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DRAFT ENVIRONMENTAL IMPACT REPORT

for

RE CAPITAL 3: SOLAR DEVELOPMENT

on

Portion 12 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 3 (Pty) Ltd. (previously Kimbratrax (Pty) Ltd)

By: *Cape EAPrac*

Report Reference: KAI231/10

Department Reference: 14/12/16/3/3/2/538

Case Officer: Thulisile Nyalunga

Date: 8 January 2014

APPOINTED ENVIRONMENTAL ASSESSMENT PRACTITIONER:

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Report written & compiled by: **Dale Holder** (Ndip Nat Con), who has 11 years' experience as an environmental practitioner.

Report reviewed by: **Louise-Mari van Zyl** (MA Geography & Environmental Science [US]; Registered Environmental Assessment Practitioner with the Interim Certification Board for Environmental Assessment Practitioners of South Africa, EAPSA); Chairperson of the Southern Cape International Association for Impact Assessments (IAIA). Mrs van Zyl has over ten years' experience as an environmental practitioner.

PURPOSE OF THIS REPORT:

Public Review and Comment

APPLICANT:

Re Capital 3 (Pty) Ltd. (previously Kimbratrax (Pty) Ltd)

CAPE EAPRAC REFERENCE NO:

KHA231/10

DEPARTMENT REFERENCE:

14/12/16/3/3/2/538

SUBMISSION DATE

08 January 2014

DRAFT ENVIRONMENTAL IMPACT REPORT

in terms of the

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

RE Capital 3 Solar Development,

Portion 12 of the Farm Dyasonsklip 454, Upington, Northern Cape

Submitted for:

Departmental Review

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REPORT DETAILS

Title:	**DRAFT ENVIRONMENTAL IMPACT REPORT** **for proposed 'RE Capital 3 Solar Development'**
Purpose of this report:	This Draft Environmental Impact 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 3 Solar Development in the Northern Cape Province. In accordance with the EIA Regulations, the main purpose of the Draft EIR 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 a summary of the impacts identified during the Scoping phase of the environmental process. • Undertake an assessment of the impacts identified during the scoping phase.. The final Scoping Report was made available for a 21 day comment period from **Tuesday 15 October** to **Tuesday 05 November 2013**. The final Scoping Report was accepted by the National Department of Environmental Affairs on **25 November 2013**. This Draft Environmental Impact Assessment Report is made available for review and comment from **Wednesday 08 January 2014** – **Monday 17 February 2014**.
Prepared for:	RE Capital 3 (Pty) Ltd. (previously Kimbratrax (Pty) Ltd.)
Published by:	*Cape Environmental Assessment Practitioners (Pty) Ltd. (Cape EAPrac)*
Authors:	Mr Dale Holder
Reviewed by:	Director: Louise-Mari v Zyl
Cape EAPrac Ref:	KAI131/10
DEA Case officer & Ref. No:	Ms Thulisile Nyalunga 14/12/16/3/3/2/538
Date:	08 January 2014
To be cited as:	*Cape EAPrac,* 2014. Draft Environmental Impact Report for the proposed RE Capital 3 Solar Development. Report Reference: KAI231/06. George.

COMPLIANCE CHECKLIST

Regulation 543 of NEMA, Section 31(2): "*Contents of an Environmental Impact Report*".

The following is included as a "route map" for stakeholders and officials considering and reviewing this report. It contains the minimum requirements for an environmental impact report and guides the reader to the relevant pages where specific aspects are detailed:

	Requirement	**Page #**
(a)	Details of the EAP who compiled the report and the expertise of the EAP to carry out an EIA.	Second cover page
(b)	Detailed description of the proposed activity.	A photovoltaic (PV) solar facility with a generation capacity of 225MW implemented in 3 phases of 75MW each. The PV technology will consist of either conventional PV or Concentrated PW with a maximum height of 10m above Ground Level. The following additional infrastructure will be constructed as part of this development: - Inverter stations; - an on-site substation (including a feed-in transformer to allow the generated power to be connected to Eskom's electricity grid) – A total of three on site substations may be constructed – i.e. one for each phase of the development; - an overhead transmission power line to distribute the generated electricity from the on-site substation to the proposed MTS sub-station - auxiliary buildings, including: - administration / office & security (gate house), - control room & workshop, - visitor centre, - ablution / change room and - Warehouse / storeroom. - a laydown area of approximately 3ha for each phase; - internal electrical reticulation network ; - an internal road / track network - 10 x 10kLt rainwater tanks; and - Electrified perimeter fencing around the solar facility.
(c)	Description of the property on which the activity is to be undertaken and the location of the activity on the property.	Section 11 – Pg. 51 – Pg. 60
(d)	Description of the environment that may be affected and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected.	
(e)	Details of the public participation process: 1. Steps undertaken in accordance with the	91

	PoS EIR 2. List of persons, organizations and organs of state that were registered as interested & affected parties 3. Summary of comments received from, and a summary of issues raised by registered I&AP's, the date of receipt of the comments and the responses of the EAP to those comments 4. Copies of any representations, objections and comments received from registered I&AP's	Appendix F & Final Scoping Report
(f)	Description of the need & desirability of the proposed activity.	Section 2 – Pg. ii
(g)	A description of identified potential alternative to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.	Section 6 Pg. 18 - 32
(h)	An indication of the methodology used in determining the significance of potential environmental impacts.	Section 16 Pg. 79
(i)	A description and comparative assessment of all alternatives identified during the environmental impact assessment process.	78 - 90
(j)	A summary of the findings and recommendations of any specialist report or report on a specialised process.	Section 7, 13, 14, 17
(k)	Description of all environmental issues, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.	Section 17
(l)	An assessment of each identified potentially significant impact, including: • cumulative impacts • nature of the impact • extent and duration of the impact • probability of the impact occurring • degree to which the impact can be reversed • degree to which the impact may cause irreplaceable loss of resources; and • degree to which the impact can be mitigated.	Section 17, 18 and 19
(m)	A description of any assumptions, uncertainties and gaps in the knowledge.	Section 21
(n)	A reasoned opinion as to whether the activity should be authorized, any conditions that should be made in respect of that authorisation.	Section 24
(o)	An environmental impact statement which contains: • a summary of the key findings; and • comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.	Section 18

(p)	An Environmental Management Programme that complies with Regulation 33 of NEMA.	Appendix E
(q)	Copies of any specialist reports and reports on specialized processes complying with Regulation 32 of NEMA.	Appendix D
(r)	Any specific information that may be required by the competent authority.	Table below
(s)	Any other matters required in terms of Sections 24(4)(a) and (b) of the Act.	Table below

FINAL SCOPING REPORT REQUIREMENTS

The acceptance of the Final Scoping Report was subject to various conditions and information that must be included in this Draft Environmental Impact Report. The checklist below serves as a summary of how these requirements were incorporated into this Draft EIR. Where items will only be included in Final EIR, these are indicated as such.

Requirement	Description
General Requirements	
Comments from relevant stakeholders are to be included in the Final EIR. These stakeholders must include: Northern Cape Department of Environment and Nature conservation, Department of Agriculture, Forestry and Fisheries, South African Civil Aviation Authority, Department of Transport, Local Municipalities, District Municipality, Department of Water Affairs, Department of Communications, SENTECH, Eskom Holdings, South African National Roads Agency, South African Heritage Resources Agency & Square Kilometre Array.	Comments have already been received from Department of Agriculture, Forestry and Fisheries, South African Civil Aviation Authority, Department of Water Affairs, Eskom Holdings, South African National Roads Agency, South African Heritage Resources Agency & Square Kilometre Array. The authorities who have not yet commented on this process will be given a further opportunity to comment on this Draft Environmental Impact Assessment Report
An A3 regional map of the area and the site layout must be included.	This is attached in **Appendix C** of this report.
Specific Requirements	
i. The application form must be amended and resubmitted to department to reflect the changes to activities that were considered and assessed	An amended application has been submitted to the National Department of Environmental Affairs.
ii. Written comment from the provincial department of environmental affairs that the activities applied for under GN546 apply. In addition, a graphical representation of the proposed development within the respective geographical area must be provided.	The Northern Cape Department of Environment and Nature conservation, Department of Agriculture were given an opportunity to comment on the Draft as well as the Final Scoping Report and will be given further opportunity to comment on this report.
iii. Details for future plans for the site and infrastructure after decommissioning in 20-30 years and the possibility of upgrading the	The impacts of decommissioning and closure are assessed in **section 17** of this report. The Environmental Management Programme attached in **Appendix F**, also contains specific

Requirement		Description
	proposed infrastructure to more advanced technologies.	management recommendations for the closure and decommissioning phases of the development
iv.	The total footprint of the proposed development should be indicated. Exact locations of the PV positions, power lines and associated infrastructure should be mapped at an appropriate scale.	Various plans in this regard are attached in **Appendix C.**
v.	Should a water use licence be required, proof of application for a licence needs to be submitted.	The department of water affairs have confirmed that they will only consider water use licences for REIPP's after projects are selected as preferred bidders. The applicant has however applied for a non-binding water agreement from the Departement of Water Affairs. Details of this process will be included in the **Final EIR.**
vi.	Information on services required on site e.g. sewerage, refuse removal, water and electricity. Who will supply these services and has an agreement and confirmation of capacity been obtained? Proof of these agreements must be provided.	Details of the services required are contained in the engineering report attached in **Annexure D4**
vii.	A copy of the final site layout map. All available biodiversity information must be used in finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads.	This Plan is attached in **Annexure G4**.
viii.	An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	This Plan is attached in **Annexure G4**.
ix.	A map combining the final layout map superimposed on the environmental sensitivity map	This Plan is attached in **Annexure G4**.
x.	A shape file of the preferred development layout	Shapefiles showing the development layout are included on the **CD** attached to this report.
The Environmental Management Programme must include the following.		
i.	All recommendations and mitigation measures recorded in the EIR and the specialist studies conducted.	This is dealt with throughout the EMPr, and is summarised in **section 6** of the document.
ii.	The final site layout map	Attached in **Appendix C**.
iii.	Measures as dictated by the site layout map and micro siting.	Attached in **Appendix C**, and summarised in **section 6.3** of this report.
iv.	An environmental sensitivity map indicating environmental sensitive	The environmental sensitivity map is attached in **Appendix G4** of this report.

Requirement		Description
	areas and features identified during the EIA process.	
v.	A map combining the final layout map superimposed on the environmental sensitivity map.	The sensitivity overlays are attached in **Appendix G4** of this report.
vi.	An Alien Invasive Management Plan to be implemented during construction and operation of the facility.	An Alien Invasive Management Plan is included in the EMPr attached in **Appendix F.**
vii.	A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed.	A Plant Rescue and Protection Plan is included in the EMPr attached in **Appendix F.**
viii.	A re-vegetation and habitat rehabilitation plan to be implemented during construction and operation	An Re-vegetation and Habitat Rehabilitation plan is included in the EMPr attached in **Appendix F.**
ix.	An open space management plan to be implemented during the construction and operation of the facility	An Open Space Management Plan is included in the EMPr attached in **Appendix F.**
x.	A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.	A traffic management plan is included in the Engineering Report attached in **Annexure D4**.
xi.	A transportation plan for the transport of components, main assembly cranes and other large pieces of equipment.	A Transportation plan is included in the Engineering Report attached in **Annexure D4**.
xii.	A stormwater management plan to be implemented during the construction and operation of this facility.	A stormwater management plan is included in the Engineering Report attached in **Annexure D4**.
xiii.	An erosion management plan for monitoring and rehabilitating erosion events associated with the facility.	A erosion management plan is included in the Engineering Report attached in **Annexure D4** and is also detailed in the EMPR attached in **Appendix F**.
xiv.	An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage.	A Leak Investigation, Detection and Repair program (LIDAR) is included in the EMPr attached in **Appendix F**.
xv.	Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their	The Ecological specialist has made recommendations to protect the hydrological resources on site. These recommendations are included in the Ecological Impact Assessment

Requirement	Description
catchments.	Report attached in **Annexure D1** and are summarised in **section 22** of this report.
EIA INFORMATION REQUIRED FOR SOLAR FACILITIES	
1. General Information	
Description of the affected farm portions	**Portion 12 of the Farm Dyasonsklip 454**.
21 digit Surveyor General codes of all affected farm portions	**C02800000000045400012.**
Copies of deeds of all affected farm portions	The title deed for portion 12 of the farm Dyasonsklip 454 is attached in **Annexure G3.**
Photos of areas that give a visual perspective of all parts of the site.	A full photographic record of the site is attached in **Appendix B.**
Solar plant design specifications • Type of technology • Structure height • Surface area to be covered (incl. associated infrastructure) • Structure orientation • Laydown area dimensions (construction period & thereafter) • Generation capacity	The design specifications of the facility are detailed in the Engineering Report attached in **Annexure D4**. • Photo Voltaic(PV) (including both conventional PV as well as Concentrated PV) • Maximum of 10m • 600ha • Orientation subject to optimisation (tracking) • 1 ha per phase (3ha in total) • Total Generation Capacity of 225MW – implemented in 3 phases of 75MW.
Generation Capacity of the Facility as a whole at delivery points	The facility will have a maximum generating capacity of **225 Megawatts** implemented in **three phases of 75 Megawatts**.
2. Site Maps and GIS information	
All maps and information layers must also be provided in ESRI Shapefile format.	All Shapefiles (layout, cadastral units, biodiversity and sensitivity layers) are included in the **Portion 12 of the Farm Dyasonsklip 454** attached to this report.
All affected farm portions must be indicated	The affected farm portions are indicated on all maps and plans.
The exact site of the application must be indicated.	The exact site is indicated on all maps and plans.
A Status Quo Map must be provided that includes the following: - Current land use of the site, - Rivers streams and watercourses, - Ridgelines and 20m continuous contours, - Fountains, boreholes, dams,	This is included in the regional land use plan attached in **Appendix A.**

Requirement	Description
- High potential agricultural areas, and - Buffer Zones.	
Slope Analysis that includes the following slope ranges: - Less than 8% slope. - Between 8% and 12% slope. - Between 12% and 14 % slope. - Steeper than 18% slope.	A slope analysis has been commissioned and will be included in the **Final EIR**.
Site Development proposal map that indicates: - Foundation footprint, - Permanent laydown area, - Construction period laydown area, - Internal roads, - River, stream and water crossings, - Substations, - Cable routes, - Connection routes, - Cut and fill areas, - Borrow pits, - Spoil heaps, and - Buildings including accommodation.	These items are indicated on the series of plans attached in the Layout Report Attached in **Appendix C**.
3. Regional map and GIS information	
All maps must be provided in ESRI shape file format.	ESRI Shapefiles are included on the attached **CD**.
The map/layer must cover an area of 20km around the site.	All cadastral and regional biodiversity data contains a 20km buffer of the site.
Indicate the following on the Map: - Roads, - Railway lines and their stations, - Industrial areas, - Harbour and Airports, - Electricity transmission, - Pipelines, - Water Sources, - Visibility Assessment, - Critical Biodiversity Areas and Ecological Support Areas, - Critically endangered and Endangered vegetation areas, - Agricultural fields, - Irrigated Areas, and - New Roads and upgrades to existing roads.	These are indicated on the topographical plan in **Appendix A** as well as the Biodiversity overlays in **Annexure G4**.
AGRICULTURAL STUDY REQUIREMENTS	
Detailed Soil Assessment of the site including the following: - Identification of soil forms present,	A full agricultural potential study was undertaken and this is included in **Annexure D2**.

Requirement	Description
- The size of the area where a particular soil form is found, - GPS readings of soil survey points, - The depth of the soil at each survey point, - Soil colour, - Limiting factors, - Clay content, - Slope of the site, - A detailed map indicating the locality of the soil forms within the specified area, and - Size of the site	
Exact locality of the site.	Detailed in the study site description in **section 11** of this report as well as on all plans attached in **Appendix A, C** and **Annexure G2** and **G4**
Current activities on the site, developments, buildings	These are indicated on the Topographical plans attached in **Appendix A**
Surrounding developments and land uses.	These are indicated on the Regional plans attached in **Appendix A**
Access routes and the condition thereof.	These are indicated on the Solar Facility Layout Plans and the Layout Report attached in **Appendix C**.
Current status of the land	The land is currently **vacant** and is marginally used for **livestock grazing**.
Possible land use options for the site	These are considered in the **Need and Desirability** section of this report.
Water availability, source and quality	This is detailed in the engineering report attached in **Annexure D4**.
Detailed descriptions as to why agriculture should or should not be the land use of choice	These are included in the Agricultural Potential Study attached in **Annexure D2**.
Impact of the change in land use of the surrounding area	This has been assessed under the cumulative assessment of impacts included in **section 18** of this report.
A Shapefile containing the soil forms and relevant attribute data.	The Shapefiles of the soil forms are included on the **CD** attached to this report.
ASTRONOMY GEOGRAPHIC ADVANTAGE ACT, 2007	
Indicate the applicability of the Astronomy Geographic Advantage Act.	SKA were approached to provide comment on this proposal. The nearest SKA station has been identified as Rem-Opt-09, at approximately 32km from the proposed installation; Based on distance to the nearest SKA station, and the information currently available on the detailed design of the PV installation, this facility poses a low risk of detrimental impact on the

Requirement	Description
	SKA;
Obtain comment from the South African Large Telescope (SALT) if the proposed development is situated within a declared astronomy Advantage Area.	The information provided by SKA, indicates that Re Capital 3 is not situated in a declared astronomy advantage area.

ORDER OF REPORT

Executive Summary

Final Scoping Report – Main Report

Appendix A	:	Location, Topographical & Development Site Plans
Appendix B	:	Site Photographs
Appendix C	:	Solar Facility Layout Alternatives & Layout Report (Van der Merwe, 2013)
Appendix D	:	Specialist Reports
Annexure D1	:	Ecological Impact Assessment (Todd, 2013)
Annexure D2	:	Agricultural Potential Study (Lubbe, 2013)
Annexure D3	:	Heritage Impact Assessment (Morris, 2013)
Annexure D4	:	Engineering Report (Van der Merwe, 2013)
Appendix E	:	Public Participation Process
Appendix F	:	Environmental Management Programme
Appendix G	:	Other Information
Annexure G1	:	Correspondence with Authorities – Acceptance of Application, Acceptance of scoping Report
Annexure G2	:	NPAES Map, BGIS LUDS Evaluation
Annexure G3	:	Title Deed
Annexure G4	:	Biodiversity Overlays

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REPORT SUMMARY

1 PROJECT OVERVIEW

Cape EAPrac has been appointed by **RE Capital 3 (Pty) Ltd.** (previously Kimbratrax (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 3 Solar Development** near Upington and Keimoes in the Northern Cape.

The Activity proposed is the Generation of Electricity using Photovoltaic (PV) Technology. Photovoltaic technology refers to both conventional photovoltaic as well as concentrated photovoltaic (CPV).

RE Capital 3 (Pty) Ltd. have an option to sub-lease a portion of Portion 12 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 **Annexure G5**.

The total generation capacity of the solar facility will not exceed **225MW** (3 Phases of 75MW) for input into the national Eskom grid. **These three phases may be undertaken by three separate Renewable Energy Independent Power Producers (REIPP's)**. Each of the phases may be implemented by agents acting on behalf of the applicant or by completely separate legal entities. Notwithstanding this, these entities will be required to comply with the recommendations in this EIR as well as any conditions contained in an environmental decision. It should also be noted that the three phases may be submitted under the same window as per the RFP.

The purpose of this **Draft Environmental Impact Report (EIR)** is to describe the environment to be affected, the proposed project, the process followed to date (focussing on the outcome of the scoping and public participation process and specialist studies), to present the findings and recommendations presented in the specialist impact assessment studies, and to assess the potential impacts of the project on the environment as well as to provide a description of how the development concept has been adjusted to consider the above..

This Draft Environmental Impact Assessment Report is available for a 40 day review and comment period extending from **Wednesday 08 January 2014** – **Monday 17 February 2014**.

All comments on the Draft EIR must be submitted to Cape EAPrac, no later than 17 February 2014 to the address below.

*C*ape *EAP*rac
ATTN: Mr **Dale Holder**
P.O. Box 2070, George, 6530
Tel: 044 874 0365; Fax: 044 874 0432
E-mail: dale@cape-eaprac.co.za

All comments received on the Draft EIR will be included in the Final EIR that will be submitted to the National Department of Environmental Affairs for consideration and decision making.

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 (IPP's).

RE Capital 3 (Pty) Ltd is one such IPP which intends to generate electricity from the proposed RE Capital 3 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 14/12/16/3/3/2/538).

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).

4 SITE DESCRIPTION

The property, Portion 12 of the farm Dyasonsklip 454, is located in the Siyanda district 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 600ha in size.. The property is situated north of the N14 National Road.

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

5 DEVELOPMENT PROPOSAL & ALTERNATIVES

The proposed RE Capital 3 Solar Development is to consist of solar photovoltaic panels with a generation capacity of 225MW (megawatts), implemented in 3 phases of 75MW each 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 section 4 of 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.

6 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 and assess 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 Final Scoping Report as well as the project layout and concept:

- Agriculture potential;
- Ecological (Fauna and Flora);
- Heritage (including archaeology and palaeontology)

7 PLANNING CONTEXT

Mr Martin Scott from Ilali Investments has been appointed as the planning specialist for this project and will be responsible for undertaking the necessary applications. Further details on the progress with the planning applications are included in section 8 of this report and will be presented in the Draft Environmental Impact Report.

8 AVOIDANCE APPROACH

A constraint map has been developed for the proposed RE Capital 3 Solar Development site. This serves to identify possible contextual constraints for the target solar property, the two alternative sites within the property as well as for the site-specific solar layout, based on local (site specific) 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.

Layout Alternative 3 (the preferred mitigated layout) was responsive to all the constraints defined by the participating specialists as well as those defined in regional plans.

The following key potential constraints have been identified to date:

FLORA:

- Main drainage lines & seasonal washes;
- Protected plants species and communities;
- Pans

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.

AGRICULTURAL POTENTIAL:

No specific constraints in terms of agricultural potential were identified

HERITAGE:

Main drainage lines & seasonal washes.

VISUAL:

Due to the remote location of the site and distance from the N14 there are not deemed to be any visual constraints on the proposed Solar Development.

9 CONCLUSION AND RECOMMENDATIONS

The decision to grant or refuse authorisation in terms of Section 24 of NEMA must be made in the light of the provisions of NEMA. Section 24 provides that, in order to give effect to the general objectives of integrated environmental management laid down in NEMA, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by the Act with deciding applications for environmental authorisation. An environmental impact assessment report (an “EIA Report”) concerning the impact of the proposed

activity and alternative activity options on the environment, has been compiled and submitted as prescribed and authorisation may only be issued after consideration of such report.

The Regulations inter alia require that an EIA report must contain all information that is necessary for the competent authority to consider the application and to reach a decision concerning the application, and must include an assessment of each identified potentially significant impact, including cumulative impacts of the proposed development on the environment, socio-economic conditions and cultural heritage. The objective of this exercise is both to identify and predict the actual and potential impact on socio-economic conditions, and consider ways of minimising negative impacts while maximising benefit. We submit that the environmental process undertaken thus far complies with these requirements and that the assessment has considered potential impacts and responded thereto by either complete avoidance where possible, or appropriate mitigation.

Irrespective of having investigated and addressed the known impacts, NEMA requires "a risk-averse and cautious" approach to be applied by the decision-makers. This process entails taking into account the limitation on present knowledge about the consequences of an environmental decision (i.e. cumulative impacts associated with other photovoltaic applications).

The preferred / mitigated development proposal presented in this report is responsive to the integrated results of the assessment of potential impacts made by the various specialists on the project team. The majority of recommendations have been accommodated in the RE Capital 3 solar development – Layout Alternative 3 (Preferred) and mitigation measures proposed for the construction, operation and decommissioning have been included in the Environmental Management Programme (EMP'r) for implementation.

The relevant alternatives considered were refined in an iterative manner during the process to ensure that the constraints / concerns raised and recommendations provided by the specialists, the public, state departments and the competent authority have been incorporated into the design, thereby ensuring that the negative impacts associated with the proposal were avoided as a priority, and reduced via mitigation measures were necessary. This precautionary approach has allowed impacts to be avoided and/or minimised, while the positive benefits enhanced.

Based on comparative evaluation of the various alternatives, including the No-Go option, it is evident that the status quo (vacant land with limited agricultural potential) is not necessarily the best environmental option (subject to the implementation of recommended development mitigation measures).

The preferred development Layout Alternative 3 for the Re Capital 3 Solar Development consists of the following:

A photovoltaic (PV) solar facility with a generation capacity of 225MW implemented in 3 phases of 75MW each. The PV technology will consist of either conventional PV or Concentrated PW with a maximum height of 10m above Ground Level. The following additional infrastructure will be constructed as part of this development:

- **Inverter stations;**
- **an on-site substation (including a feed-in transformer to allow the generated power to be connected to Eskom's electricity grid) – A total of three on site substations may be constructed – i.e. one for each phase of the development;**

- **an overhead transmission power line to distribute the generated electricity from the on-site substation to the proposed MTS sub-station**
- **auxiliary buildings, including:**
    - **administration / office & security (gate house),**
    - **control room & workshop,**
    - **visitor centre,**
    - **ablution / change room and**
    - **warehouse / storeroom.**
- **a laydown area of approximately 3ha for each phase;**
- **internal electrical reticulation network (underground cabling);**
- **an internal road / track network**
- **10 x 10kLt rainwater tanks; and**
- **electrified perimeter fencing around the solar facility.**

The abovementioned preferred / mitigated proposal is considered a **reasonable and feasible** alternative that requires only limited mitigation to enable it to be sustainable, and is thus considered to be the best practicable environmental option with the least level of impact.

This Draft EIR therefore concludes that the proposed RE Capital 3 Solar Development has been considered via a balanced approach, mindful of cumulative impacts and need and desirability requirements, and that no fatal flaws have been identified that warrant refusal of the proposed development. As such, it can be considered for environmental authorisation subject to implementation of the EMP'r and specific specialist mitigation measures as specified in this report.

This Draft EIR is available for a final review and comment period of 40 Days, extending from **08 January 2014** to **17 February 2014**. In terms of Regulation 56(6) of NEMA, registered I&AP's must submit comments on the EAP within this allowed comment period.

DRAFT ENVIRONMENTAL IMPACT REPORT

1 INTRODUCTION

Cape EAPrac has been appointed by **RE Capital 3 (Pty) Ltd.** (previously Kimbratrax (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 3 Solar Development** near Upington and Keimoes in the Northern Cape.

The Activity proposed is the Generation of Electricity using Photovoltaic (PV) Technology. Photovoltaic technology refers to both conventional photovoltaic as well as concentrated photovoltaic (CPV).

RE Capital 3 (Pty) Ltd. Have an option to sub-lease a portion of Portion 12 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 **Annexure G5**.

The total generation capacity of the solar facility will not exceed **225MW** (3 Phases of 75MW) for input into the national Eskom grid. These three phases may be undertaken by three separate Renewable Energy Independent Power Producers (REIPP's). Each of the phases may be implemented by agents acting on behalf of the applicant or by completely separate legal entities. Notwithstanding this, these entities will be required to comply with the recommendations in this EIR as well as any conditions contained in an environmental decision. It should also be noted that the three phases may be submitted under the same window as per the RFP.

The purpose of this **Draft Environmental Impact Report (EIR)** is to describe the environment to be affected, the proposed project, the process followed to date (focussing on the outcome of the scoping and public participation process and specialist studies), to present the findings and recommendations presented in the specialist impact assessment studies, and to assess the potential impacts of the project on the environment as well as to provide a description of how the development concept has been adjusted to consider the above..

This Draft Environmental Impact Assessment Report is available for a 40 day review and comment period extending from **Wednesday 08 January 2014** – **Monday 17 February 2014**.

All comments on the Draft EIR must be submitted to Cape EAPrac, no later than 17 February 2014 to the address below.

*C*ape *EAP*rac
ATTN: Mr **Dale Holder**
P.O. Box 2070, George, 6530
Tel: 044 874 0365; Fax: 044 874 0432
E-mail: dale@cape-eaprac.co.za

All comments received on the Draft EIR will be included in the Final EIR that will be submitted to the National Department of Environmental Affairs for consideration and decision making.

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** (IPP's) to contribute electricity to the national grid (National Response Document, 2008). **RE Capital 3 (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.)

