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DRAFT SCOPING REPORT

for

'BOESMANLAND SOLAR FARM'

on

A portion of Portion 6 (a portion of Portion 2) of Farm 62 Zuurwater, Aggeneys, 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: Boesmanland Solar Farm (Pty) Ltd. (previously Anjubex (Pty) Ltd)

By: *Cape EAPrac*

Report Reference: KHA131/11

Department Reference: 12/12/20/2602

Case Officer: To be confirmed

Date: 25 May 2012

APPOINTED ENVIRONMENTAL ASSESSMENT PRACTITIONER:

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PURPOSE OF THIS REPORT:

Public Review & Comment

APPLICANT:

Boesmanland Solar Farm (Pty) Ltd. (previously Anjubex (Pty) Ltd)

CAPE EAPRAC REFERENCE NO:

KHA131/11

DEPARTMENT REFERENCE:

12/12/20/2602

SUBMISSION DATE

25 May 2012

DRAFT SCOPING REPORT

in terms of the

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

Boesmanland Solar Farm,

Portion 6, a portion of Portion 2, Farm 62 Zuurwater, Aggeneys, Northern Cape

Submitted for:

Stakeholder Review & Comment

Report Issued by:

Cape Environmental Assessment Practitioners

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REPORT DETAILS

Title:	**DRAFT SCOPING REPORT** **for proposed 'Boesmanland Solar Farm'**
Purpose of this report:	This Draft Scoping Report forms part of a series of reports and information sources that are being provided during the Environmental Impact Assessment (EIA) for the proposed Boesmanland Solar Farm in the Northern Cape Province. In accordance with the EIA Regulations, the purpose of the Scoping Report is to: • Provide a description of the proposed project, including a sufficient level of detail to enable stakeholders to identify relevant issues and concerns; • Describe the local environmental and developmental context within which the project is proposed, to assist further identifying issues and concerns; • Provide an overview of the process being followed in the Scoping Phase, in particular the public participation process, as well as present the Plan of Study for EIA that would be followed in the subsequent EIA phase; • Present the issues and concerns identified to date from the baseline specialist studies and the initial stakeholder engagement process, as well as an explanation of how these issues will be addressed through the EIA process. This Draft Scoping Report is made available to all stakeholders for a 40 day review & comment period, 28 May to 6 July 2011.
Prepared for:	Boesmanland Solar Farm (Pty) Ltd. (previously Anjubex (Pty) Ltd.)
Published by:	*Cape Environmental Assessment Practitioners (Pty) Ltd. (Cape EAPrac)*
Authors:	Mrs. Siân Holder
Reviewed by:	Director: Louise-Mari v Zyl
Cape EAPrac Ref:	KHA131/11
DEA Case officer & Ref. No:	Nyiko Nkosi 12/12/20/2602
Date:	25 May 2012
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ORDER OF REPORT

Executive Summary

Draft Scoping Report – Main Report

Appendix A	:	Location, Topographical & Development Site Plans
Appendix B	:	Site Photographs
Appendix C	:	Solar Facility Layout Alternatives & Layout Report (Aylward, 2012)
Appendix D	:	Specialist Reports
Annexure D1	:	Ecological Scoping Report (Todd, 2012)
Annexure D2	:	Agricultural Report (Beukes, 2012)
Annexure D3	:	Heritage Scoping Report (de Kock, 2012)
Annexure D4	:	Archaeological Scoping Report (Smith, 2012)
Annexure D5	:	Palaeontological Statement (Almond, 2012)
Annexure D6	:	Engineering Report (van der Merwe, 2012)
Annexure D7	:	Planning Statement (Scheepers, 2012)
Appendix E	:	Public Participation Process
Appendix F	:	Other Information
Annexure F1	:	Correspondence with Authorities – Acceptance of Application
Annexure F2	:	NPAES Map, BGIS LUDS Evaluation

TABLE OF CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

1 PROJECT OVERVIEW

Cape EAPrac has been appointed by **Boesmanland Solar Farm (Pty) Ltd.** (previously Anjubex (Pty) Ltd.), hereafter referred to as the Applicant, as independent environmental practitioner responsible for facilitating the Scoping & Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended) for the proposed development of the **Boesmanland Solar Farm,** near Aggeneys.

Boesmanland Solar Farm (Pty) Ltd. has sub-leased a portion of Portion 6 (a portion of Portion 2) of Farm 62 Zuurwater from the landowner, Blommeland Boerdery BK, for the purposes of developing the proposed solar facility.

The project involves the development of a solar-energy facility with a total generation capacity of approximately **75MW renewable electricity** to be supplied to the national Eskom grid via the existing Aggeneis[1] Substation. The project infrastructure covers an area of approximately **200ha.** The necessary associated infrastructure, including access roads, overhead electric lines, substation and control building(s) form part of this application.

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' electricity for input into the national grid to augment Eskom's power supply.

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

Boesmanland Solar Farm (Pty) Ltd is one such IPP which intends to generate electricity from the proposed **Boesmanland Solar Farm**. 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**

[1] Variation of name exist "Aggeneys" (town), "Aggeneis" (Eskom Substation) & "Aggenys" (region)

Management Act (NEMA, Act 107 of 1998, as amended)[2]. 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 12/12/20/2602).

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, are as follows:

Regulation 544 (Basic Assessment): 1, 10, 11, 18 & 22,

Regulation 545 (Scoping & EIA): 1, 8 & 15 and

Regulation 546 (Basic Assessment): 4, 13 & 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 BROAD CONTEXT

The target property, Portion 6 (a portion of Portion 2) Farm 62 Zuurwater, is located in the Namaqualand district of the Northern Cape Province, within the jurisdiction area of the Khai-Ma Local Municipality. The property is approximately 1,927.197ha is size and is located approximately 65km west of Pofadder, 8km west of the town of Aggeneys and is bound to the east by the Black Mountain Mine.

The proposed solar development site is situated just north of the N14 National Road, visually screened from the N14 by a series of dunes extending from the N14 to a nearby inselberg named Hoedekop.

5 SITE DESCRIPTION

The area of land designated for the proposed Boesmanland Solar Farm as part of the lease agreement with the landowner is approximately 450ha in size and located directly west of the Vedanta Black Mountain Mine and town of Aggeneys. This 450ha development area was assessed by the various specialists to determine sensitive areas which may pose as site constraints to the proposed solar development. These site constraints have been considered and avoided as far as possible in the design of the proposed development site (and associated preferred solar layout – Alternative 2) of approximately 265ha (see Appendix C).

The proposed development area is a generally flat, undulating plain of low dunes of red Kalahari sands interspersed with gravel and stony plains, which falls entirely within the Bushmanland Sandy Grassland vegetation type. Those parts of the site with sandy soils tend to be dominated by perennial grasses with scattered shrubs and low trees, while the areas of stony and gravel plains are dominated by woody shrubs and occasional succulents. There are no significant rocky outcrops or

[2] 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.

large drainage lines within the proposed development area itself, although these features are present within the broader area.

6 DEVELOPMENT PROPOSAL & ALTERNATIVES

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

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

Various alternatives, in terms of technology of the solar arrays, as well as layout for the solar arrays and associated infrastructure on the development site, will be considered and be informed by the environmental constraints identified during the baseline / scoping process.

Three alternatives are currently being considered for the Boesmanland Solar Farm:

- **Alternative 1 – Uniform Layout**, which proposes a rectangular-shaped solar facility orientated east-west across the middle of the proposed development site, and represents the most practical development shape and size;
- **Alternative 2 - Preferred Layout**, which proposes a pentagon-shaped development footprint of approximately 265ha within the western region of the development site; and
- **NO-GO / Status-Quo Alternative**, which proposes that the Boesmanland Solar Farm not go ahead and that the area in proximity to Black Mountain Mine and Aggeneis Substation remain undeveloped as it is currently.

Layout Alternative 2 has been designed to **avoid** the majority of the area identified in the Ecological Scoping Report as being highly sensitive. In the event that the scoping/impact assessment process identify any other feasible/reasonable alternatives other than the above, such will be considered and incorporated as additional alternatives.

7 SPECIALIST STUDIES

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

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

- **Agriculture Potential -** the farm has a low carrying capacity, 60ha per unit of cattle or 15ha per sheep, with a potential of stocking 32 cattle or 147 sheep on the entire 1 927ha. The proposed solar development site, however would only carry approximately 4 units of cattle or 18 sheep. The economic benefits that the proposed solar development holds cannot be recovered from the current or potential agricultural activities (Beukes, 2012).

- **Biophysical** – in terms of the likely impacts and risk factors associated with the development, **avifaunal impacts and wind erosion** are highlighted as the most important potential concerns. The drainage lines, the patches of quartz and the deep red sand dunes towards the east of the development area are considered sensitive. Several ***Hoodia gordonii*** **plants** are located throughout the development area. These should be avoided, however those that have to be removed and transplanted (with a permit) will not have a significant impact on the viability of the local population of this species. Impacts associated with the development are considered to be of **low significance** and not likely to result in significant biodiversity loss or degradation of the receiving environment.
- **Heritage** – the Boesmanland Solar Farm proposal would not materially impact on heritage resources of the built environment, would not alter any natural or cultural landscape of cultural significance and would not negatively impact on any heritage resource, or the visual-spatial relationships and associations between such resources.
- **Archaeology** - from an archaeological perspective, that there would be **no inhibitors** to construction of the solar facility.
- **Palaeontology** – As there are **no palaeontological resources** likely to occur in the area, it is recommended that no further palaeontological studies or mitigation be undertaken in respect of the proposed development site.

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

8 PLANNING CONTEXT

Macroplan Town and Regional Planners (Upington) have been appointed to facilitate the necessary Planning Application process for the proposed Boesmanland Solar Farm. A land use change application for the rezoning of 350ha, from Agricultural Zone I to Special Zone, will be lodged at the Khai-Ma Local Municipality, in accordance with the Northern Cape Planning and Development Act (Act 7 of 1998), to allow for the development of the proposed Boesmanland Solar Farm.

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) to allow for the development of the proposed Boesmanland Solar Farm.

9 POTENTIAL CONSTRAINTS

The only significant ecological features within the development area are a few small drainage lines, and thus the area in proximity to these lines has been classified as having a medium-high sensitivity. The area to the west of these lines has been classified as having a medium sensitivity, while the area to the southeast of the development area is however mostly high sensitivity, due to the presence of rocky hills, tall dunes and drainage lines outside the development area boundary. Species of conservation concern which were observed, or are likely to occur at the site, include *Hoodia gordonii,* which was common at the site and the narrow endemic Red Lark, *Certhilauda burra,* which is likely to occur in the red dune habitat at the site.

The layout and location of the solar infrastructure of the Preferred Layout Alternative has been informed by these constraints and further detailed assessment will determine the measure to which these constraints can be avoided and reasonable mitigation measures implemented.

10 PROCESS TO DATE

This Draft Scoping Report (DSR) follows the Application Form submitted to the Department of Environmental Affairs (DEA) on 4 November 2011. DEA, as the competent authority, accepted the Application on 21 November 2011 (Ref: 12/12/20/2602), authorising *Cape EAPrac* to commence with the public participation phase of the environmental process. This project and the environmental process was advertised in the *Namaqua Weekly* and the *Die Plattelander* newspapers (issues of 25November 2011), inviting the public to register as interested and affected parties. This Draft Scoping Report (DSR) (Ref: KHA131/11) has been made available to Stakeholders and Interested and Affected Parties (I&APs) for a review and comment period extending from **Monday 28 May 2012 to Friday 6 July 2012.**

This report reflects the findings of **preliminary specialist investigations** and reports (Heritage, Biophysical and Agricultural Potential). It is also a tool to identify the **need for further specialist investigations and assessments** in the event that issues/impacts cannot be resolved during the scoping phase.

As part of the public participation process various key stakeholders have been identified and notified of the project and their right to participate and comment on the proposal. The project has been advertised and stakeholders that response to the adverts, notices and written notices will be kept informed throughout the remainder of the on-going environmental process. Please see **Section 24** in the main report and **Appendix F** for evidence of the Public Participation process.

Thus far the following key issues and concerns were raised through informal discussions with the project team, specialists and authorities and the baseline specialist studies:

- Provision of **labour** and **skills transfer** to the local community.
- Promotion of **Green Energy tourism** and contribution of **Carbon Credits.**
- **Adding value to vacant land** with poor agricultural potential.
- Potential for **soil erosion**, particularly in proximity to the drainage lines and red dunes, during construction and operation phases of the development.
- Potential impact on **natural resources and habitat**; and

Where required, the project will **avoid areas of concern** in order to minimise the potential negative impacts and where impacts cannot be avoided completely, effective **mitigation measures** will be investigated through the on-going environmental process.

11 CONCLUSIONS & RECOMMENDATIONS

Alternative energy is considered favourable compared to conventional electricity generation methods, which include coal fired stations. International literature confirms the long-term benefit of alternative energy to far exceed fossil fuel energy and as such it should be supported. The associated impacts of the Boesmanland Solar Farm, which include mainly biophysical aspects, must be considered within this context.

Members of the public and other key stakeholders and authorities must review this Draft Scoping Report (DSR) in order to familiarise themselves with the project proposal and potential impacts that may be caused by the development. Concerns and issues raised during the scoping phase will be used to inform the more detailed impact assessment phase that will follow the scoping phase.

This DSR is made available for public review and comment for a period of **40 days** extending from **Monday 28 May 2012 – Friday 6 July 2012**. Queries and comments must be submitted to *Cape EAPrac* in writing, and within the specified comment period to:

Mrs. Siân Holder

PO Box 2070, George, 6530 Fax: 044-874 0432 Email: sian@cape-eaprac.co.za

DRAFT SCOPING MAIN REPORT

1 INTRODUCTION

Cape EAPrac has been appointed by **Boesmanland Solar Farm (Pty) Ltd.** (previously Anjubex (Pty) Ltd.), hereafter referred to as the Applicant, as independent environmental practitioner, 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 '**Boesmanland Solar Farm'** near Aggeneys, Northern Cape.

Boesmanland Solar Farm (Pty) Ltd. has sub-leased a portion of Portion 6 (a portion of Portion 2) Farm 62 Zuurwater from the landowner, Blommeland Boerdery BK, for the purposes of developing the proposed solar facility. The total generation capacity of the solar facility will not exceed **75MW** for input into the national Eskom grid.

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

1.1 WHY RENEWABLE ENERGY? WHY NORTHERN CAPE?

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

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

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

This necessitates the additional generation of at least 3 000MW in the shortest possible time, to allow the reserve necessary to bring Eskom's system back into balance (*ibid*). This need can either be addressed from the *supply* or the *demand* side. Where the demand side interventions include short, medium and long term aspects of a national Power Conservation Programme to incentivise the public to use less electricity (as mentioned above), one of the supply side options (besides Eskom building new plants and returning old plants to service) is to allow **Independent**

Power Producers (IPPs) to contribute electricity to the national grid (National Response Document, 2008). **Boesmanland Solar Farm (Pty) Ltd.** is one such body, which intends generating electricity from a renewable energy resource, namely solar.

