain features on the landscape, such as hills or rocky outcrops and in proximity to water (i.e. pans or rivers). Morris (2013) suggests these are generally

short-lived occupations in contrast to the more substantial pastoralist settlements on the floodplains of the Orange River. Smith (1995) excavated the small rock shelter (and specularite mining site) of Zoorvoorbij in a range of hills to the north-east of Keimoes.

Morris (2013) reported a small scatter of LSA material on Dyason's Klip and Gaigher (2013) reported three small scatter of LSA microlithic stone tools on the adjoining farm of Tungsten Lodge. He refers to these artefacts as "re-worked microliths".However, the heavy patination on some of the artefacts illustrated in the report suggest that some may be of MSA origins. Morris (2013) also reported grinding grooves in the bedrock exposures on Dyason's Klip.

The lower units of Zoorvoorbij Cave contain a large flake component which Smith (1995) attributes to the MSA although this is not confirmed by radiocarbon dates. The upper units contain heavy patinated LSA material, including large scrapers, and radiocarbon dates suggest two distinct clusters of dates, that of c.4500-4300 and 2600-2300 BP.

12.2.3 Historical Background

Early travellers such as Wikar and Gordon travelled along the Orange River in the 1770s and described various communities living along the river (Penn 1995). By the mid-19th century the stretch of the Orange River to the west of Upington was settled by the Korana, a Khoekhoen group whose origins are still unclear (Strauss 1979). With increasing Trekboer encroachment from the south, the Korana became involved in a struggle to maintain an independent existence. The attempt by the Korana to resist resulted in two wars, that of 1868-9 and 1878-9.

According to Morris (2013), the name Dyasons Klip is derived from events which occurred during the Korana War of 1879-1880. Apparently a certain Captain Dyason of the Northern Border Police was killed by Korana adversaries while walking between two rocks at this place in 1880. However, it is not recorded exactly where these stones are situated. The adjoining property of McTaggarts Camp also derives its name from events during the Korana War when Captain McTaggart set up his military camp here. It is assumed that the camp was located close to the river and that it is unlikely to have left much of an archaeological trace.

In his assessment of the farm Olyvenhout's Drift, Dreyer (2006) reported finding a heavily soldered food tin resembling British rations from the Anglo-Boer War (1899-1902). He considered it possible that a British camp may have existed in the area. Van der Walt (2011) reported the presence of a sandy track marking an old wagon-track on the farm Geel Kop to the west of Dyason's Klip. The wagon road between Keimoes and Upington crossed the farm and is marked on maps dating to 1908 (Van der Walt 2011). To the north of the farm Geel Kop, on the farm Van Rooi's Vley 443, is the Rebellion Tree monument (Van der Walt 2011). It marks the Rebellion of 1914 in which many Afrikaners opposed the plan of the South African government to invade German South-West Africa at the commencement of World War I (Van Vollenhoven 2012). The site is a Provincial Heritage site.

Van der Walt (2011) mentions the presence of mining exploration trenches on the farm Geel Kop dating to 1929 and Morris (2013) also reports on tungsten mining on the north-western portion of the farm McTaggarts Camp dating to the early 1930s. Morris (2013) identified two ruined mud-brick structure, presumably that of 19th/20th century farm workers, on the farm Dyason's Klip.

12.3 ANTICIPATED ARCHAEOLOGICAL IMPACTS

Since heritage sites, including archaeological sites, are non-renewable, it is important that they are identified and their significance assessed prior to development.

12.3.1 Nature of Impacts

The main cause of impacts to archaeological sites is direct, physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose buried archaeological sites and artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large scale excavations will damage archaeological sites, construction of roads and laydown areas, injudicious use of off-road vehicles can contribute to high levels of impact. The impacts are likely to be most severe during the construction period although indirect impacts may occur during the operational phase of the project.

It is not anticipated that there will be any impacts to the Built Environment. There do not appear to be any structures on the property, although Morris (2013) did records some mud-brick ruins on Dyason's Klip. Historic structures and graveyards are sensitive to physical damage such as demolition as well as neglect. They are also context sensitive, in that changes to the surrounding landscape will affect their significance. The presence of any historic structures and graveyards will need to be assessed through site inspection.