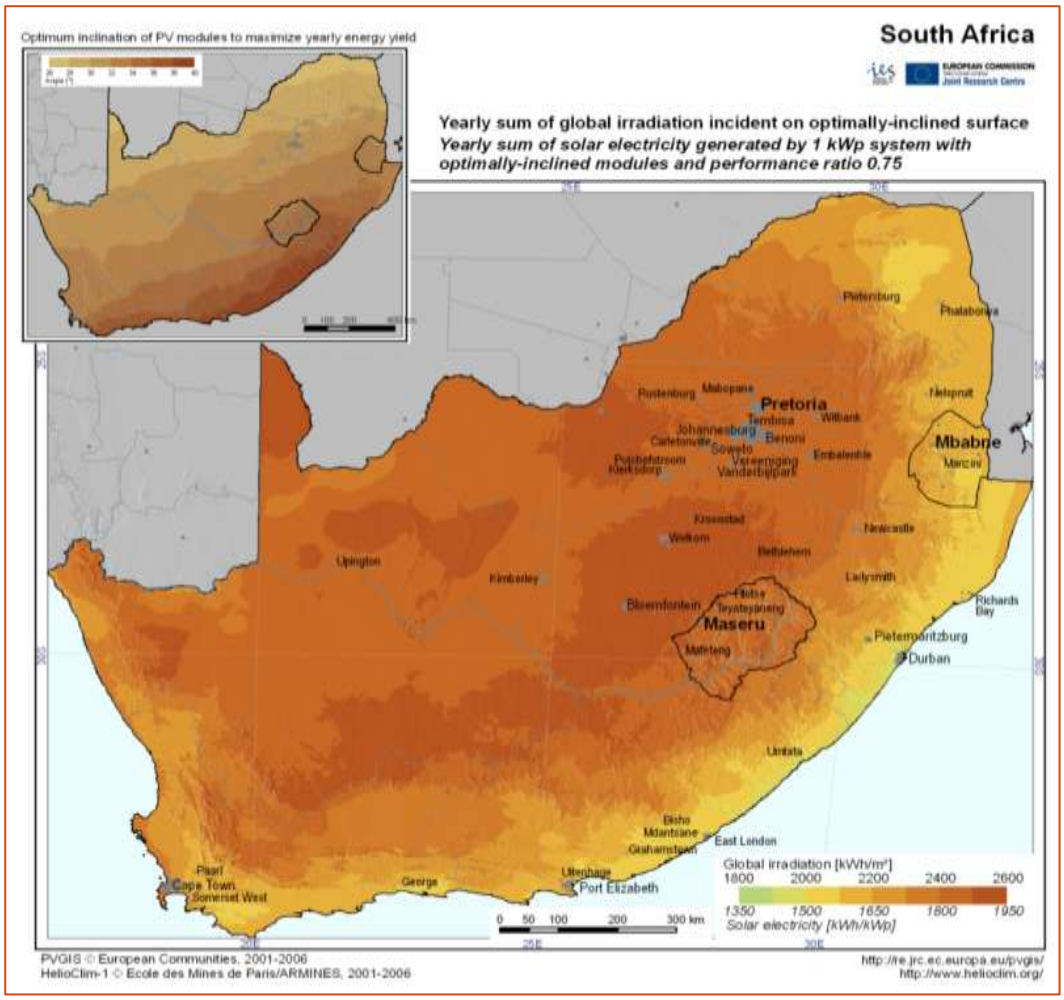

Figure 1: Solar radiation map for South Africa (Source: Solek Engineering Report, 2012).

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 (This facility is currently under construction on a portion of land adjacent to the proposed Re Capital 3 Solar Development), 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 3 Solar Development Ltd. is one such IPP solar project which intends to generate 225MW (in three phases) of electricity from solar-energy for inclusion into the National grid. The RE Capital 3 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 & proposed new Major Transmission Substation; and
- Its proximity to other Alternative Energy Facilities (both proposed and currently under construction). This area will become an alternative energy hub in the Northern Cape.

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: 19 August 2013

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 3 facility falls within **the high priority grid** for PV installations.

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). Figure 2 depicts a summary of the S&EIR process.

Figure 2: Summary of Scoping & 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.

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 3 Solar Development

R544	Listed Activity	Activity Description
10(i)	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.	**New overhead power line** linking the proposed on-site substation/operation building to the new proposed Major Transmission Substation. A number of alternative power line alignments are being investigated and have been assessed as part of this environmental process.
11	The construction of **(ii)** channels **(iii)** bridges **(v)** weirs **(x)** buildings exceeding 50m² in size, or **(xi)** infrastructure or structures covering 50m² or more, where such construction occurs **within a watercourse or within 32m of a watercourse**, measured from the edge of the watercourse, excluding where such construction will occur behind the development line.	The possible construction of roads/tracks & PV arrays across the minor drainage lines or in proximity to seasonal pans. These crossings have been assessed and details of these are included in the Engineering report attached in Annexure D4.
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, pebbles or rock of more than 5cubic metres from **(i) a watercourse.**	The possible construction of roads/tracks & PV arrays across the minor drainage lines. These crossings have been assessed and details of these are included in the Engineering report attached in Annexure D4.
22 (ii)	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 or, **(iii)** for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.	Construction of **access and internal roads** for the solar facility for construction and operation phases outside the urban area and of both Upington and Keimoes.
R545	**Listed Activity**	**Activity Description**
1	The construction of facilities or infrastructure for the **generation of electricity** where the electricity output is **20MW or more**.	RE Capital 3 will have a maximum generation capacity of **225MW**. This will by undertaking in three phases of 75MW – Each phase may be implemented by a different REIPP
8	The construction of facilities or infrastructure for the **transmission and distribution of electricity** with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.	**New overhead power line** linking the proposed on-site substation/operation building to the proposed new Eskom Major Transmission Substation. A number of power line alignments have been considered and assessed as part of this environmental process.
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 3 Solar Development of approximately **600ha** on vacant land, outside of the Urban Areas of both Upington and Keimoes
R546	**Listed Activity**	**Activity Description**

4	The **construction of a road wider than 4m** with a reserve less than 13.5m. All areas outside urban areas.	Construction of **access and internal roads wider than 4 metres** for the solar facility, outside the urban areas of both Upington and Keimoes.
14	The **clearance of an area of 5ha or more of vegetation** where 75% or more of the vegetative cover constitutes indigenous vegetation. All areas outside urban areas.	**Vegetation clearing** for the Solar Panels and associated infrastructure: access roads, cable trenches and on-site substation & axillary buildings etc. **outside the urban areas of Upington and Keimoes** Solar Energy Plant to be constructed over an area approximately 600ha on private land. Intact vegetation to be avoided by solar facility as far as possible.

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.

2.3 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.** Please see the **ecological impact assessment** attached in **Annexure D1** for further information.

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**.

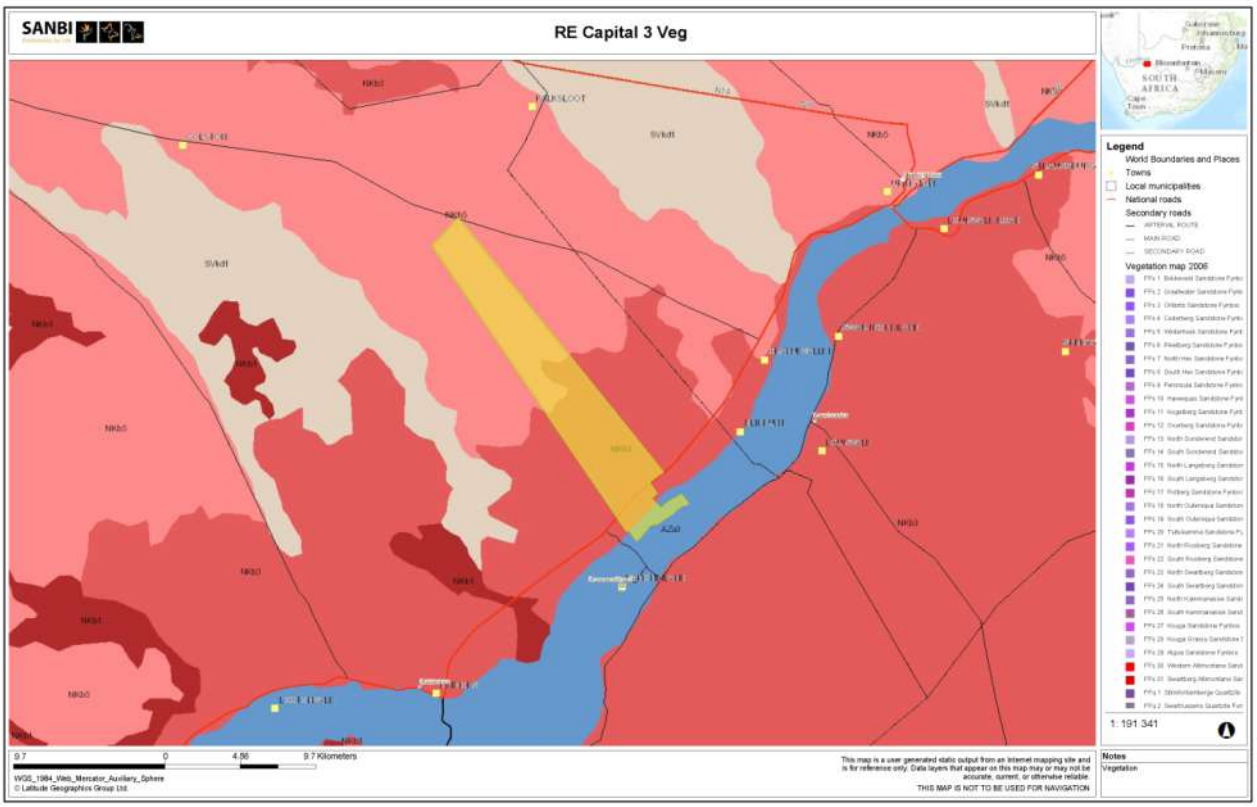

Figure 3: The broad-scale vegetation in and around the proposed RE Capital Solar Facility. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006),

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 NPAES 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 3 Solar Facility will **not have an effect** on this or any other **NPAES** focus Area.

2.5 NAMAQUA DISTRICT BIODIVERSITY SECTOR PLAN, 2008.

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 3 Solar facility **will not affect** this level 2 CBA along the Southern section of the property (as the proposed solar development will be restricted to either the central or northern section of the property).

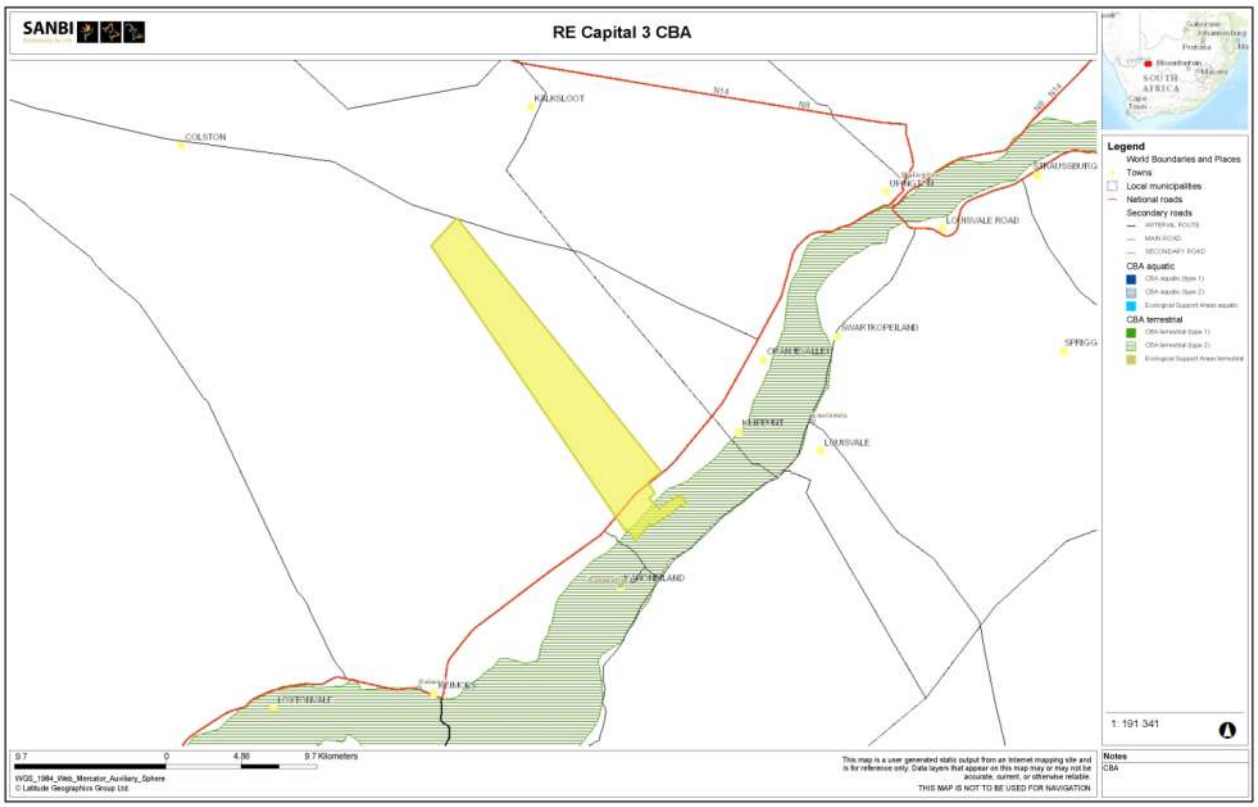

Figure 4: Showing Critical Biodiversity Areas (CBA's) in relation to Portion 12 of Dyasonsklip 454.

According to the information provided by the South African National Biodiversity Institute (SANBI) through their Biodiversity GIS (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 3 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".*

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 larger but not highly significant numbers of this species are likely to be affected by the development but probably **less than 100 plants**, which would not be considered highly significant given then abundance in the local area.

Please refer to the **Ecological Impact Assessment Report** in **Appendix D**, **Annexure D1** for a detailed description of the plant species found to occur in the area.

The Department of Agriculture, Forestry and Fisheries (DAFF) was registered as a key stakeholder on this environmental process and were given an opportunity to comment on the DSR and FSR At the stage of publishing this DEIR, comment had net been received from DAFF forestry directorate..

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 3 site is very low, which can be ascribed firstly to the aridity of the site.

In terms of soil and water resources, the seasonal washes and several pans highlighted as sensitive and have been excluded from the development footprint.

DAFF have acknowledged correspondence regarding the availability of the DSR and have confirmed that it has been captured on the **Agriland tracking and management system** (attached in appendix E).

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.

According to the SANBI SIBIS database, 286 indigenous plant species have been recorded from the quarter degree squares 2820 BD, DB and 2821 AC and CA. This includes 7 species of conservation concern as listed in the table below.

The Ecological specialist confirmed that two of these can be confirmed present at the site, with *Hoodia gordonii* present in low numbers and *Acacia erioloba* common along the larger drainage lines.

There are also additional species present which are either protected under the National Forests Act such as *Boscia albitrunca* or protected under the Northern Cape Nature Conservation Act of 2009, which includes *Boscia foetida*, all *Mesembryanthemaceae*, , all species within the *Euphorbiaceae*. *Oxalidaceae*, *Iridaceae*, all species within the genera *Nemesia* and *Jamesbrittenia*. It is not likely that many *Boscia albitrunca* would be affected by the development

as this species is mostly restricted to the larger drainage lines at the site. *Boscia foetida* is however common along the smaller drainage lines as well as in the open veld, and it is likely that a fairly large number of these would be affected, but probably **less than 100 plants**, which would not be considered highly significant given then abundance in the local area.

Table 2. Listed species which may occur within the RE Capital 3 Solar Energy Development, including their IUCN status and the likelihood that they occur at the site (Todd, 2013).

Family	Species	IUCN Status	Likelihood
ASPHODELACEAE	*Aloe dichotoma*	VU	Low
MESEMBRYANTHEMACEAE	*Dinteranthus wilmotianus*	NT	Low
AMARYLLIDACEAE	*Crinum bulbispermum*	Declining	Low
FABACEAE	*Acacia erioloba*	Declining	Confirmed
APOCYNACEAE	*Hoodia gordonii*	DDD	Confirmed
ASTERACEAE	*Felicia deserti*	DDD	High
ASTERACEAE	*Senecio glutinarius*	DDT	Low

The Northern Cape Department of Environmental Affairs and Nature conservation were registered as a key stakeholder on this process and were given an opportunity to comment on the DSR and FSR. At the date of publishing this DEIR, the department had not provided comment on this application. They will be given further opportunity to comment on the Draft and Final EIR.

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.

According to the SANBI SIBIS database, 286 indigenous plant species have been recorded from the quarter degree squares 2820 BD, DB and 2821 AC and CA. This includes 7 species of conservation concern as listed in Table 3 of the Ecological Scoping Report in Annexure D1.

Although not all the listed species would occur at the site, there is a high probability that at least some of these species occur at the site.

The Northern Cape Department of Environmental Affairs and Nature conservation were registered as a key stakeholder on this process and were given an opportunity to comment on the DSR. At the date of publishing this FSR, the department dad not provided comment on this application. They will be given further opportunity to comment on the Draft EIR.

2.10 NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). South African National Heritage Resources

Agency (SAHRA) is the enforcing authority in the Northern Cape, and is registered as a Stakeholder for this environmental process.

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

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

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

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

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

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

Dr **David Morris** from the **McGregor Museum Department of Archaeology** has undertaken a heritage impact assessment of the proposed development. A copy of this Heritage Impact Assessment is attached in **Annexure D3**.

The project was furthermore registered on the South African Heritage Resources Information System (SAHRIS). The South African Heritage Resources Agency (SAHRA) provided comment on the Draft Scoping Report. SAHRA concurred with the findings of the Heritage Scoping Report and made the following recommendations:

- A full Heritage Impact Assessment, consisting of an Archaeological and Paleontological Impact Assessment, must be compiled for this application.
- The archaeological component will identify the archaeological sites and assess their significance. It should also make recommendations (as indicated in section 38 of the NHRA) about the process to be followed. For example, there may need to be a mitigation phase (Phase 2) where the specialist will collect or excavate material and date the site. At the end of the process the heritage authority may give permission for destruction of the sites.
- The paleontological study must be undertaken to assess whether or not the development will impact upon paleontological resources - or at least a letter from a Palaeontologist motivating for an exemption is needed to indicate that this is unnecessary. If the area is deemed sensitive, a full Phase 1 Paleontological Impact Assessment will be required and if necessary a Phase 2 rescue operation might be necessary (see www.palaeontologicalsociety.co.za).

The Heritage Impact Assessment compiled by Dr Morris, attached in Annexure D3, complies with these requirements. SAHRA have been given a copy of this Heritage Impact Assessment and the Draft EIR for review and comment.

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 3 Solar is to be sourced from boreholes on the property (preferred supply), 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 5: Showing potential water sources on portion 12 of Dyasonsklip 454.

An Application will be submitted to the Northern Cape Department of Water Affairs (DWA) for the registration of the boreholes, as well as an **Application for a Water Use Licence (WUL)** for the use of the borehole water for the purposes of the solar facility.

This WUL Application will be reviewed by DWA once the Environmental Authorisation has been received from DEA (if granted) and approval provided by the Department of Agriculture. It is envisioned that an Integrated WULA will be submitted for the section 21 A, I and C provisions in the National Water Act.

A Non-binding Water Confirmation Letter for the project have been applied for at the DWA, in which the DWA is asked to confirm that according to their information whether there is adequate water available for the project.

DWA and the Department of Agriculture have been registered as a stakeholder on this environmental application and were given an opportunity to comment on the DSR. DWA made the following recommendations on their comment on the DSR:

- It is recommended that pump test, not a blow yield test, be done on both the boreholes by an accredited person or company. This is one of the requirements for the integrated WULA.
- It is recommend that the applicant do a monthly monitoring of the water level of the boreholes and keep it on record.
- The applicant must investigate using high pressure wind to clean the panels as an alternative.

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 225MW RE Capital 3 solar development supports the notion of sustainable development by presenting a reasonable and feasible alternative to the existing vacant land use type, which has limited agricultural potential due the lack of water and infrastructure.

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

2.13 GREEN PAPER ON NATIONAL STRATEGIC PLANNING (2009)

The Green paper on National Strategic Planning (2009) for South Africa has an overarching objective with respect to planning which is to enhance South Africa's socio economic development by improving planning within Government and managing the Governments development processes.

The 10 priorities as per the Medium Term Strategic Framework outlined in the Green Paper

Are as follows:

- Speed up economic growth and transform the economy to create decent work and sustainable livelihoods;
- Introduce a massive programme to build economic and social infrastructure;
- Develop and implement a comprehensive rural development strategy linked to land and agricultural reform and food security;
- Strengthen the skills and human resource base;
- Improve the health profile of all South Africans;
- Intensify the fight against crime and corruption;
- Build cohesive, caring and sustainable communities;
- Pursue African advancement and enhanced international cooperation;
- Ensure sustainable resource management and use; and
- Build a developmental state, improve public services and strengthen democratic institutions.

The proposed Re Capital 3 Solar Development is deemed to comply with these strategic priorities.

3 ACTIVITY

The Applicant intends to develop a **solar energy facility** with a generation capacity not exceeding **225MW** (Megawatt). The proposed RE Capital 3 Solar Development is to be located on a development site of approximately 600ha on a portion of portion 12 of the farm Dyasonsklip near Upington in the Northern Cape. The project will consist of and be developed in **three phases**, consisting of 75MW each. Each phase will occupy approximately 200ha.

Reference to PV refers to both PV as well as Concentrated PV (as variations of the same technology)

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

The proposed infrastructure planned to be constructed includes a series of solar Photovoltaic Arrays or Concentrated Photovoltaic panels as well as inverters, internal electrical reticulation and an internal road network. An on-site substation will need to be constructed - this will typically include a transformer to allow the generated power to be connected to Eskom's electricity grid. Auxiliary buildings, including ablution, workshops and storage areas, 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.

The series of **PV array** rows which will cover an approximate **footprint** of **600 hectares** (200 hectares per phase), **internal roads** covering approximately **36 hectares** (12 hectares per phase) and **Auxiliary Buildings** of approximately **3 hectares** (1 hectare per phase).

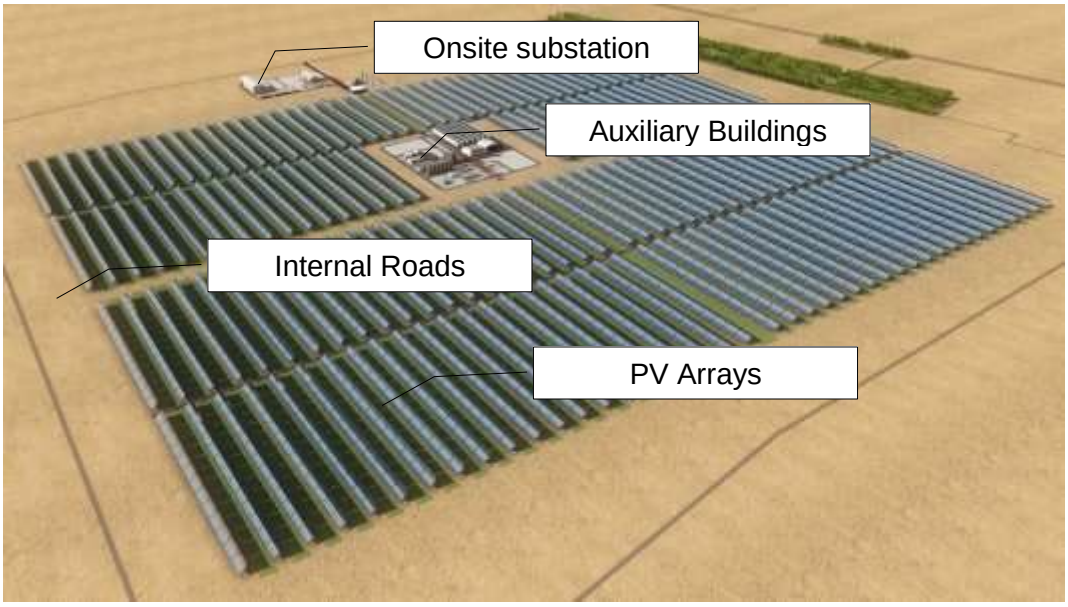

Figure 6: A typical layout of the components of a Solar PV facility (Source: Solek Engineering Report, 2013).

The 225MW RE Capital 3 will occupy approximately **600ha** of land – the estimated portion of land each component will typically occupy for the total project as well as for each phase is summarised in the tables below.

Table 3: Component size and percentage for total development

Component	Estimated extent of total component	Percentage of total footprint (600ha)	Percentage of total farm (±5725 ha)
PV arrays	540ha (5.4 km^2)	90%	less than 10%
Internal roads	54ha (0.54 km^2)	7%	less than 0.9%
Auxiliary buildings	6ha (0.06 km^2)	0.6%	less than 0.1%

Table 4: Component size and percentage for each phase

Component	Estimated extent of components	Percentage of total footprint (+ 165 ha)	Percentage of total farm (±5725 ha)
PV arrays	180 ha (1.8 km^2)	90%	3%

Internal roads	18 ha (0.18 km^2)	9%	0.3%
Auxiliary buildings	2 ha (0.02 km^2)	1%	less than 0.1%

Various site and layout alternatives for the abovementioned components are under consideration. Details regarding the consideration of alternatives are included in section 4 below.

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

The solar arrays are put together with strings of solar modules connected in series, which can be 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 50 and 200 m 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 constraints defined by the participating specialists.

4 CONSIDERATION OF ALTERNATIVES

A number of alternatives, including activity, site, layout and technological alternatives were considered for the proposed RE Capital 3 Solar Development. The consideration of these alternatives are detailed below.

4.1 ACTIVITY ALTERNATIVES

Two activity alternatives were considered at the onset of this project, namely:

- The generation of electricity via Concentrated Solar Power (CSP) facilities; and
- The generation of electricity via Photovoltaic (PV) power facilities.

PV refers to both conventional as well as concentrated PV CPV) as these are variations of the same technology.

According to Solek, 2013, CSP facilities operate by concentrating the sun's energy to produce heat that either drives a steam turbine or an external heat engine to produce electricity. CSP facilities consist of a series of heliostats or trough panels with mirrors that concentrate sunlight on a receiver tower (although some CSP farms are developed without receiver towers).

A liquid (known as heat transfer fluid, HTF, which usually consists of a mix of oils) or gas medium is heated. The heat is then used to convert water to steam, which is used to generate electricity through steam turbine generators. The heated liquid (HTF) or gas medium is then cooled, condensed, and reused. Evaporation ponds for waste water are needed to separate sludge or solids containing hazardous chemicals from the chemical waste water, cycle water blow down and cleaning liquids. Such materials are removed from the ponds by a licenced waste company. Hazardous waste would then be disposed by a hazardous waste facility; waste that is not hazardous should be disposed at a landfill site.

The option of operating a **CSP was eliminated and will not be considered further** in this environmental process, for the following reasons:

- CSP facilities have greater impact on birds than PV farms because of the associated central receiver tower, standby focal points and heliostats;
- CSP facilities require significant volumes of water for operation (water is a scarce resource in this region); and
- CSP facilities generate significant volumes of waste product.

Figure 7: Example site of a Concentrated Solar Power Facility (Solek, 2013)

The remainder of the environmental process will thus only assess the impacts associated with the preferred activity alternative, namely the generation of power through a PV (including conventional and Concentrated PV) facility.

4.2 SITE ALTERNATIVES

Two site alternatives for the proposed facility have been considered. For ease of reference, these two site alternatives will be referred to as the Northern site and the Central Site (both these sites are on portion 12 of the farm Dyasonsklip 454).

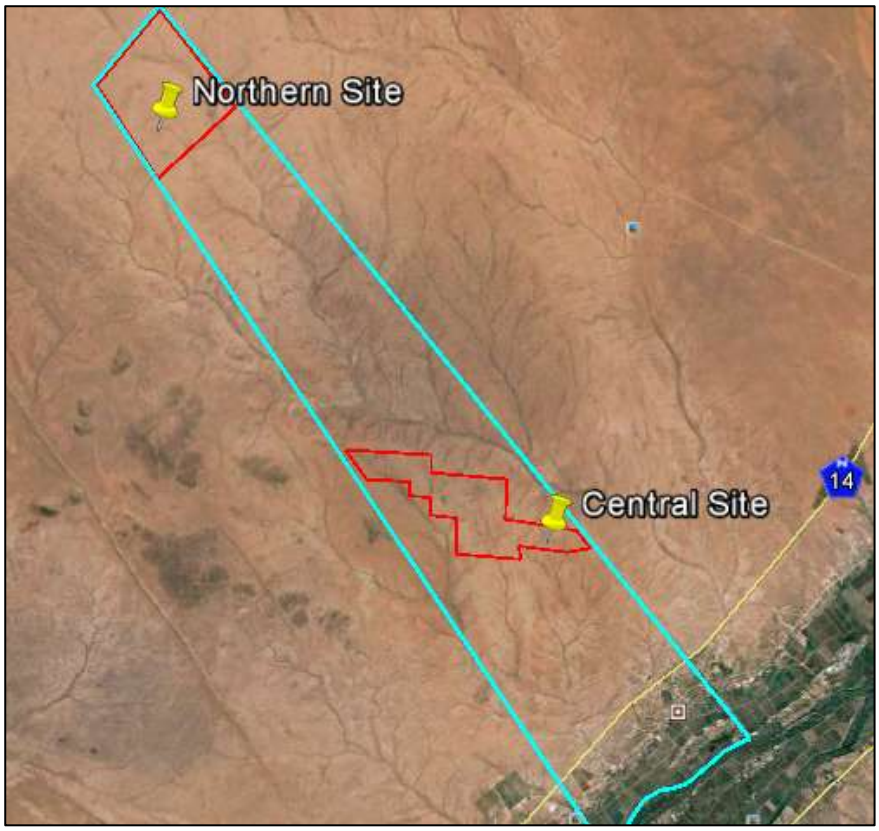

Figure 8: Showing the proposed site alternatives in relation to the property boundary.