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

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

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

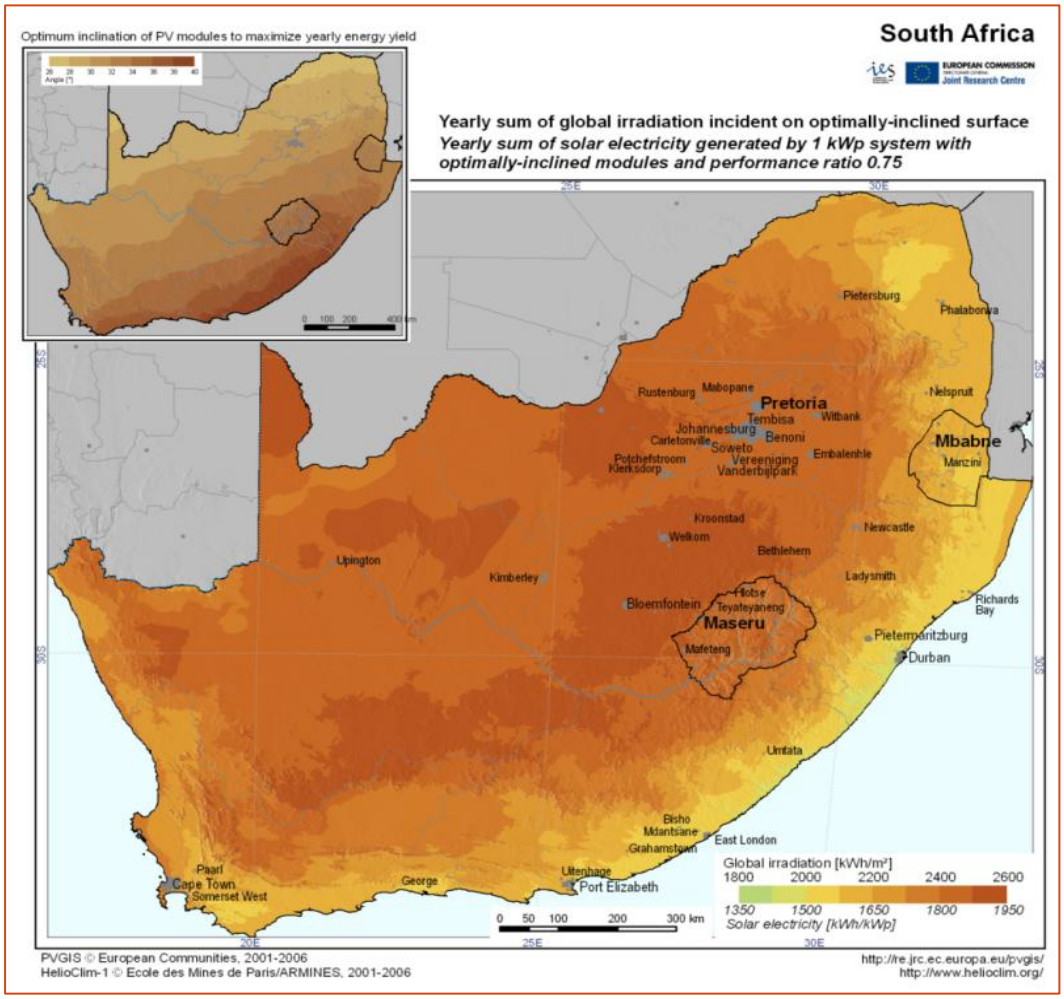


Figure 1: Solar radiation map for South Africa (Source: Solek Engineering Report, 2012).

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

have been produced for South Africa, all of which indicate that the Northern Cape area **high solar irradiation**.

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

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

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

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

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

Not comparable in size with these larger projects, the Boesmanland Solar Farm (Pty) Ltd. is one such smaller IPP solar project which intends to generate 75MW of electricity from solar-energy for inclusion into the National grid. The Boesmanland 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; and
- The grid connection potential based in proximity to existing transmission & substation infrastructure.

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)[3] . 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.

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

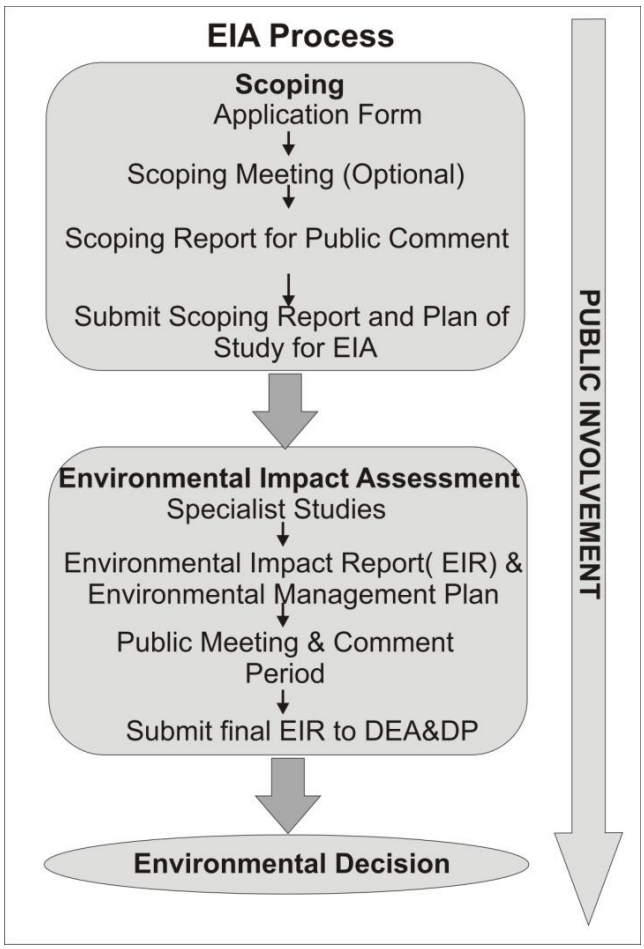


Figure 2: Summary of Scoping & EIR Process

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

Table 1: NEMA 2010 listed activities for the Boesmanland Solar Farm

R544	Listed Activity	Activity Description
1	The construction of facilities or infrastructure for the **generation of electricity** where the output is more than 10 megawatt and the total extent of the facility covers an area in excess of 1 hectare.	Construction of Boesmanland Solar Farm with a maximum capacity of **75MW.** The total area to be affected by the development will be **approximately 265ha**.
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 existing Aggeneis Substation.
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 he on-site drainage systems. Stabilisation of stream / drainage line bed & banks may be required.
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 he on-site drainage systems. Stabilisation of stream / drainage line bed & banks

		may be required.
22	The **construction of a road**, **outside urban areas**, **(i)** with a reserve wider than 13.5m or, **(ii)** where no reserve exists where the road is wider than 8m 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 edge of Khai-Ma municipal area.
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**.	Boesmanland Solar Farm will have a maximum capacity of **75MW**.
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 existing Aggeneis Substation.
15	**Physical alteration of undeveloped, vacant or derelict land** to **(ii)** residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is **20ha or more**.	Development of the Boesmanland Solar Farm of approximately **265ha** on vacant land, outside of the Khai-Ma urban edge.
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 solar facility, outside the Khai-Ma urban edge.
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 of the Khai-Ma urban edge**. Solar Energy Plant to be constructed over an area approximately 265ha 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)

This Act controls the management and conservation of South African biodiversity within the framework of NEMA. Amongst others, it deals with the protection of species and ecosystems that warrant national protection, as well as the sustainable use of indigenous biological resources. Sections 52 & 53 of this Act specifically make provision for the protection of critically endangered, endangered, vulnerable and protected ecosystems that have undergone, or have a risk of

undergoing significant degradation of ecological structure, function or composition as a result of human intervention through threatening processes.

The site falls within the planning domain of the **Namakwa Biodiversity Sector Plan** (Desmet & Marsh 2008). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. When incorporated into municipal Spatial Development Frameworks (SDFs) and bioregional plans, such fine-scale plans are recognized under NEMA and the various activities listed under the Act as described in Section 2.4 come into effect. The CBA map for the general area surrounding the site illustrates that the southern corner of the proposed development area falls within an Ecological Support Area (ESA). Although ESAs should be maintained in a natural to near-natural state, should the development impinge on this area, it would be highly unlikely to disrupt the ecological functioning of the ESA and would not be viewed as being highly significant (Todd, 2012). A large proportion of the study area to the south west of the proposed development area is however classified as a CBA and activities within this area should proceed with caution in order to avoid impacts to the CBA.

In terms of the National Spatial Biodiversity Assessment (NSBA), the Terrestrial Ecosystem Status of the entire development area is classified as **Least Threatened** (see **Appendix F, Annexure F2 for BGIS LUDS Evaluation**).

A sensitive drainage line and low dunes cover a portion of the proposed 75MW Boesmanland Solar Farm development site, while a highly sensitive drainage line (associated with the Black Mountain Mine), as well as a series of tall red dunes and rocky outcrops are located outside of the development area, to the south-east. A detailed aerial and Topographical Survey of the solar development site was undertaken, to inform the siting of the proposed solar facility development footprint and associated infrastructure.

2.3.1 National Protected Area Expansion Strategy (NPAES) for S.A. 2008 (2010)

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

The NPAES identifies 42 focus areas for land-based protected area expansion in South Africa. These are large intact and unfragmented areas suitable for the creation or expansion of large protected areas. Focus Area number **15: Kamiesberg Bushmanland Augrabies**, 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, 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 majority of the proposed Boesmanland Solar Farm development area and a large proportion of the broader site fall within a National Protected Areas Expansion Strategy focus area. This indicates that the site is potentially important from a broad-scale conservation perspective. Measures to ensure that the development does not impact on broader-scale ecological processes may therefore be required. Given the proximity of the site to the Black Mountain Mine, it is however unlikely that the development of the site would lead to broad-scale disruption of ecological

processes, given that there is a large amount of less disturbed land to the north and south of the site which contains very similar habitat. The development is relatively small in extent when considered in light of the overwhelmingly intact nature of the surrounding landscape. Furthermore, the proximity of the development to the existing ESKOM substation and powerlines would decrease the cumulative impact of the development on the connectivity of the landscape (see Location Plan in **Appendix A** and NPAES maps in **Appendix F, Annexure F2**).

The NPAES does not deal with the site-scale planning on exactly which sites should be included in the protected area network, nor with detailed implementation planning for expanding protected areas. This responsibility lies with protected area agencies, such as provincial conservation authorities, South African National Parks (SANParks) and World Heritage Site Authorities.

Augrabies National Park (and SANParks head office) and SAHRA are registered as key stakeholders for this environmental process and have been provided with the opportunity to provide comment on this solar energy development is relation to the NPAES for the Aggeneys area. **No issues** in this regard have been raised to date.

2.3.2 Municipal Biodiversity Summary Project (SANBI BGIS)

According to the information provided by the South African National Biodiversity Institute (SANBI) through their Biodiversity GIS (BGIS) system, the environment in the Khai-Ma Local Municipality is mostly untransformed (98.7% natural areas remaining). Three biomes occur within the municipality, which support eleven (11) 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 Boesmanland Solar Farm. The Orange River forms the only water management area in the Municipality and has an ecosystem status of Endangered.

2.4 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".*

There were **no protected tree species** found within the proposed Boesmanland Solar Farm development area. Please refer to Section 4.3 of this report and in full in the Ecological Scoping Report in Appendix D, Annexure D1 for a detailed description of the plant species found to occur in the area.

2.5 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 floodlines of water courses and wetlands.

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

In terms of soil and water resources, the drainage lines and dune areas on and to the south-east of the solar development site have been highlighted as sensitive. Caution would need to be exercised if any development were to take place within these areas, as although these drainages and dunes are currently well vegetated, and the removal of the vegetation would potentially result in the erosion of the drainage lines and mobilization of the dunes, which would be undesirable, ecologically, as well as for the development and surround land uses.

2.6 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.

The parameter fencing of the Boesmanland Solar Farm site will be constructed in a manner which allows for the passage of small and medium sized mammals: i.e. steel palisade fencing (20 cm gaps min), alternatively the lowest strand or bottom of the fence will be elevated to 15 cm above the ground at least at strategic places to allow for fauna to pass under the fence. The most appropriate method will be confirmed during the final design phase in collaboration with the biodiversity specialist. No electrified strands will be placed within 20 cm of the ground – to allow free movement of tortoises and reptiles in particular. During operation, all gates will be kept closed to ensure that no larger fauna enter and become trapped within the fenced-off area.

The Act also lists protected fauna and flora under 3 schedules ranging from Endangered (Schedule 1), Protected (Schedule 2) to Common (Schedule 3). The majority of mammals, reptiles and amphibians are listed under Schedule 2 (common), except for listed species which are under Schedule 1. A permit is required for any activities which involve species listed under schedule 1 or 2.

Within the proposed development there were a large number of *Hoodia gordonii* plants, which is a protected species under the TOPS (Threatened and Protected Species) Regulations. A permit would therefore be required in terms of these regulations in order to remove or translocate these plants. As the species is not rare and is abundant in the area, the development would not have a significant impact on the viability of the local population of this species.

In terms of fauna, a permit will not be necessary for this project as no listed mammal, reptile or amphibian species are to be negatively impacted by the proposed solar development.

The eastern section of the solar development site supports the habitat of the Red Lark *Calendulauda burra*, a species of conservation concern. Based on the reported density of this

species in the area (Dean et al. 1991), the maximum number of birds that would be affected, assuming a high density of birds and that the entire development lays within suitable habitat, would be 25. However, it is unlikely that the site represents optimal habitat for this species as it was heavily grazed at the time of the site visit and the grazing pressure has been listed as the major threat to this species. Therefore it is more realistic to expect that less than 10 individuals would be directly affected, which is not highly significant considering the estimated population size of 9400 (BirdLife International (2012) Species factsheet: *Certhilauda burra*). Overall the Boesmanland Solar Farm site is not viewed as being highly ecologically sensitive and with standard mitigation measures in place, the risk of significant environmental impact or degradation as a result of the development is very low.

2.7 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 and Threatened Species Programme, Red List of South African Plants (2011), as many as 22 plant species of conservation concern occur in the broad area surrounding the solar site. Conspicuous among these is the large number of Mesembryanthemaceae present. These and many of the others are associated with the inselbergs of the area, and occur on gravel and quartz patches on the summits and adjacent plains and slopes of the inselbergs. As there is very little of these habitats within the study area, it is unlikely that a large proportion of these species occur within the site. Of the species in the list **only *Hoodia gordonii* was observed** within the proposed development area. As *Hoodia gordonii* is a protected species under the TOPS (Threatened and Protected Species) Regulations, a permit would be required in terms of these regulations in order to remove or translocate these plants.