12.3.2 Extent of Impacts

In the case of the proposed solar facility, it is expected that impacts will be extensive. The clearance and levelling of the ground surface to install the PV units will result in the destruction of all surface material. Similarly, the clearing of access roads could impact material that lies buried in the surface sand.

Potential impacts caused by a 132 kV power line and the power line access roads are likely to be limited and local, however these will need to be physically searched and assessed during the EIA phase and the routes adjusted where necessary. Morris (2013) points out that the access road required for a 132 kV powerline is likely to be a 'two-track' which generally only requires limited physical disturbance of the ground surface.

12.3.3 Impacts on Pre-Colonial Archaeology

Archaeological surveys on the adjoining properties of McTaggarts Camp, Geel Kop and Tungsten Camp as well as on Dyason's Klip itself, suggest that ephemeral scatters of MSA and LSA material may be recovered.

They are generally reported to occur in low densities and have been given a low rating by archaeologists. Based on the surveys conducted on adjoining properties, the following impacts may occur:

- It is expected that ephemeral scatters of Middle Stone Age and Later Stone Age material may occur around pans, small drainage areas and at granite outcrops which contain hollows in which rain water may collects;
- Grinding grooves may occur in any bedrock exposures;
- Buried pre-colonial graves may occur.

12.3.4 Impacts on Colonial Period Heritage

The fact that both Dyason's Klip and the adjoining farm of McTaggart Camp derive their names from the Korana Wars suggest that archaeological material from this time period may occur in the study area. However, historic remains are more likely to be located close to the Orange River. Surveys have reported 20th century features and structures such as an old wagon track (Van der

Walt 2011); old mud-brick structures (Morris 2013) and evidence for mining dating to the first half of the 20th century. While there is a possibility that colonial period heritage may occur, the likelihood of this occurring is low.

Based on the surveys conducted on adjoining properties, the following impacts may occur:

- Possible military remains relating to the Korana Wars;
- 20th century buildings and structures associated with farming and mining;
- Unmarked graves.

12.3.5 Living Heritage

Living or intangible heritage (defined in the Heritage Act as including cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems and the holistic approach to nature, society and social relationships) is given also protection under the National Heritage Resources Act, No 25 of 1999.

Close association with the land, such as that experienced by farm owners and farm workers, may result in certain features on the landscape enjoying particular social or ritual significance. This information is difficult to obtain unless there is a possibility of conducting oral interviews with the inhabitants of the property. However, it is not thought likely that any significant intangible heritage values would be attached to the particular terrain in question.

Please refer to the plan of study for Environmental Impact Assessment in the section below for further details on additional Heritage Related studies that will take place in the next phase of the environmental process.

13 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.

The DEA is in the process of identifying Renewable Energy Development zones (REDz) across South Africa, which is typically best, suited for renewable energy generation. Upington and its surrounding area is one of the areas identified to be a Renewable Energy Development Zone.

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.

Other solar projects that are already being developed or proposed in close vicinity to the Dyason's Klip project (RE Capital 11 solar development) are illustrated in the figure below. Some of these projects have already been awarded preferred bidder status in the previous REIPPP rounds, while others are still in the planning phase.