Both of these alternatives were considered in detail during the scoping phase of this process. Both these sites were investigated by the participating specialists. After the scoping phase, the **Northern Alternative** has been **eliminated**. In summary, the Northern Alternative was eliminated for the following reasons:

- Proximity in relation to the proposed Eskom MTS. The northern site alternative is situated further away from the MTS and thus will result in the need for longer grid connections that will result in additional ecological impacts (particularly with regard to bird collisions and electrocutions). It will also result in increased opportunity costs as a result of the increased length of the connection infrastructure.
- The Ecological specialist highlighted certain constraints associated with the Northern Alternative. These constraints included portions of a major drainage system as well as a number of seasonal pans.

The Northern site alternative has been eliminated and will not be considered further or assessed as part of this process.

Further details regarding the site alternatives are included below and in the layout report attached in **Appendix C**.

4.3 LAYOUT ALTERNATIVES

Within the preferred site alternative, a number of layout alternatives will also be considered and assessed in this environmental process. At the previous stage in the process (scoping) only the initial uniform layouts have been considered. Once all the participating specialists had identified sensitive areas within the initial study sites, additional layout alternatives were developed to avoid these sensitive features.

Each of the site alternatives have been divided into three phases and a preliminary layout developed within these three phases.

NB: The optimum arrangement of the three phases and the specific layout within each phase is a costly exercise and will only be determined once the project has been awarded preferred bidder status. This will however not has an effect on the environmental impacts assessed, as these have been assessed for the total footprint of each of the phases.

For the purpose of the environmental process, a **total environmental footprint** has been considered and assessed (the detailed design within this footprint will only take place at a later stage).

During the planning phase of the project numerous layouts and technologies were taken into consideration before the preferred proposal was decided upon. The two major points which lead to the preferred/mitigated proposal were the following:

- Three uniform areas between 200 ha and 250 ha each, to ensure the project would be economically viable;
- Minimal disturbance to water washes and highly sensitive areas as identified by the ecological specialist.

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

4.3.1 Layout alternative 1 - Original 750ha layout

Figure 8: Original 750ha layout, phases A, B and C

The total study site of 750ha was divided in three phases, approximately 250 ha each. If there were no environmentally sensitive areas, this would have been the ideal layout for the three phases of the project. This layout is further referred to as the Original 750ha layout.

4.3.2 Sensitive Areas identified by specialists

After undertaking detailed site inspections, the participating specialists (Ecological, Heritage and Agricultural) identified all sensitive features that were to be avoided by the development footprint.

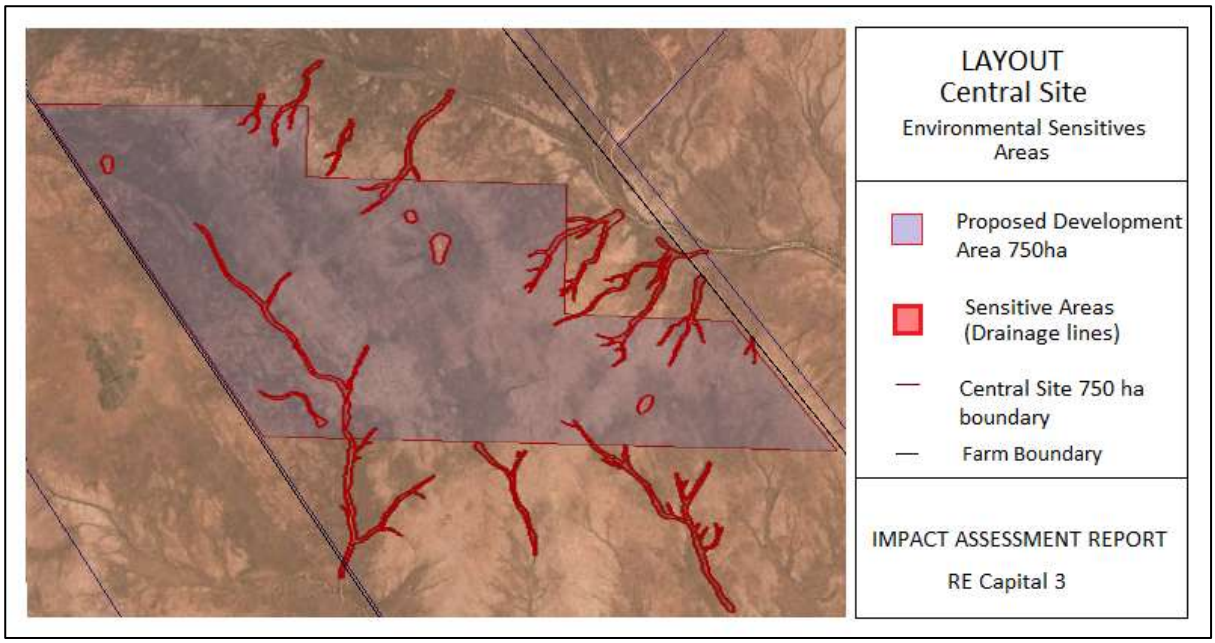

Figure 9: Sensitive Areas on and surrounding the 750ha study area

The ecological study showed there are seasonal washes on the proposed development area that need to be taken into account. There is one larger drainage line to the left bottom corner of the site that, according to the ecological specialist, is the major feature that needs to be avoided. The smaller drainage lines should be avoided as far as possible, but if this is not completely possible, it would not have a significant impact since the foundation of the modules, the mounting methods used and the space in between the modules, it will be possible to construct the solar modules over the end parts of the smaller drainage lines without having a significant negative effect on the drainage line.

There are also four pans on the proposed development area. The ecological study indicated two of these as sensitive. The map below shows the major drainage line and two pans that have been indicated as more sensitive.

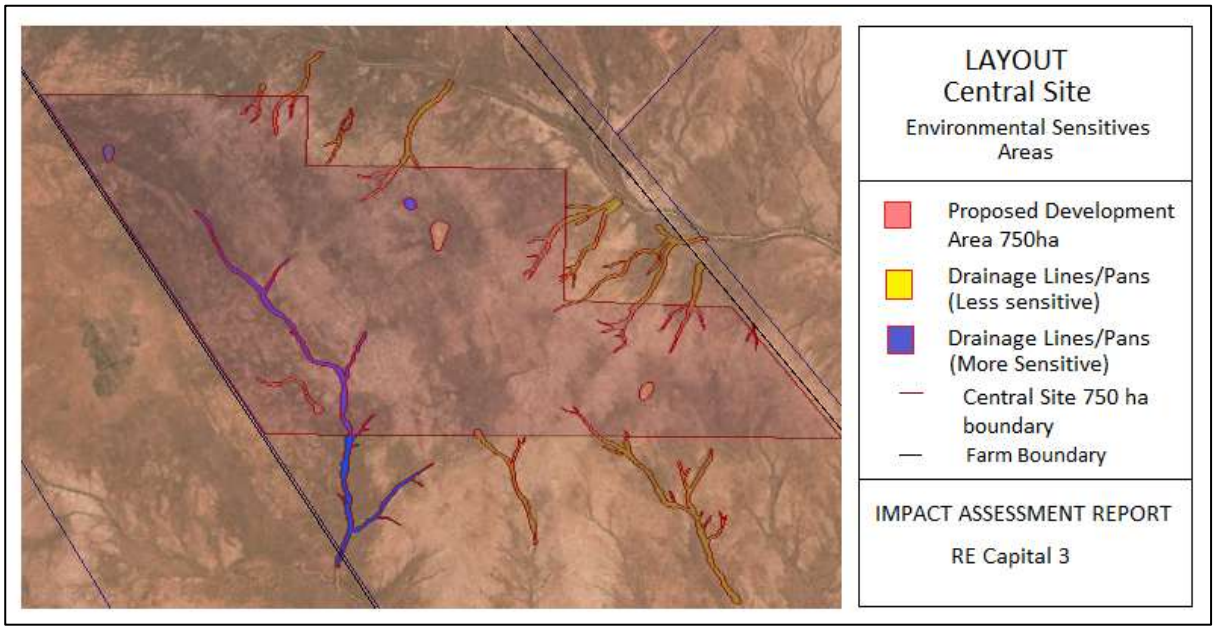

Figure 10: Sensitivity of features identified by ecological specialist

4.3.3 Layout Alternative 2 – Uniform Layout

As a first layout option, the sensitive areas were added to the original 750ha layout. This is referred to as the Uniform Layout. In the Uniform layout 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.

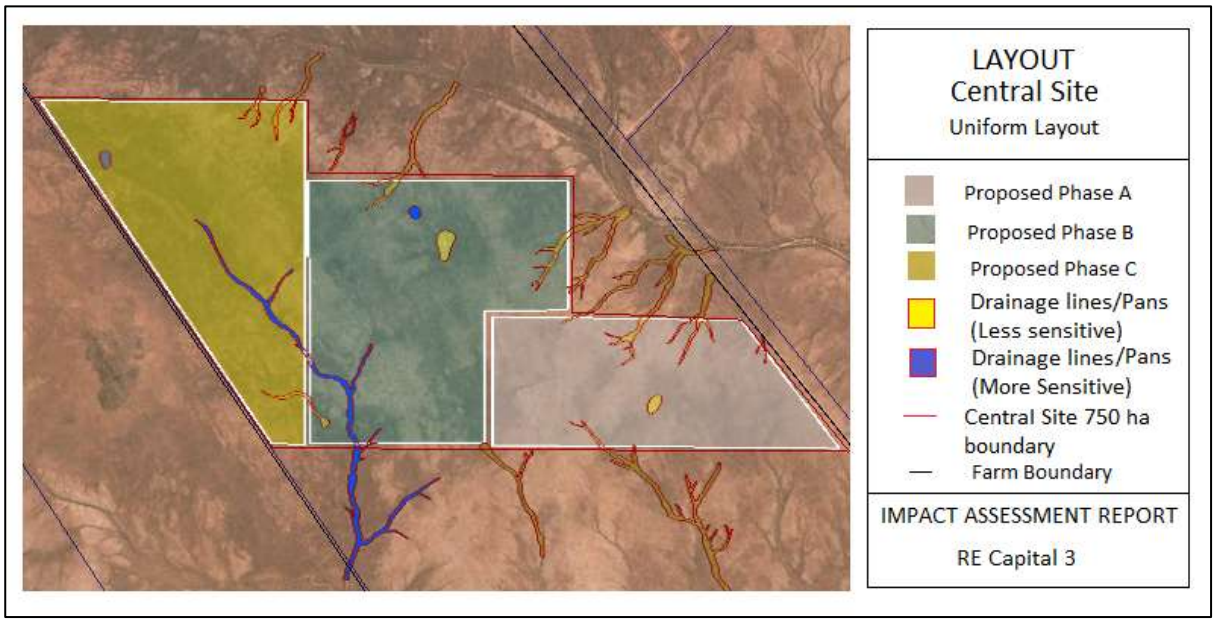

Figure 11: Uniform layout (750ha including sensitive areas)

4.3.4 Layout Alternative 3 – Preferred Layout

In order to avoid the major drainage line in the south-west of the study area and the two sensitive pans, as well as the smaller drainage lines as far as possible, an alternative layout was developed. The borders of the 3 phases were adjusted in order to keep the developable area for each phase more or less the same size.

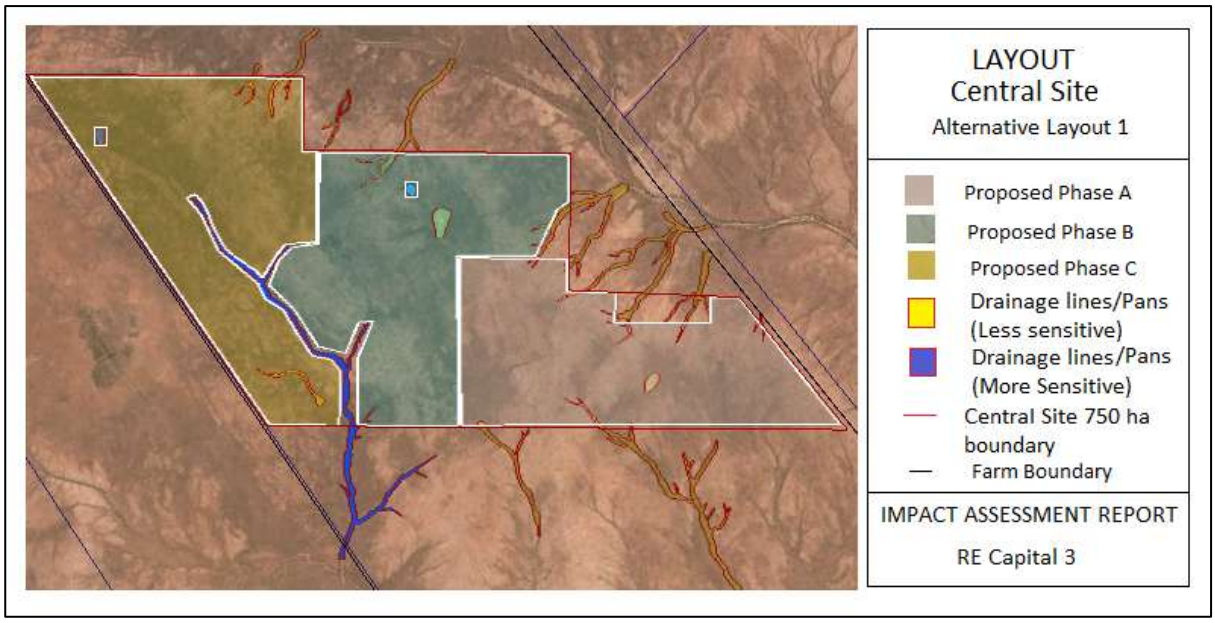

Figure 12: Alternative (Preferred) layout (Development area avoiding high sensitive areas)

As can be seen from the preferred layout, the solar arrays have been placed in such a way that they would have the least influence on the seasonal washes while avoiding the ecological sensitive areas where practically possible.

Although the annual rainfall within this region is extremely low, the drainage lines, seasonal washes and pans were carefully considered and the most viable alternative selected.

Because of the relatively dry climate and low rainfall, natural vegetation tends to be denser within the drainage washes, thus the layout which has the smallest impact on the washes would generally also have the smallest impact on the vegetation.

4.3.5 Layout of phases within the preferred alternative.

Figures 13-15 below show the proposed layout of the various phases within the preferred layout alternative.

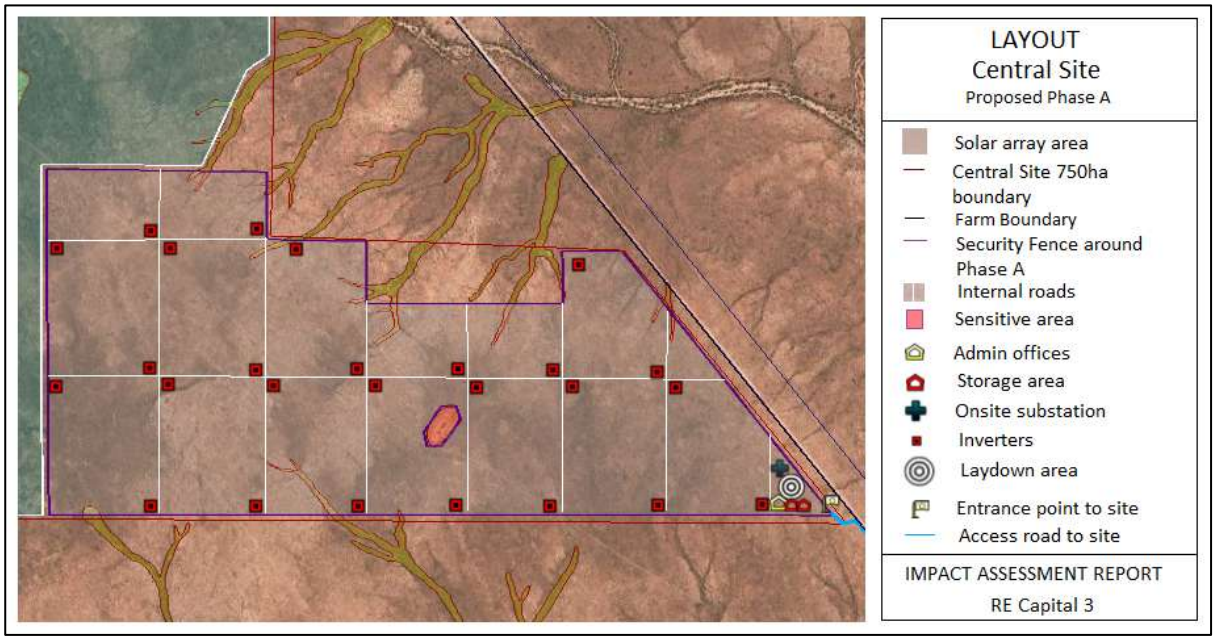

Figure 13: Preferred Layout - Phase A

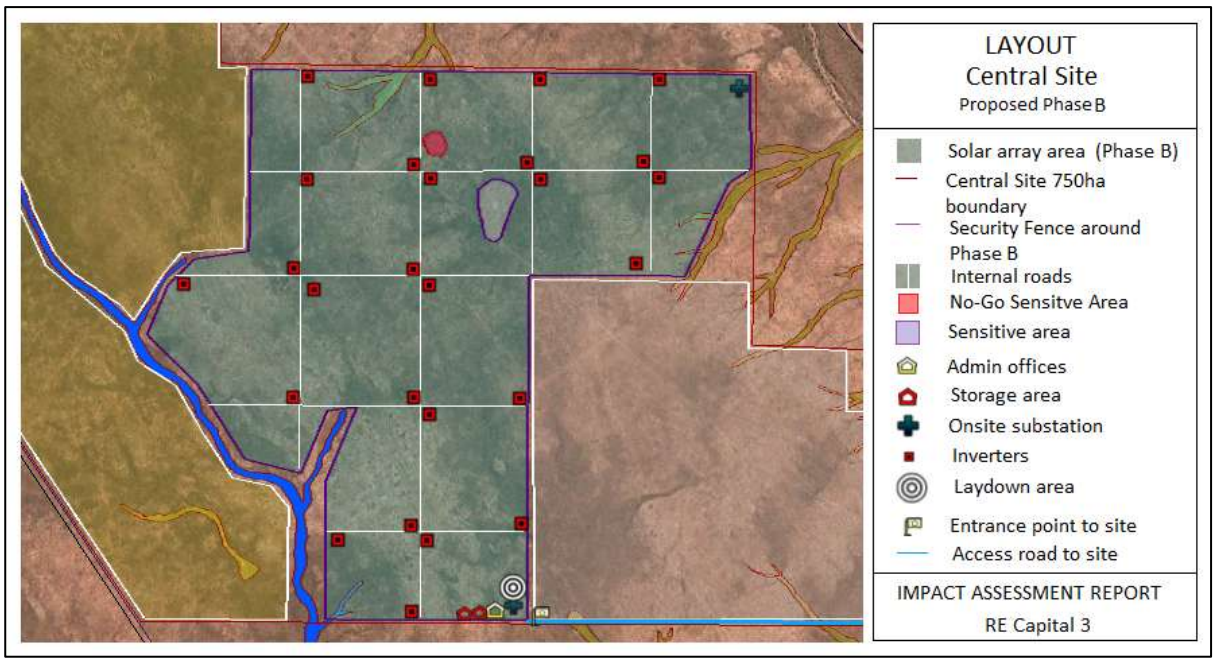

Figure 14 – Preferred Layout – Phase B

Phase B will consist of the same components as Phase A. The access road will be lengthened across the southern border of Phase A, to the entrance of Phase B.

The red area indicated on the illustration of Phase B as “No-Go sensitive area” is a sensitive pan that will be avoided. The area indicated as the “Sensitive Area” will again be treated with caution during construction, and as far as possible the poles will be constructed in the lesser sensitive areas.

Two substation locations have also been indicated, because of the multiple power line alternatives.

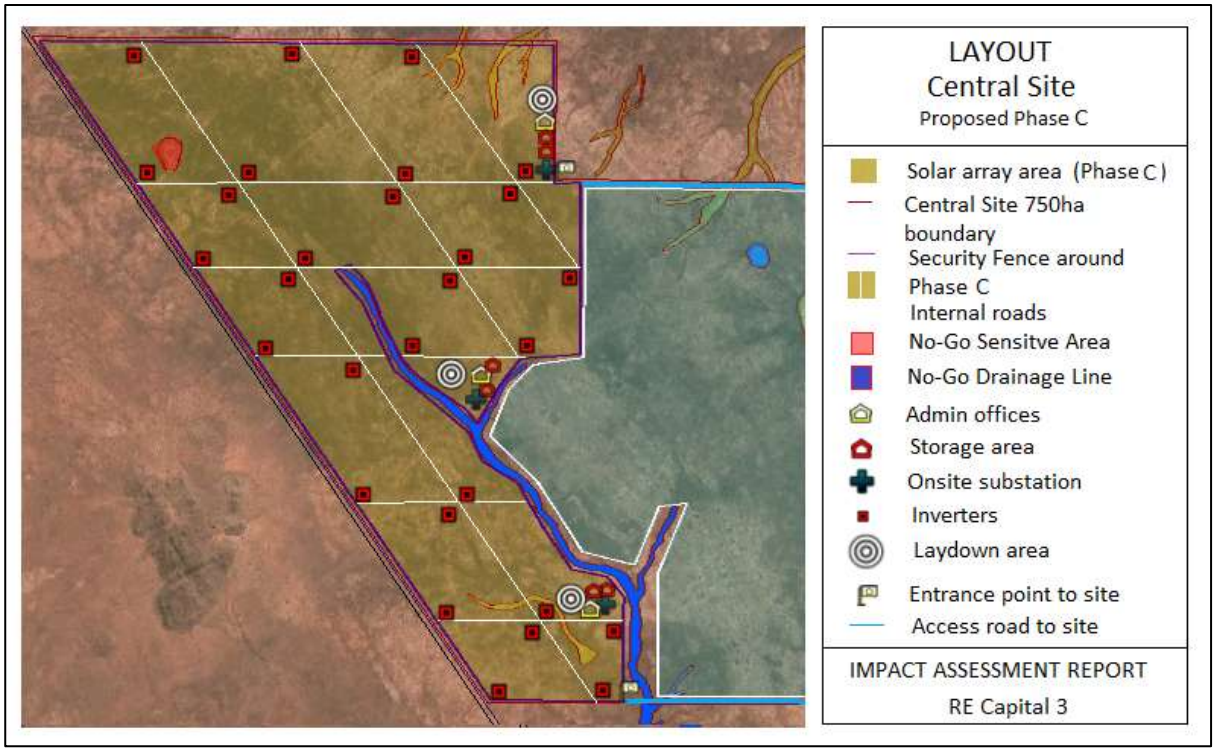

Figure 15: Preferred Layout – Phase C

The above illustrations show the typical layout in each phase. Each phase will consist of the same list of components. As explained in more detail in the Engineering Report (Solek, December 2013) attached in Annexure D4, these components include solar modules, roads, workshop and admin office area, laydown area and an onsite substation. The exact position of these components will be determined with the final plant design after bidding, but will be constructed within the assessed footprint (and avoid sensitive areas on the site)

The infrastructure of each phase will have a footprint of approximately 200 ha and is aimed at having the lowest possible environmental impact while keeping the project economical viable.

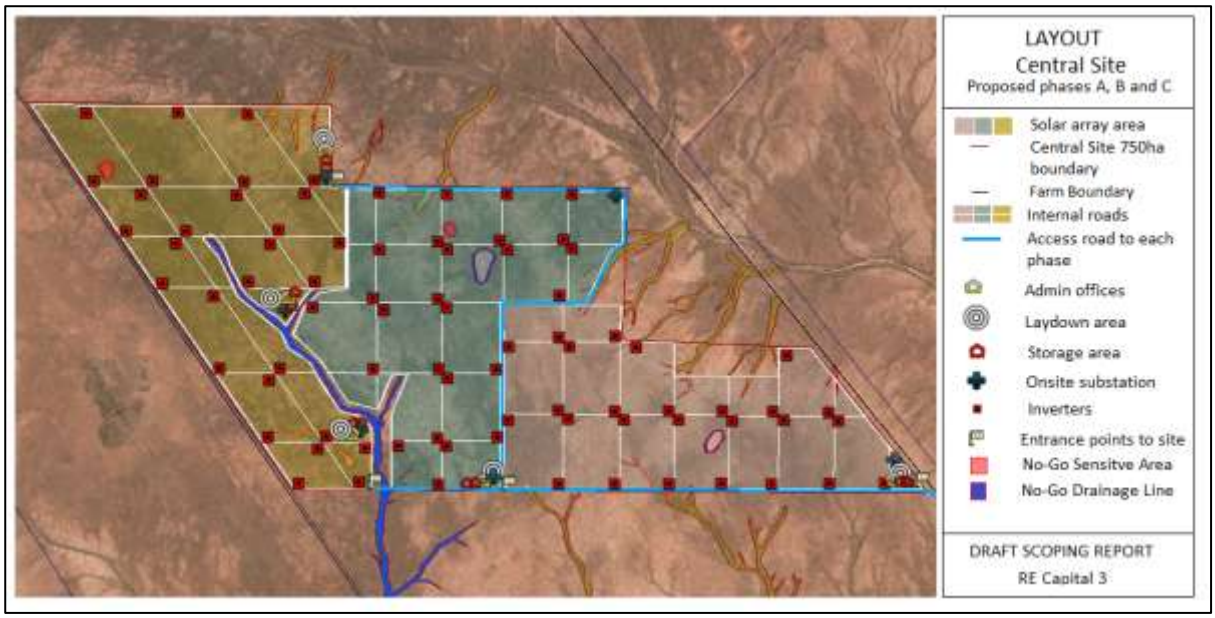

Figure 16: Preferred layout alternative for all 3 phases (phase A,B&C)

4.4 GRID CONNECTION OPTIONS

In the Scoping Phase four power line route alternatives were investigated, with the loop-in route option. Due to possible complications with neighbouring projects, it was decided to include two more alternatives to the south of the project.

The option to loop into the existing 132 kV line is investigated as one of the primary connection alternatives. This option is indicated as “Power line option 0: Loop-in” in the figure below. The other alternative routes will all lead from the individual on-site substations to one of the proposed locations for the new Eskom MTS substation. Options 1 to 4, as shown in the figure below, are all across the Tungsten Lodge property, whereas Options 5 and 6 are across the McTaggarts Camp property.

Option 1 will be across the neighbouring farm (Tungsten Lodge) on the southern border of the farm to one of the two possible MTS locations. Options 2 and 3 will also be across the neighbouring farm(Tungsten Lodge), running parallel and on both sides of the existing 132 kV line.

Option 4 is across the neighbouring farm (Tungsten Lodge), along the northern border of the farm, to one of the substations.

Option 5 will run parallel to Option 1, but on the McTaggarts Camp side of the fence, making a loop in order to avoid the Tungsten Lodge property before it reaches the MTS substation. Finally, Option 6 is to the south of the McTaggarts Camp property, along the N14, and then goes up to the MTS substation.

The loop-in option will be most cost effective, but this is dependent on the capacity on the line. Options 2 and 3 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. That is also the reason for the large number of options that were investigated and assessed. Negotiations are in progress for all the servitudes.

All 6 options were all chosen along existing fences or existing power lines, in order to minimise the additional environmental impact. The ecological specialist has confirmed that the impact of the various options will be more or less the same (with priority given to the shorter routes (due to the decreased possibility of bird collisions). There is not one grid connection route that will result in lower impact than others and as such, all 6 routes should be considered for authorisation (although only one will be built).