2.8 NATIONAL HERITAGE RESOURCES ACT

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

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

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

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

Furthermore, in terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority. **No buildings, ruins or any other structures were noted on the site. Furthermore, no structures considered to be of cultural significance were located within the proximity of the proposed development site boundaries (de Kock, 2012).**

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). **No grave sites were found to occur on or in proximity to the proposed Boesmanland Solar Farm.**

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. **The flat, open terrain has a low archaeological signature, and that there are no inhibitors, from an archaeological perspective, preventing the solar facility from proceeding with construction (Smith, 2012).**

The on-going environmental process has been informed by inputs from heritage, archaeological and palaeontological specialists. Sites that are considered to be sensitive have been identified and mapped with appropriate buffers. The layout for the Solar Facility itself has been informed by these constraints and **avoids select features**.

The Integrated Heritage Impact Assessment (including the above studies) will be submitted to SAHRA for further input, comment and decision-making. The Final Comment / Decision from SAHRA will be included in the EIR phase of the environmental process.

2.9 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. The Boesmanland Solar Farm and its associated infrastructure are to be constructed well away from any river / major drainage line / wetland, and thus no Application in this regard is required.

Water required for the construction and operation of the Boesmanland Solar Farm is to be sourced either from nearby boreholes on the property, from the borehole on the adjacent farm of Witputs (20km away), from the Nama Khoi Municipality via water-tanker and/or from a rainwater collection and storage system (off the on-site substation and axillary building roofs). 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, along with confirmation that sufficient water is available (a water declaration letter explaining the process to be followed has been attached as an appendix to the Engineering Report, Annexure D6).

This WUL Application will be reviewed by DWA once the Environmental Authorisation has been received from DEA and approval provided by the Department of Agriculture. DWA and the Department of Agriculture have been registered as a stakeholder on this environmental application.

2.10 SUSTAINBILITY 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.*[4]

It is believed that the proposed 75MW Boesmanland Solar Farm 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.

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

3 ACTIVITY

The Applicant intends to develop a **solar energy facility** with a generation capacity not exceeding **75MW** (Megawatt). The proposed Boesmanland Solar Farm is to be located on a development site of approximately 450ha on a portion of Portion 6 (a portion of Portion 2) Farm 62 Zuurwater, Aggeneys, Northern Cape, and will consist of the following:

A **series of Solar Photovoltaic (PV) array rows**, mounted onto single-axis tracking systems, approximately **2m in height and 5m apart**, which will cover an **approximate footprint of 265 hectares**.

Associated infrastructure, with an approximate footprint of 13ha, will include to the following:

- approximately **75 x inverter stations** (built within transporter containers, 25m² in size);
- an **on-site substation** (including a transformer to allow the generated power to be connected to Eskom's electricity grid);
- an overhead **transmission power line** to distribute the generated electricity from the on-site substation to the existing Aggeneis Eskom substation (approximately 6km to the SE);
- **auxiliary buildings**, including:
  - administration / security offices,
  - ablution & workshop and
  - storage area.
- an **internal electrical reticulation network** (underground cabling);
- an **access road** and **internal road / track network**;
- 10 x 10kLt **rainwater tanks;** and
- **parameter fencing** around the solar facility.

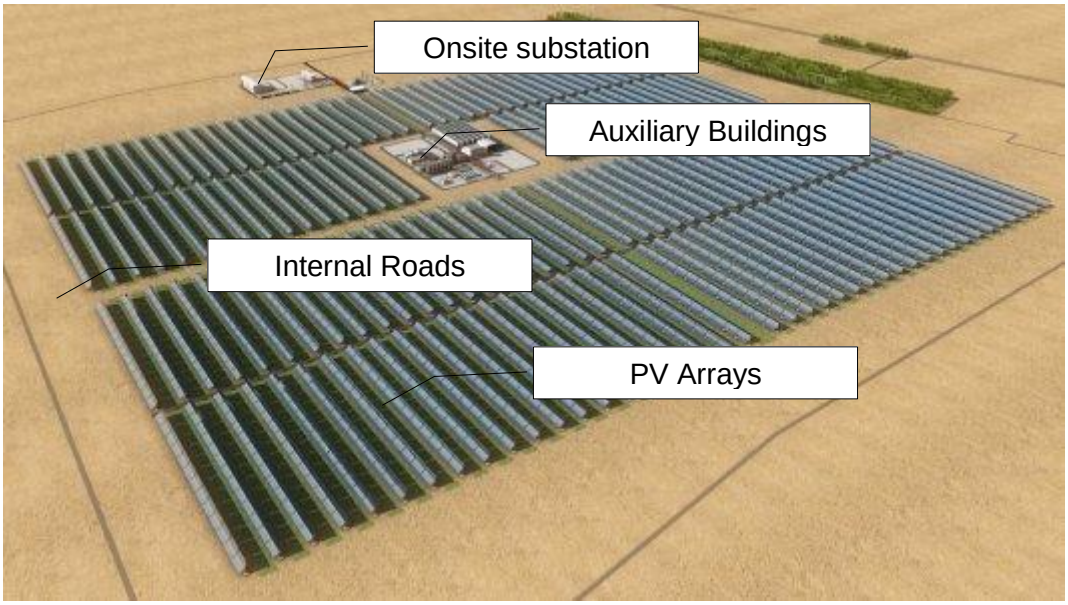


Figure 3: A typical layout of the components of a Solar PV facility (Source: Solek Engineering Report, 2012).

The 75MW Boesmanland Solar Farm will occupy approximately 265ha of land – the estimated portion of land each component will typically occupy is summarised in the table below:

Table 2: Component / area summary of Boesmanland Solar Farm

Component	Estimate extent of the 75MW plant	Percentage of selected area (+ 265ha)	Percentage of whole farm (±1930ha)
PV Arrays	240 ha (1.8 km^2)	90%	less than 13%
Internal Roads	12 ha (0.12 km^2)	6%	less than 1%
Auxiliary Buildings	1 ha (0.01 km^2)	0.5%	less than 0.1%

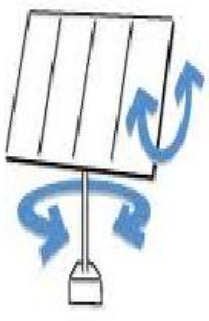
3.1 TECHNOLOGICAL ALTERNATIVES

Photovoltaic (PV) solar power technology has been identified as the preferred technology to generate electricity in this project. Several alternate options in terms of this specific solar technology have been considered. These alternatives can be grouped in terms of fixed/tracking, mounting and film alternatives.

3.1.1 Fixed & Tracking Options

Fixed-tilt / stationary solar technology was initially considered form this Solar Development where the Solar PV modules would be fixed to the ground in a specific north facing angle and consist of no moving parts. Although this type of technology is a less expensive option than tracker technology, it has been excluded as it has a much lower energy yield, due to the limited exposure to sun radiation when it is not turning.

Instead ***double axis tracking systems*** were investigated for this project, due to the high yield and efficient operation of the technology. Systems incorporating this technology are very effective due to sun being tracked in more than one axis. This allows maximum radiation over the entire solar module.



Figures 4 & 5: Double axis PV tracking systems (Solek Layout Report, 2012)

As can be seen from the above figures, a much larger ground area / footprint is required, due to the individual units and the elevated angle combined with the rotational axis, casting very long shadows. The wind loading on this type of structure plays is significant, requiring foundations with steel reinforcing and a significant amount of concrete.

In addition, complexity of the control system required to operate a two-axis PV system like this is not adequately suited to isolated areas, where spare parts and technicians are few and far between (more spares must be stored to keep the plant in a running condition, which increases capital layout costs and storage area required).

Single axis tracking systems yield maximum available power for a certain period of every day throughout the year, as opposed to stationary / fixed systems which only yield the maximum available power for a certain period of time in a single season.

Considering the above, a **single-axis tracking system has been selected as the preferred tracking technology**, as it requires comparatively less capital costs, less land coverage and is suitable to isolated areas such as Aggeneys.

The preferred technology type for the Boesmanland Solar Farm is known as horizontal tracker technology. This single-axis technology is designed to follow the path of the sun across the sky, allowing the modules to be **exposed to typically 25% more radiation than fixed PV systems**. The preferred design is extremely robust and contains only a few moving parts, while still having more or less the same footprint and infrastructure requirements than that of fixed-tilt designs.

Figures 6 & 7: Single / horizontal axis PV tracking systems (Source: Solek Engineering Report, 2012).

The tracker requires approximately 1.8 – 2.3 hectares per megawatt and is based on a simple design, allowing this well proven off-the-shelve **technology to be readily available**. The **maximum height of the trackers is typically less than 2m**.

3.1.2 Founding / Mounting Options

The most common foundation used for anchoring single axis tracking or fixed solar frames is concrete cast foundations. This type of foundation requires a foundation trench, shuttered aboveground, to be filled with concrete and reinforcing steel. Once the concrete has cured, the solar frame could either be welded or bolted to protruding reinforcing steel (or could have been left to cure with the concrete).

Figure 8 & 9: Examples single axis & fixed solar cast foundations.

This technology is much more suitable to European conditions and not for the extremely hard surfaces of the proposed site, unless the concrete is cast onto the surface using shutters. This process poses the risk of concrete spillages which could have long term negative effects.

With reference to the abovementioned option of the surface cast foundations (using removable shutters), another alternative considered for the mounting of the solar frames is pre-cast concrete footing. The pre-cast concrete feet could be manufactured off site, reducing the risk of concrete spillages and the need for exorbitant amounts of water during the construction phase of the project. Drawbacks associated with pre-cast footing include the large physical footprint required to keep the structures stable, in addition to the possible need for them to be bolted or grouted to the ground surface for stability.

In terms of the context, the greatest drawback applicable to the proposed site is the negative influence on surface water flow within the washes / drainage lines (obstruction and diversion) and associated risk of erosion, which cast and pre-cast foundations may pose.

Considering the above, is has been recommended that the Boesmanland Solar Farm be installed by means of driven/rammed piers, earth-screws or rock anchors, as these will have a similarly reduced impact on the environment. **Driven piers have been selected as the preferred method of installation**, however where earth-screws or rock anchor would be more suitable, the driven pole would be replaced by either method. The figures below show the equipment required for the ramming process.

Figures 10 & 11: Ramming equipment for solar mounting structures (Source: Solek Layout Report, 2012).

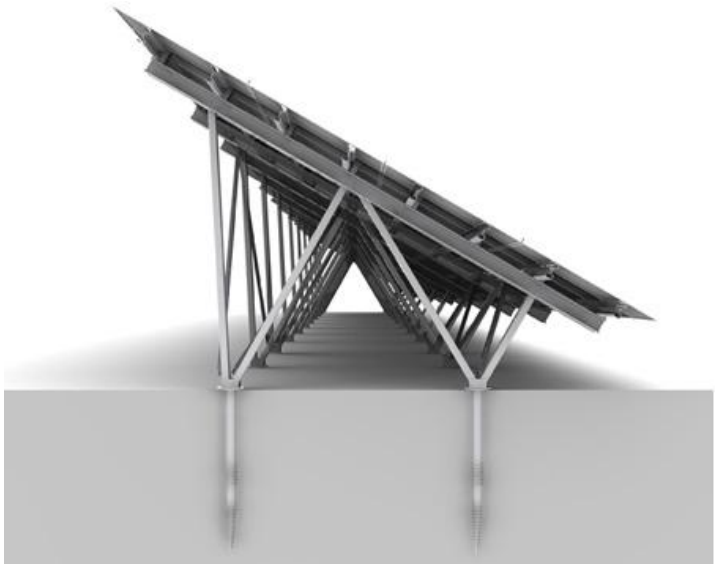


Figure 12: Typical rammed or screwed method with fixed frame (Source: Solek Layout Report, 2012).

This installation technology eliminates the need for the use of cement or polymeric products, and as a result of the very small mounting footprint, has minimal disturbance of the ground cover, substrate or natural water flow (which could have significant long term effects on the ecology of the surrounding area).

3.1.3 Film Options

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

Thin-film technology is expensive and is not suited to the conditions of the Northern Cape Province, due to its inferior performance at high temperatures. With ambient temperatures regularly exceeding 40 °C in the area, the **proposed multi-crystalline or thick-film technology** easily outperforms the thin-film alternative.

Each solar PV module consists of approximately 60 crystalline silicon cells, forming a single panel. Each module/panel is capable of generating typically 230W of DC electrical power. The solar PV modules/panels are assembled in long rows across the Solar PV array, with the **rows approximately 5m apart**. The exact number of modules in each Solar PV array, as well as the number of array rows, is subject to the final facility design and will be confirmed later in the process.

3.2 SOLAR LAYOUT ALTERNATIVES

3.2.1 Alternative 1 – Uniform Layout

A conceptual layout was initially designed to make use of a large portion of the 450ha study area identified for the Boesmanland Solar Farm. This conceptual design entailed a uniform rectangle-shaped solar facility, orientated east-west, roughly in the centre of the development site. The shape and size of this layout represents the most practical and cost-effective, in terms of the proposed solar technology.

This initial layout was revised based on the results of the ecological baseline / scoping (section 4 & 7 below) and the site constraints identified in the ecological study. As this Alternative 1 was **designed without these environmental sensitivities in mind**, it has been **excluded from the on-going environmental process and will therefore not be assessed further**.

3.2.2 Alternative 2 – Preferred Layout

Alternative 2 is a roughly pentagon-shaped solar facility of approximately 265ha in size, concentrated to the east of the 450ha development site. Unlike Alternative 1, this preferred layout has **taken the identified site constraints into account**, avoiding one of the major drainage lines, as well as the area of dunes to the west of the site as far as possible (higher density of *Hoodia gordonii* and habitat of Red Lark). The method of founding / mounting the solar arrays has been changed from the cast-foundation to consider **driven piers as the preferred mounting technology**. This minimalistic method of installation may allow the solar array to be installed over / across the drainage lines, as **potential disturbance would be greatly reduced** as compared to the concrete cast-foundations (to be confirmed in the impact assessment phase).

It is proposed that as far as practically possible, the ramming piers / poles will be driven into the ground away from the drainage lines. Some of the ground cover in the plain areas in-between the drainage lines (of medium to medium-high sensitivity) may have to be partially cleared of vegetation to allow proper installation i.e. access by ramming equipment etc. Although the site is very flat, some minor excavation may be necessary where surface irregularity exists. These excavations will however avoid the drainage lines and will be kept to an absolute minimum. **The vegetation cover under the proposed solar arrays will be left intact to avoid the risk of erosion and dune sand drift.** Large brushes, high enough to cast shadows, will be kept trimmed, or removed. The layout may require that several of the *Hoodia gordonii* plants that occur within the development area be removed, and where possible, transplanted.