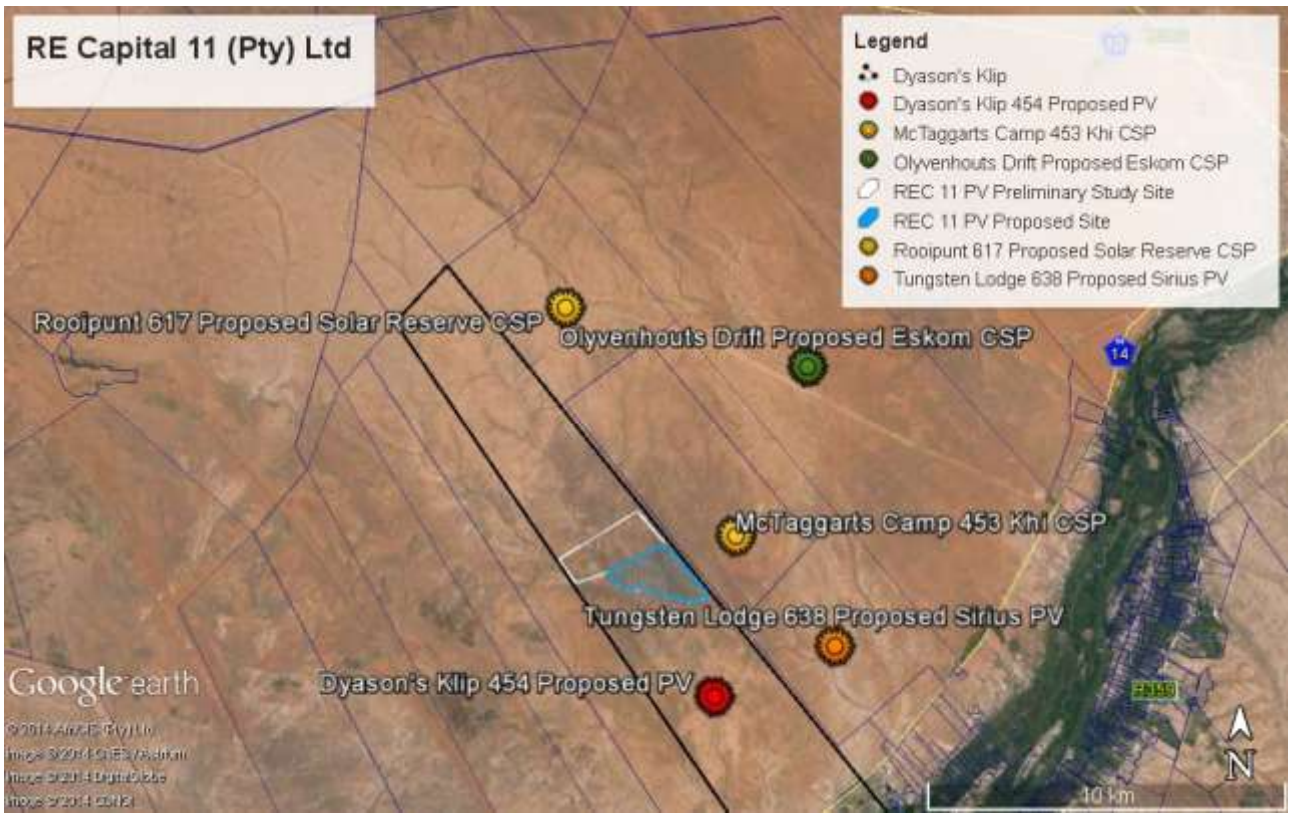

Figure 25: Showing the proximity of the proposed RE Capital 11 Solar Development (Solek, 2014)

14 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.

14.1 FLORA:

- **Main drainage lines & 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.

14.2 FAUNA:

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

14.3 AGRICULTURAL POTENTIAL:

No specific constraints in terms of agricultural potential were identified

14.4 HERITAGE:

- **Main drainage lines & seasonal washes**.
- Possible military remains relating to the Korana Wars;

- 20th century buildings and structures associated with farming and mining;
- Unmarked graves.
- It is expected that ephemeral scatters of Middle Stone Age and Later Stone Age material may occur around pans, small drainage areas and at granite outcrops which contain hollows in which rain water may collects;
- Grinding grooves may occur in any bedrock exposures;
- Buried pre-colonial graves may occur.

14.5 VISUAL:

Due to the remote location of the site and distance from the N14 as well as the landscape context within a renewable energy hub there are unlikely to be any specific visual constraints on the project. 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.

15 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 11: Summary of Public Participation Process to date.

CHRONOLOGY OF EVENTS	
DATE	**ACTION**
15 May 2014	**Notification** was sent to the Landowner of remainder of Dyasonsklip 454 notifying him of the development proposal and the environmental process to be followed.
15 May 2014	**Notification** was sent to the landowners of Remainder of farm 638 as an affected landowner for possible grid connections.
15 May 2014	**Notification** was sent to the landowners of portion 3 of farm 453 as an affected landowner for possible grid connections.
15 May 2014	**Notification** was sent to the landowners of the remainder of farm 452 as an affected landowner for possible grid connections.
15 May 2014	**Notification** was sent to the landowners of Remainder of farm 636 as an affected landowner for possible grid connections.
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 **Khai Garib Local Municipality** (which have jurisdiction over the area) were notified and automatically registered as key stakeholders.
28 July 2014	**Organs of state** (including SANParks, Northern Cape Nature Conservation, Department of Agriculture, 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 on remainder of the farm Dyasonsklip 454.
May 2014	A **Stakeholder Register** was opened and the details of all registered stakeholders entered for future correspondence.
22 August 2014	Hard copies of the Draft Scoping Report (DSR) have been placed at the Khai-Garib Municipality offices (Upington and Keimoes) and the Keimoes Library, to inform the public of the proposal and EIA process, and invite them to review the document and provide comment (**25 August 2014 to 04 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 **25 August 2014 to 04 October 2014.**