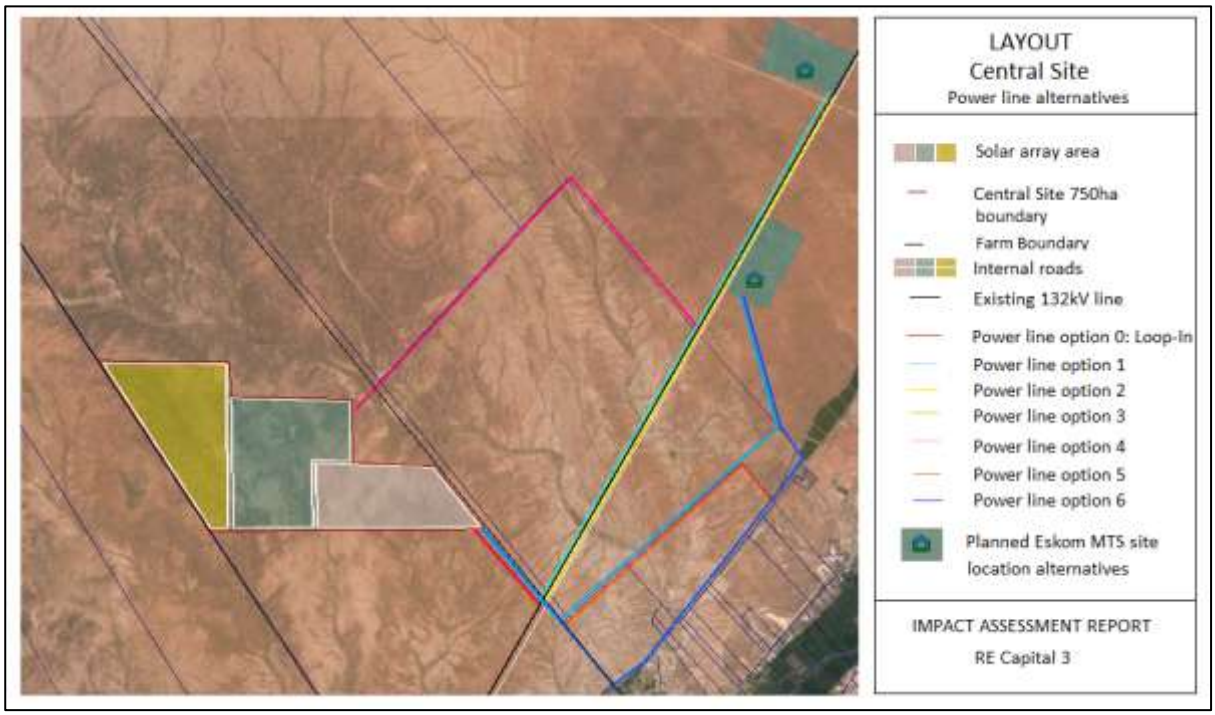

Figure 17: Six Power Line Alternatives for the Proposed Site

4.5 ACCESS ROAD OPTIONS

In the Scoping phase of the project two access roads to the construction site were investigated. One of the roads was an existing farm road running from the N14 to the proposed site, while the other was the neighbouring project's access road. At the moment the financers of the REIPPP projects, however, insists that the projects are ring-fenced, so the neighbouring project's access road is no longer an option.

The RE Capital 3 project will need to build an independent new road parallel to the neighbouring project's road, on the Dyason's Klip side of the fence.

The figure below shows the access routes that were investigated.

- **Option 1** is an existing farm road, making use of the existing Dyason's Klip entrance from the N14.
- **Option 2** is an existing farm road on the neighbouring farm, entering through the McTaggarts Camp entrance from the N14. There is, however, a chance this option may fall away, seeing that the farmer is planning a new development along this road.
- **Option 3** is along the Dyason's Klip fence, making use of a new entrance from the N14 that will have to be constructed.
- **Option 4** runs parallel to Option 3, but makes use of the neighbour's N14 entrance (on the McTaggarts Camp property).

- **Option 5** makes use of the Dyason's Klip farm entrance, and then runs along the southern border of the farm to the eastern border, and then parallel to Options 3 and 4 to the proposed site.

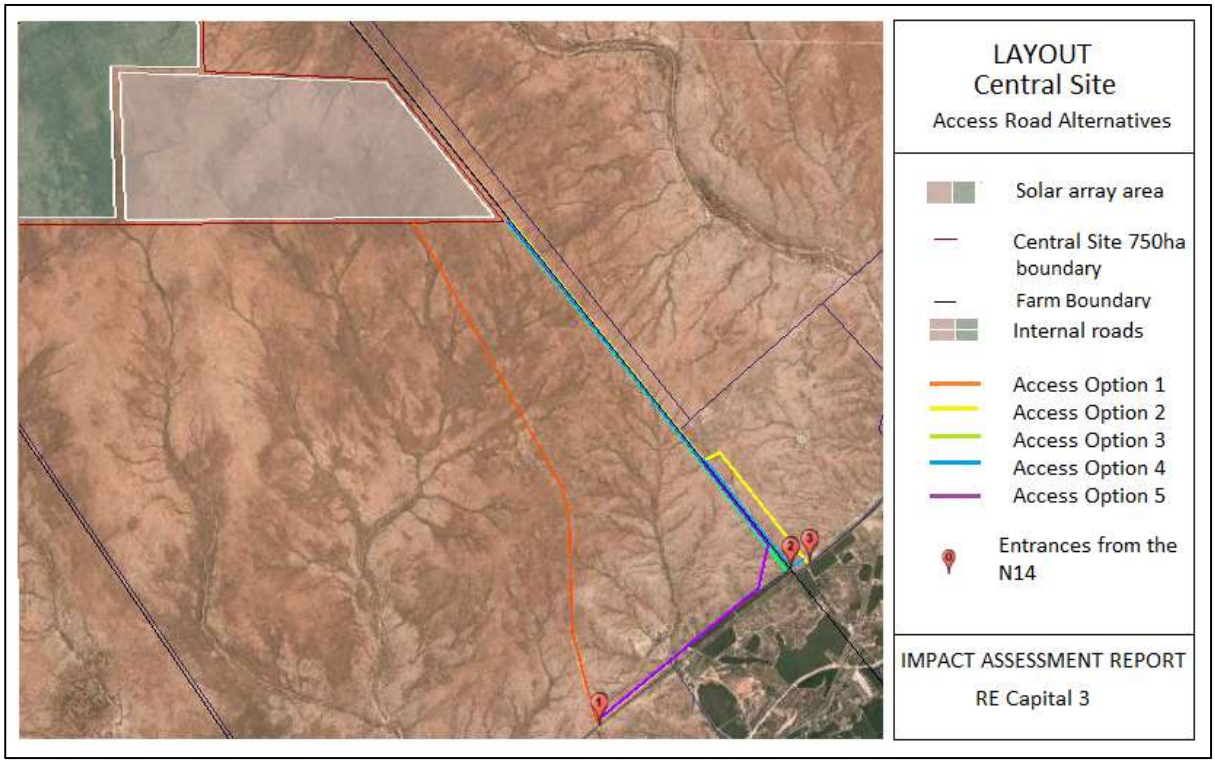

Figure 18: Access Alternatives to the Proposed Site

4.6 TECHNOLOGICAL ALTERNATIVES

The preferred activity has been identified as the generation of electricity by means of a photovoltaic power facility (this includes both Conventional Photovoltaic as well as Concentrated Photovoltaic). There are however technological alternatives or options that have been considered within the confines of the preferred activity. These technological alternatives for PV are considered under PV type, film alternatives and mounting alternatives.

4.6.1 PV Type

Two variations of PV generation were considered and are described below. The advantages and disadvantages of these PV types are summarised in table 4 below.

Table 5: showing advantages and disadvantages of PV types under investigation.

	Concentrated Photovoltaic	Conventional Photovoltaic
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.	- 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. - 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 are water intensive. - Higher cultural/ historic impact to the landscape. - Harder to transport – abnormal load.	- PV facilities of the same footprint of CPV facilities produce less power.

Both conventional pv as well as concentrated pv are deemed to be viable alternatives, and as such, both have been considered and assessed in this report.

4.6.1.1 PV technological Variation T1: concentrated photovoltaic solar farm (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. CPV technology systems are much higher, thereby using less space, 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 cooling methods that do not required additional water. By using CPV technology the impact on the environment can be seen as slightly higher mostly in terms of the height of the module, although some parties see this as an environmental advantage. The height of the modules and the fact that the modules are spread wider apart exposed the ground below the modules to more sunlight than PV arrays, which can allow the vegetation to grow back much quicker than with conventional PV

Figure 19: Example of concentrated photovoltaic (CPV) facility (Solek, 2013)

CPV technology systems are much higher (vertically), thereby using less space (horizontally). CPV systems reach a maximum height of approximately 10 m.

4.6.1.2 PV Technological Variation T2: Conventional Photovoltaic Solar Farm (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 or heat, 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 or 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 double axis tracking system (free standing panel installation).

Impacts associated with **CPV** and **PV** are similar, with each variation of the technology having its own advantages and disadvantages. The department is thus requested to **consider both these technological variations** for approval.

4.6.2 Mounting Technology Alternatives

There are two major alternatives in terms of solar PV mounting, namely fixed-tilt and tracker mounting technology.

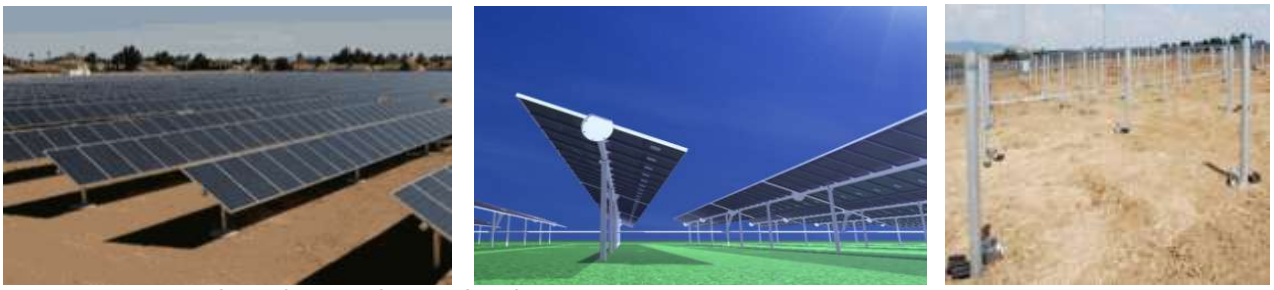

Figure 20: Examples of mounting technology.

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. The maximum height of the trackers is typically

less than 2 m. For the purpose of the environmental process, a maximum height of 5m is considered.

Figure 21: An example of a single axis tracking system. **NB – The final tracking technology will be only be decided at a later stage during the detailed design.**

The environmental impacts associated with different tracking technologies are likely to be similar and as such the final tracking technology will only be decided at a later stage during the detailed design. The environmental process will consider and assess a total environmental footprint.

The foundation of mountings can either be laid in a small concrete block, driven piers or a deep seated screw mounting system. The impact on agricultural resources and production of these alternatives are considered equal, although the concrete option will require greater inputs during decommissioning in order to remove the concrete from the soil. Driven piers and deep seated screws are recommended in order to minimise the environmental impact and input during decommissioning of the facility, but will be dependent on mechanical specifications.

The environmental impacts associated with different foundation technologies are likely to be similar and as such the final tracking technology will only be decided at a later stage during the detailed design. The environmental process will consider and assess a total environmental footprint.

4.6.3 Film Alternatives

There are a multitude of different film technologies available today. The best solution, according to research conducted, are either thin film (amorphous silicon or cadmium telluride) or multi-crystalline cells depending on the space and irradiance conditions. The electricity yield and application will be the deciding factor.

Multi-crystalline cells are the preferred technology type in South Africa, since the output of this technology is higher and it performs better under higher temperatures than the thin film technology. Furthermore, thin film technology is not yet feasible for South African large scale projects because of its higher price.

The environmental impacts associated with different film types are likely to be similar and as such the final film type technology will only be decided at a later stage during the detailed design. The environmental process will consider and assess a total environmental footprint.

4.7 NO-GO ALTERNATIVE

The **Status Quo Alternative** will mean that the RE Capital 3 Solar Development not go ahead and 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 and sheep grazing activities. The agricultural specialist found the site unsuitable for commercial cultivation due to limiting factors such as shallow soil depth and hard setting carbonate horizons below surface. The low clay percentage results in low water holding capacity and low nutrient availability. Severe climatic conditions, such as low rainfall, further limit commercial cultivation.

The solar-power generation potential of the Dyasonsklip area, particularly in proximity to the new proposed MTS substation, 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 'no-go' 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 and the envisioned low environmental impact, however it will be used as a baseline from which to determine the level and significance of potential impacts during the Impact Assessment phase of the on-going environmental process.

5 ENGINEERING OVERVIEW

The following details were drawn from the **Engineering Report** (van der Merwe, 2013), attached in Appendix D, **Annexure D4**. Two variations of photovoltaic power generation are under consideration in this Impact Assessment Phase.

5.1 BASIC UNDERSTANDING OF SOLAR PV PLANTS

Photovoltaic (PV & CPV) 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.

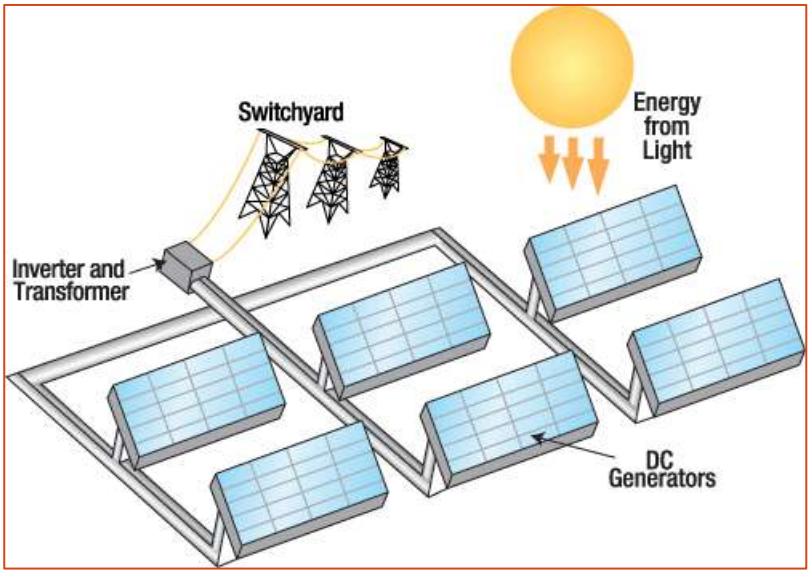

Figure 22: Typical overview of PV / CPV power generation facility (Solek, 2013).

The infrastructure of the facility includes the ground-mounted panels, cables, 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. The facility also utilises auxiliary electricity from the Eskom grid to power tracker motors in order to optimise the amount of sunlight on the solar PV infrastructure.

Installing either a fixed or dual tracking PV system or a Concentrated PV system is proposed. In a fixed system, the PV panel 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 panels. 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.

5.2 SITE DEVELOPMENT COMPONENTS

The final design will consist of different components. A typical description of the components and their assumed impact are listed below. For more detail on the preliminary layout, please refer to the Layout Report. Each 75 MW phase will consist of the same development components discussed below:

5.2.1 Position of solar facilities

The exact position of the solar PV array layout has followed a risk adverse approach and was determined by the recommendations in the environmental specialists' reports in order to avoid all sensitive areas in the positioning of the facility (Please see section 4 of this report discussing alternatives). In addition, the final detailed layout (within the assessed footprint) will be influenced by the final detailed design of the project once a tender has been awarded. The footprint of each 75 MW phase will be located on approximately 200 ha of the proposed site (on the Remainder of Farm 454, Dyason's Klip).

Figure 23: Showing typical positioning of solar arrays in a photovoltaic power generation facility (Solek, 2013).

5.2.2 Foundation footprint

The physical footprint of the PV panels on the ground is formed by a network of vertical poles (typically 100 mm in diameter), on which the PV panels are to be mounted (see examples below).

Figure 24: Showing typical examples of foundation footprints.

Different methods are used to mount the panels to the ground. The alternative mounting technology is described in section 4 above.

5.2.3 Panel height

The PV panel arrays have an approximate height of 2.5 m and 10m. A maximum height of 10 m has been 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.

5.2.4 Access road to site

An access road of approximately 6m wide will be required for the facility. The access road alternatives are discussed in section 4 of this report.

5.2.5 Internal roads

Gravelled internal roads and un-surfaced access tracks are to be provided for. Such access tracks (typically < 4 m wide and limited to the construction site) will form part of the development footprint. Pathways (typically < 4 m wide) between the PV panel 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.

Figure 25: Showing example of typical internal roads between PV Panel Arrays (Solek, 2013)

5.2.6 On-site substations and transformers.

The step-up substation and its associated infrastructure and internal roads will 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.

Figure 26: Typical example of on-site substation and transformer (Solek, 2013)

5.2.7 Cable routes and trench dimensions.

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

Figure 27: Examples of typical cable trenching used to connect the PV panels to the on-site substation (Solek, 2013)

5.2.8 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 the planned Eskom substation which is located to the east of the proposed site. A number of possible connection routes are investigated in this EIA (please see section 4 above for the discussion of the power line route alternatives). The final preferred route will be subject to the negotiations with the neighbouring farmers and the outcome of this environmental process.

5.2.9 Security fence

A perimeter security fence will be constructed around the solar park with a guarded security point. The ecological specialist will provide recommendations into the type and location of perimeter fence during the impact assessment stage of this process.

5.2.10 Auxiliary buildings

The auxiliary buildings area will typically include:

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

The infrastructure for the auxiliary buildings should occupy approximately 1 ha. The workshop will be used for general maintenance of parts, etc. and will typically be 20 m x 40 m. The storeroom will be used for the storage of small equipment and parts and will typically be 20 m x 30 m. 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 10 m x 10 m.

The final detailed design and exact coordinated layout of the facility will be designed and finalised should the facility be approved and awarded a tender as an IPP. The components listed above are typical to such projects and may deviate due to engineering requirements, new technologies and regulatory changes from the government's tender process. The detailed design will take place with due consideration of the specialist recommendations.

Figure 28: Typical example of auxiliary buildings under construction (Solek, 2013).

5.2.11 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 and the environmental control officer will be sourced regarding the cut and fill aspects.

5.2.12 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.

5.2.13 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 600 ha development footprint, for later rehabilitation. It is unlikely that major soil heaps will be required for this construction site.

6 SERVICES REQUIRED

The following service requirements have been considered and assessed

6.1 WATER USE 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 many water will be required for a 75 MW plant (i.e. one phase of the proposed development). 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 kl of water required per day. The ten 10 kl capacity tanks will be places on site in order to store 100 000 litres of water at any given time. The water distribution system will distribute water from the ten 10 kl water tanks to a high pressure hose and onto the solar panels. The proposed activity is not a "water intensive activity" (as opposed to CSP). 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 ground water required to wash 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 are 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.

6.1.1 Water Sources

The following water sources are currently under investigation:

6.1.1.1 Boreholes (preferred supply):

The preferred water sources are the existing boreholes on the proposed farm. Two boreholes are situated near the proposed northern site, and two boreholes situated near the central site (A plan showing the location of these boreholes is shown in figure 5 of this report).

These boreholes are seen as a possible water option for the facility. The small volumes of water required for washing the solar PV panels and for general operational purposes (maximum 7 kl per day or 210 kl per month) can be sourced from these boreholes. According to the farmer the boreholes are strong enough and the water they supply is drinking water quality.

Depending on where on the final design the water tanks will be located, the water from the boreholes will probably be pumped to the water tanks through a pipeline. The pipe diameter will be approximately 150mm-300mm. The pipeline will be laid on the ground, or just below the ground by means of manual excavation. The water pipeline should not result in any additional environmental impacts outside of the main construction area.

6.1.1.2 Storage dam (alternative supply)

An additional option is the storage dam the farmer has on the Dyason's Klip farm. The dam is situated south of the proposed sites and a pipeline will have to be constructed to distribute the water to the proposed sites. As an alternative to the pipeline, trucks can be used to transport the water from the storage dam to the proposed sites. Confirmation on the capacity of the boreholes and the storage dam will be sought from the farmer.

6.1.1.3 Khai Garib municipality (alternative supply)

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

6.1.1.4 Rainwater (additional supply)

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. Investigation is also underway to possibly capture the rainwater runoff from the PV panels.

6.1.2 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 requires the installation of ten 10 kl water tanks. These tanks will serve as both a water buffer as well as for rainwater capture as described above.

6.1.3 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, 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 will be applied for at the DWA, in which the DWA will be asked to confirm that according to their information there should be adequate water available for the project. The engineers have made contact with DWA who have confirmed that the application for a non-binding water agreement should only be applied for later in the EIA Phase.

The DWA are also registered as a key stakeholder in the environmental process and will have an opportunity to provide any additional input.

6.2 EROSION AND STORM WATER CONTROL

The erosion potential of the site 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 would 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 panels would be welcomed due to its cleaning effect, but as mentioned before the annual predicted rainfall is very low and would not cause any erosion. The solar panel surfaces are installed at a relatively large incline with gaps between panels. This does not allow significant water build up on the panels while also reducing the energy in falling droplets. Considering that the panels are on a tracking system, this also means that droplets leaving the solar panel 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 panels 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 and all parties involved will have to be vigilant in avoiding this from happening. The environmental management programme submitted as part of the Draft Environmental Impact Report will contain management recommendations regarding dust and erosion control during the construction phase.

Note that the construction will take place in three phases. This phased construction approach should also minimise the amount of exposed soil at any one time thus reducing the risk for wind erosion and dust generation. Once the construction on each phase is complete the cleared areas will be re-vegetated. Bare areas will also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion. Any water being used in the cleaning process would speed up this natural vegetation rehabilitation process. Further it will also have a bonding effect on the sandy soil, avoiding the loose sand blowing away causing wind erosion.

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 that the environment is preserved in a sustainable way by avoiding erosion. 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. Such measures are only likely at a single existing crossing of the main drainage only if the existing farm access is used to gain access to the site.

Figure 29: Showing examples of temporary measures for the potential crossing of the main drainage channel on site (Solek, 2013).

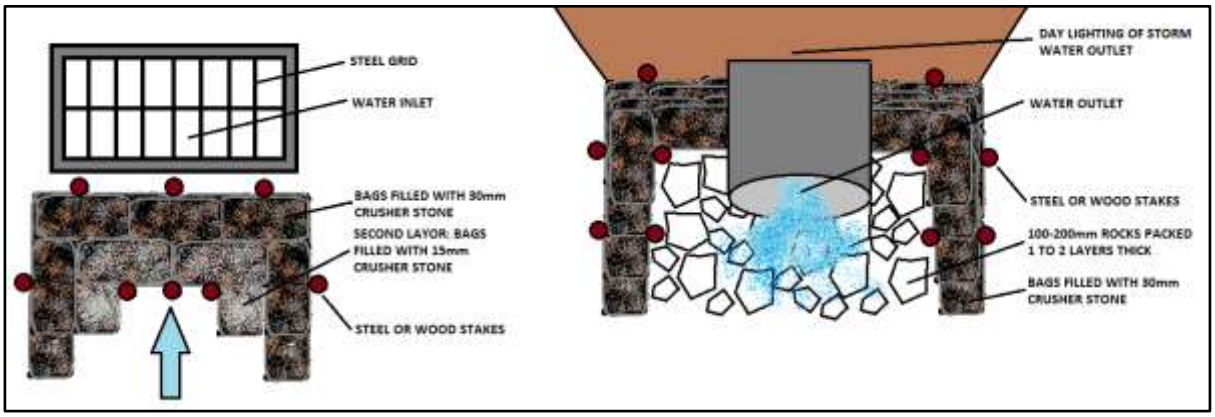

Figure 30: Showing diagrammatic examples of erosion protection mechanisms for catch pits and culverts (Solek, 2013).

More **permanent solutions** would be designed to address stormwater control in a sustainable way. These structures would be built to be aesthetically pleasing by using fixtures such as stones packed in wire mesh to stay in a position or locking retaining walls at the inflow and outflow of the culverts also acting as scour protection. The type of structure will depend on the type of crossing (i.e. crossing of the seasonal washes will have different engineering requirements to crossing of the main drainage channel).

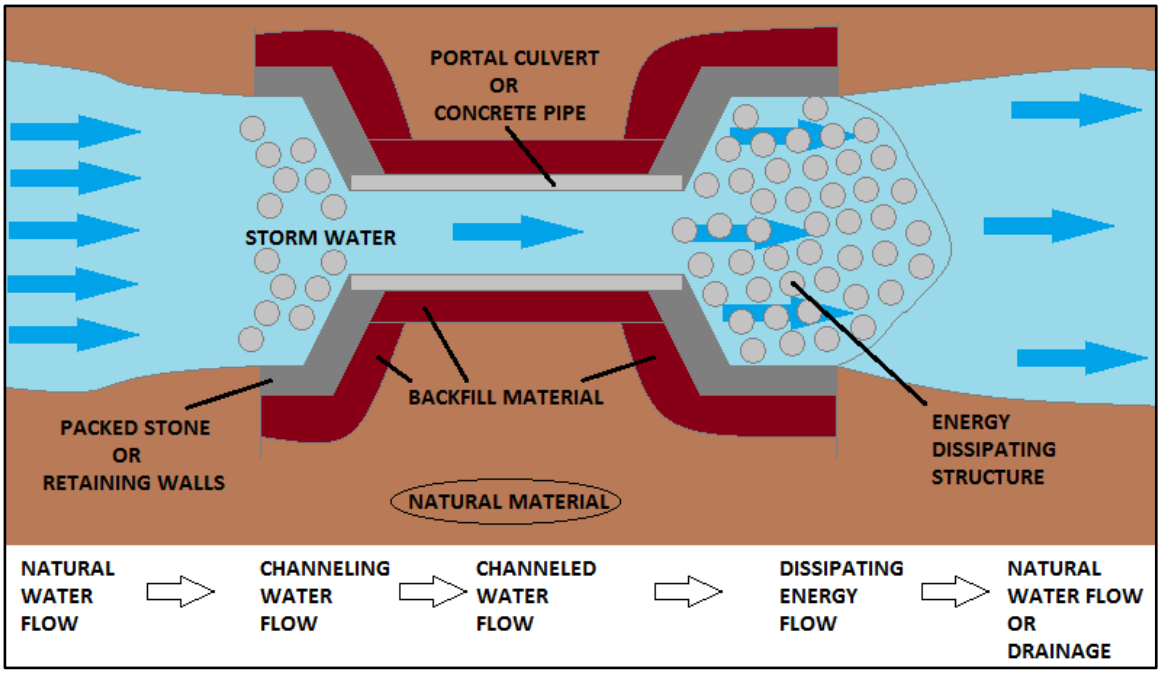

Figure 31: Diagrammatic example of portal culvert or concrete pipe – One of the options of crossing drainage channels (Solek, 2013).

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.

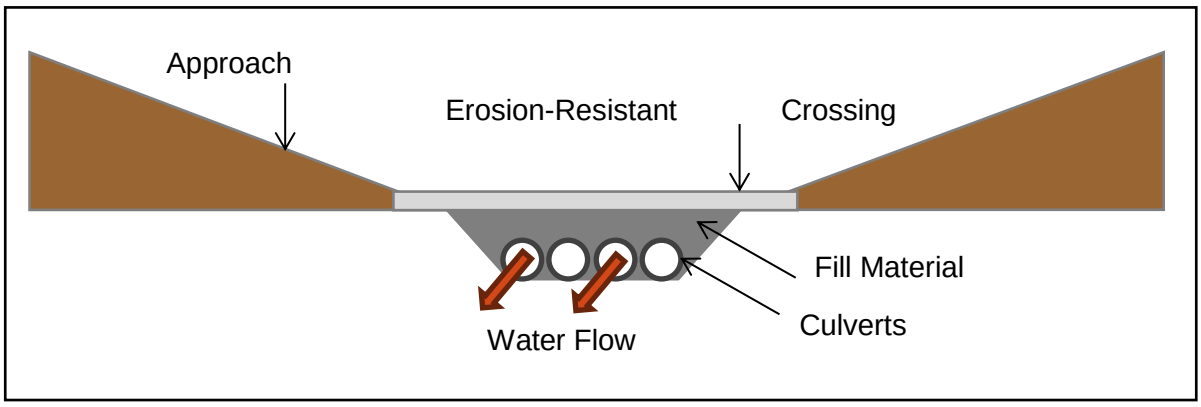

Figure 32: Diagrammatic example of low level river crossing (Causeway)

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.

Note, these types of structures will only be likely if the access road to the central site, going through the Dyason's Klip farm is selected.

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 only commence if the project is selected as a preferred bidder.

6.3 WASTE AND EFFLUENT MANAGEMENT

6.3.1.1 Solid waste management

During the construction phase an estimated amount of **less than 5m^3 non-hazardous solid construction waste** are to be produced **per month**, for the expected 18 month construction period. All construction waste will be safely stored, and should be removed from site on a scheduled waste removal basis by the appointed construction contractor where and when deemed necessary. The construction waste, where applicable, are to be disposed at a municipal landfill site that is appropriately licenced. The Environmental Management Programme will address solid waste management during construction.

During the operational phase after construction, the facility should not produce any solid waste.

6.3.1.2 Liquid effluent (sewage)

The liquid effluent generated is going to be minimal and limited to the ablution facilities.. All workers will be transported to site on a daily basis and no workers will be housed on site. Chemical toilets will be on site during construction and during operation of the facility. These chemical toilets will be serviced and emptied on a weekly basis by a private contractor. The sewage will be transported to a nearby Waste Water Treatment Works for treatment. The use of a septic vs. conservancy tank during operation will be determined by the local authority, namely Khai Garib Municipality. The Khai Garib municipality are registered stakeholders on this process and will be requested to provide input.

Due to the remote locality of the farm, sewage cannot be disposed in a municipal waterborne sewage system.

6.4 EMISSIONS AND NOISE MANAGEMENT

Very little emissions should be released into the atmosphere (with the exception of dust during the construction phase) 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. The Environmental Management Programme will address the noise and dust generation during the construction phase.