The lack of casted cement foundation blocks and limited mounting footprint will allow natural runoff flow within the drainage lines and minimal disturbance to the on-site dune systems. Recommendations for runoff management, as well as anti-erosion measures for construction, operation and decommissioning phases of the development, will be provided in impact assessment phase to follow (and be described in the Environmental Management Programme to be compiled). These recommendations will attempt to ensure that the drainage lines are kept clear of any obstructions or diversions and that anti-erosion measures be implemented. Education and training of personnel would be component of the abovementioned measures.

This layout the solar facility is to be approximately 265ha and is aimed at having the lowest possible environmental impact, while still keeping the project economically viable. **The potential impacts (negative and positive) associated with this layout will be assessed as part of the forthcoming Environmental Impact Assessment / Reporting phase (EIR) of the on-going environmental process,** which will include the identification of reasonable avoidance, mitigation and management measures for the further design of the Boesmanland Solar Farm.

3.3 NO-GO ALTERNATIVE

The **Status Quo Alternative** proposes that the Boesmanland Solar Farm not go ahead and that the area in proximity to Black Mountain Mine and Aggeneis Substation remain undeveloped as it is currently. The land on which the proposed project is proposed is currently vacant. It is currently used for limited cattle grazing activities, however due to a combination of poor soil quality, water scarcity and distance from the major market, it has no potential for irrigated crop cultivation. The area in question is also considered too small to generate noteworthy financial benefit from agricultural activities due to its low carrying capacity.

The solar-power generation potential of the Aggeneys area, particularly in proximity to the Aggeneis 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 'do-nothing' alternative be considered, the positive impacts associated with the solar facility (increased revenue for the farmer, local employment and generation of electricity from a renewable resource) will not be realised.

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

3.4 PHOTOVOLTAIC SYSTEM OVERVIEW

The following details were drawn from the Engineering Report (van der Merwe, 2012), attached in Appendix D, Annexure D6.

The Boesmanland Solar Farm is to consist of a **Concentrator Photovoltaic System (CPV),** which uses concentrating optics (lenses) to bundle the sunlight and focus it onto very small solar cells which convert the sunlight into electrical energy. The required active area of the solar cell is reduced to only a small fraction of the area normally required by conventional solar cells (traditional PV or thin film). The solar modules/panels will be mounted onto **single-axis tracker arrays**, which use an east-west **tracking system** to follow the sun's movement throughout the day. This system ensures that the focus point of the concentrated sunlight is always directly onto the cells.

The **tracker arrays are approximately 2m in height and arranged in series of rows, spaced approximately 5m apart** to avoid shading each other, while minimizing the footprint of the facility. The tracker array rows will be between 50 and 200m long and be **oriented at a tilt, facing approximately North**, to maximize annual solar energy yield. The total solar facility, including tracker spacing and associated infrastructure, will occupy a footprint of approximately 265ha.

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

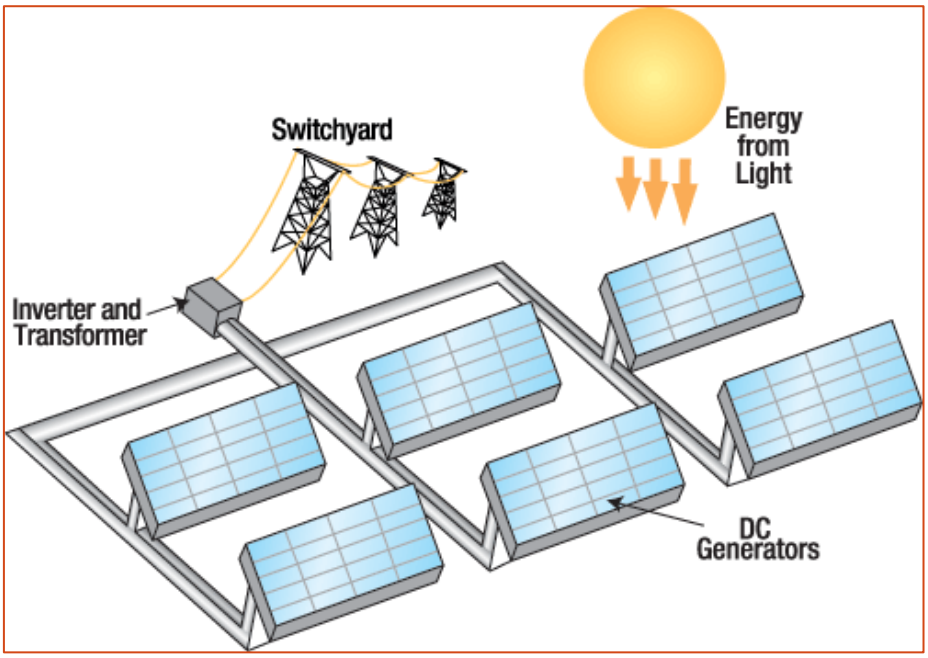


Figure 13: Typical Solar PV Plant diagram (Source: Engineering Report, 2012)

The infrastructure of the facility includes the ground-mounted panels, cables, access roads, auxiliary roads, an on-site substation, auxiliary buildings (admin./security, workshop & storage) and an overhead distribution line.

3.4.1 Electrical Infrastructure

Approximately **75 inverting stations** will convert the power produced by the solar panels into a form that it could be fed into the step-up on-site substation. These inverting stations will be connected to array series via underground cabling and would be placed along the service roads to allow for quick and easy access. These inverter stations would typically be built into a transportable container measuring 10 x 2.5m, having a footprint of 25 square meters. The **underground electrical cables** will then be aligned alongside / within these internal roads and pathways between the arrays to connect to the on-site substation.

The interconnecting cables will be trenched where practically possible, but in areas of high sensitivity, cables will be mounted onto the mounting structures to avoid excessive excavation works and clearing of vegetation.

Figures 14, 15 & 16: Photos of typical underground cable trenches (Source: Solek Engineering Report, 2012).

The **step-up on-site substation** and its associated infrastructure (transformers etc.) will have a footprint of approximately 0.04 ha (20m x 20m). Note that the 0.04 ha is included in the entire building footprint of <1ha. The generated by the solar panels is stepped up to the required voltage and frequency of the national grid by transformers.

Figures 17 & 18: Typical examples of on-site step-up substations (Source: Solek Engineering Report, 2012)

Electricity from the on-site substation will be transmitted via a **66kV overhead power line** to the existing Eskom Aggeneis Substation which is located approximately 6km south west of the proposed solar site. In principle, there are three viable alternatives for the alignment of this overhead power line:

Transmission Line – Alternative 1 (Preferred)*:* The transmission line route to align parallel to/with the existing 220kV transmission line running between the Aggeneis substation and Harib. As this existing line forms the southern boundary of the proposed solar development it is consider the preferred option. This line has a registered servitude of 47m (23,5m on either side), and thus the minimum separation distance between this line and any other proposed line is 32m. Thus, the proposed line would run parallel to the existing line, with a separation distance of approximately 50m between them.

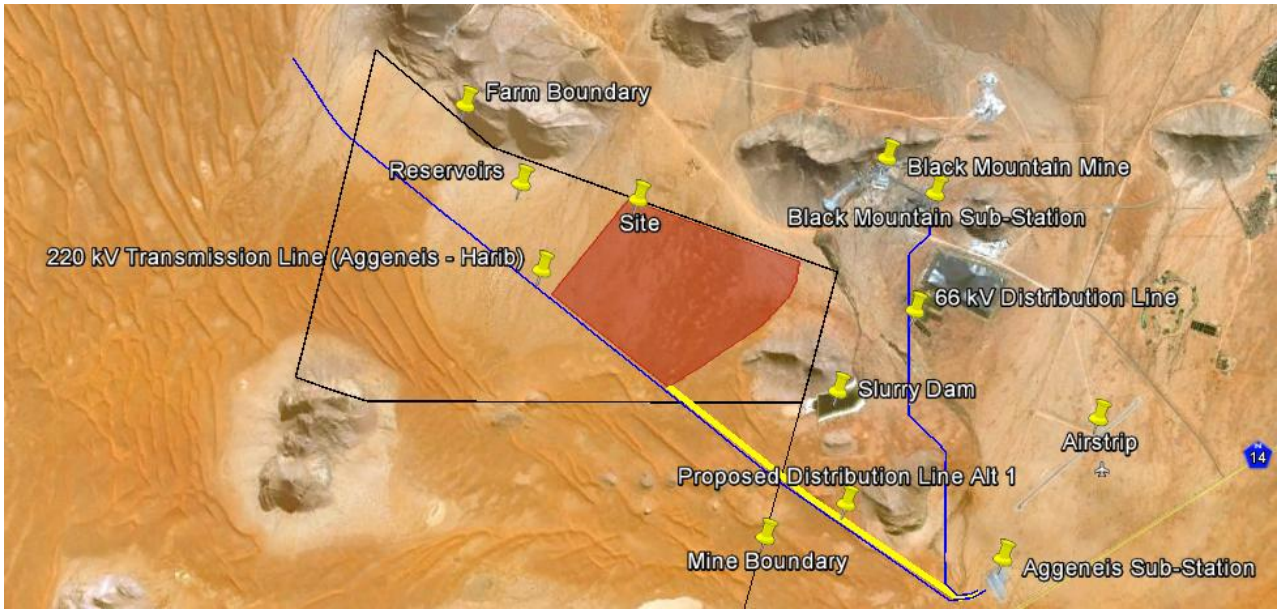


Figure 19: Transmission Line alignment – Alternative 1 – 66kV line between Harib and Aggeneis Substation (yellow line)(Source: Solek Engineering Report, 2012)

Transmission Line – Alternative 2: The alternative option for the transmission line route would be to align parallel to/with the existing 66kV distribution line running between the Aggeneis substation and Black Mountain Mine substation. This line has a registered servitude of 22m (11m on either side), and thus the minimum separation distance between this line and any other proposed line is 14m. Thus, the proposed line would run parallel to the existing line, with a separation distance of approximately 20m between them.

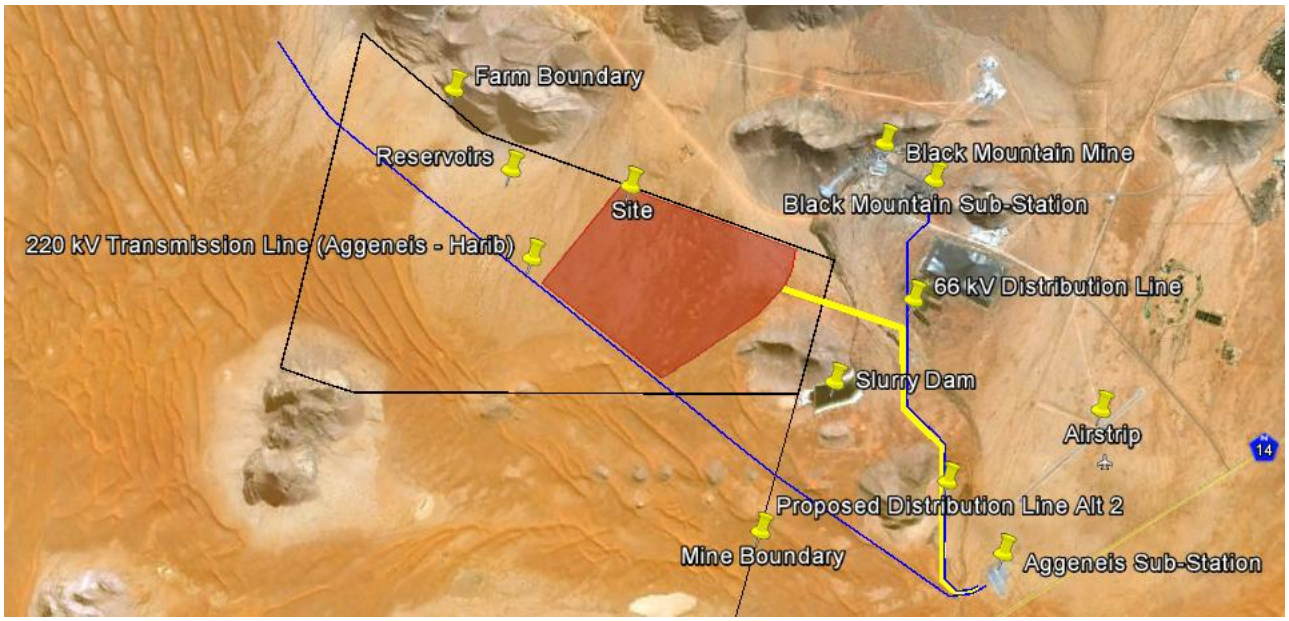


Figure 20: Transmission Line alignment – Alternative 2 – 66kV line between Black Mountain Mine Substation and Aggeneis Substation (yellow line)(Source: Solek Engineering Report, 2012)

Transmission Line – Alternative 3: The option also exists to connect to the 66kV line between the Aggeneis and the Black Mountain Mine substations by means of a "loop-in/loop-out" connection, due to the fact that the line is a double circuit line and the mine is the only entity utilising the line.

There are some possibilities of expansion in the near future, which may affect the proposed project. Eskom is planning a new 220kV transmission line from Aggeneys towards Namibia, while Vedanta (Black Mountain Mine) is also planning to develop the Gamsberg zinc project, which could lead to the construction of a new 132kV distribution line.

These connection options, and those possible in the future, will be considered by specialists and the project team during the impact assessment phase, in order to select the most practical and least environmentally sensitive option.

3.4.2 Auxiliary Buildings

The infrastructure for the auxiliary buildings should occupy approximately 1ha. The **workshop** will be used for general maintenance of parts, etc. and will typically be 20m x 20m. The **storeroom** will be used for storage of small equipment and parts and will typically be 20m x 10m. The change and **ablution facilities** will be very basic and include toilets, basins and a change area. The **administrative and security building** will be used as an onsite office and will have a footprint of typically 10mx10m.

The final detailed design and exact co-ordinated position of these buildings will be designed and finalised during the environmental impact assessment / reporting (EIR) phase of this environmental process and the final design phase of the project, should the facility be approved and awarded a tender as an IPP. The component list above is typical to such projects and may deviate due to

engineering requirements, new technologies and regulatory changes from the government's tender process.