During the registration phase, preliminary comments were received from Square Kilometre Array (SKA), Eskom, Northern Cape Department of Agriculture, Land Reform and Rural Development and the Department of Agriculture Forestry and Fisheries (DAFF). Copies of all comments received to date 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.

15.1 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 12: Affected landowners notified at the pre-application phase of the environmental process

Owner	Property
Botha du Toit – Owen Davies Trust	Remainder of Farm 454
Susanna Louw – Zelpy 2418 (Pty) Ltd	Remainder of Farm 638
KHI CSP South Africa	Portion 3 of the Farm 453
KHI CSP South Africa	Portion 12 of the Farm 452
Francisus Thynsma	Remainder of the Farm 636

15.2 SITE NOTICES

Site notices printed in English as well as Afrikaans were placed on the boundary of RE 454 Dyasonsklip.

Plate 19: Site notices placed on the boundary of the Remainder of the farm 454 Dyasonsklip.

15.3 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 Keimoes Library and the Khai Garib municipality. The BID's were also made available on the Cape EAPrac Website.

15.4 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 13: 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
Khai Garib Municipality: Municipal Manager	South African National Parks	Department of Science and Technology
Khai Garib Municipality: Ward Councillors	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
Khai Garib Municipality Ward	Department of Mineral	SENTECH

Stakeholders Registered		
councillors	Resources	

Preliminary comments received.

Preliminary comments were received from the following stakeholders:

- Square Kilometre Array (SKA);
- Department of Agriculture, Land Reform and Rural Development;
- Department of Agriculture Forestry and Fisheries; and
- Eskom.

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

15.5 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 Keimoes Library as well as the Khai Garib 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: The environmental Regulations make provision that as there are no substantive changes between the *Draft* Scoping Report (DSR) and *Final* Scoping Report (FSR), the Final SR can be submitted to the Department (DEA) and to I&AP's at the same time. The FSR will then be made available to I&AP's whilst the Department considers the report

16 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**.

17 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.

17.1 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.

17.2 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 comments received will be considered by each specialist, responded to and the final impact assessment report updated accordingly.

18 PLAN OF STUDY FOR SPECIALIST IMPACT ASSESSMENTS

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

18.1 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 14: 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 RE Capital 11 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 200ha 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 new MTS 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 RE Capital 11 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 RE Capital 11 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 Khai-Garib 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 RE Capital 11 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.

18.2 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.

18.2.1 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**.

18.2.2 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.

18.3 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 EIA phase study needs to fulfill the requirements of heritage impact assessment as defined in section 38 of the NHRA. This means that the assessment has to cover the full range of potential cultural heritage resources as defined in the National Heritage Resources Act 25 of 1999.

The aim of the EIA would be to identify and assess the significance of all heritage resources on the property, to determine the potential impacts on the resources, and where appropriate to recommend “no-go’ areas and to propose mitigation if avoidance is not possible.

- The proposed study area, including proposed routes of linear infrastructure (access roads, underground services, power lines) will need to be subject to a detailed survey by heritage practitioner/archaeologist who will need to walk a pattern of transects over the site recording details and locations of any heritage material found;
- The significance of each find will need to be assessed along with the impacts of the proposed activity;
- In the case of impacts to significance heritage resources, the proposed mitigation measures may include the “No-Go” alternative, avoidance, archaeological excavations or monitoring during earthworkds;

Based on the archaeology of the adjoining areas, the terrain on which the proposed RE Capital 11 Solar Development will be located is unlikely to be rich in heritage remains. Morris (2013) identified 11 heritage sites during his survey of the farm Dyason’s Klip and he graded them as of “low” significance.

18.4 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

19 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**.

20 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 RE Capital 11 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 **25 August 2014 to 04 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 04 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

21 ABBREVIATIONS

AFNP	Augrabies Falls National Park
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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