7 PROJECT PHASING

7.1 CONSTRUCTION OF THE PROPOSED FACILITY

The following engineering construction phase considerations are proposed for this project. The environmental management of these activities has been addressed in the Environmental Management Programme attached in Appendix F of this report.

The facility will be developed and constructed in three consecutive phases. Each phase will consist of a 75 MW facility. The construction of each 75 MW phase should be between **14-18 months**. During the construction activities 5 jobs will be created for each MW of energy. **375 jobs** are therefore expected to be created during the construction phase for each 75 MW facility, of which most will ideally be local employments. The construction material and sourcing of required goods can be from the local community and surrounding towns.

Should the project be approved, and all required approvals and licences are obtained from the DEA, NERSA and a Power Purchase agreement (PPA) is secured with Eskom, the construction is envisioned to begin in the second half of 2015. A series of activities would need to be undertaken, to construct the proposed facility and associated infrastructure.

Each facility will be established in different phases namely: the pre-construction, construction, operation and decommissioning phases.

The **preconstruction phase** includes:

1. Conducting of surveys;
2. Transporting of the required construction components and equipment to site; and
3. Pre-site preparation (establishment of temporary services for construction such as lavatories, water, health and safety requirements, site office, etc.).

The **construction phase** includes:

1. Transportation of solar components and equipment to site;
2. Establishment of internal access roads;
3. Undertaking site preparation (including clearance of vegetation; stripping of topsoil where necessary);
4. Erecting of solar PV frames and panels;
5. Constructing the on-site substation;
6. Establishment of additional infrastructure (workshop and maintenance buildings);
7. Establishing the underground connections between PV panels and on-site substation;
8. Connection of on-site substation to power grid;
9. Undertaking site remediation; and
10. Construction of perimeter fencing.

The activities that will be undertaken on site fall under different specialist fields and include:

- **Civil works:** site preparation, site grading, drainage, roads, foundations, storm water & anti-erosion management;
- **Mechanical works :** piers installations, mechanical assembly including trackers, mounting of panels; and
- **Electrical works:** installation from low to high voltage, including substation.

7.1.1 Transportation of solar components and equipment to site

All solar plant components and equipment are to be **transported** to the planned site **by road**. Construction should 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 containers will therefore be transported to the proposed site. Roughly estimated this amounts to **two 2 x 40 ft. 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 relevant authorities can be obtained in this regard if required.

The alignment of the proposed access routes from the N14 to the site are discussed in section 4 of this report.

7.1.2 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 botanical specialist in the impact assessment report. These access tracks (typically less than 4 m wide) will form part of the development footprint. The layout and alignment of these internal roads will be informed by recommendations made by the botanical specialist, as well as the topographical survey (although this detailed design based on the topographical survey will only take place at a later stage). Pathways (typically less than 4 m wide) between the solar PV panels 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 4 m wide.

7.1.3 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 panels, the digging of foundations for 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. In the instance where there are cultivated areas currently on the site, the upper 30 cm of the cultivated areas will be stockpiled on the boundaries of the site. The topsoil stockpiles must be protected from erosion by re-establishing vegetation (grasses) on them. The environmental management plan will provide specifications for this vegetation re-establishment.

Figure 33: Showing typical examples of site preparation during the construction phase of the project (Solek, 2013).

To reduce the risk of open ground erosion, the site preparation will typically be undertaken in a systematic manner / phased approach. Where any botanical 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 participating specialists and in the Environmental Management Programme.

7.1.4 Erecting of solar PV panels

Once the site preparation has been done, and all necessary equipment has been transported to the site, the solar PV panels 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 230 W - 260 W of **DC electrical power**. The solar PV modules are assembled in long rows across the solar PV array, with the rows approximately 5 m apart. The exact amount of modules in each solar PV array is subject to the **final facility design** and is still to be confirmed. Foundation holes for the solar PV panels are to be mechanically quarried to a depth of approximately 300 - 500 mm.

Figure 34: Showing typical erection of PV panels during the construction phase of the project (Solek, 2013).

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 30 cm – 50 cm. The concrete foundation will be poured and be left for up to a week to cure.

7.1.5 Construct ion of 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 into the Eskom grid via the new 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. Once the site is approved, the site clearing and levelling is to be done, after which the access roads to the substation are 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.

Figure 35: Showing typical example of on-site substation.

7.1.6 Establishment of additional infrastructure

To minimise the potential ecological impact of this project, 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, which will then form part of the auxiliary building area. The laydown area for the construction period will be approximately 1ha. This area will typically be used for the assembly of the solar PV panels and the generation placement/storage of construction equipment. A temporary facility are planned to be used to secure the storage of fuel for the on-site construction vehicles. Necessary control measures will be put in place for correct transfer and use of fuel.

The auxiliary building area will typically consist of the following:

- workshop area;
- storeroom area;
- change and ablution room area;
- administrative and security building; and
- 10 x 10 kL water tanks.

7.1.7 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 new planned Eskom MTS substation. As stipulated in Eskom's TDP 2013-2022 document, Eskom plans to build a 5 x 500 MVA 400/132 kV transmission substation 5-10 km from the proposed site. The planned MTS substation will be a key substation in the Upington and Northern Cape area. The substation is built in order to distract the energy generated from the 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 the 5 x 500 MVA 400/132 kV transformer capacity available, the proposed project as well as the surrounding projects in the area should be able to connect onto the grid. Various alignment options for the power line from the site to this MTS substation are under investigation as detailed in section 4 of this report.

A grid feasibility application will be submitted to Eskom, to confirm the connection possibilities for this project. Feedback on the grid feasibility application will be included in the final Environmental Impact Report.

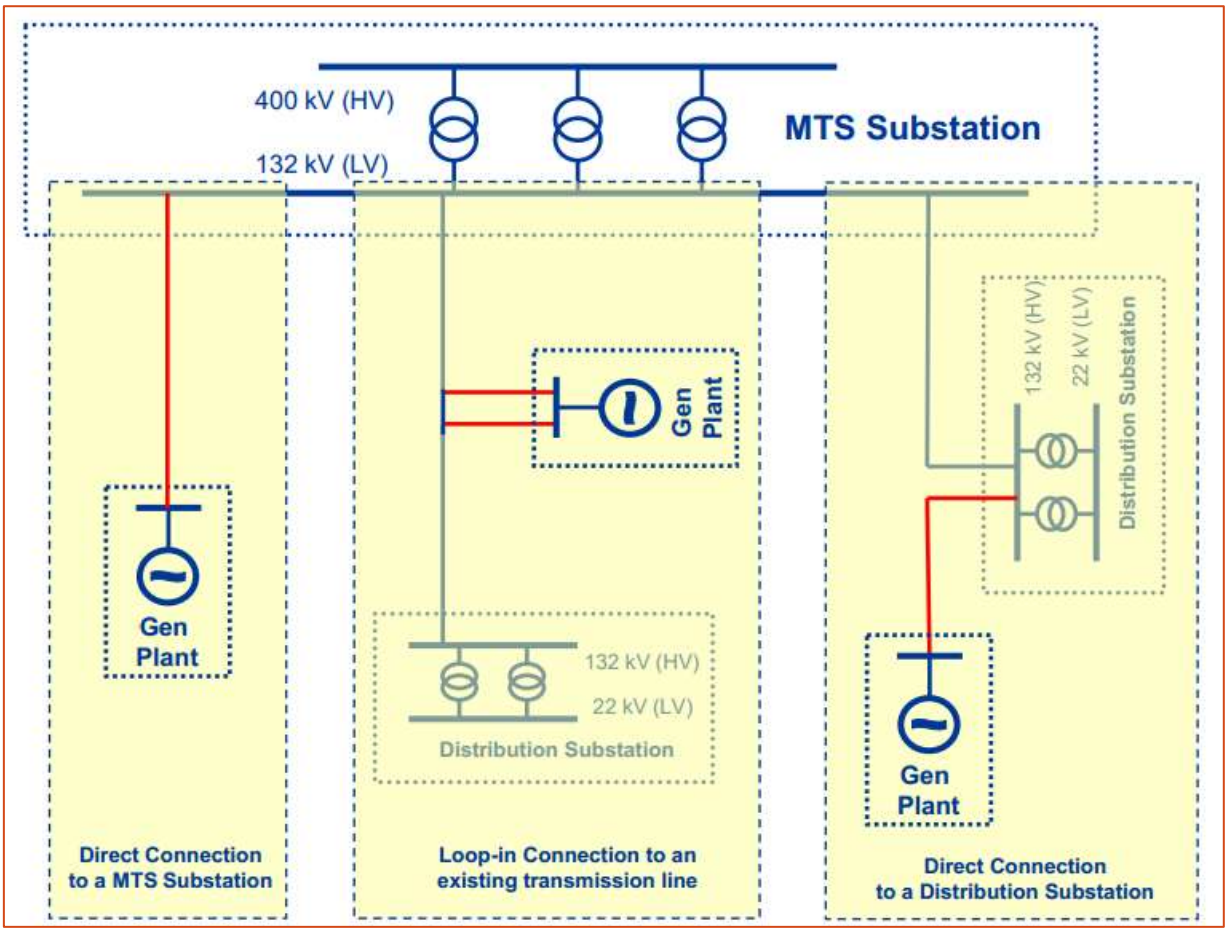

Figure 36: showing the various alternatives of connecting to the Eskom Grid

As shown in figure 34 above, there are different alternatives to connect to the existing Eskom grid. Two of the options that will be investigated are looping into the existing 132 kV line currently running over the farm or building a new line directly to the new MTS Eskom substation. The "loop-in" option will be subject to the available capacity on the existing 132 kV line. The line currently has a total carrying capacity of 80 MW.

If this capacity is already occupied, then 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 forms part of this Environmental Process**. The location of this line will be subject to the final location of the new Eskom MTS substation. The exact location of the planned substation is still to be confirmed by Eskom; three alternatives have been indicated in the Eskom's EIA Reports. The image below shows the three alternative locations and is pointed out by the yellow blocks. Different power line routes are being investigated for the project to accommodate the different Eskom MTS locations. These power line routes are indicated with the orange lines. These alternatives are explained in more detail in section 4 of this report and in the layout report attached in **Appendix C**.

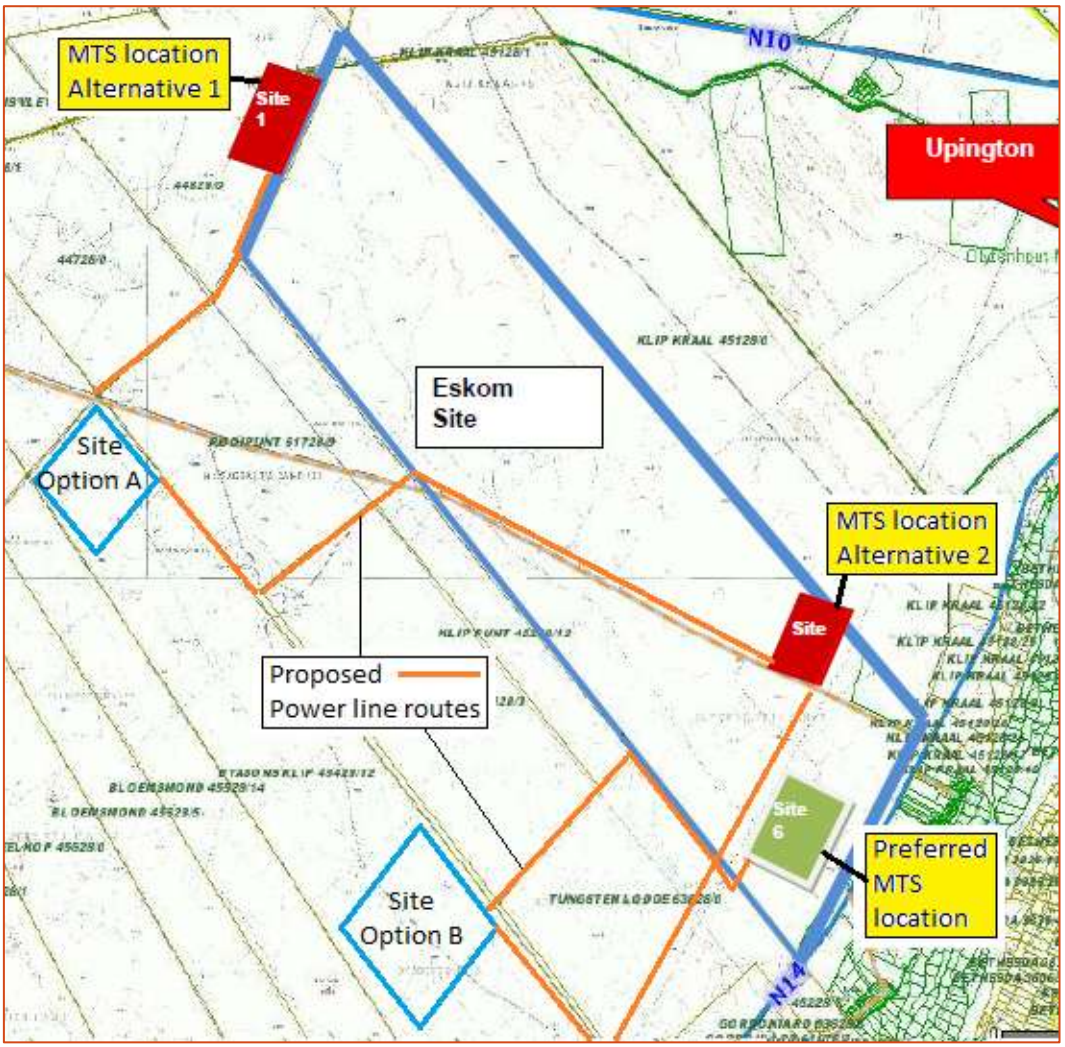

Figure 37: Showing alternative locations of the proposed new Eskom MTS substation.

7.1.8 Undertake site remediation

Once construction is completed and once all construction equipment is removed, the site is to be rehabilitated where practical and reasonable. In the case where access routes to the site will not be used during operation, the access points are to be closed and rehabilitated as detailed in the Environmental Management Programme.

7.1.9 Access to facility during construction

As mentioned, 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. The Dyasons Klip farm entrance is directly from the N14. Different access routes that were investigated are detailed in section 4 of the report.

Figure 38: Showing access to the D3276 from the N14.

Figure 39: Showing existing farm access from the N14.

7.2 PROJECT OPERATION AND MAINTENANCE PHASE

The proposed operation of the site is for **25 years**. During this life-cycle, the plant will be maintained and monitored. The aim is to generate at full capacity by the second half of 2016. The facility should be operational during daylight hours, except during maintenance, poor weather conditions or breakdowns. Regular maintenance will typically include periodic cleaning, greasing of bearings and inspection. The panels are planned to be cleaned with water or compressed air. Any waste products generated (defunct bearings, broken panels etc.) be disposed of in accordance with the National Environmental Management: Waste Act (Act 59 of 2008).

During the operation 1 job will be created for each MW of energy. The staff members will typically include technicians, maintenance and security personnel. Staff can be transported around the site using utility vehicles and a typical mini bus to transport staff from nearby towns of Upington, Keimoes and surrounding community. From time to time additional contract staff may be required for ad hoc ground cleaning or special panel cleaning.

When the solar modules and associated equipment become defective, they will be recycled and re-used where possible.

7.3 PROJECT DECOMMISSION PHASE

The proposed solar energy facility is expected to have a lifespan of approximately 25 years if the specified periodic maintenance is performed. If financially viable and depending on climate factors in 25 years' time (farming may no longer be viable) the PV facility may continue operating. Existing infrastructure and components of the PV facility may be replaced with new technology.

Once the facility has reached the end of its economic life, the infrastructure is to be decommissioned. The decommissioning of the facility would entail the disassembly and

replacement of components with other appropriate technologies. However, if not deemed so, then the facility would be completely decommissioned.

Preparation activities for site decommissioning should include confirming the integrity of access to the site. Site access should be able to accommodate the required equipment (e.g. lay down areas, construction platform) and the mobilisation of decommissioning equipment.

The components would be disassembled, reused and recycled where possible, or disposed of in accordance with regulatory requirements. Functional components are planned to be donated to and installed at local schools and clinics to benefit the community.

8 ECONOMIC CONTEXT

The economic context described below was provided by the project managers, Solek renewable energy engineers. Please see the engineering report attached in Annexure D4 for supplementary information in this regard.

8.1 PROJECT COST OVERVIEW

Renewable energy projects, such as the proposed solar facility, require significant 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.

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

8.2 PROJECT SPECIFIC COSTS

The Re Capital 3 detailed costing has not been completed on the date of submitting this engineering report. The running cost of a solar PV/CPV facility is minimal related to the initial capital cost, contributing to the most significant cost of constructing and running a solar PV/CPV facility. The economic feasibility of the project has however been determined.

8.3 OPERATIONAL REVENUE STREAMS

The revenue streams during the operation 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 REIPP 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 REIPP governmental study 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 short the subsidy offered by the REIPP 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 REIPP procurement programme preferred bidders will enter into a **power purchase agreement** between the **IPP generator** and the **Single Buyers Office**. **National treasury** stands in for **surety**, while the National Energy Regulator of South Africa (NERSA) regulates the IPP licences.

NERSA and the IPP procurement programme require an Environmental Authorisation as a gate keeping criteria, where no project would be considered without the Environmental Authorisation being granted.

9 SITE DESCRIPTION AND ATTRIBUTES

The following sections provide a description of the environmental and built environment context of portion 12 of the Farm Dyasonsklip 454.

9.1 LOCATION & BUILT ENVIRONMENT

The target property, Portion 12 of the farm Dyasonsklip 454, is located in the Siyanda 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 3 development site is approximately 600ha in size and is situated north of the N14 National Road. The study site is situated approximately 4km from the N14. Current vehicular access to the site is via an existing gravel road with an entrance off the N14.

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

9.2 GEOLOGY & CLIMATE

The Geology and climate of the study site was defined by the agricultural specialist as follows.

9.2.1 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 the following components:

9.2.1.1 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

9.2.1.2 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.

9.2.2 Climate

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

Table 6: Showing typical climatic data associated with portion 12 of the farm Dyasonsklip 454.

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	>2400mm
Humidity	<30%

9.3 TOPOGRAPHY

The topography of the study site was defined by the agricultural specialist as follows:

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**.

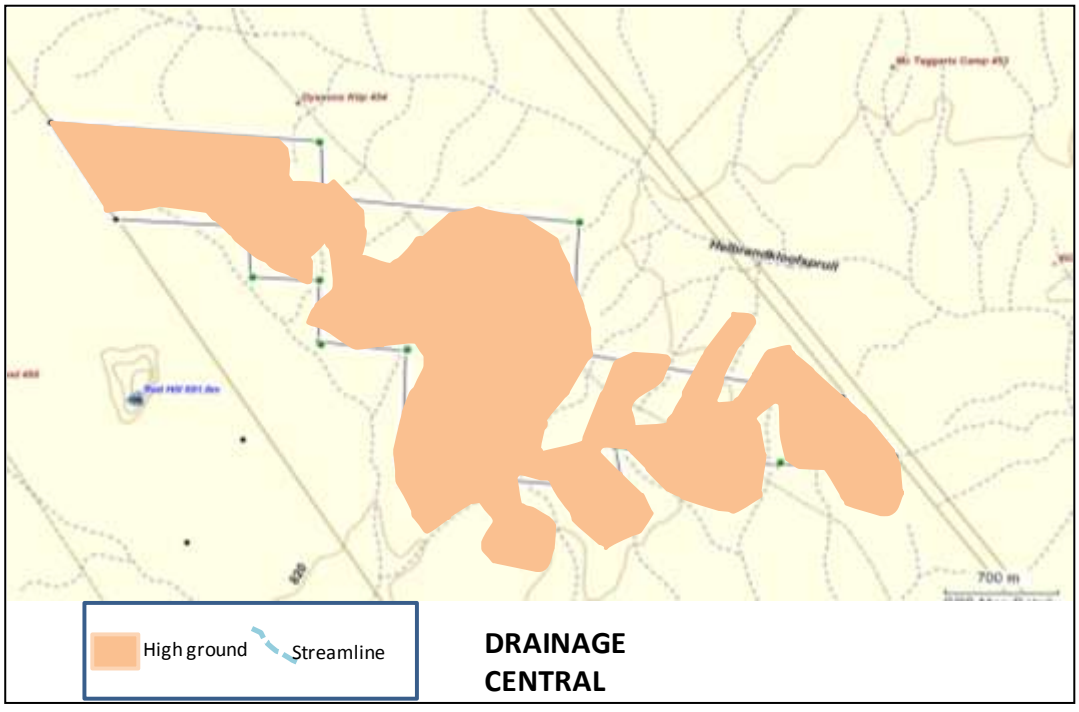

Figure 40: Drainage pattern of the study site (Lubbe, 2013).

9.4 VEGETATION

Mr Simon Todd, of Simon Todd Consulting, conducted a Faunal and Flora Impact Assessment of the proposed solar development sites (see **Appendix D, Annexure D1** for full report), from which the following is drawn.

The purpose of the Ecological Scoping Report is to describe and detail the ecological features of the proposed site; provide a preliminary assessment of the ecological sensitivity of the site and identify the likely/potential impacts that may be associated with the development.

A desktop review of the available ecological information for the area was conducted in order to identify and characterize the ecological features of the site. This information was used to derive a **draft ecological sensitivity map** that presents the presumed ecological constraints and opportunities for development of the site. These assumptions will be verified by means of a detailed site inspection during the environmental assessment stage of this process.

The information and sensitivity map presented by the ecologist thus provides an ecological baseline that can be used in the planning phase of the development to ensure that the potential negative ecological impacts associated with the development can be minimized. The constraints detailed in this plan will be used to generate the preferred layout alternative for this proposed facility.

9.4.1 Scope of Study

The specific terms of reference for the scoping ecological study included the following:

- a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project;
- a description and evaluation of potential environmental issues and potential impacts (including direct, indirect and cumulative impacts) that have been identified; and
- Identification of potentially significant impacts to be assessed within the EIA phase and the details of the methodology to be adopted in assessing these impacts. This should be detailed enough to include within the Plan of Study for EIA and include a description of the proposed method of assessing the potential environmental impacts associated with the project

9.4.2 Sensitivity Mapping & Assessment

A draft ecological sensitivity map of the site was produced by integrating the **available ecological** and **biodiversity information** available in the literature and various spatial databases. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- **Low** – Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within

these areas with little ecological impact. Due to the large amount of transformation that has occurred in the area, this is the dominant sensitivity category within the study area.

- **Medium**- Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken.
- **High** – Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately.
- **Very High** – Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially no-go areas from a developmental perspective and should be avoided as much as possible.
- In some situations, areas where also categorized between the above categories, such as Medium-High, where an area appeared to be of intermediate sensitivity with respect to the two defining categories.

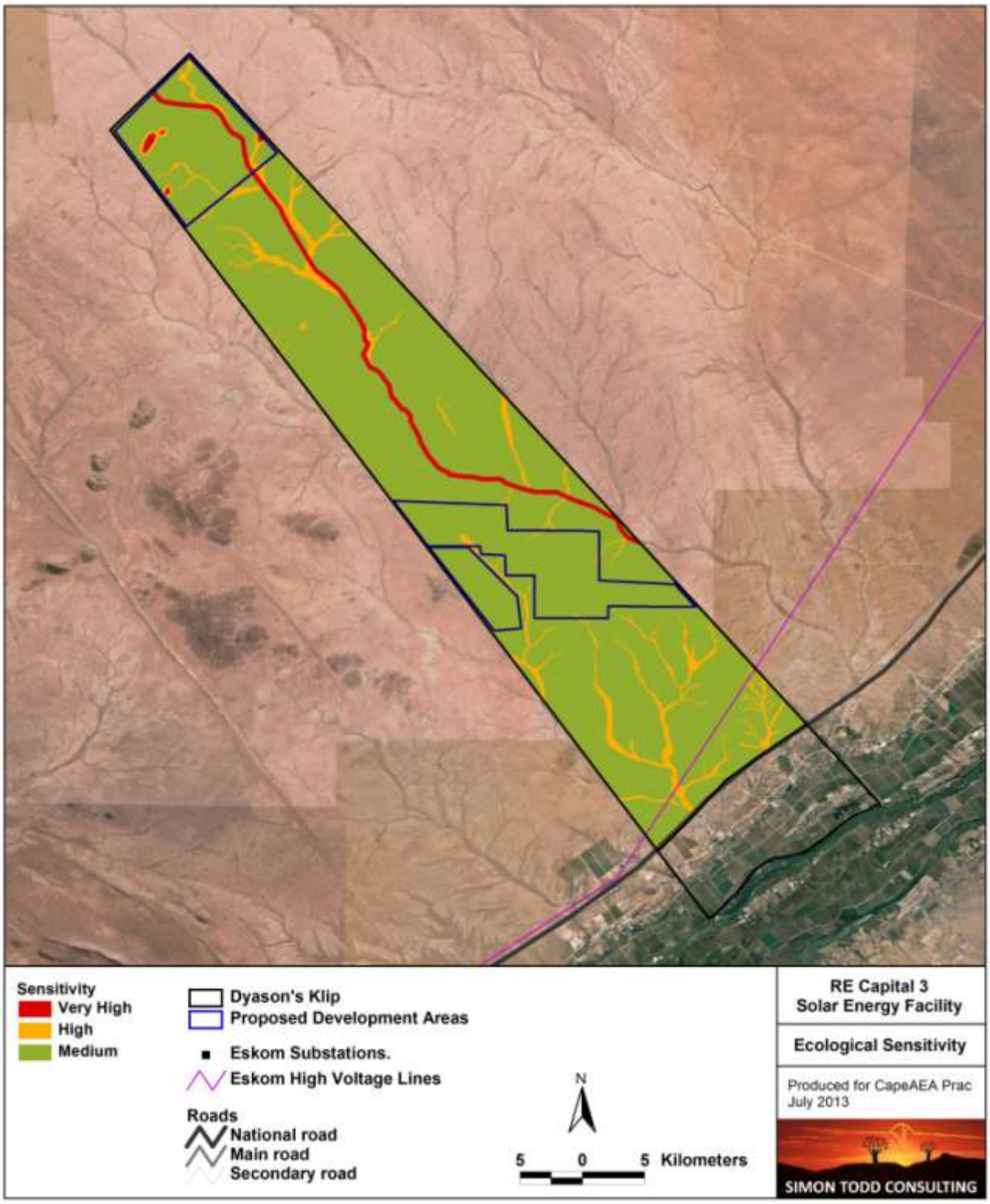

Figure 41: Draft Ecological sensitivity map for portion 12 of the farm Dyasonsklip 454 (Todd,2013)

9.4.3 Baseline Description of the Affected Environment

The following baseline description of the affected environment was provided by the Ecological Specialist.

9.4.3.1 Broad-Scale Vegetation Patterns

According to the national vegetation map (Mucina & Rutherford 2006), there are **three vegetation types** within the boundaries of the farm, and an additional two which are common in the area, but which do not occur within the site. Within the area affected by the proposed development (i.e. the central and northern site alternatives), only **two vegetation types** occur, namely **Kalahari Karroid Shrubland** and **Bushmanland Arid Grassland**.

In terms of the conservation status of the various vegetation types **of the area**, only **Lower Gariep Alluvial Vegetation** which is listed as **Endangered** is of concern. 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. Furthermore, within the study area the **majority of the Lower Gariep Alluvial Vegetation has been transformed** by intensive agriculture.

Both **Kalahari Karroid Shrubland** and **Bushmanland Arid Grassland** are classified as **Least Threatened** and have been **minimally impacted by transformation** and more **99% of their original extent is still intact**.

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. Both Bushmanland Arid Grassland and Gordonia Duneveld (another vegetation type present in the vicinity but not within the study sites) are widely distributed and represent some 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.

At this point, there is **little basis to differentiate** between the different vegetation types of the potentially affected area in terms of **botanical sensitivity**.

The ecological sensitivity of the different parts of the site are likely to be related to local ecological features and the presence of species and habitats of conservation concern, rather the broad distribution of vegetation types.