3.4.3 Solar Facility CONSTRUCTION

The majority of the proposed solar site is flat and covered with sparse, low vegetation. Therefore accessibility to development areas should be possible with minimal vegetation clearing. The vegetation along the access and internal road network will be trimmed where possible (not removed) to form vegetated tracks (to minimise disturbance and erosion). Road areas with soft soils may however be covered with a gravel layer to avoid vehicles becoming stuck in wet conditions.

The majority of the vegetation clearing and earthworks required for the solar facility will be associated with the construction of the on-site substation and auxiliary buildings. The area to be disturbed for the construction of the solar panel array support / mounting structures will be minimal (in comparison to the surface area to be covered).

The physical footprint of the PV panels on the ground is formed by a network of vertical piers / poles (typically 10cm in diameter) on which the PV panels are mounted (see examples below).

Figure 21: Example of foundation structures – driven / rammed piers/poles.

These piers are rammed / drilled into the ground, which easy removal during de-commissioning of the project. The use of concrete for stabilisation is to be avoided as far as possible.

3.4.4 Water Requirements

It is estimated that **approximately 11 200kl of water in total should be required during the eighteen (18) month construction phase**, while **approximately 10 - 18kl of water per day should be required for the cleaning of solar panels and for other operational phase requirements**. No water will be used for cooling purposes as the electricity transformers will make use of dry cooling. This also reduces the threat of environmental risks associated with alternative oil cooled transformers.

Weather conditions, traffic and general dustiness of 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 twice a month.

To further reduce the use of water at the solar facility, the use of **alternative panel cleaning methods** is also being investigated. The most feasible technology under consideration uses compressed air to blow off any debris from the panel's surface. At this stage the technology is being tested and needs refinement before it would be commercially viable.

Possible water sources identified at this stage include the existing boreholes on the property and adjacent farm (Witputs), trucked/tanker water from the Namakhoi Municipality (Springbok) and rainwater capture/storage:

- ***Borehole water***

Farm Zuurwater boreholes: There are three boreholes in the vicinity of the proposed solar site, of which one is currently being utilised for agricultural purposes. According to the farmer, the water from these boreholes have a good yield and is fit for human consumption, thus be suitable for the proposed development. The total capacity of the three boreholes is however unknown. Once the proposed project has been selected as a preferred bidder, pump tests will be done on these boreholes to confirm the exact capacity/yield, should this option be considered as the preferred water alternative. The small volumes of water required for washing of the Solar PV panels and for general operational purposes (maximum 18kl per day or 500 kl per month) can be sourced from these boreholes without challenges.

Farm Witputs borehole (alternative supply): Borehole water could be extracted from an additional borehole situated at the homestead of the neighbouring Witputs farm, owned by the same farmer, approximately 20km from the proposed site. The water quality is also fit for human consumption and would be suitable for the proposed development. A blow test has been performed on this borehole and proved that it can supply 2.5 kl per hour, of which only 1.5 kl is currently used. It would therefore also be able to supply the daily quantity required. If this option is put into action, the water will either be transported by 20kl water trucks/tankers, or a pipeline would be constructed from the farmstead to the proposed site.

The abovementioned farm boreholes have not been registered. Due to the relatively small amount of water required for the solar facility (no more than 18kl per day) such a water use would normally be allocated by means of a General Authorisation (GA) from the Department of Water Affairs. However, the specific quaternary region in which the proposed development is situated does not currently allow for a GA and a Water Use License would have to be applied for. Ms. Danita Hohne of, the Department of Water Affairs (DWA) confirmed that such a license could only be granted once the approval was received from the Department of Agriculture, Forestry and Fisheries (DAFF), the relevant Record of Decision (ROD) or Environmental Authorisation (EA) has been issued by the Department of Environmental Affairs (DEA) and the proposed project has been selected as a preferred bidder by the Department of Energy (DOE). The relevant environmental application (EIA) must therefore be submitted without a water license; but provide confirmation that sufficient water sources are available for the facility.

An application for Water Use Rights and registration of the boreholes will be submitted to the Provincial (Kimberley) Department of Water Affairs for consideration at the end of this environmental process.

- ***Nama Khoi Municipality***

The town of Aggeneys falls under the Khai-Ma Municipality, which receives its water from the Orange River, via the Pella pipeline. At the moment, the pipeline is running at full capacity, and while capacity upgrades are being investigated, these may only be implemented in the next three years. In the meantime, the Nama Khoi Municipality has agreed to provide the Boesmanland Solar Farm with the necessary water, until the Khai-Ma water provision capacity has been expanded. This water will be transported to the proposed site by standard water trucks/tankers. A letter confirming this agreement has been received from the Nama Khoi office (see appendix to Engineering Report as Annexure D6).

- ***Rainwater***

As an additional measure, 10 x 10 000lt rainwater tanks will be placed alongside the on-site maintenance/administration, workshop and storage buildings to collect the rainwater runoff from their roofs. This rainwater will be used to supplement the water sources mentioned above.

3.4.5 Transportation of Solar Equipment

All solar plant components and equipment are to be transported to the solar development site by road via container trucks. Construction is likely to extend over a period of approximately 18 months, during which time the majority of the solar PV panels and construction components will be transported by utilising **2 x 40ft container trucks**.

Less than 30 containers required per installed MW, which typically includes all solar PV components and additional construction equipment. **Over the period of 18 months, approximately 2250 containers will therefore be transported to the proposed site**, which amounts to two 2x40ft container truck 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.), as well as components required for the establishment of the onsite substation power line. 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 Springbok, 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.

The access road to the Boesmanland Solar Farm facility will be via the Aggeneys turnoff off the N14, via two possible routes, as discussed below.

Figures 22 & 23: Aggeneys turnoff off N14 highway and Road to Aggeneys

- ***Access and internal road network***

Various options exist for the alignment of the access route to the Boesmanland Solar Farm. These include the existing servitude road along the existing Eskom transmission line between Harib and the Aggeneys Substation, via the existing Black Mountain Mine road network or via a new road to the south of the Mine. Black Mountain Mine has confirmed in a meeting with the project engineers that in principle they will allow Boesmanland Solar Farm to make use their roads. The existing road running parallel to the Eskom Powerline, has been confirmed by Eskom to belong to the property owners: the Mine and the Maasdorp Farm. Written consent has also been received from Maasdorp, indicating that in principle they will consent to Boesmanland Solar Farm making use of

their road. The most appropriate access route, in terms of the least environment impacts, viability and consent from relevant parties, will be confirmed during the impact assessment phase.

The **access road** to the solar facility will consist of compacted rock-fill with a layer of higher quality surfacing stone on top, while the **internal farm access roads** will either be comprised of the same, or gravel tracks. The **internal road network** of the solar facility will be gravelled roads (less than 4m width around the solar array periphery) and un-surfaced tracks (in-between the solar modules to be used for maintenance and cleaning of solar cells). The layout and alignment of these access and internal roads will be informed by recommendations made by the botanical specialist and topographical survey, as well as input from the relevant stakeholders.


Figures 24 & 25: Typical internal road and track examples (Source: Solek Engineering Report, May 2012).

- ***Temporary layout area***

A temporary laydown area will be required for the **temporary placement/storage and assembly of the PV panels and associated equipment** during construction. The laydown area for the construction period will be approximately 1ha and will be determined by the recommendations from the environmental specialists' reports to avoid all sensitive areas in the positioning of the facility.

3.4.6 Waste Management

- ***Solid Waste***

During the construction phase, an estimated amount of **less than 5m^3 non-hazardous solid construction waste will be produced per month**, for the expected 18 month construction period. All construction waste will be safely stored in containers and be removed from site on an ad hoc basis by the appointed construction contractor, as and when deemed necessary. The construction waste will be **disposed of at an appropriately licenced Municipal landfill site**.

No solid wastes will be generated during the operational phase.

- ***Sewerage effluent***

Sewage from the on-site ablution facility is to be treated onsite by means of a **septic tank system**. Sewage cannot be disposed in a municipal sewage system, due to the isolated nature / locality of the farm.

3.4.7 OPERATION & Maintenance Phase

The solar facility will 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 solar panels will be cleaned with water or compressed air.

An estimated total of **six full-time staff members** will typically be required during the operation phase of the project, which includes technicians, maintenance and security personnel. Approximately **three unskilled labourers will be needed for maintenance purposes and two security personnel will be deployed on a shift basis**. **One skilled staff member will be needed to manage and oversee the operations**. From time to time additional contract staff may be required for ad hoc ground cleaning or special panel cleaning. Staff can be transported around the site using utility vehicles and a typical mini bus to transport staff from nearby towns of Aggeneys and surrounding community.

3.4.8 Project DECOMMISSIONING

The proposed solar energy facility is expected to have a **lifespan of approximately 30 years** if the specified periodic maintenance is performed. Once the facility has reached the end of its economic life, the infrastructure is to be disassembled and replaced with appropriate or more advanced technology. Should replacement not be deemed necessary, then the facility would be completely decommissioned i.e. all infrastructure will be disassembled and removed from site. Site decommissioning activities will ensure integrity of access to the site and well as rehabilitation as necessary.

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

4 SITE DESCRIPTION AND ATTRIBUTES

The following sections provide a description of the environmental and built context of Farm 62 Zuurwater, with particular focus of the proposed Boesmanland Solar Farm site.

4.1 LOCATION & BUILT ENVIRONMENT

The target property, Portion 6 (a portion of Portion 2) Farm 62 Zuurwater, is located in the Namaqualand district of the Northern Cape Province, within the jurisdiction area of the Khai-Ma Local Municipality. The property is approximately 1 927ha is size and is located approximately 65km west of Pofadder, 8km west of the town of Aggeneys and is bound to the east by the Black Mountain Mine.

The proposed Boesmanland Solar Farm development site is approximately 450ha in size and is situated north of the N14 National Road, visually screened from the N14 by a series of dunes extending from the N14 to a nearby inselberg/koppie named Hoedekop. Vehicular access to the site is either via existing roads off the N14 and entrance road to Aggeneys/ Black Mountain Mine (latter with special permission) or alternatively via a series of narrow tracks (accessible by four-wheel drive) approaching the property from the east.

The surrounding arid and desert landscape is characterised by scattered Inselbergs (koppies) consisting of solid basement rock surrounded by wind-blown Kalahari dune sands (orange to red in colour). The proposed development area is a generally flat / gently southeast-facing, undulating plain of low dunes of red Kalahari sands interspersed with gravel and stony plains, which falls entirely within the Bushmanland Sandy Grassland vegetation type. Those parts of the site with

sandy soils tend to be dominated by perennial grasses with scattered shrubs and low trees, while the areas of stony and gravel plains are dominated by woody shrubs and occasional succulents. There are no significant rocky outcrops or large drainage lines within the proposed development area itself, although these features are present within the broader area, particularly to the south-west.

No buildings, ruins or any other structures were noted on or within the direct proximity of the proposed solar development site. Built infrastructure on the site includes a windmill, two small cement reservoirs and an Eskom Transmission line, along the southern boundary (see Appendix B for site photographs).

The Eskom Aggeneis substation, located approximately 6km to the south west of the site is a key substation in the supply base of the Northern Cape and is fitted with two 40 MVA 220/66kV step-down transformers. The substation is fed with a 400kV power line from Aries, from which three 220kV power lines are fed towards the Nama, Harib and Paulputs substations.

Figure 26 & 27: Existing Eskom Aggeneis Substation, located beside the N14, south-east of the solar site.

The 220kV power line towards Harib is a double circuit line, which runs parallel to the solar development site southern boundary. There is also a double circuit 66kV line to the east of the solar site that feeds the Black Mountain substation.

Figure 28 & 29: Existing Eskom power line and track along southern boundary of solar development site.

The Black Mountain Mine (Vedanta Zinc, Africa and Ireland's Black Mountain zinc / lead / copper / silver mine) is located on the property directly to the east of the proposed solar development site. The town of Aggeneys was established around 1976 to facilitate the Black Mountain Mine, which is an underground base-metal operation, which that currently employs over 600 permanent staff (Aggeneys website).

Figure 30: Entrance to Black Mountain Mine

Figure 31: View north east towards mine from solar development site

4.2 GEOLOGY & TOPOGRAPHY

The following description of the geological context of the site was drawn from the Palaeontological Statement (Almond, 2012). See Appendix D, Annexure D5.

The proposed solar development area comprises fairly flat-lying terrain between the scattered Inselberge to the southwest of the main Black Mountain Massif. These **Inselberge**, like the Black Mountain itself, are built of a variety of resistant-weathering igneous and high grade metamorphic rocks of Late Precambrian (Mokolian / Mid-Proterozoic) age. The various basement rock units - mainly **gneisses, schists, quartzites and amphibolites** are assigned to the **Namaqua-Natal Province** and are approximately two to one billion years old (Cornell *et al.* 2006, Moen 2007, Almond & Pether 2008 in Almond, 2012).

The flatter portions of the study area – including those that are likely to be directly affected by the proposed development - are underlain by a range of unconsolidated superficial sediments of Late Caenozoic age. These include **Quaternary to Recent sands and gravels** of probable fluvial or sheet wash origin that are locally overlain, and perhaps also underlain, by unconsolidated aeolian (*i.e.* wind-blown) **orange dune sands of the Quaternary Gordonia Formation** (**Kalahari Group**). All these sediments can be subsumed into the Late Cretaceous to Recent **Kalahari Group.** The Gordonia dune sands are considered to range in age from the Late Pliocene / Early Pleistocene to Recent, dated in part from enclosed Middle to Later Stone Age stone tools. Note that the recent extension of the Pliocene - Pleistocene boundary from 1.8 Ma back to 2.588 Ma would place the Gordonia Formation almost entirely within the Pleistocene Epoch (Almond, 2012).

4.3 VEGETATION

Mr. Simon Todd, of Simon Todd Consulting, conducted an Ecological Impact Assessment of the proposed Boesmanland Solar Farm development site (see **Appendix D, Annexure D1** for full report), from which the following is drawn.

According to the national vegetation map (Mucina & Rutherford 2006), the site lies entirely within the Bushmanland Sandy Grassland vegetation type. This vegetation type occurs on red sands along the Koa River valley, southeast and west of Aggeneys, as well as on the eastern edge of the Bushmanland basin near Copperton. This vegetation unit occupies an area of 2283 km^2 and has not been significantly impacted by transformation and is classified as Least Threatened. Other important vegetation types which occur in the vicinity of the site include Bushmanland Inselberg Shrubland, Bushmanland Arid Grassland and Aggeneys Gravel Vygieveld. All of these vegetation

types are also classified as Least Threatened and have not been significantly impacted by transformation. Of these vegetation types, only Aggeneys Gravel Vygieveld contains a significant number of endemic species, most of which are dwarf succulents in genera such as *Conophytum, Dinteranthus* and *Lithops*. Given the proximity of the site to some mapped units of Aggeneys Gravel Vygieveld, it is possible that some of the endemic species associated with this vegetation unit occur at the site. The likelihood of their occurrence would depend on the presence of suitable gravel and qwartz plains substrate at the site.