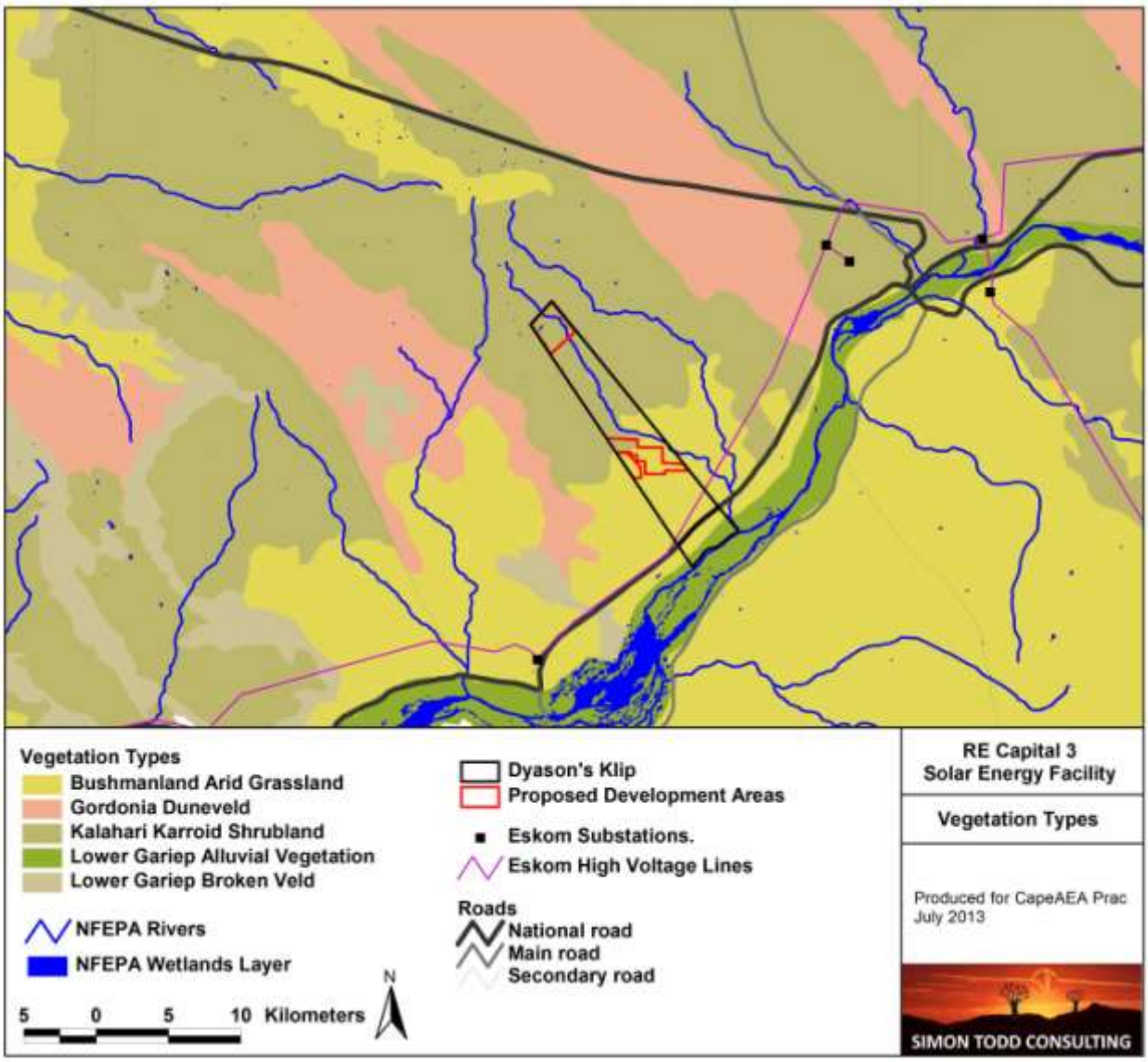

Figure 42: Broad-scale overview of the vegetation in and around the RE Capital 3 Solar Energy Development (Todd,2013).

Areas of **Bushmanland Arid Grassland** generally comprise **extensive open plains** with greater or lesser amounts of scattered taller woody species and trees present, especially along drainage courses. Typically, this vegetation unit is dominated by grasses such as *Stipagrostis ciliata*, *S.uniplumis*, *S.amabilis* and *Schmidtia kalahariensis*. Trees and shrubs of the open plains include *Boscia foetida*, *Boscia albitrunca*, *Parkinsonia africana*, *Phaeoptilum spinosum*, *Rhigozum trichotomum* and *Aptosimum albomarginatum*. It is **not likely** that there are many **habitats of conservation concern** within this vegetation type as it tends to be very homogenous usually has a relatively **low species richness**.

Species commonly observed within the areas of **Kalahari Karroid Shrubland** include shrubs such as *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 are often present and it is in these areas that **species of conservation concern are**

usually located. . **Species of conservation concern** that are often present within such areas include *Adenium oleifolium*, *Aloe claviflora* and *Hoodia gordonii*.

The drainage lines within the vicinity of the study site are generally broad and flat, often without a distinct drainage channel. These areas generally contain similar grass species to the surrounding plains but contain a **greater proportion of woody trees** and shrubs, particularly *Acacia erioloba*, *A.mellifera*, *Boscia albitrunca*, *B.foetida*, *Rhigozum trichotomum* and *Lycium oxycarpum*. .

9.4.3.2 Listed and Protected Plant Species

According to the SANBI SIBIS database, **286 indigenous plant species** have been recorded from the quarter degree squares 2820 BD, DB and 2821 AC and CA (Table 3). This includes **7 species of conservation concern** as listed below in Table 3 of the Ecological Scoping Study in Annexure D1. Although not all the listed species would occur at the site, there is a high probability that at least some of these species occur at the site (This will be verified during the EIA phase of the study). There are also likely to be additional species 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. Habitats likely to harbour such species will be searched for species of conservation concern during the EIA phase of the study.

9.4.3.3 Critical Biodiversity Areas & Broad-Scale Processes

No fine-scale conservation planning has been conducted for the region and as a result, no Critical Biodiversity Areas have been defined for the study area. In terms of other broad-scale planning processes, the site does not fall within a National Protected Areas Expansion Strategy Focus Area (NPAES), indicating that the area has not been identified as an area of exceptional biodiversity or of significance for the long-term maintenance of broad-scale ecological processes and climate change buffering within the region. In terms of the NFEPA wetland assessment, a few small pans within the northern extent of the site were identified as wetlands and there appear to be several other similar smaller pans at the site as well. The smaller pans are usually little more than small depressions which hold water occasionally and do not usually contain any species associated with mesic conditions.

9.4.4 Faunal Communities

9.4.4.1 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.

9.4.4.2 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.

9.4.4.3 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** within the northern site alternative would 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.

9.4.4.4 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**, detailed below in Table 4. 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.

10 PLANNING CONTEXT

Mr Martin Scott from Ilali Investments has been appointed as the planning specialist for this project and will be responsible for undertaking the necessary applications. Further details on the progress with the planning applications 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 600ha, 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). Ilali Investments have obtained a Conveyancer Certificate confirming/stating that there are no Title Deed restrictions prohibiting the proposed land use.
- 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 town planning specialist will negotiate the best possible statutory process/program, submit the required land use application to all the relevant authorities, pay the application fees on behalf of the client, prepare notices and advertisements, place of adverts in the local newspapers, send registered letters, travel where required, etc. - this includes facilitation/submissions for comment/input and/or authorisation to among others the following competent authorities:

- **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.

These same authorities have been registered as key stakeholders in the environmental process and as such were given an opportunity to provide comment on this Draft Scoping Report.

According to Ilali Investments, the following planning related policies and legislation was considered in terms of planning context and is included in the planning application that has been submitted to the Khai Garib municipality for consideration and decision making.

10.1 GREEN PAPER ON NATIONAL STRATEGIC PLANNING (2009)

The Green Paper's priorities applicable to this solar plant proposal are:

- Speed up economic growth and transform the economy to create decent work and sustainable livelihoods;
- Introduce a massive programme to build economic and social infrastructure;
- Develop and implement a comprehensive rural development strategy linked to land and agrarian reform and food security;
- Pursue African advancement and enhanced international cooperation;
- Ensure sustainable resource management and use; and
- To build a developmental state, improve public services and strengthen democratic institutions.

10.2 NATIONAL PLANNING COMMISSION

The National Planning Commission was established in 2009 to develop a long-term vision and strategic plan for South Africa. The plan entitled "Vision for 2030" has the following key priority areas (applicable to this solar plant application):

- Create an economy that will create more jobs.
- Improve infrastructure.
- Ensure the transition to a low carbon economy.
- Endure an inclusive and integrated rural economy.
- Improve the quality of education, training and innovation.

10.3 RENEWABLE ENERGY POLICY (1998)

Due to the high environmental impact of burning fossil fuels for generating electricity, there is a national (and international) initiative to increase the use of renewable energy technologies in order to generate electricity. Burning fossil fuels leads to the build-up of excessive amounts of carbon in the atmosphere, which in turn "traps" the earth's heat instead of the heat being reflected out to space. The earth therefore becomes warmer which is known as the "greenhouse effect". Due to the predicted climate change impacts the South African Government ratified the United Nations Framework Convention on Climate Change in 1997 and acceded the Kyoto Protocol in 2002.

In addition, South Africa has also associated itself with the Copenhagen Accord and announced its intention on reducing its carbon emissions by 34% by 2020. In order to meet the long-term demand of a sustainable renewable energy industry the South African Government has set a target of 10GWh of renewable energy by the end of 2013 to be produced mainly from biomass, solar, wind and small- scale hydro. The White Paper on Renewable Energy states that: “It is imperative for South Africa to supplement its existing energy supply with renewable energies in order to combat global climate change which is having profound impacts on our planet”.

10.4 NATIONAL SPATIAL DEVELOPMENT PERSPECTIVE (2011)

The National Spatial Development Perspective (NSDP) is a framework to guide development planning at all levels and recommends mechanisms to bring about alignment between infrastructure investment and development programmes. The NSDP provides a common framework and planning methodology for all the different spheres of government to coordinate their efforts and improve development impact. It sets out a methodology that all spheres of government should follow in conducting their planning processes. This methodology promotes the development of a coherent understanding of spatial realities, recognising that patterns of economic development, social exclusion and resource use are of paramount importance in developing our country’s plans.

The NSDP argues that undertaking infrastructure investment and development spending decisions on the basis of an area’s unique potential is likely to produce far more desirable and sustainable outcomes in terms of addressing poverty and improving growth. The NSDP goes on to identify 6 categories of economic potential (i.e. tourism, retail and private sector services, public services and administration, production of labour-intensive mass produced goods, innovation and experimentation) and advocates a detailed analysis of each economy to determine its potential. Upington is identified as an area with economic potential and thus this proposed solar plant is in line with this National Policy document.

10.5 NORTHERN CAPE PROVINCIAL GROWTH AND DEVELOPMENT STRATEGY (PGDS)

The key economic sectors that are focused on to realise the socio-economic priorities of the Province are as follow:

- Agriculture and agri-processing
- Fishing and Aquaculture
- Mining and mineral processing
- Manufacturing
- Tourism
- Knowledge economy
- Energy sector
- Under economic and investment potential the competitive and comparative advantage of the Northern Cape is listed as:
- Mineral resources
- Climate
- Open spaces and distances
- Coast
- Astronomy
- Air quality
- Coastline

One of the **key focus points** listed for economic growth in the Siyanda District Municipality is "solar energy" and "Independent Power Supplier: wind, gas, solar, hydro, biomass" is listed as a key project for economic growth.

10.6 NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK 2012 (PSDF)

The NCPSDF does not create or take away land use rights and it is to be applied in a flexible and pragmatic manner, which takes into account the merits and particular circumstances of each case as required by law. However, the NCPSDF has statutory status as the common spatial vision and strategy around which to align the future development and management of the Northern Cape. Compliance with the NCPSDF in this regard is therefore mandatory.

The PSDF is an over-arching provincial policy and strategy that:

- Provides direction and guidance pertaining to future land use in the province.
- Provides spatial context for provincial sectoral strategies.
- Promotes a developmental state in accordance with legislation policy.
- Aligns environmental management in the Northern Cape with applicable international agreements, protocols and conventions.
- Gives effect to the overarching intent of the Northern Cape Provincial Growth & Development Strategy (PGDS) to 'build a prosperous, sustainable and growing provincial economy to eradicate poverty and improves social development'.

The PGDS provides for the following:

- Directives pertaining to the desired scale, format and location of development.
- Directives for development and use of capital for the benefit of all inhabitants.
- Opportunities for innovative land use as a primary economic driver.
- Opportunities for public/private/community partnerships for the promotion of LED.
- Promotion of all economic sectors.
- Certainty regarding the future development of the Northern Cape and its component places.
- Protection and enhancement of the interests of all property owners.

The Northern Cape Government recognises that the transformation of the Northern Cape into a global model for sustainability and a place where all its people would be able to live with dignity and pride has a long-term horizon. The NCPSDF is therefore the expression of a 30 year vision. Accordingly, the spatial vision for the Northern Cape for the following 30 years among others comprises a coherently structured "matrix of sustainable land-use zones that collectively support a dynamic provincial economy vested in the primary economic sectors, in particular, mining, agriculture, tourism and the energy industry".

The NCPSDF states that government has set a target of 10,000GWh of energy to be produced from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013. Achieving the target will:

- Add approximately 1,667MW new renewable energy capacity with a net impact on GDP as high as R1,071 billion a year.
- Create additional government revenue of R299 million.
- Stimulate additional income that will flow to low-income households by as much as R128million, creating just over 20,000 new jobs.

- Contribute to water savings of 16.5 million kilolitres, which translates into a R26.6 million saving. The total area of high radiation in South Africa amounts to approximately 194,000km² of which the majority falls within the Northern Cape. It is estimated that, if the electricity production per km² of mirror surface in a solar thermal power station were 30.2MW and only 1% of the area of high radiation were available for solar power generation, then generation potential would equate to approximately 64GW. A mere 1.25% of the area of high radiation could thus meet projected South African electricity demand in 2025 (80GW). This would, however, require large investments in transmission lines from the areas of high radiation to the main electricity consumer centres (Pegels, 2009). The implementation of large solar power plants has been proposed as one of the main contributors to greenhouse gas emission reductions in South Africa.

The energy objectives of the NCPSDF among others are to:

- Promote the development of renewable energy supply which is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts.
- Enhance the efficiency of Eskom's power station at the Vanderkloof power station.
- In order to reinforce the existing transmission network and to ensure a reliable electricity supply in the Northern Cape. There is a national electricity supply shortage and the country is now in a position where it needs to commission additional plants urgently. Consequently, renewable energy projects are a high priority.
- Develop and institute innovative new energy technologies to improve access to reliable, sustainable and affordable energy services with the objective to realize sustainable economic growth and development. The goals of securing supply, providing energy services, tackling climate change, avoiding air pollution and reaching sustainable development in the province offer both opportunities and synergies which require joint planning between local and provincial government as well as the private sector.
- Develop and institute energy supply schemes with the aim to contribute to the achievement of the targets set by the White Paper on Renewable Energy (2003). This target relates to the delivery of 10000 GWh of energy from renewable energy sources (mainly biomass, wind, solar, and small-scale hydro) by 2013.

The NCPSDF's energy policy is stated as follows:

- The construction of renewable energy infrastructure must be strictly regulated in terms of the spatial plans and guidelines put forward in the NCPSDF. They must be carefully placed to avoid visual impacts on landscapes of significant symbolic, aesthetic, cultural or historic value and should blend in with the surrounding environment to the extent possible.
- EIAs undertaken for such construction must assess the impacts of such activities against the directives listed in above.
- Renewable energy sources such as wind, solar thermal, biomass and domestic hydroelectricity are to constitute 25% of the province's energy generation capacity by 2020.
- The implementation of sustainable renewable energy is to be promoted through appropriate financial and fiscal instruments.
- An effective legislative system to promote the implementation of renewable energy is to be developed, implemented, and continuously improved.
- Public awareness of the benefits and opportunities of renewable energy must be promoted.
- The development of renewable energy systems is to be harnessed as a mechanism for economic development throughout the province in accordance with the Sustainable Development Initiative (SDI) approach.

• Renewable energy must first and foremost be used to address the needs of the province before being exported.

The PSDF states that whilst mining, agriculture, urban development, bulk infrastructure and renewable energy installations are imperative for the economic development of the province, these large scale projects could have a detrimental impact on the environment, human-wellbeing and on the tourism. In terms of the NCPSDF he following objectives and policy apply in this regard:

- All large-scale resource use activities must on an on-going basis and in a balanced manner give effect to the imperatives for sustainable development namely, human wellbeing, environmental integrity and economic efficiency. [More detail below].
- All large-scale resource use activities must be managed in accordance with a best-practice Environmental Management System (EMS) that provides for on-going monitoring, auditing and continual improvement as it relates to environmental performance and compliance with (a) above.
- All large-scale resource use activities must be planned, implemented and managed in accordance with the Sustainable Development Initiative (SDI) approach.
- Where tracts of agricultural land are to be used for non-agricultural uses such as mining, construction of renewable energy installations, the SKA activities, etc., such activities must create sustainable multipliers in the local economy and synergies that would unlock meaningful benefit through implementation programmes.
- Applications for approval of large-scale consumptive resource use activities must include a comprehensive Project Development Framework, which must include inter alia the following:

The NCPSDF states that “development is only acceptable and in the public interest if it is environmentally justifiable, socially equitable and economically viable, i.e. environmentally sustainable”. This means that “the development needs of present generations should be met without the ability of future generations to meet their own needs, being compromised”.

Based on the outcome of specialist studies, Ilali investments concluded the following.

Social equity or human wellbeing: The proposed solar plant will have a positive impact on the material human wellbeing (the absence of poverty) as it will create many job opportunities and stimulate the local economy of the surrounding communities. In this regard Key aspects of the above-mentioned SDI are that it capitalises on the efficient use of resources for the benefit of the developer, affected local communities and the environment. The over-arching objective of the SDI approach is to promote sustainable development through the following:

- Ensuring that large-scale resource use contributes in a sustainable manner to socio-economic growth and environmental rehabilitation.
- Building upon and promoting the comparative economic advantages of the area.
- Unlocking the latent value of the land.
- Utilising the natural resource base in a sustainable manner.
- Ensuring an acceptable return on capital invested by the core project investors.
- Ensuring that local communities are recognised as partners in the planning and development process.

It is important to note that the Upington is identified in the spatial planning documentation as having “high development potential and high need”. Surely the proposed solar plant through its required workforce and skills development will facilitate the economic potential and human need of this town and others, thus creating opportunity.

Environmental integrity: The proposed solar plant will have an acceptable impact on the environment in terms of providing for and sustaining life on earth, the region or nearby towns, i.e. both the natural and human-made environment. The solar plant will be positioned on land with low agricultural production and already disturbed by human activities, it will not cause pollution that could have any negative impact on the ecology (in fact it will prevent about 90,000 tonnes of carbon dioxide emissions annually, compared to a coal-fired power plant), it will not consume natural recourses other than a little water (for washing) and sunlight, and there is no evidence to suggest that the solar plant will disturb the integrity or ecological carrying capacity of the existing ecosystem any further that what has already been caused by agricultural activities.

Economic efficiency: The proposed solar plant will have a positive impact on the way human needs are met and the way society can seek prosperity through economic efficiency. Economic efficiency refers to the use of resources so as to maximize the production of goods and services – and what better example than the proposed solar plant. The argument that one resource (agricultural land/production) is exchanged for another (energy generation), and thus the proposed solar plant is not economically efficient, does not hold-up since the loss of low-potential agricultural land is far outweighed by the supply of clean/renewable energy to thousands of households, factories and/or businesses. The use of the subject property for renewable solar energy generation is optimally utilising the resources available for maximum production.

Various solar and CSP plants have been proposed in the Northern Cape with Upington being the hub of such developments. In terms of the NCPSDF the proposed solar plant on the subject property falls within the demarcated "solar corridor", which centres around Upington and "extends from Kakamas in the north to De Aar in the east". (See Figure 4 which shows the spatial context of the current development regions and corridors of the Northern Cape). In terms of the NCPSDF's Spatial Plan for Agricultural Potential, the subject property falls outside any high potential agricultural land; outside any core biodiversity conservation area; and inside a potential industrial area/corridor.

Ilali Investments concluded that the proposed solar plant on the subject property in line with the objectives, policy, renewable energy generation targets, location inside the solar corridor, socio-economic and environmental requirements of the **NCPSDF**.

10.7 KAI GARIB MUNICIPALITY DRAFT IDP (2013/14)

In terms of the economic analysis of the Kai Garib Municipality's latest Integrated Development Plan (IDP), the economy is heavily depended on the agricultural sector but "new opportunities have opened up since the need to facilitate the generation of sustainable energy was introduced in South Africa by Eskom and the South African Government". According to the document "Kai Garib Municipality immediately became a hotspot for solar energy developments and numerous developments are currently in process and the resulting economic spin-offs are eagerly anticipated". Please refer to the planning report attached in Annexure D5 for a list of planning applications currently underway in the vicinity.

The IDP states that solar energy generation shows great potential to grow and to contribute to the local economy in the whole Kai Garib Municipal area. Studies have found that South Africa has one of the best solar resources on the planet and the solar energy sector (including the proposed solar plant) could change the region's economic landscape from reliance on agriculture and mining to include renewable energy and the manufacturing of solar-related components.

10.8 KAI GARIB MUNICIPALITY SPATIAL DEVELOPMENT FRAMEWORK (2012)

The Kai Garib Spatial Development Framework (SDF) was adopted in 2012 to act as the spatial component to all projects mentioned in the above IDP. It aims to illustrate the current spatial situation in the Kai Garib Municipality, whilst also addressing future development on a spatial plane.

The SDF states that "a new era for economic development was introduced in South Africa when Eskom and the South African Government sided together to facilitate the generation of sustainable energy". It states that current solar developments along the N14 between Upington and Kakamas indicate that "this area will form the centre of solar development".

Therefore, even though the area around the subject property is not specifically demarcated for renewable energy generation, it is evident that the principle has been accepted and that the proposed solar plant on the subject property is in line with the SDF.

10.9 KAI GARIB ZONING SCHEME REGULATIONS

The subject property is currently zoned for agricultural use (Agriculture I), which does not permit a solar plant as a primary use right. An application for rezoning (of a 600ha portion of the subject property) to Special Zone is thus required – the subject property will therefore have a split zoning.

In terms of the Zoning Scheme Regulations a "special zone" is defined as "a use which is such, or of which the land use restrictions are such that it is not catered for in these regulations, and of which the uses and land use parameters are fully described by means of the conditions as contained in the special zone". This Special Zone rezoning application's conditions must therefore contain renewable energy structures and include photovoltaic solar panels, access roads, power lines (above and below ground), a substation, workshop, guard house, fencing, ablution, offices, water tanks, etc. (refer to No. 5 below for more detail regarding associated infrastructure).

"Renewable energy structures" is defined in the NCPSDF as "any wind turbine or solar voltaic apparatus, or grouping thereof, which captures and converts wind or solar radiation into energy for commercial gain irrespective of whether it feeds onto an electricity grid or not. It includes any appurtenant structure or any test facility which may lead to the generation of energy on a commercial basis". (In terms of the NCPSDF "appurtenant structure" means any structure or accessory necessary for or directly associated with generation of renewable energy). This rezoning application therefore covers all associated land uses and thus no additional land use rights are required to accommodate the proposed solar plant.

This application also does not include subdividing off the 600ha portion of the subject property, even though the Subdivision of Agricultural Land Act is applicable (refer to No 4.11 below). The required solar plant land, including the access road and power lines over the farm (if and where required) will be leased from the Owen Davies Trust. Infrastructure required on abutting properties to link with the Eskom MTS and/or access roads (if required) will be dealt with by means of lease agreements with the respective land owners and Council could make it conditions of approval that servitudes (if any) be registered in this regard over these properties.

10.10 CONSERVATION OF AGRICULTURAL RESOURCES (CARA)

The Conservation of Agricultural Resources (Act 43 of 1983 - CARA) provides for the conservation of natural agricultural resources through prevention of erosion, the destruction of water resources and veld protection measures. Due to the scale and nature of the proposed solar plant this Act is also applicable.

In addition, the National Department of Agriculture, Forestry & Fisheries (DAFF) adopted Regulations concerning renewable energy during 2010. These Regulations gives DAFF the mandate to protect and manage agricultural land, especially high potential agricultural land - it deals with the conflict between agricultural land for food security and the pressure for land for other land uses. In terms of these Regulations:

- No solar farming structure, supporting infrastructure or access road...will be allowed on high potential agricultural land...as determined by DAFF.
- No solar farming structure, supporting infrastructure or access road...will be allowed on areas currently being cultivated or on fields that have been cultivated in the last 10 years.

The rezoning application undertaken by Ilali Investments must therefore also seek the approval of DAFF in terms of the above-mentioned legislation; who will have to make a decision based on the agricultural potential of the subject property and/or whether or not the proposed solar plant is effective and sustainable utilisation of agricultural land. This decision could among others take into consideration the following:

- Government in general has a responsibility to keep up with the changing global economic and environmental trend of changing to alternative energy sources. This must be seen in light of the fact that a solar plant of this scale and nature (smaller is less financially viable) could only settle in rural areas/outside the urban edge. Furthermore, natural vegetation is vigorously protected so except for true desert conditions, solar plants will more often than not have to be located on land that has at some stage been farmed on. If this land has low agricultural production potential (refer to the Agricultural Potential Study attached as Annexure G) then surely an effective and sustainable alternative use for sun-drenched and low production agricultural land is a solar plant?
- The agricultural specialist study has shown that the subject property's soil has limited agricultural use and is only suitable to limited grazing. In this regard it is important to highlight that this application will not have an impact on food security. ("Food security" means ensured access to essential nutrition and refers to a country's ability to provide access to sufficient, safe, and nutritious food that fulfils the dietary needs for an active and healthy lifestyle).

10.11 SUBDIVISION OF AGRICULTURAL LAND LEASE

The Subdivision of Agricultural Land (Act 70 of 1970) specifies that agricultural land may only be subdivided if the subdivided portions will be economically viable independent entities. Although the proposed solar plant does not require subdivision, the lease of agricultural land for longer than 9 years is deemed to require the same approval process as subdivision. DAFF will not allow the subdivision of agricultural land for renewable energy plants but they will allow leases of up to 25 years.

Application must therefore be made to DAFF for approval of the lease (area) for 25 years in terms of Act 70 of 1970. In this regard it is important to mention that the lease area for the proposed solar plant on the subject property will not sterilise or make any portion of the farm economically unviable or dependant on the lease area (to continue the farming activities). Current farming activities will continue around the lease area as per normal. The lease area will also be maintained and ultimately rehabilitated (on decommissioning) to ensure that the land can be used for farming when the proposed lease agreement runs out.

11 AGRICULTURAL POTENTIAL OF THE LAND

Mr Christo Lubbe, an agricultural specialist, undertook an agricultural potential study of the proposed RE Capital 3 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.

11.1 OBJECTIVES

The objectives of the agricultural potential study were:

- To evaluate the possibility of impacts on agricultural production that may result from the development of the PV power station.
- To consider the necessity of conducting a full agricultural study.

11.2 APPROACH AND METHODOLOGY

The methodology applied by the agricultural specialist included a desktop study as well as a field investigation as described below.

11.2.1 Desktop Study

A desktop study was conducted to review existing data and literature sources. The desktop review provided a baseline agricultural and land use profile, focusing on the specific geographical area potentially impacted by the proposed project.

11.2.2 Field Investigation

The site was visited by the specialist and a field survey was carried out.

Potential impacts of the proposed project on agriculture were identified with particular attention to the following issues:

- The possibility of permanent loss of high potential agricultural land;
- Impairment of land capability due to construction;
- Analysis of erosion risk because of altered drainage patterns and poor rehabilitation in erosion-sensitive areas; and
- Veld conditions for grazing.

11.3 ASSUMPTIONS AND LIMITATIONS

As far as **regional** information is concerned, this is primarily a desktop-based study. Climatic conditions, land uses, land type and terrain are readily available from literature, GIS information and satellite imagery.

Notwithstanding these limitations, the **site-specific** field studies confirmed most of the desktop findings.

The specialist however confirmed that he is confident that the findings provide sufficient detail for the agricultural potential study reported in the study.

11.4 PHYSICAL DESCRIPTION OF SITE

The area surrounding the site has a differentiated agricultural character. The N14 from Keimoes towards Upington divides the agricultural practices abruptly into two practices: East from the N14 towards the Orange floodplain intensive irrigated farming is practised while extensive livestock farming takes place on the western side of the road. The reason for this abrupt difference is the

availability of water for irrigation and alluvial deposits on the floodplain of Gariep River and its catchment area on the east side of the road and the arid character of the region west of the road.

11.4.1 Soils

With the climate and geology associated with the area, **calcic soils** are prone to develop.

Calcic soils originate in arid climates with the accumulation of secondary lime, forming a distinctive horizon consisting chiefly of calcite. In calcic soils, either hardpan carbonate or a soft carbonate horizon or (rarely) gypsic horizon dominates the morphology of the sub-soil.

Soil forms with these characteristics include Molopo, Askham, Kimberly, Plooysburg, Etosha, Gamoep, Addo, Prieska, Brandvlei and Coega

The typical profile for soils in this region as follows:

11.4.1.1 Area specific

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

11.4.1.2 Site specific

The **Northern Site Alternative** soil pattern is indicated as AR2, a red and yellow well-drained sandy soil with high base status. The larger part of the area (90%) is classified as **floodplain** (Landform 4). Majority soils expected (>80%) to be found here are:

The ***Central Site*** soil pattern is indicated as LP2. These soils has minimal development, are usually shallow, on hard or weathering rock with or without intermittent diverse soils. Lime generally present in part or most of the landscape.

11.4.2 Past and Current Agricultural Activities on Site

The sites are currently utilised for extensive cattle and sheep farming. There is no evidence of past or current cultivation.