Although the vegetation of the site has been classified as a single vegetation type, the site visit suggested there are in fact several different plant communities present at the site. Soil depth and texture appear to be key drivers of the vegetation patterns at the site. The different plant communities observed at the site are described below:

4.3.1 Drainage lines & Washes

Due to the high infiltration capacity of the deep sands, which characterize a large proportion of the site, there are few drainage lines within the proposed development area.

The drainage lines that are present have their origin in the rocky hills outside of the site. Within the proposed development area, the drainage lines are generally wide and open, with a flat sandy bed. The drainage lines were dominated by *Stipagrostis ciliata* and *Stipagrostis namaquensis*, with scattered shrubs such as *Sisyndite spartea*, *Salsola namibica*, *Trichodesma africanum* and *Lycium pumilum* (Todd, 2012).

Figure 32: Example of drainage line in solar development area.

4.3.2 Sandy Plains

A large proportion of the proposed development area is characterized by the presence of **deep, red Kalahari sand**, which forms flats, low or occasionally taller vegetated dunes. Typically these areas are dominated by perennial bushman grasses with scattered shrubs and low trees. Dominant grasses include *Stipagrostis brevifolia*, *S.ciliata*, *S.anomala*, *S.obtusa* and *S.uniplumis*, while shrubs include *Rhigozum trichotomum, Hermannia affinis*, *Lycium eenii* and *Calabota spinescens*. Occasional low trees include *Parkinsonia africana* and *Boscia foetida*. In the areas of larger dunes, species such as *Cladoraphis spinosa*, *Leucophrys mesocoma*, *Stipagrostis amabilis, Hermannia tomentosa* and *Crotalaria orientalis* were prevalent (Todd, 2012).

This community is has a relatively low plant diversity and is **not considered highly sensitive**. The only **species of conservation concern observed with this area was *Hoodia gordonii***, which is a nationally protected species. This community corresponds with the Bushmanland Sandy Grassland vegetation unit of Mucina & Rutherford (2006).

Figure 33: Typical view of the vegetation which occurs on the deep sands of the site.

4.3.3 Gravel Plains

The east and western margins of the proposed development area is characterized by the presence of gravel plains with low, open shrubby vegetation. These areas are dominated by shrubs such as *Eriocephalus ambiguus*, *Zygophyllum retrofractum*, *Euphorbia spinea*, *Sarcocaulon crassicaule*, *Salsola rabieana*, *Hermannia stricta*, *H.spinosa* and *Ruschia divaricata*. The dominant grass in these areas is *Enneapogon scaber*. Larger shrubs and trees which occur occasionally include *Lycium cinereum* and *Boscia foetida*. Although most areas of this community are **not considered sensitive**, there were some patches of quartz gravel, where the structure and species composition correspond to the Aggeneys Gravel Vygieveld vegetation type.

Given the relatively large number of endemic species known from this vegetation unit, the **patches of gravel should be considered sensitive and should be avoided wherever possible**. The only species of conservation concern that was observed in this community type, at least within the proposed development area was ***Hoodia gordonii*****, which was abundant in some parts, particularly towards the west of the proposed development area** (Todd, 2012).

Figure 34: The gravel plain plant community type, which characterizes a large part of the western portion of the proposed development area.

4.3.4 Plant Species of Conservation Concern

According to the SANBI SIBIS database and Threatened Species Programme, Red List of South African Plants (2011), as many as 22 species of conservation concern occur in the broad area surrounding the site. Conspicuous among the list is large number of Mesembryanthemaceae present. These and many of the others are **associated with the inselbergs of the area**, and **occur on gravel and quartz patches** on the summits and adjacent plains and slopes of the inselbergs. As there is very little of these habitats within the study area, it is unlikely that a large proportion of these species occur within the site. Of the species in the list only *Hoodia gordonii* was observed within the proposed development area. *Conophytum limpidum* was also observed during the site visit, but outside of the study area to the northwest on a ferricrete outcrop associated with the mountain slope to the north. Suitable habitat for this species did not appear to occur within or near the development area. Although some of the other listed species may occur at the site, these would be associated with the quartz patches, which were observed within the site, but outside the proposed development area.

4.4 FAUNA

Mr. Simon Todd, of Simon Todd Consulting, conducted an Ecological Impact Assessment of the proposed Boesmanland Solar Farm development site (see **Appendix D, Annexure D1** for full report), from which the following is drawn.

4.4.1 Mammals

The site falls within the **distribution range of 40 terrestrial mammal and 4 bat species**, indicating the mammalian diversity at the site is of moderate to low diversity. Two listed species may occur in the area, the Black-footed cat *Felis nigripes* (Vulnerable) and Leopard *Panthera pardus* (Near Threatened). Given the agricultural activity that takes place in the area, the abundance of Leopard in the area is likely to be low. The habitat is suitable for the Black-footed Cat which favours a mix of open and more densely vegetated areas. However this species is widely distributed across the arid and semi-arid areas of South Africa, and the development would not amount to a significant amount of habitat loss for this species.

In terms of **important mammalian habitats** in the vicinity of the development, the rocky hills, **inselbergs and larger drainage lines** can be singled out as being the most significant. Compared to the adjacent plains, the rocky habitats are likely to harbor far greater species richness, particularly of small mammals. Species associated with such rocky outcrops include Rock Hyrax *Procavia capensis*, Klipspringer *Oreotragus oreotragus*, Pygmy Rock Mouse *Petromyscus collinus*, Namaqua Rock Mouse *Aethomys namaquensis* and Western Rock Elephant Shrew *Elephantulus rupestris*. The open plains, such as those which occur within the proposed development area, are likely to be dominated by species associated with open hard or sandy ground such as various gerbils such as Hairy-footed Gerbil *Gerbillurus paeba* and Highveld Gerbil *Gerbilliscus brantsii*. Other mammals observed at the site include South African Ground Squirrel *Xerus inauris* and Cape Porcupine *Hystrix africaeaustralis* (Todd, 2012).

There are **no highly significant habitats for mammalian fauna within the proposed development area**, and the loss of habitat within this area as a result of the development would **not have a high impact on the broader richness of mammals in the area** (Todd, 2012).

4.4.2 Reptiles

The site lies in or near the **distribution range of at least 49 reptile species**, indicating that the reptile diversity at the site is likely to be quite high. Given the variety of habitats available at the site, which range from sandy plains and dunes, to rocky plains and outcrops to drainage lines, a large proportion of these reptiles are likely to occur at the site. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 1 tortoise, 19 snakes, 19 lizards and skinks, one chameleon and 9 geckos. Within the proposed development area, **only those species associated with sandy and gravel flats are likely to occur**. As a result, a large proportion of the geckos and girdled lizards known from the area are likely to be absent from the development area. The only listed reptile species known from the area is the Armadillo Girdled Lizard *Cordylus cataphractus.* This species is however restricted to rocky outcrops and would not occur within the proposed development area (Todd, 2012).

4.4.3 Amphibians

The site lies within the **distribution range of only four amphibian species** which can be ascribed to the aridity of the area. The proposed **development area is not likely to be an important area for amphibians** within the context of the site as there is little suitable cover or habitat present within this area. In the broader area, the settling ponds associated with the mine and their overflow are likely to be important as amphibian foraging and breeding habitat. The greatest risk factor associated with the development in terms of amphibians would be pollution spills which may occur during the construction phase and which could affect amphibians in downstream areas (Todd, 2012).

4.4.4 Birds

According to the SABAP 1 and 2 data sets, **174 bird species are known from the broad area surrounding the Boesmanland Solar Farm site**. This includes **12 IUCN listed species**. The smaller species such as the larks would be affected by habitat loss in the developed areas, while the larger species and raptors would be affected by habitat loss as well as the risk of collisions and electrocution from power-line infrastructure. **Collisions and electrocution from power-line infrastructure** are significant causes of mortality for bustards, flamingos, eagles and vultures. The construction of new power lines is therefore a potentially significant source of impact for these species. Although the length of the proposed power line infrastructure is quite short, new lines can result in significant mortality if they lie across flight paths and other areas of high activity. These impacts can to a large degree be **mitigated by fitting bird flappers to the new lines** to reduce collisions as well as insulating the live infrastructure to avoid electrocution. Although the development area is just outside one of Birdlife South Africa's Important Bird Areas, the **eastern section of the site falls within an Important Bird Area, which is related to the presence of the Red Lark *Calendulauda burra*** in the area (Birdlife International 2012). The habitat of this species is well vegetated red dunes dominated by perennial tussock grasses such as *Stipagrostis*. As previously described in the vegetation section, this corresponds with a large proportion of the proposed development area. Based on the reported density of this species in the area (Dean et al. 1991), the maximum number of birds that would be affected, assuming a high density of birds and that the entire development lays within suitable habitat, would be 25. However, it is **unlikely that the site represents optimal habitat for the Red Lark** as it was heavily grazed at the time of the site visit and the grazing pressure has been listed as the major threat to this species. Therefore it is more realistic to expect that less than 10 individuals would be directly affected, which is not highly significant considering the estimated population size of 9400 (BirdLife International (2012) Species factsheet: *Certhilauda burra*) (Todd, 2012).

5 PLANNING CONTEXT

Bennie Scheepers of Macroplan Town and Regional Planners (Upington) compiled a Planning Statement (see **Appendix D, Annexure D7** for full statement), from which the following was drawn:

Macroplan Town & Regional Planners are to handle the following components regarding the project:

- A **land use change application** for the rezoning of 350ha, from **Agricultural Zone I to Special Zone**, will be lodged at the Khai-Ma Local Municipality, in accordance with the Northern Cape Planning and Development Act (Act 7 of 1998).
- Where applicable, the consent of SANRAL, Civil Aviation Authority (CAA) and the bondholder will be obtained as part of the rezoning application.
- If there are restrictive Title Deed conditions burdening the proposed development, an application for the removal thereof will be lodged at the Government of the Northern Cape Province, Department: Corporate Governance and Traditional Affairs, in accordance with the Removal of Title Deed Restriction Act (Act 84 of 1967).
- Parallel to the rezoning application, a **long term lease application will be lodged at the National Department of Agriculture**, in accordance with the Subdivision of Agricultural Land Act (Act 70 of 1970).
- Relevant planning documents, on all spheres of Government, will be evaluated before any land use change application is launched. These documents include, but are not limited to the following: **NSDP** (National Spatial Development Perspective); **PGDS NC** (Provincial Growth

and Development Strategy), Northern Cape Province; **IDP** (Integrated Development Plan); **SDF** (Spatial Development Framework).

The following sections discuss the site constraints and potential impacts associated with development of the 425ha solar site as a whole.

6 AGRICULTURAL POTENTIAL STATEMENT

Mr. Hendri Beukes, of Solek Renewable Energy Engineers, compiled an Agricultural Potential report of the proposed Boesmanland Solar Farm development site, based on of his knowledge and experience of farming in the Northern Cape (see **Appendix D, Annexure D2** for full report), from which the following is drawn:

6.1.1 Agricultural Potential Context

The study area is characterised by scattered inselberge of resistant basement rocks surrounded by Kalahari dune sands and other superficial deposits such as braided stream sediments, sheet wash and colluvium. The flatter portions of the study area, which would be affected by the proposed development, are underlain by a range of unconsolidated superficial sediments.

The area on which the proposed development site is located consists mainly of **dune sand and is not fit for the extensive cultivation of crops and grains**. The soil can be described as red massive and weak-structured with high base status. Red topsoils are usually low in organic matter and would need excessive enrichment in order to support most crops. The soil is generally between 450mm and 750mm deep and contains less than 15% clay. The soil does not allow for the economic cultivation of crops or grains, since the water is drained very soon after precipitation.

The climate of the area in which the proposed development site is situated, is not favourable for intensive agriculture, due **to low rainfall and temperature extremes**. The Aggeneys region is a summer rainfall district. It is a semi-desert area with arid conditions, with an average annual precipitation range between approximately 100 mm and 120mm, which is extremely low. The variation of annual precipitation is very high. The day temperatures are known to become extremely high and range on average between 18°C and 36°C. In winter months it can become very cold.

The vegetation within the proposed development site is homogeneous. There are no trees on the site and the plain is sparsely populated by annual grasses. The **grazing value of these plant types is relatively poor** (Beukes, 2012).

According to the Department of Agriculture, the prescribed **carrying capacity of the farm is 60 ha per unit of cattle or 15ha per sheep**. The total farm is able to carry a maximum of 32 units of cattle or 145 small livestock units. The proposed development site, however, can only carry approximately 4 units of cattle or 18 sheep. The economic value of the solar site is thus insignificant in terms of its grazing capacity.

There are **two primary water sources on the farm, namely rainwater and groundwater**. There are no rivers or significant dams on the farm. Groundwater is readily available and of high quality, perfect for human and animal consumption. There are **three boreholes on the farm** which are utilised by means of windmills. The water is currently accumulated in two small reservoirs and is used to supply the livestock of drinking water.

6.1.2 Existing Land Use & Infrastructure

There are currently no buildings on the farm, while built infrastructure includes a windmill, two small cement reservoirs and an Eskom Transmission line. There is a small network of tracks on the farm, but most of the farm is still inaccessible without the use of four-wheel-drive vehicles or motorcycles. The farm is not subdivided into camps, but the border fences are well maintained. There are no cattle handling facilities on the farm (kraal).

There are currently no formal access routes to the farm, except for a jeep track along the Eskom line. The current owner accesses the farm by means of a motorcycle due to the poor condition of the roads. Although the farm is situated close to the N14 national road, there are no access roads that connect the farm with the national road network, which has a crippling effect on exports from the farm. The farm is very far from the primary markets, which complicates the economical export of agricultural products from the farm even more (Beukes, 2012).

The **farm is currently utilised for low density stock farming**. The entire farm is currently grazed by some 100 heads of cattle, for 9 months of the year. Although the area is very dry, there is no need to provide extra feed to the livestock. **Overgrazing has had abominable effects on the grazing potential** of the farm and it would take several years to recover to its original state (Beukes, 2012).

Figure 35: Cattle grazing on solar site

Figure 36: Overgrazed / highly disturbed state of land.

There is a variety of activities on the surrounding areas that borders the farm. To the west and south of the farm there are livestock farms, mainly focused on sheep and cattle farming. The northern and eastern parts of the farms borders the mine grounds that are not used for any agricultural activities. There is also a golf course, a landing strip and the town of Aggeneys nearby.