11.4.3 Agricultural Structures on site

Current agricultural structures on site include:

- Handling facilities (collecting kraals with removable handling facilities;
- Boundary fences consist of 1200mm Jackal Proof fence wire. The northern fence is electrified;
- Internal stock camp fencing (900mm in height);
- Windmills;
- Reservoir;
- Drinking troughs where camps intersect; and
- One overhead Eskom transmission line through the Northern Site and one between the N14 and the Central Site.

The location of these structures for the northern site alternative are illustrated in Figure 43 and for the central site alternative in Figure 44 (note that the northern site alternative has been eliminated from the process, and although mentioned in this section will not be assessed further).

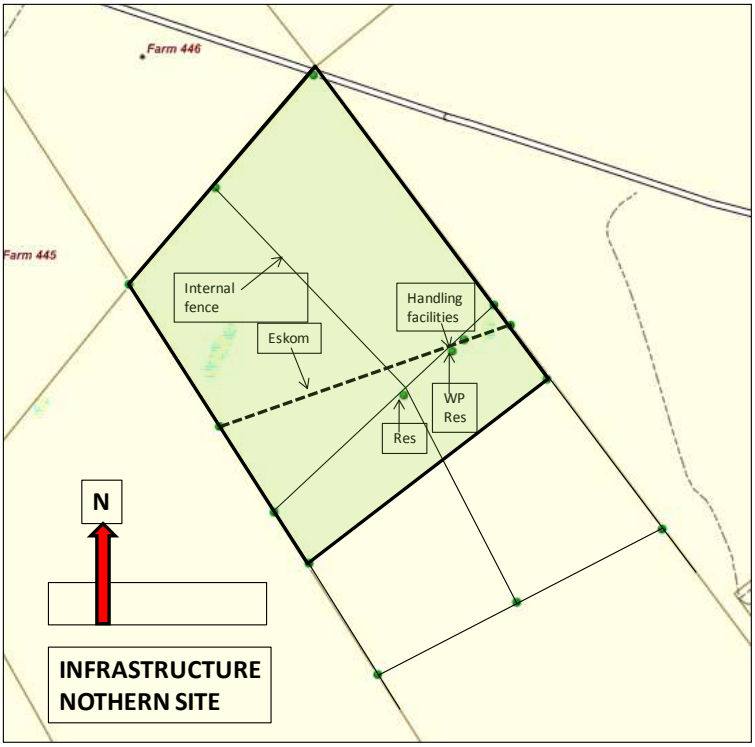

Figure 43: Agriculturally Related Infrastructure on the Northern site Alternative (Lubbe, 2013).

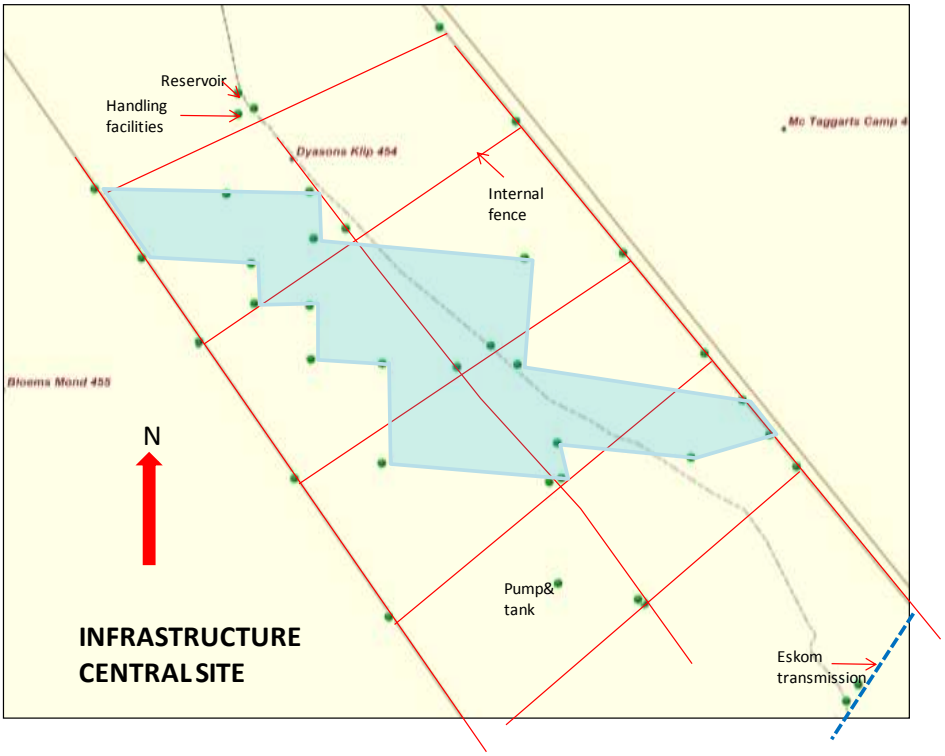

Figure 44: Agriculturally related Infrastructure situated on the central site alternative.

11.4.4 Agricultural study findings

The agricultural specialist study had the following findings.

11.4.4.1 Soil survey

The site inspection was undertaken by the agricultural specialist on 8 and 9 July 2013.

Soil was augured at a 200m interval on sections of the alternative sites as indicated in Figures 6 to 8 of the agricultural potential study and soil properties were noted

The soil forms found on the northern site alternative are shown in Table 6 below.

Table 7: Soil Forms identified on the northern site alternative.

Plooysburg (40-60 cm)
About **13%** of the area is represented by the Plooysburg form (Family Brakkies), indicated by a red line in Figures 6 and 7 in the Agricultural Potential Study in Annexure D2. Details are as follows.
10-20cm red sandy (Very fine grade) single grain structured top soil
20-40cm Red brown, loamy sand, (Very fine grade) structure less sub soil
40-60cm Hardpan Carbonate horizon
Brandvlei (20-30 cm)
About **13%** of the area is represented by Brandvlei (Family Grootvloer), indicated by a green line in Figures 6 and 7. Details are as follows
10-20cm red sandy (fine grade) with single grain structured top soil
40-60cm Soft Carbonate horizon
Coega (20-30 cm)
The largest part of the site (74%) consists of the Coega soil form (Family Marydale). These areas are marked by a yellow line on Figures 6 and 7 in the Agricultural Potential Study in Annexure D2.
0 - 20cm red, sandy, (fine grade)with single grain structure top soil
40 – 60cm Hard pan Carbonate horizon

Figure 45: Showing example of the Plooysberg soil form found on the northern site alternative (Lubbe, 2013).

Figure 46: Showing example of the Coega soil form found on the northern site alternative (Lubbe, 2013).

The soil forms found on the central site alternative are shown in Table 7 below.

Table 8: Soil Forms identified on the central site alternative.

Plooysburg (40-60 cm)
About **23%** of the area is represented by the Plooysburg form (Family Brakkies), indicated by a red line in Figure 8 in the Agricultural Potential Study in Annexure D2. Details are as follows.
10-20cm red sandy (Very fine grade) single grain structured top soil
20-40cm Red brown, loamy sand, (Very fine grade) structure less sub soil
40-60cm Hardpan Carbonate horizon
Coega (20-30 cm)
The largest part of the site (77%) consists of the Coega soil form (Family Marydale). These areas are marked by a yellow line on Figure 8.
0 - 20cm red, sandy, (fine grade)with single grain structure top soil
40 – 60cm Hard pan Carbonate horizon

Figure 47: Showing example of the Plooysberg soil form found on the central site alternative (Lubbe, 2013).

Figure 48: Showing example of the Coega soil form found on the Central site alternative (Lubbe, 2013).

11.4.4.2 Veld Condition Assessment

A veld condition assessment was done simultaneous with the soil survey, by visual acknowledgement and random sampling on a 1m^2 grids.

The outcome of the veld condition assessments for the northern site are shown in the table below.

Table 9: Veld Condition Assessment outcome of the study site

ASSESSMENT CATEGORY	FINDING	SCORE
PLANT COVER	Plant cover very sparse with large bare areas	10
COMMON GRASSES	Moderate and poor grazing mixed *Stipagrostis Ciliata, Fingerhuthia Africana* Karoo shrubs	10
SURFACE CONDITION	Moderate levels of top soil loss	3
BUSH ENCROACHMENT	Medium to light encroachment present	6

SOIL TYPE	Sandy soil	2
	TOTAL	**31**

Figure 49: Typical Veld conditions: Central Site Alternative (Lubbe 2013)

With a score of 31/80, the veld condition of the central site alternative is regarded as poor with a grazing capacity of 63ha/LSU.

11.4.4.3 Water Availability/Provision

Water is provided to livestock from boreholes pumped by windpumps and stored in reservoirs and troughs. Rainwater is also harvested in earth dams where stock can drink in season. The low rainfall and high evaporation impede the success of this operation.

11.4.4.4 Land Capability and Suitability for agriculture

Land capability is classified as **non-arable low potential grazing land** .This is due to the arid climate and limiting soil properties.

Table 10: Land Capability and Suitability for Crop Production – Central Site Alternative

Land capability class	Suitability Rating	Major Limitation to Crop Production	Distance Km	% of Local Study Area
Class VI Cg	**Very low**	Low water holding capacity Shallow rooting zone Severe climate Severe erosion hazard	5.3	77
Class lV Py	**Low**	Low water holding capacity Severe climate	1.6	23

Table 11: Land Capability and Suitability Assessment for Grazing - Central Site Alternative.

Area Description	Suitability Rating	Major Limitation to Grazing	Area (ha)	% of Local Study Area
Cattle /Sheep	**Low**	Very shallow rooting depth on carbonate hard setting, low clay content, low rain fall, with carrying capacity of 21-25ha/LSU	450	100

11.4.4.5 Summary of 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 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 establishment of a PV power station would have no severe impact on the agricultural potential or activities at the identified site, while agricultural activities would continue in the surrounding area. The following possible impacts were considered.

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

11.5 IDENTIFICATION OF POSSIBLE IMPACTS ON AGRICULTURAL POTENTIAL

Due to the low agricultural potential of both alternative sites, possible impacts on agricultural activities during construction and operation of the PV power facility are few.

Due to the low carrying capacity, the loss of **grazing during construction is negligible**. After construction and due to the nature of the facility, animals will still be able to graze the site.

11.5.1 Agricultural Conclusion and Recommendations

The findings of the agricultural potential study indicate that **impacts on agriculture**, locally and on site, will be **minimal** and will have **very little influence** on **commercial farming**. Due to poor soil properties and extreme climatic conditions, farming activities consist of grazing for sheep, but due to the low grazing potential of the region, the **loss of the small area of grazing land is negligible**.

A full agricultural impact assessment will probably not indicate otherwise and is therefore regarded as unnecessary.

12 ECOLOGICAL SENSITIVITY ANALYSIS

Mr Simon Todd, of Simon Todd Consulting, conducted an Ecological Sensitivity Analysis of the proposed RE Capital 3Solar Development (see **Appendix D, Annexure D1** for full report), from which the following is drawn:

The draft sensitivity map for the RE Capital 3 Solar Energy Development site is illustrated in figure 42 above (in section 7 of this report as well as in the Fauna and Flora Scoping Report attached in Annexure D1.

The majority of the site consists of **open plains** considered to be of **moderate sensitivity** and would be **suitable for development** without a very high risk of significant ecological impacts. The **northern site alternative** is seen as the **least preferred site alternative** from an ecological point of view as there is a significant drainage line which traverses the area as well as several pans which are also considered ecologically sensitive. The central site alternative appears to be significantly less sensitive and is identified as the preferred development option from an ecological point of view. Although there are also some minor drainage channels in this area, these are not likely to be highly ecologically significant. The vegetation structure and composition of these washes will be investigated during the EIA phase to evaluate their ecological value and sensitivity.

12.1 POTENTIAL IMPACTS

Based on the results of the abovementioned ecological sensitivity analysis, the following impacts have been identified as the most significant potential impacts likely to be associated with the development of the RE Capital 3 solar facility:

The development will result in a variety of impacts, associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as PV arrays, roads, operations buildings etc. The following impacts are identified as the major impacts that are likely to be associated with the development and which will be assessed during the EIA phase of the development, for the preconstruction, construction and operational phases of the development. The potential significance of these impacts is contained in the fauna and flora scoping report (annexure D1) but will only be assessed in detail during the EIA phase.

12.1.1 Impacts on vegetation and protected plant species

It is highly likely that some listed plant species occur within the site and there is a probability that some of these would be affected by the development. Depending on the identity and status of the affected species, impacts on such species are likely to be of **low to moderate significance** given the relatively low footprint of the PV facility in relation to the extensive nature of the surrounding landscape. As PV developments generate a high local impact, the exact location of the PV facility in relation to the sensitive receptors is usually the most important factor determining the impact of this element of the development.

12.1.2 Soil erosion and associated degradation of ecosystems

The large amount of disturbance created during construction will leave the site vulnerable to alien plant invasion and soil erosion. On the one hand, the generally low slope at the site will to some extent reduce the likely severity of this impact, while the panels themselves will constitute several hectares of hardened surface which will generate a large amount of runoff with a high erosion capacity during large storm events. Therefore, runoff management will be a key factor in reducing the likely impact of the development on local vegetation, soils and hydrology.

12.1.3 Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence 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 mammals or reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. However in the long term, operational phase impacts are likely to be relatively low.

12.1.4 Impacts on Broad-Scale Ecological Processes and Loss of Landscape Connectivity

As there are several other renewable energy developments in the area, the development of the site will contribute towards cumulative impacts, particularly the loss of landscape connectivity. The site is likely to be fenced and the cleared site is also likely to be hostile to many smaller fauna which will prevent or impede their movement across the landscape. The significance of this impact will need to be evaluated at the landscape level with consideration of the location and configuration of the other developments in the area.

12.1.5 Avifaunal Impacts

Large raptors and many larger bird species such as cranes and bustards are vulnerable to collisions with or electrocution from power line infrastructure. This can be a particular problem if the power line lies within the movement or migration pathway of the birds. As many of these species are long-lived slow-breeding species, collisions with power lines can be a major source of mortality for such species and may threaten the viability of local or regional populations. Insulating electrical components and fitting bird flight diverters can provide effective mitigation against such impacts and is recommended as standard practice for new power line infrastructure.

12.2 ECOLOGICAL CONCLUSION & RECOMMENDATIONS

The site does **not appear to be highly sensitive** from a botanical perspective. The only listed vegetation type in the area is Lower Gariep Alluvial Vegetation which is restricted to the vicinity of the Orange River and will not be impacted by the development. The affected vegetation types have been little impacted by transformation and are still overwhelmingly intact. As these vegetation types are common in the local area as well as in the broader region, the loss of a relatively small extent of these vegetation types does not appear to be a significant concern. There is however likely to be a number of listed and protected species present within the site which may be impacted by the development. Although there are no indications at this stage that any of these are very abundant at the site, an important activity during the field assessment will be to locate and map the distribution of such species at the site, so that impact on such species can be reduced or avoided. It is likely that many of the species of conservation concern are associated with localised habitats containing plant communities of conservation concern such as quartz outcrops or calcrete patches.

Overall, the **faunal diversity** of the site is likely to be **low** with relatively few species of conservation concern present. The listed mammals which may occur at the site all have wide distribution ranges and the development would not constitute a significant loss of habitat for such species. 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. No listed or range-restricted reptiles are likely to occur at the site the impacts on reptiles resulting from the development are not likely to be of broader significance. Site clearing and the construction of the panels will alter habitat structure within the affected area for reptiles and is likely to result in an increase in geckos and other climbing species at the expense of diurnal ground-foraging species. The Giant Bullfrog *Pyxicephalus adspersus* is the only listed amphibian which may occur at the site and is listed as Near Threatened. The larger pans within the northern development option would represent the only potentially suitable breeding habitat for this species. A number of listed avifauna are likely to be present and in the long-term, the overhead power line to connect the facility to the Eskom grid is identified as the major threat to avifauna resulting from the development.

The sensitivity mapping suggests that the majority of the site consists of open plains considered to be of moderate sensitivity and which would be suitable for development without a very high risk of significant ecological impacts. The northern development option is seen as the least preferred option as there is a significant drainage line which traverses the area as well as several pans which are also considered ecologically sensitive. The alternative development area in the central part of the site appears to be significantly less sensitive and is identified as the preferred development option. As the Eskom MTS has yet to be built, the preferred power line route to the substation cannot be identified at this point but with suitable mitigation, is not likely to generate significant impact.

13 SUMMARY OF SITE CONSTRAINTS

The following site-specific constraints were identified by various specialists during this scoping / baseline phase of the environmental process. These site constraints will be used to further refine the proposed solar facility layout, as the potential impacts associated with them will be and recommendations to avoid and/or mitigate impacts are provided during the on-going environmental process.

13.1 FLORA:

- **Main drainage lines & seasonal washes**;
- ***Protected*** plants species and communities;
- **Pans** (within the Northern Alternative Site);

13.2 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.

13.3 AGRICULTURAL POTENTIAL:

No specific constraints in terms of agricultural potential were identified

13.4 HERITAGE:

- **Main drainage lines & seasonal washes**.

13.5 VISUAL:

Due to the remote location of the site and distance from the N14 there are not deemed to be any visual constraints on the proposed solar development.

14 CRITERIA FOR THE ASSESSMENT OF IMPACTS

The assessment criteria used in the assessment are described below and are drawn from 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 Brownlie (2005).

For each of the identified impacts the following are described:

Nature of the impact

A description of positive or negative effect of the project on the affected environment, or *vice versa*. The description includes who or what would be affected, and how.

Extent of the impact

This includes assessing the spatial scale of the impact, i.e. is it local (within the boundaries of the study site), regional, national or international.

Duration of the impact

The lifespan of the impact is assessed, i.e. is it short term (0 - 5 years) Medium term (6 - 15 years) long term (where the impact will cease after the operational life of the proposed project) or permanent (the impact will persist beyond the operational life of the proposed project). Certain impacts can also be *discontinuous or intermittent* (where the impact may only occur during specific climatic conditions or during a particular season of the year).

Intensity or magnitude of the impact.

The intensity or severity of the impact would be indicated as either Low (where the impact affects the environment in such a way that functioning and processes are not affected), Medium (i.e. where the affected environment is altered but functioning and processes continue albeit in a modified way) or High (i.e. where functioning and processes are altered to the extent that they will temporarily or permanently cease).

Probability of occurrence

The likelihood of the impact actually occurring would be indicated as either Improbable (the possibility of the impact materialising is very low as a result of design or historic experience), Probable (there is a distinct possibility that the impact will occur), Highly probable (it is most likely that the impact will occur), or Definite (the impact will occur regardless of the implementation of any prevention measures).

Significance of the impact

Based on a synthesis of the information contained in the criteria above, the potential impact would then be described according to 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 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.

Confidence The level of confidence in predicting the impact can be described as low, where there is little confidence in the prediction, due to inherent uncertainty about the likely response of the receiving ecosystem, or inadequate information; medium, where there is a moderate level of confidence in the prediction; or high, where the impact can be predicted with a high level of confidence.

Cumulative Impact

Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments 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.

Mitigation

The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on vegetation and animal habitats and to maximise re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potential impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested appropriately implemented.

15 ASSESSMENT OF IMPACTS

The Assessment of impacts was undertaken by Cape EAPrac, with specialist input provided by the participating specialists.

15.1 ECOLOGICAL IMPACTS

Mr Simon Todd undertook assessment of the potential ecological impacts (both Faunal and Botanical) of the proposed development from which the following is drawn. A copy of this impact assessment report is attached in Annexure D1 of this report.

15.1.1 Identification of potential ecological impacts

Potential ecological impacts resulting from the development of three 75 MW phases of 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. These were identified during the scoping phase of the Environmental process. Potential Ecological Impacts including the following:

15.1.1.1 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.

15.1.1.2 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.

15.1.1.3 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.

15.1.2 Identification of impacts to be assessed

In this section each of the potential impacts identified in the section above is explored 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.

15.1.2.1 Preconstruction Phase

Impacts on vegetation and protected plant species.

Preconstruction activities such as **geotechnical investigations**, access road construction or other unauthorised vegetation clearing may have a negative impact on vegetation and listed species. As listed and protected species are widespread at the site this is a plausible impact associated with the development, it is assessed for the preconstruction phase.

Impacts on fauna during the preconstruction phase

Uncontrolled access to the site and preconstruction activities may be detrimental to fauna. **Poaching** of susceptible species may occur as a result of increased access to the site and site clearing or disturbance with heavy machinery may also result in mortality of fauna unable to avoid the disturbance. As this is a possible outcome of the development it is assessed.

15.1.2.2 Construction Phase

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. The loss of currently intact habitat resulting from site clearing within the development footprint is an inevitable consequence of the development. This impact is **certain to occur** and is therefore assessed for the construction phase, for the facility and for the grid connection.

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 is assessed for the construction phase.

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 mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present. Some impact on fauna is **highly likely** to occur during construction and this impact is therefore assessed for the construction phase.

15.1.2.3 Operational Phase

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 intact 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 is assessed as a likely impact associated with the development.

Direct faunal impacts

During the operational phase of the development, **interactions between fauna and the infrastructure** of the facility may generate negative impacts on fauna. Possible impacts include **electrocution** of fauna such as tortoises along electric fencing around the facility, or the persecution or **poaching** of fauna within and around the facility. As there is a **possibility** that this impact would occur, it is assessed for the development.

Avifaunal Impacts Due to Power Lines

Large raptors and many larger bird species such as cranes and bustards are vulnerable to **collisions** with or **electrocution** from power line infrastructure. This can be a particular problem if the power line lies within the movement or migration pathway of the birds. As many of the vulnerable species are long-lived slow-breeding species, collisions with power lines can be a major source of mortality for such species and may threaten the viability of local or regional populations. Insulating electrical components and fitting bird flight diverters can provide some mitigation against such impacts and is recommended as standard practice for new power line infrastructure. It important to note with regards to power line impacts that even if the impact at any one moment in time is **low**, it is the cumulative long-term impact which can generate **significant impact**.

15.1.3 Assessment of Ecological Impacts Associated with the Solar Development

The tables below contain an assessment of ecological impacts associated with the solar development. This assessment was undertaken by an ecological specialist, Mr Simon Todd. A copy of the Faunal and Flora specialist report is attached in **Appendix D1**. Please note, that this section excludes the power line and grid connection, which is assessed separately in section 17.1.4 below.

15.1.3.1 Preconstruction Phase

Table 12 below, contains an assessment of ecological impacts during the pre-construction phase of the development as identified and assessed by the ecological specialist, Mr Simon Todd. These are potential impacts that could occur prior to the commencement of earthworks for the installation of the PV/CPV panels.

Table 12: Assessment of Ecological Impacts during the pre-construction phase.

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Impacts on vegetation and listed or protected plant species resulting from preconstruction activities	Local	Long-Term	Low	Probable	Moderate	• No unauthorised access to the site. • No unauthorised site clearing or disturbance at the site without an ECO present. • The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction activities. • Areas where exploration work is permissible should be clearly demarcated.	Medium-Low Negative	Low Negative	High
Direct Faunal	Local	Short-	Medi	High	High	• Site access to be controlled and no	Medium-	Low	High

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Impacts During Preconstruction		Term	um			unauthorized persons should be allowed onto the site. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. • No open excavations, holes or pits should be left at the site as fauna can fall in and become trapped.	Low		

15.1.3.2 Construction Phase

Table 13 below, contains an assessment of ecological impacts during the construction phase of the development as identified and assessed by the ecological specialist, Mr Simon Todd. These are potential impacts that could occur during the physical construction activities associated with the installation of the PV/CPV panels.

Table 13: Assessment of Ecological Impacts during the construction phase.

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Impacts on vegetation and listed or protected plant species resulting from construction activities	Local	Long-Term	High	Definite	Low	• Preconstruction walk-through of the facility in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DENC permit conditions. • Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained. • Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc. • Eco to provide supervision and oversight of vegetation clearing activities within sensitive areas. • Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. • All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.	High Negative	Medium Negative	High

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
						• Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.			
Direct Faunal Impacts During Construction	Local	Short-Term	Medium	High	High	• All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. • Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • If trenches need to be dug for water pipelines or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them.	Medium Mitigation	Medium-Low Mitigation	High

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Soil Erosion Risk During Construction	Local	Medium-term	Medium-High	High	Low	• Dust suppression and erosion management should be an integrated component of the construction approach. • Regular monitoring for erosion problems along the access roads and other cleared areas. • Erosion problems should be rectified on a regular basis. • A low cover of vegetation should be left wherever possible to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.	Medium Negative	Low Negative	High

15.1.3.3 <u>Operational Phase</u>

Table 14 below, contains an assessment of ecological impacts during the operational phase of the development as identified and assessed by the ecological specialist, Mr Simon Todd. These are potential impacts that could occur during the life cycle of the facility, i.e. after completion of construction and for the entire lifespan of the facility.

Table 14: Assessment of Ecological Impacts during the operational Phase.

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Alien Plant Invasion Risk During Operation	Local	Long-term	Medium-High	High	Low	• Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species. • The recovery of the indigenous grass layer should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas. • Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. • Regular monitoring for alien plants within the development footprint. • Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.	Medium Negative	Low Negative	High
Soil Erosion Risk During	Local	Long-term	Medium-High	High	Low	• All roads and other hardened surfaces should have runoff control features which redirect water	Medium Negative	Low Negative	High

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Operation						flow and dissipate any energy in the water which may pose an erosion risk • Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. • All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and re-vegetation techniques. • All cleared areas should be re-vegetated with indigenous perennial grasses			
Faunal impacts during operation	Low	Long-term	Medium	Moderate	High	• No unauthorized persons should be allowed onto the site. • Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. • If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. • All hazardous materials should be stored in the appropriate manner to prevent contamination of	Medium-Negative	Low-Negative	High

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
						the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises. • If the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as come species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.			

15.1.4 Assessment of Ecological Impacts of Grid Connection

The tables below contain an assessment of ecological impacts associated with the powerline and grid connection. This assessment was undertaken by an ecological specialist, Mr Simon Todd. A copy of the Faunal and Flora specialist report is attached in Annexure D1.

The following assessed impacts are those for the grid connection required to connect the facility to the Eskom grid, for the construction and operational phases of the development. No preconstruction-phase impacts are anticipated for the grid connection.

15.1.4.1 Construction Phase

Table 15: Assessment of Impacts associated with the Grid connection during the construction phase

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Impacts on vegetation and listed or protected plant species resulting from preconstruction activities	Local	Long-Term	Low	Probable	Moderate	• No unauthorised access to the site. • No unauthorised site clearing or disturbance at the site without an ECO present. • The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction activities. • Areas where exploration work is permissible should be clearly demarcated.	Medium-Low Negative	Low Negative	High

15.1.4.2 Operational Phase

Table 16: Assessment of Impacts associated with the Grid connection during the construction phase

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
The operation and presence of the facility may lead to negative impacts on avifauna as a result of electrocution or collisions with the associated power transmission infrastructure.	Local	Long-Term	Low	Probable	Moderate	• Ensure that all new lines are marked with bird flight diverters along their entire length, but particularly in areas where larger birds are likely to pass such as near drainage lines, dams or pans and hills. • All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). • Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.	Medium-Low Negative	Low Negative	Moderate

15.2 IMPACT ON HERITAGE RESOURCES

15.2.1 Baseline Heritage Information

No previous archaeological survey work by the McGregor Museum has been carried out on the farm Dyasonsklip. However previous survey work has documented archaeological observations on nearby properties including McTaggarts Camp 453. For the broader region the following comments can be made as background or baseline information from which certain heritage predictions may be made. These predictions will be confirmed (tested) in the environmental impact assessment phase of the project.

15.2.1.1 Colonial frontier

The eighteenth- and nineteenth-century records for this region pertain mainly to the areas south of and along the Orange River. None of these accounts refer to the specific area of the proposed development.

Dyasons Klip derives its name from events during the Korana War of 1879-1880. A certain Captain Dyason of the Northern Border Police was killed by Korana adversaries while walking between two rocks at this place in 1880 (Van Vreeden 1961:271, citing Gordonia News, 11 Nov 1949). It is not recorded exactly where these stones are situated: most likely they would be near to the Orange River.

There was further military activity in the area in the early twentieth century in relation to Jacob Marengo, shot dead on 20 September 1907 near Eensaamheid Pan where, in an incident of "severe overkill", 5000 rounds were fired to exterminate the resistance leader, five other armed Nama and two accompanying women (Masson 1995). Eensaamheid is about 100 km north west of Upington.

Tungsten mining took place at the north western-most part of the adjoining farm McTaggarts Camp in the 1930s (Morris 2012). Tungston mining also took place on the Dyasonsklip farm.

15.2.1.2 Later Stone Age

Late Holocene Later Stone Age (LSA) sites are frequently noted in surveys south of and south west of the region of proposed development and along the Orange River. These are generally short-duration occupations by small groups of hunter-gatherers. In contrast, there are substantial herder encampments along the Orange River floodplain itself and in the hills north of Kakamas. In a range of hills north east of Keimoes, on Zovoorby, a rock shelter and specularite working (a sparkling mineral with known cosmetic and ritual use in the precolonial past) has been excavated . LSA sites are usually focused on a particular feature in the landscape such as a hill or rocky outcrop and in relation to resources like water and associated habitats richer in animals and plant foods.