6.1.3 Potential Land Use Options

The combination of poor soil quality, water scarcity and distance from the major market hinders the possibility of the commercial production of grain, vegetables and horticultural products. Irrigation on this arid area is excluded due to low availability of water and fast-draining soils. It is possible to consider game farming in the area, especially Springbok and Gemsbok, but the capital expenditure would be extremely high. The **proposed solar development site does not have any significant agricultural value and has not been utilized for any extensive agricultural purposes for many years**. The site is too small to generate noteworthy financial benefit from agricultural activities. The development of the proposed solar facility would constitute the loss of less than 265ha of the overall approximate 1927ha area, which will **not have a significant impact on the agricultural potential of the farm**. The **economic benefits that the proposed solar development holds cannot be recovered from the current or potential agricultural activities.**

7 ECOLOGICAL SENSITIVITY ANALYSIS

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

The proposed development area is largely suitable for development. The only significant ecological features within the development area are a few drainage lines. The **area to the southeast of the development site is however mostly highly sensitive**, due to the presence of **rocky hills, tall dunes and drainage lines**. Although the solar arrays would be out of this area, some of the **powerline and access road options traverse this area**. Within the proposed development there were however a large number of ***Hoodia gordonii* plants**, which is a protected species under the TOPS (Threatened & Protected Species) Regulations. A permit would therefore be required in terms of these regulations in order to remove or translocate these plants. As the species is not rare and is abundant in the area, the development would not have a significant impact on the viability of the local population of this species.

Although the low dunes, which characterise a large proportion of the site, are not highly sensitive in terms of plant biodiversity, this is the **habitat of the Red Lark**, which is a species of relatively high conservation concern. Furthermore, caution would need to be exercised if any development were to take place within these areas as these dunes are currently well vegetated and the removal of the vegetation would potentially result in the mobilization of these dunes, which would be undesirable, ecologically, as well as for the development. Therefore, if these areas of deeper sand are to be developed, specific measures to prevent sand movement and wind erosion would be required. The mobilization of the sand would be particularly undesirable as once mobilized it would tend to smother the vegetation of adjacent areas, and potentially mobilizing the sand in these areas as well, creating a knock-on effect that would impact a far greater area than initially disturbed.

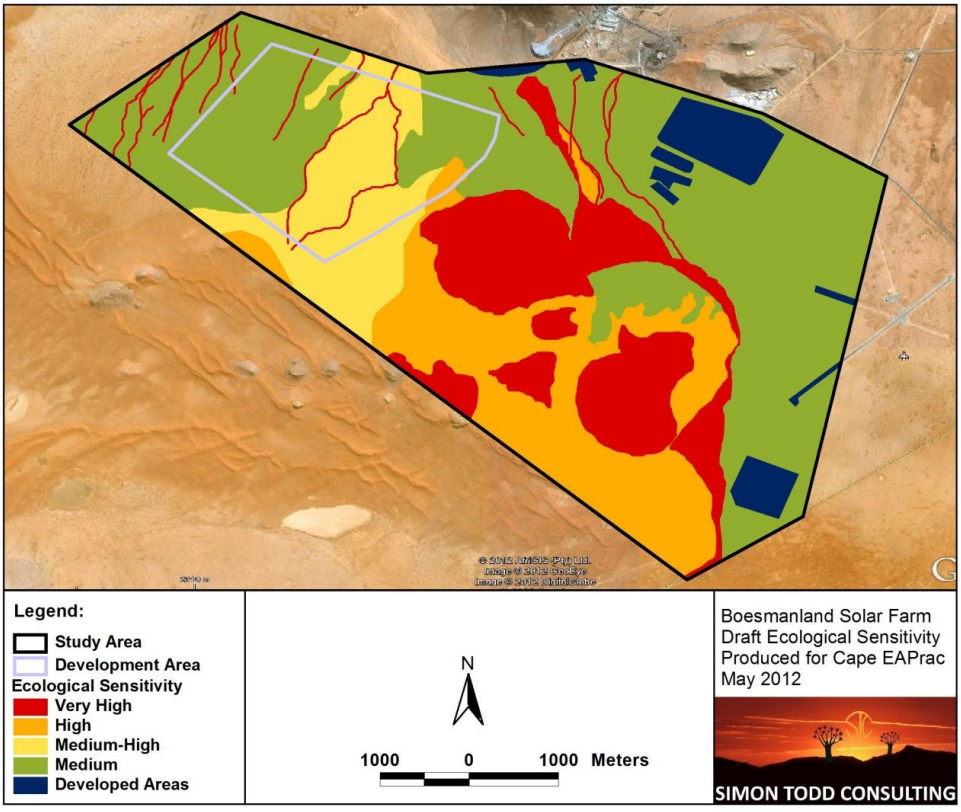


Figure 37: Draft Ecological Sensitivity map of the proposed Boesmanland Solar Farm site. Those areas classified as Medium Sensitivity are preferable for the construction of the facility (Todd, 2012).

7.1 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 Boesmanland Solar Farm:

- **Impacts on vegetation and protected plant species** would occur due to the presence of sensitive plant communities and the potential presence of a number of protected species within the development area.
- Increased **risk of alien plant invasion** resulting from the high levels of disturbance during construction as well as potentially from maintenance activities during the operational phase.
- Increased **erosion risk** as a result of soil disturbance and loss of plant cover. This risk would be particularly significant in the areas of low dunes which are vulnerable to wind erosion as well as along some of the powerline and access route options which traverse some steeper ground.
- **Negative faunal impacts** would occur as result of increased levels of noise, pollution, disturbance and human presence. Shy mammals would move away from the area particularly during the construction phase as a result of the noise and human activities present. Some mammals and 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.

Direct and indirect **impacts on avifauna** would result from habitat loss as well as electrocution and collisions with transmission lines, which is a particular problem for many larger birds such as eagles, flamingos, cranes and bustards.

7.2 ECOLOGICAL SENSITIVITY SUMMARY & PRELIMINARY RECOMMENDATIONS

The construction phase of the project will create a lot of disturbance at the site, which will leave the **site vulnerable to wind and water erosion**, as well as result in **habitat loss for fauna**. Wind erosion is highlighted as a specific concern in the areas of red sands, which are currently stabilized, but could become mobilized if the vegetation is disturbed. The **red sand dunes are also the habitat of the narrow endemic Red Lark *Calendulauda burra***. Therefore, it is recommended that the **development avoid the areas of deep red sands** as far as possible. The area of least impact would be the **areas in the eastern and western corners of the proposed development area**. Within this area, the majority of impacts would be of low significance and the development would not result in significant biodiversity loss or degradation of the receiving environment (Todd, 2012).

The proposed preferred Layout (Alternative 2) has been concentrated to the western corner of the proposed development area to avoid these potential impacts. This layout will be refined in response to the ecological impact assessment of this layout during the next phase.

In terms of the **different access road and power line options**, Todd (2012) provided the following provisional recommendations with regard the preferred option in each case:

Access Road Alternative via the Black Mountain Mine Roads is the preferred access route option as it is the shortest as well as remains near the mine, resulting in lower overall levels of disturbance. The route parallel to the existing Eskom line is the least preferred as it traverses some high dunes and would result in significant impact along the route which is vulnerable to disturbance.

Parallel to the Black Mountain Mine Power Line (Transmission Line Alternative 2 as above) is the preferred line option. Although Alternative 1 runs parallel to the existing 220 kV line (Harib to Aggeneis Substation) to the south of the development site, this area is ecologically sensitive as it runs over a large rocky hill and some high dunes. Alternative 2 also traverses some sensitive drainage lines, but the impacts in these areas would be more easily managed and the alternative option is not recommended (please note alternatives number differently in Ecological Report).

The selection of the most appropriate access route and powerline alignment will be informed by negotiation with the relevant stakeholders (landowners and project engineers), as well as the assessment of impacts for each route alternative.

8 HERITAGE ASSESSMENT

An Integrated Heritage Impact Assessment (HIA) compiled for the proposed Boesmanland Solar Farm development site includes inputs from the following specialist reports sanctioned as part of the HIA:

- Archaeological Impact Assessment – Prof. Andrew Smith
- Historical background report – SE de Kock
- Recommendation for Mitigation from further paleaontological studies and mitigation (Desktop) – Natura Viva (Dr. John Almond)

This Integrated HIA has been submitted to the SAHRA, as the competent heritage authority, for consideration.

8.1 HERITAGE SCOPING

Mr. Stefan de Kock, of Perception Heritage Planning, conducted an Integrated Heritage Impact Assessment of the proposed Boesmanland Solar Farm development site (see **Appendix D, Annexure D3** for full report), from which the following is drawn:

Based on historical research, areas within the proximity of natural water sources and along the base of Inselbergs are potentially sensitive from archaeological perspective (see Archeaological Scoping in Section 8.2 below). From a much broader perspective the Aggeneys area has associations with the following historic themes:

• Pre-colonial history and indigenous inhabitants;
• Various conflicts between e.g. “Trekboers” and local tribes (including Nama wars);
• Early mining activities.

However, no archival references referring to these historic themes, which include the possibility of grave sites/ burial ground on proposed development site and/ or lands directly contiguous to it, could be located (de Kock, 2012).

8.1.1 Cultural Landscape Context

The term “*cultural landscape*” refers to the imprint created on a natural landscape through human habitation and cultivation over an extended period of time. While the Northern Cape has been inhabited for many tens of thousands of years (pre-colonial history) prior to Western settlement (colonial history), the nomadic lifestyles of early inhabitants are not always as evident within the landscape than the significant imprints made by humans during the last two – three hundred years. Unlike ancient landscapes in parts of the world where intensive cultivation over periods much longer than locally have allowed natural and cultural components of the landscape to become

interwoven, climatic conditions prevailing with this arid, semi-desert landscape mostly precluded large-scale cultivation, save within the proximity of perennial rivers such as the Orange River or other places with a reliable water source (de Kock, 2012).

Ultimately, definition of a cultural landscape is informed by the following elements, weighed through professional opinion, public values and statutory (legal) framework:

- Natural Landscape
- Public Memory
- Social History
- Historical Architecture
- Palaeontology
- Archaeology

Given the absence of early aerial photography for the area, identifying any Pre-Modern traditional landscape patterns that occur within the direct proximity of the proposed development site has been met with some difficulty. In this case, primary traditional landscape features evident within the current landscape are **limited to existing farm tracks, none of which are considered to be of cultural significance**.

Existing structures older than 60 years located directly south-east of the site (farmstead and two associated outbuildings) are considered to be of moderate – low cultural significance and is furthermore situated well outside the actual development footprint currently proposed. As such we are of the view that the **proposal would not materially impact on these heritage resources.**

From a regional and natural landscape perspective, the proposed development site forms part of an isolated wilderness area well outside local tourism routes and areas (including the Orange River corridor). While the proposal would relate to a landscape modification, we do **not consider that it would alter any natural or cultural landscape of cultural significance** (de Kock, 2012).

8.1.2 Visual-spatial Issues

The N14 National road alignment between Springbok and Pofadder is just south of Aggeneys and is the most important route through this area and offers unique views across the surrounding landscape, which is sensitive to visual encroachment through possible inappropriate development. The proposed development site would be set back from the N14 National road by at least 5km and would **not be visible from any main roads or other important public vantage points**.

Taken in conjunction with this setback, as well as the flat nature of this landscape, the entire **development site is in fact hidden from view through natural landscape features such as Inselbergs and a series of high dunes**. Historic maps of the area dating back to 1906 – 1914 describes this dune system as being, *"waves of very heavy sand dunes causing considerable delay to traffic [wagons and carts]*" and 40ft (c. 12.2m) in height.

Even if there were a possibility for proposed development being marginally visible from the N14, such views would clearly be within the context of existing buildings, infrastructure, works and landscape transformation associated with the Black Mountain Mine. Therefore, we are of the view that the **proposal would not materially alter existing views** from the N14 or any other known area or site considered to be of moderate to high local, provincial or national aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value cultural significance (de Kock, 2012).

8.1.3 Eco-tourism

One of the goals of ecotourism is to offer tourists insight into the impact of human beings on the environment, and to foster a greater appreciation of our natural habitats and from an economic perspective, heritage resources may prove to be valuable resources when used in sustainable manner through eco-tourism. This may for example include investment in adaptive re-use of historic buildings so as to conserve and enhance the unique character and historic themes pertinent to this area. Heritage tourism can therefore serve as a driver for economic development,

including infrastructure development and poverty alleviation through job creation. The broader region's rich archaeological, palaeontological, historical and natural heritage has the potential to provide unique tourism opportunities when developed and used in responsible and sustainable ways (de Kock, 2012).

Existing eco-tourism related activities present in the broader region include e.g. walking trails, horseback riding, geological interpretive excursions, bird watching and river rafting. The Augrabies Falls National Park – approximately 210km east of the proposed development site – is an important formal conservation area in the region. Given the isolated location of the site in relation to important tourism routes and formal conservation areas; as well as the relative **low density of heritage resources considered of cultural significance** noted as part of this assessment, we do **not consider that the proposed development would offer significant heritage-related eco-tourism opportunities** associated with the development site (de Kock, 2012).

8.2 ARCHAEOLOGICAL SENSITIVITY ASSESSMENT

Prof. Andrew Smith, conducted an Archaeological Sensitivity Assessment of the proposed Boesmanland Solar Farm site (see **Appendix D, Annexure D4** for full report), from which the following is drawn:

The flat, open terrain made surface visibility good, and any stone tools could easily be seen. In the soft sandy areas and along the dry river bed almost nothing was seen, but quartz flakes were to be found at fairly large intervals along tracks, and across those areas where the ground was hard. In one area a stony surface of at least 2ha stone chips could be seen scattered in low numbers. A few Early Stone Age (ESA) and Middle Stone Age (MSA) pieces were also noted (Smith, 2012).

On the clean sand at the top of the dune just outside the footprint area three ostrich eggshell fragments were found, as well as an ESA(?) quartz core axe and a crystal quartz flake. This was the richest site found during the survey.

Figure 38: Dry drainage line across site (Smith, 2012)

Figure 39: Stony surface with low numbers of quartz pieces (Smith, 2012).

Inspection of the Eskom power line access road yielded some quartz and quartzite flakes, but these had been introduced with road fill from elsewhere when the track was upgraded. No in situ material was noted, even on the top of the dunes flanking the road (Smith, 2012).

The distinct lack of any concentration of cultural material across the property implies that this is **not a rich archaeological environment**, and would be similar to observations by Beaumont et al. (1995: 264), who state that in this dry environment: *"Surveys of large areas...have failed to yield*

any signs of human occupation, except around the granite inselbergs extruding above the peneplain".

The access road through the Black Mountain Mine property already exists and is well used by heavy equipment, so would be adequate for servicing the solar facility. The direct Eskom power line track from the sub-station close to the N14 highway has no visible in situ archaeological material, and so could be widened, if this was the preferred access route to the solar facility. The area of the other power line route through the mine, has already been disturbed by the building of the slurry dam, and from the absence that was noted on the other power line track, no archaeological material would be anticipated.