15.2.1.3 Pleistocene: Middle and Earlier Stone Age

Beaumont et al. (1995:240-1) note a widespread low density stone artefact scatter of Pleistocene age across areas of Bushmanland to the south where raw materials, mainly quartzite cobbles, were derived from the Dwyka glacial till. Similar occurrences have been noted north of Upington in situations where raw materials are abundant. Systematic collections of this material at Olyvenkolk south west of Kenhardt and Maans Pannen east of Gamoep could be separated out by abrasion state into a fresh component of Middle Stone Age (MSA) with prepared cores, blades and points, and a large aggregate of moderately to heavily weathered Earlier Stone Age (ESA) (Beaumont et al. 1995).

The ESA included Victoria West cores on dolerite and quartzite (a fine example has been found at Hondeblaf north of Upington), long blades, and a very low incidence of handaxes and cleavers. The Middle (and perhaps in some instances Lower) Pleistocene occupation of the region that these artefacts reflect must have occurred at times when the environment was more hospitable than today. This is suggested by the known greater reliance of people in Acheulean times on quite restricted ecological ranges, with proximity to water being a recurrent factor in the distribution of sites.

15.2.2 Heritage Impact Assessment

A heritage impact assessment was undertaken by Dr Morris of the Mcgregor Museum undertook an archaeological impact assessment (Attached in Annexure D3) from which the following is drawn.

Dr David Morris undertook a site visit in November 2013 to inspect various parts of the terrain on foot, focusing on areas of expected impact including that of secondary infrastructure. Heritage traces noted during this survey are evaluated in terms of their archaeological significance.

15.2.2.1 3Assumptions and constraints

It is assumed that, by and large in this landscape, with its sparse vegetation and shallow soil profiles, some sense of the archaeological traces to be found in the area would be readily apparent from surface observations (including assessment of places with erosion or past excavations that expose erstwhile below-surface features). Given a prevailing erosion regime in much of this landscape, it was not be considered necessary to conduct excavations as part of the full HIA to establish the potential of sub-surface archaeology.

A proviso is routinely given, however, that should sites or features of significance be encountered during construction (this could include an unmarked burial, an ostrich eggshell water flask cache, or a high density of stone tools, for instance), specified steps are necessary (cease work, report to heritage authority).

With regard to fossils, a report and/or field assessment of the likelihood of their occurring here should be obtained from a palaeontologist.

15.2.2.2 Potentially significant impacts to be assessed in the HIA process

Any area or linear, primary and secondary, disturbance of surfaces in the development locales could have a destructive impact on heritage resources, where present. In the event that such resources are found, they are likely to be of a nature that potential impacts could be mitigated by documentation and/or salvage following approval and permitting by the South African Heritage Resources Agency and, in the case of any built environment features, by Ngwao Boswa jwa Kapa Bokone (the Northern Cape Heritage Authority). Although unlikely, there may be some that could require preservation in situ and hence modification of intended placement of development features.

Disturbance of surfaces includes any construction: of a road, a pipeline, erection of a pylon, or preparation of a site for a sub-station, or plant, or building, or any other clearance of, or excavation into, a land surface. In the event of archaeological materials being present such activity would alter or destroy their context (even if the artefacts themselves are not destroyed, which is also obviously possible). Without context, archaeological traces are of much reduced significance. It is the contexts as much as the individual items that are protected by the heritage legislation.

Some of the activities indicated here have a generally lower impact than others. For example, Sampson (1985) has shown that powerlines tend to be less destructive on Stone Age sites than roads since access along the route of the line during construction and maintenance tends to be by way of a 'twee-spoor' temporary roadway (not scraped, the surface not significantly modified). Individual tower positions might be of high archaeological significance (e.g. a grave, or an engraving). Note: the impact of a 'twee-spoor' could be far greater on Iron Age landscapes in other parts of South Africa, where stone walling might need to be breached.

15.2.2.3 Archaeological observations

The specific footprint of the proposed development area was investigated, as was adjacent terrain.

The landscape in question consists of gently sloping and relatively flat plains with shallow drainage lines running through it. In a very few places bedrock is exposed in outcrops potentially of archaeological interest in that they are places where water may remain for a short time after rains. There are also a few small vleis, two of which have been artificially deepened in order to catch and retain rain water. These potentially also would be 'magnets' for past human activity. The remainder of the terrain is veneered by shallow topsoil supporting sparse vegetation.

In addition to guidelines provided by the National Heritage Resources Act (Act No. 25 of 1999), a set of criteria based on Deacon (nd) and Whitelaw (1997) for assessing archaeological significance has been developed for Northern Cape settings (Morris 2000a). These criteria include estimation of landform potential (in terms of its capacity to contain archaeological traces) and assessing the value to any archaeological traces (in terms of their attributes or their capacity to be construed as evidence, given that evidence is not given but constructed by the investigator).

In terms of these criteria, all the archaeological observations made fell in the range of low significance.

15.2.2.4 Conclusion

The manner in which archaeological and other heritage traces might be affected by the proposed RE Capital 3 Solar Development has been indicated above. In summary, it would be any act or activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, of any heritage material, object or value (as indicated in the National Heritage Resources Act (No 25 of 1999). The most obvious impact in this case would be land surface disturbance associated with infrastructure construction.

All the archaeological observations made were assessed as being of low significance. The following conclusions are offered relative to the predictions made in the scoping report (Morris, July 2013), based on previous work in the area and tested by fieldwork for this full Impact Assessment:

Based on previous experience, the terrain on which the proposed RE Capital 3 Solar Development would be located was thought unlikely to be rich in archaeological traces of major significance.

- This prediction was sustained by this study: the terrain is not rich in archaeological traces and none of major significance was noted.

Should there be local sources of Dwyka tillite, these could have served as raw materials often drawn upon in Pleistocene times. If not, it might be expected that any archaeological traces would be sparse.

- No tillites were exposed here and spreads of Stone Age material are diffusely scattered, with most widely scattered/isolated stone tools being made on jaspilite sourced from the banks and terraces of the Orange/Gariep River.

There appeared to be none of the features such as hills or rocky features (such as Spitskop north of Upington) which in other parts of this landscape provide shelters with traces of precolonial Stone Age occupation/activity.

- This prediction was largely confirmed: even local outcrops of bedrock that provide !gorras (hollows in which water remains after rain) were (with minor exceptions) largely bereft of artefacts or other traces of past human activity.

Nineteenth- and twentieth-century cultural history and intangible heritage values attached to places could be difficult to recover owing to the sparse population. It was not thought likely that any significant intangible heritage values would be attached to the particular terrain in question.

- It would be difficult to recover any such intangible values where they might have existed. There were no very obvious places that might be a focus for such features but the likelihood of their having existed in a 'storied landscape' (Bleek & Lloyd 1911; cf. Green & Green 2009) cannot be discounted.

There appeared not to be colonial era built environment features in the areas of proposed Solar Development.

- This prediction was falsified by the finding of the above-mentioned ruins of two dwellings. It is not considered that these two sites are of any major significance.

The likelihood of paleontological features of significance occurring would be subject to a desktop enquiry and fieldwork if deemed necessary.

- This report makes no further comment on this aspect.

As far as archaeological and cultural heritage is concerned, the specialist recommended that the project in the proposed 'central' development footprint (i.e. the preferred site location) area may proceed without further mitigation.

16 CUMULATIVE IMPACTS

The purpose of assessing cumulative impacts is to ascertain the potential impact of the facility considering others in the area. In the case of this projects, the overall cumulative impacts can be viewed as positive, for the following reasons:

- The facility is proposed within a renewable energy hub.
- There are at least 4 other renewable energy facilities (either in progress or under construction) bordering the site.
- Fragmentation of the landscape is minimal, as a number of facilities are concentrated into a single area.
- The associated infrastructure in the form of grid connections will be minimal, as Eskom has proposed a Major transmission substation in the area for the purpose of the renewable energy facilities in the area.

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 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 are 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.

Other solar projects that are already being developed or proposed in close vicinity to the Dyason's Klip project are provided on the map 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.

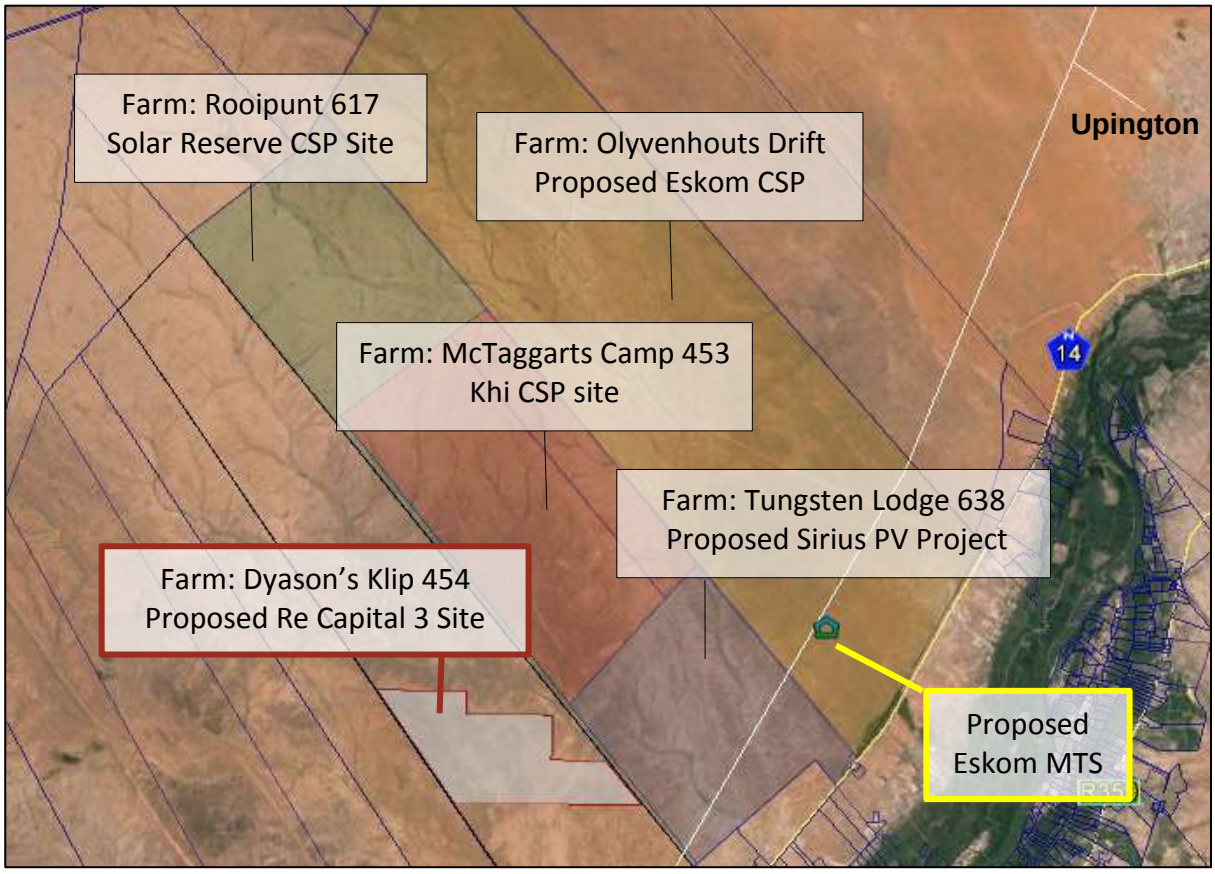

Figure 50: Showing other solar developments in relation to the proposed Re Capital 3 Site.

The following cumulative impacts were identified and assessed by the ecological specialist, Mr Simon Todd. A copy of the ecological impact assessment is attached in Annexure D1.

16.1 IDENTIFICATION OF 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.

16.2 CUMULATIVE IMPACTS TO BE ASSESSED

- 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 type

in the study area is classified as Least Threatened and is an extensive vegetation type that is still more than 98% intact. The development of all three phases would result in the loss of up to 700ha ha of intact habitat from this vegetation unit which on its own is not considered highly significant, but there is an array of other developments in the area, which raises the possibility for significant cumulative impact on the affected vegetation types.

- 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.

16.3 ASSESSMENT OF CUMULATIVE IMPACTS

Table 17: Assessment of ecological cumulative impacts.

Nature of impact	Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation/Management Actions	Significance and Status		Confidence level
							Without Mitigation	With Mitigation	
Reduced ability to meet conservation obligations & targets due to cumulative habitat loss	Regional	Long-Term	Low	Low	Moderate	• The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. • An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.	Medium-Low Negative	Low Negative	Moderate-High
Impact on broad-scale ecological processes due to cumulative fragmentation of habitat	Regional	Long-Term	Medium	Moderate	Low	• Minimise the development footprint as far as possible. • Avoid impact to potential corridors such as the riparian corridor associated with the Helbrandkloofspruit.	Medium Negative	Low Negative	Moderate-High

17 COMPARATIVE ASSESSMENT OF ALTERNATIVES

The following table summarises the envisioned impacts of the various layout alternatives considered as part of this environmental process.

Table 18: Comparative assessment of alternatives.

Impact	Layout Alternative 1 Original Layout	Layout Alternative 2 Uniform Layout	Layout Alternative 3 Mitigated Layout (Preferred)
Fragmentation of landscape	High	High	Moderate-Low
Impact on seasonal pans	High	High	Low
Impact on main Drainage lines	High	High	None
Impact on seasonal washes	High	High	Moderate - Low
Impact on heritage resources	Low	Low	Low
Impact on Archaeological resources	Low	Low	Low

18 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 19: Summary of Public Participation Process to date.

CHRONOLOGY OF EVENTS	
DATE	**ACTION**
23 May 2013	**Notification** was sent to the Landowner of portion 12 of Daysonsklip 454 notifying him of the development proposal and the environmental process to be followed.
23 May 2013	**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
23 May 2013	The **Siyanda District Municipality** and the **Khai Garib Local Municipality** (which have jurisdiction over the area) were notified and automatically registered as key stakeholders.
23 May 2013	O**rgans 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.
24 May 2013	**Advertisements** were placed in a regional newspapers (*Namaqua Weekly & Die Plattelander*), calling for stakeholders to register as Interested & Affected Parties

11 June 2013	**Notice Boards** (English & Afrikaans) were placed at the Keimoes Municipality and Keimoes Library.
11 June 2013	**Notice Boards** (English & Afrikaans) were placed on the boundary of the study site on portion 12 of the farm Dyasonsklip 454.
May 2013	A **Stakeholder Register** was opened and the details of all registered stakeholders entered for future correspondence.
02 August 2013	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 (**Wednesday 07 August 2013 to Wednesday 18 September 2013.**). The DSR has also been made available on the *Cape EAPrac* website: www.cape-eaprac.co.za/active
02 August 2013	Registered Stakeholders and I&AP's were sent notifications informing that of the availability of the DSR for a review and comment period of 40-days, extending from **Wednesday 7 August 2013 to Wednesday 18 September 2013.**
15 October 2013	**Final Scoping Report** (FSR) submitted to the National Department of Environmental Affairs.
15 October 2013	Registered Stakeholders and I&AP's were sent notifications informing them of the submission of the FSR and of the availability of the FSR from **Tuesday 15 October 2013 to Tuesday 5 November 2013.**
25 November 2013	Final Scoping Report Accepted by the National Department of Environmental Affairs
08 January 2014	**Draft Environmental Impact Report** made available to Registered I&AP's and stakeholders for a 40 day comment period.

All comments received during the 40 day comment period will be included in the final Environmental Impact Report that will be made available for a further 21 days..

18.1 SITE NOTICES

Site notices were placed on the border of the site as well as at the Khai Garib Municipality and the Keimoes Library. Notices were placed in both English and Afrikaans

Figure 51: Site notices placed on site, at the Khai Garib Municipality and the Keimoes Library.

18.2 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.

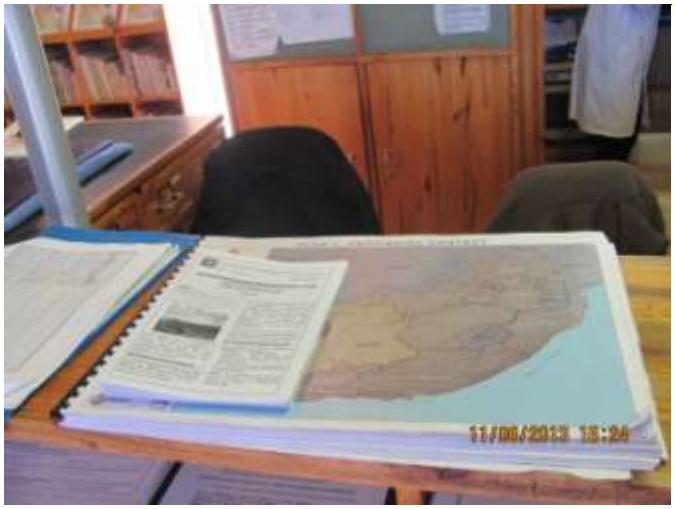

Figure 52: Background Information Documents available at the Keimoes Library.

18.3 REGISTRATION OF KEY STAKEHOLDERS

A number of key stakeholders were automatically registered and were given an opportunity to comment on the Draft Scoping Report. A list of key stakeholders registered for this process included in table 15 below.

Table 20: 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	
Provincial Department of Agriculture	Eskom	

18.4 COMMENTS AND RESPONSES

Copies of all comments received as well as the responses thereto are included in Appendix E of this document. Comments on the DSR were received from the following parties:

- South African National Roads Agency Limited (SANRAL);

- South African Heritage Resources Agency (SAHRA)
- ESKOM;
- Department of Water Affairs;
- South African Square Kilometre Array (SKA);
- Department of Agriculture.

SANRAL stated that access to the Northern Alternative should be via the D3276, and the central site should preferably be accessed via the neighbouring solar facility access road. SANRAL also requires that any services installed within 100m of the National Road, must apply for a wayleaf from SANRAL.

SAHRA stated that they concurred with the recommendations made by the specialist, Dr David Morris. SAHRA will provide additional comment on the Draft EIR, once the archaeological impact assessment is completed.

SKA stated that the facility is not likely to have a negative impact on the Square Kilometre Array Project

Civil Aviation Authority (CAA) stated that they have no objection to the facility as long as the power lines are not more than 32m above ground level.

ESKOM provided a list of requirements when working near ESKOM servitudes as follows:

1. Eskom's rights and services must be acknowledged and respected at all times.
2. Eskom shall at all times retain unobstructed access to and egress from its servitudes.
3. Eskom's consent does not relieve the developer from obtaining the necessary statutory, land owner or municipal approvals.
4. Any cost incurred by Eskom as a result of non-compliance to any relevant environmental legislation will be charged to the developer.
5. If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the developer's activities or because of the presence of his equipment or installation within the servitude restriction area, the developer shall pay such costs to Eskom on demand.
6. The use of explosives of any type within 500 metres of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the developer must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process. It is advisable to make application separately in this regard.
7. Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's satisfaction.
8. Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether as a result of the encroachment or of the use of the servitude area by the developer, his/her agent, contractors, employees, successors in title, and assignees. The developer indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the developer's equipment.
9. No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written

permission having been granted by Eskom. If such permission is granted the developer must give at least seven working days' notice prior to the commencement of work. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued by the relevant Eskom Manager. Note: Where and electrical outage is required, at least fourteen work days are required to arrange it.

10. Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with.
11. Under no circumstances shall rubble, earth or other material be dumped within the servitude restriction area. The developer shall maintain the area concerned to Eskom's satisfaction. The developer shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom.
12. The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).
13. Equipment shall be regarded electrically live and therefore dangerous at all times.
14. In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as an additional safety precaution, Eskom will not approve the erection of houses, or structures occupied or frequented by human beings, under the power lines or within the servitude restriction area.
15. Eskom may stipulate any additional requirements to highlight any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.
16. It is required of the developer to familiarise himself with all safety hazards related to Electrical plant.
17. Any third party servitudes encroaching on Eskom servitudes shall be registered against Eskom's title deed at the developer's own cost. If such a servitude is brought into being, its existence should be endorsed on the Eskom servitude deed concerned, while the third party's servitude deed must also include the rights of the affected Eskom servitude.

The **Department of Water Affairs** (DWA) recommended that pump test (not a blow yield test) be done on both the boreholes by an accredited person or company. DWA also recommended that the applicant do a monthly monitoring of the water level of the boreholes and keep it on record as it is in the applicant's best interest to do so. It was requested that the applicant consider the option to clean the panels with high pressure wind to reduce the water usage.

Dr Adrian Tiplady of the **South African Square Kilometre Array** confirmed that a high level risk assessment has been conducted at the South African SKA Project Office to determine the potential impact of the proposed Re Capital 3 Solar facility on the on the Square Kilometre Array. The outcomes of this risk assessment were noted as follows:

1. The location of the proposed facility has been provided in the form of GIS Shapefiles;
2. The nearest SKA station has been identified as Rem-Opt-09, at approximately 32km from the proposed installation;
3. Based on distance to the nearest SKA station, and the information currently available on the detailed design of the PV installation, this facility poses a **low risk** of detrimental impact on the SKA;
4. Any transmitters that are to be established, or have been established, at the site for the purposes of voice and data communication will be required to comply with the relevant AGA regulations concerning the restriction of use of the radio frequency spectrum that applies in the area concerned;

5. As a result of the very low risk associated with the PV facility, no mitigation measures would be required at this stage. However, the South African SKA Project Office would like to be kept informed of progress with this project, and reserves the right to further risk assessments at a later stage.
6. This technical advice is provided by the South African SKA Project Office on the basis of the protection requirements of the SKA in South Africa, and does not constitute legal approval of the renewable energy projects in terms of the Astronomy Geographic Advantage Act, the Management Authority, and its regulations or declarations.

Department of Agriculture confirmed that this application has been registered on their Agriland National database.

18.5 ADDITIONAL AUTHORITIES NOTIFIED.

In compliance with the approval of the final Scoping Report, the following additional stakeholders were notified of the availability of this Draft Environmental Impact Report.

- Department of Transport (national);
- Department of Communications; and
- SENTECH.

18.6 AVAILABILITY OF DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

The Draft Environmental Impact Assessment Report is available for a 40 Day Review and comment period extending from **Wednesday 08 January 2014** to **Monday 17 February 2014**.

All comments on the Draft EIR must be submitted in writing no later than 17 February 2014 to the following address.

Cape EAPrac (Pty) Ltd

Attention: Mr Dale Holder

P.O. Box 2070, George, 6530

Tel: 044-874 0365 Fax: 044-874 0432

Email: dale@cape-eaprac.co.za

19 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 EIR which 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.

Table 20: Summary of 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 3 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 and include a cumulative assessment.	• Approximately 650ha 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 3 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 3 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.
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.

20 SUGGESTED MITIGATION MEASURES

The following mitigation measures are recommended by Cape EAPrac as well as the participating specialists.

20.1 PRE-CONSTRUCTION MITIGATION

- No unauthorised access to the site.
- No unauthorised site clearing or disturbance at the site without an ECO present.
- The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction activities.
- Areas where exploration work is permissible should be clearly demarcated.
- Site access to be controlled and no unauthorized persons should be allowed onto the site.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- No open excavations, holes or pits should be left at the site as fauna can fall in and become trapped.

20.2 CONSTRUCTION MITIGATION

- Preconstruction walk-through of the facility in order to locate species of conservation concern that can be translocated as well as comply with the Northern Cape Nature Conservation Act and DENC permit conditions.
- Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.

- Eco to provide supervision and oversight of vegetation clearing activities within sensitive areas.
- Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared.
- All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.
- Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.
- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- Any fauna threatened by the construction activities should be removed to safety by the ECO or appropriately qualified environmental officer.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- If trenches need to be dug for water pipelines or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them.
- Dust suppression and erosion management should be an integrated component of the construction approach.
- Regular monitoring for erosion problems along the access roads and other cleared areas.
- Erosion problems should be rectified on a regular basis.
- A low cover of vegetation should be left wherever possible to bind the soil, prevent erosion and promote post-disturbance recovery of an indigenous ground cover.
- No unauthorised access to the site.
- No unauthorised site clearing or disturbance at the site without an ECO present.
- The final development area should be surveyed for species suitable for search and rescue, which should be translocated prior to the commencement of construction activities.
- Areas where exploration work is permissible should be clearly demarcated.

20.3 OPERATIONAL MITIGATION

- Wherever excavation is necessary, topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.
- The recovery of the indigenous grass layer should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.
- Regular monitoring for alien plants within the development footprint.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and re-vegetation techniques.

- All cleared areas should be re-vegetated with indigenous perennial grasses
- No unauthorized persons should be allowed onto the site.
- Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.
- The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden.
- If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.
- If the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as come species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.
- Ensure that all new lines are marked with bird flight diverters along their entire length, but particularly in areas where larger birds are likely to pass such as near drainage lines, dams or pans and hills.
- All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007).
- Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.

21 PROCESS TO BE FOLLOWED

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

- The Draft Impact 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 Impact Assessment Report.
- 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;
- 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 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**.

22 CONCLUSION & RECOMMENDATIONS

The decision to grant or refuse authorisation in terms of Section 24 of NEMA must be made in the light of the provisions of NEMA. Section 24 provides that, in order to give effect to the general objectives of integrated environmental management laid down in NEMA, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority charged by the Act with deciding applications for environmental authorisation. An environmental impact assessment report (an "EIA Report") concerning the impact of the proposed activity and alternative activity options on the environment, has been compiled and submitted as prescribed and authorisation may only be issued after consideration of such report.

The Regulations inter alia require that an EIA report must contain all information that is necessary for the competent authority to consider the application and to reach a decision concerning the application, and must include an assessment of each identified potentially significant impact, including cumulative impacts of the proposed development on the environment, socio-economic conditions and cultural heritage. The objective of this exercise is both to identify and predict the actual and potential impact on socio-economic conditions, and consider ways of minimising negative impacts while maximising benefit. We submit that the environmental process undertaken thus far complies with these requirements and that the assessment has considered potential impacts and responded thereto by either complete avoidance where possible, or appropriate mitigation.

Irrespective of having investigated and addressed the known impacts, NEMA requires "a risk-averse and cautious" approach to be applied by the decision-makers. This process entails taking into account the limitation on present knowledge about the consequences of an environmental decision (i.e. cumulative impacts associated with other photovoltaic applications).

The preferred / mitigated development proposal presented in this report is responsive to the integrated results of the assessment of potential impacts made by the various specialists on the project team. The majority of recommendations have been accommodated in the RE Capital 3 solar development – Layout Alternative 3 (Preferred) and mitigation measures proposed for the construction, operation and decommissioning have been included in the Environmental Management Programme (EMPr) for implementation.

The relevant alternatives considered were refined in an iterative manner during the process to ensure that the constraints / concerns raised and recommendations provided by the specialists, the public, state departments and the competent authority have been incorporated into the design, thereby ensuring that the negative impacts associated with the proposal were avoided as a priority, and reduced via mitigation measures were necessary. This precautionary approach has allowed impacts to be avoided and/or minimised, while the positive benefits enhanced.

Based on comparative evaluation of the various alternatives, including the No-Go option, it is evident that the status quo (vacant land with limited agricultural potential) is not necessarily the best environmental option (subject to the implementation of recommended development mitigation measures).

The preferred development Layout Alternative 3 for the Re Capital 3 Solar Development consists of the following:

A photovoltaic (PV) solar facility with a generation capacity of 225MW implemented in 3 phases of 75MW each. The PV technology will consist of either conventional PV or

Concentrated PW with a maximum height of 10m above Ground Level. The following additional infrastructure will be constructed as part of this development:

- **Inverter stations;**
- **an on-site substation (including a feed-in transformer to allow the generated power to be connected to Eskom's electricity grid) – A total of three on site substations may be constructed – i.e. one for each phase of the development;**
- **an overhead transmission power line to distribute the generated electricity from the on-site substation to the proposed MTS sub-station**
- **auxiliary buildings, including:**
  - **administration / office & security (gate house),**
  - **control room & workshop,**
  - **visitor centre,**
  - **ablution / change room and**
  - **warehouse / storeroom.**
- **a laydown area of approximately 3ha for each phase;**
- **internal electrical reticulation network (underground cabling);**
- **an internal road / track network**
- **10 x 10kLt rainwater tanks; and**
- **electrified perimeter fencing around the solar facility.**

The abovementioned preferred / mitigated proposal is considered a **reasonable and feasible** alternative that requires only limited mitigation to enable it to be sustainable, and is thus considered to be the best practicable environmental option with the least level of impact.

This Draft EIR therefore concludes that the proposed RE Capital 3 Solar Development has been considered via a balanced approach, mindful of cumulative impacts and need and desirability requirements, and that no fatal flaws have been identified that warrant refusal of the proposed development. As such, it can be considered for environmental authorisation subject to implementation of the EMPr and specific specialist mitigation measures as specified in this report.

This Draft EIR is available for a final review and comment period of 40 Days , extending from **08 January 2014** to **17 February 2014**. In terms of Regulation 56(6) of NEMA, registered I&APs must submit comments on the EAP within this allowed comment period.

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24 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&AP's	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