It is found, from an archaeological perspective, that there would be no inhibitors to construction of the solar facility.

8.3 PALAEONTOLOGICAL STATEMENT

Dr. John Almond, of Natura Viva, compiled a Paleaontological Statement for the proposed Boesmanland Solar Farm development site (see **Appendix D, Annexure D5** for full report), from which the following is drawn:

The Mid Proterozoic basement rocks of the Namaqua-Natal Province are **entirely unfossiliferous** (Almond & Pether 2008). The fossil record of the Kalahari Group as a whole is generally sparse and low in diversity; **no fossils are recorded** here in the recent Pofadder geology sheet explanation by Agenbacht (2007). The Gordonia Formation dune sands were mainly active during cold, drier intervals of the Pleistocene Epoch that were inimical to most forms of life, apart from hardy, desert-adapted species. Porous dune sands are not generally conducive to fossil preservation. However, mummification of soft tissues may play a role here and migrating lime-rich groundwaters derived from the underlying Dwyka Group may lead to the rapid calcretisation of organic structures such as burrows and root casts. Occasional terrestrial fossil remains that might be expected within this unit include calcretized rhizoliths (root casts) and termitaria (*e.g. Hodotermes*, the harvester termite), ostrich egg shells (*Struthio*) and shells of land snails (*e.g. Trigonephrus*) (Almond 2008, Almond & Pether 2008). Other fossil groups such as freshwater bivalves and gastropods (*e.g. Corbula, Unio*) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms (microscopic algae within siliceous shells) and stromatolites (laminated microbial limestones) are associated with local watercourses and pans. Microfossils such as diatoms may be blown by wind into nearby dune sands. These Kalahari fossils (or subfossils) can be expected to occur sporadically but widely, and the **overall palaeontological sensitivity of the Gordonia Formation is therefore considered to be low**. Underlying calcretes might also contain trace fossils such as rhizoliths, termite and other insect burrows, or even mammalian trackways. Mammalian bones, teeth and horn cores (also tortoise remains, and fish, amphibian or even crocodiles in wetter depositional settings) may be occasionally expected within Kalahari Group sediments and calcretes, notably those associated with ancient alluvial gravels. The younger fluvial and alluvial sands and gravels within the proposed development area are **unlikely to contain any substantial fossil or subfossil remains** (Almond, 2012).

The **overall impact significance** of the proposed Boesmanland Solar Farm development on fossil heritage is considered to be **VERY LOW** because:

- Most of the study area is underlain by unfossiliferous metamorphic basement rocks (granite-gneisses *etc.*) or mantled by superficial sediments of low palaeontological sensitivity;
- Extensive, deep excavations are unlikely to be involved in this sort of solar park project.

It is therefore recommended that exemption from further specialist palaeontological studies and mitigation be granted for this solar plant development.

Should substantial fossil remains be exposed during construction, however, the ECO should safeguard these, preferably *in situ*, and alert SAHRA as soon as possible so that appropriate action (*e.g.* recording, sampling or collection) can be taken by a professional palaeontologist (Almond, 2012).

Further to the abovementioned archaeological and palaeontological recommendations, the following mitigation measures are recommended:

- In the event that vegetation clearing and earthmoving activities expose archaeological or paleontological materials, such activities must stop and SAHRA (the heritage authority) must be notified immediately.
- If archaeological materials are exposed through earthmoving activities, then they must be dealt with in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer(s) and/or property owner(s).
- Unmarked human burials may occur anywhere in the landscape and are often exposed during earthmoving activities. Human remains are protected by law and, if older than 60 years, are dealt with by the State Archaeologist at the South African Heritage Resources Agency.

9 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 are assessed and recommendations to avoid and/or mitigate impacts are provided during the on-going environmental process.

FLORA:

- **Drainage lines / washes**;
- ***Hoodia gordonii*** plants (can be removed and transplanted with a permit);
- Well vegetated deep red sand dunes dominated by perennial tussock grasses (e.g. *Stipagrostis)*, within the **sandy plains towards the eastern section of the site**, as disturbance of the dunes could result in wind erosion and the mobilization of the dunes which would be undesirable from ecological perspective, as well as for the development. In addition, these dunes are related to the habitat and thus presence of the narrow endemic Red Lark *Calendulauda burra;*
- **Patches of quartz gravel** on the gravel plains, where the structure and species composition correspond to the Aggeneys Gravel Vygieveld vegetation type;
- **Rocky hills and tall sand dune to south-east of site** – relevant / significant for proposed access road and transmission line alignments.

FAUNA:

- Habitat of the narrow endemic **Red Lark** *Calendulauda burra* - Well vegetated deep red sand dunes dominated by perennial tussock grasses (e.g. *Stipagrostis)*, within the sandy plains towards the eastern section of the site;
- Potential **collision and electrocution from power-line infrastructure** are significant causes of mortality for bustards, flamingos, eagles and vultures.

AGRICULTURAL POTENTIAL: .None.

HERITAGE: None.

VISUAL: None.

ARCHAEOLOGY: None.

PALAEONTOLOGY: None.

The proposed preferred Layout (Alternative 2) has been concentrated to the western corner of the proposed development area to avoid these potential impacts. This layout will be refined in response to the ecological impact assessment of this layout during the next phase.

10 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 3: Summary of Public Participation Process to date.

CHRONOLOGY OF EVENTS	
DATE	**ACTION**
4 Nov'11	**Notification** was sent to the Landowner of Zuurwater 62 informing him of the development proposal and the environmental process to be followed.
5 Dec'11	**Notifications** were sent to neighbouring landowners informing them of the development proposal and the environmental process, and inviting them to register as I&APs.
9 Dec. 2011	The **Siyanda District Municipality and the Khai-Ma Local Municipality** (which have jurisdiction over the area), as well as other **organs of state** (including SANParks, Northern Cape Nature Conservation, Department of Agriculture, Forestry & Fisheries, Department of Minerals and Energy, Department of Water Affairs, SAHRA, Eskom, Civil Aviation Authority etc.), were notified and registered as key stakeholders.
25 Nov. 2011	**Advertisements** were placed in a regional newspapers (*Namaqua Weekly & Die Plattelander*), calling for stakeholders to register as Interested & Affected Parties
30 Jan. 2012	**Notice Boards** (English & Afrikaans) were placed at the local municipal offices in Pofadder and at the Aggeneys Postal Agency.
Jan.2012	A **Stakeholder Register** was opened and the details of all registered stakeholders entered for future correspondence.
May 2012	Hard copies of the Draft Scoping Report (DSR) have been placed at the Khai-Ma Municipality offices (Pofadder) and the Aggeneys Postal Agency, to inform the public of the proposal and EIA process, and invite them to review the document and provide comment (from **Monday 28 May 2012 to Friday 6 July 2012**). The DSR has also been made available on the *Cape EAPrac* website: www.cape-eaprac.co.za/active
May 2012	Registered Stakeholders and I&APs were sent notifications informing that of the availability of the DBAR for a review and comment period of 40-days, extending from **Monday 28 May 2012 to Friday 6 July 2012.**

No issues or concerns have been raised by Interested and Affected Parties thus far in the environmental process. Comments received in response to the Draft Scoping Report will be included in the Final Scoping Report, to be submitted to the Department of Environmental Affairs (DEA) for consideration.

NOTE: The environmental Regulations make provision that as there are no substantive changes between the *Draft* Scoping Report (DSR) and *Final* Scoping Report (FSR), the Final SR can be submitted to the Department (DEA) without a further public comment period of 21-days (subject to approval by the delegated Authority). The FSR will then be made available to the public for information purposes whilst the Department considers the report

12 ASSUMPTIONS & LIMITATIONS

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

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

The following specialists have listed the following specific assumptions & limitations in their reports:

ECOLOGICAL / BIOPHYSICAL:

- Narrow temporal window of sampling - ideally, a site should be visited several times during different seasons to ensure that the full complement of plant and animal species present are captured. However, this is rarely possible due to time and cost constraints and therefore, the representivity of the species sampled at the time of the site visit should be critically evaluated. There had been some rainfall in the period preceding the site visit, and the vegetation within the drainage lines and run-on areas was green and growing with many species in flower.

However, the rainfall had not been sufficient to stimulate large amounts of annuals, forbs or geophytes and as a result the plant species list obtained for the site can be considered to be representative of the trees, shrubs and grasses only. In order to overcome this potential limitation, the list of species observed during the site visit was supplemented with a **list of those protected or endangered species which are known to occur** in the area. The lists of amphibians, reptiles and mammals for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. The species lists compiled for the site are therefore likely to include a much wider array of species than which actually occur at the site and represents a sufficiently conservative and cautious approach which takes account of the study limitations.

PLANNING:

- Due to the fact that **no applicable zoning** currently exists for alternative / renewable energy facilities or their ancillary facilities in the Northern Cape Province, it was necessary to apply for rezoning from Agriculture 1 to Special zone, as well as for a long-term lease on Agricultural land for the purposes of the renewable energy facility.

HERITAGE / ARCHAEOLOGY / PALEONTOLOGY:

- The Heritage Scoping Report is limited to the assessment of the potential impact of the proposed Aggeneys / Zuurwater 75MW Photovoltaic Solar Power Station on **heritage resources found on / within the proximity of the development site**.
- There is a limitation in terms of understanding the **cumulative impacts** of the project when taken in conjunction with other similar future development projects in the surrounding area;
- While every precaution was taken to accurately represent the location and extent of heritage resources with GIS software through the **integrated heritage resource mapping**, this should be considered **for illustrative purposes only**.
- Further archaeological and palaeontological artefacts/sites may only be identified once earth works have commenced, and thus it is **not possible** to identify such areas upfront. However should monitoring be implemented during earthworks, exposed heritage resources will be identified and the relevant authorities will be notified.

This scoping process was undertaken with full knowledge of the above assumptions and cognisance was taken of the limitations as specified.

13 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT REPORT

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

13.1 CRITERIA FOR SPECIALIST ASSESSMENT OF IMPACTS

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

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

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

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

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

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

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

- **High significance**: The impacts will have a major influence on the proposed development and/or environment.

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

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

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

- Each specialist is required to consider the project in as much detail as is required to inform his/her impact assessment.
- Specialists must ensure that they are aware of the necessary **planning, environmental and service requirements** associated with the proposal.
- Specialists must ensure that they **liaise with other relevant specialists** (via the EAP) if it seems necessary to use information from another discipline.
- Impact Assessments must **consider all the identified alternatives** in order to provide a comparative assessment of impacts: There are **two Solar-Photovoltaic array options** to be considered – Uniform/rectangular Alternative 1, the Pentagon-shaped Alternative 2 (preferred layout), **as well as the no-go option.**
- Specialists should consider **national and international guidelines and standards** relevant to their respective focus area. For example: *The Environmental, Health and Safety Guidelines (2007) IFC, World Bank Group* etc.
- Any **assumptions** made and any uncertainties or **gaps in knowledge**, as well as **limitations** regarding the specialist studies, must be clearly described and explained.
- The proximity of the site in relation to **key features** such as the existing Aggeneis Substation, the Black Mountain Mine, transmission lines and access routes, must be considered.
- A portion of the development site falls within an **'ecological support'** area, as well as a NPAES focus area – the relevance of such must be considered by relevant specialists.
- The draft impact assessment report of each specialist are subject to public/stakeholder review and comment – all comments received will be considered by each specialist, responded to and the final impact assessment report updated accordingly.

14 TERMS OF REFERENCE FOR SPECIALIST STUDIES

Table 4: Terms of reference for Specialist Studies

Specialist Study	Aim of the Study / Input	Terms of Reference

Ecological / Biophysical	Determine the impacts that the construction, operation and decommissioning of the **two** proposed solar array layout options the proposed 75MW Boesmanland Solar Farm, substation / auxiliary building site, transmission line and associated infrastructure will have on vegetation and fauna (with specific focus on drainage lines, quartz patches and dune areas), and recommend mitigation measures. The above assessment must include the NO-GO option as a baseline.	• Less than 265ha will be disturbed during construction and shaded during operation. • An access road must be constructed to the solar facility - route options include: along the existing track parallel to the Eskom line (Harib to Aggeneis Substation), via the existing Mine road network and via a new road south of the Mine. Consent from relevant landowners required. • 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. 400m², as well as auxiliary buildings with a footprint less than 1ha will be constructed. • A transmission line of approximately 6km from the on-site substation to the Aggeneis Substation. Proposed routes include: parallel to the existing Harib-Aggeneis SS Eskom Line and the existing Mine-Aggeneis SS Line. • Based on the findings of the Scoping Ecological Report, the **two** proposed PV array layout options, and associated infrastructure 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 **two** proposed PV panel array layout options 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 **two** proposed PV panel array layout options 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-Ma Municipality and Department of Agriculture regarding progress of the Re-zoning & Lease Applications for the Boesmanland Solar Farm on Agricultural land.

15 PROCESS TO BE FOLLOWED

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

- This Draft Scoping Report is made available for public review and comment for a period of 40 days. Comments received on this document will be responded to and included in the Final Scoping Report. Should there be substantial changes between the Draft and Final Scoping Report, this Report will be made available for review and comment for a further 21-day period. Should there be no substantial changes between the draft and final documents the Final Scoping Report will be submitted directly to the Department of Environmental Affairs (DEA) without a further 21-day public review and comment period. Registered Interested and Affected Parties will be notified when the Final Report is available on the *Cape EAPrac* website and/or be provided with digital copies of the FSR for information purposes
- Once the DEA accepts the Final Scoping Report and Plan of Study for Environmental Impact Report, the relevant specialists will undertake and complete their respective impact assessments;
- Discussions will be held with the various specialists and project team members in order to determine how best the development concept should be amended / refined to avoid significant impacts;
- In the event that amendments to the development plan are not required, the Draft Environmental Impact Report (DEIR) can be concluded;
- However, if an amendment becomes necessary, changes can be made to the layout plan to form another development alternative that will address and/or avoid any significantly detrimental impacts;
- Such an alternative will be circulated to all the relevant specialists in order for them to complete their comparative assessments and final impact assessment reports;
- The DEIR will be made available for public review and comment period of 40-days;
- All comments and inputs received during the comment & review period will be included with the Final EIR;
- The Final EIR will be submitted to the DEA for consideration and decision-making;
- The DEA's decision (Environmental Authorisation) on the FEIR will be communicated with all registered I&APs.

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

16 CONCLUSION & RECOMMENDATIONS

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

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

Cape EAPrac is of the opinion that the information contained in this Draft Scoping Report and the documentation attached hereto is sufficient to allow the general public and key stakeholders to apply their minds to the potential negative and/or positive impacts associated with the development, in respect of the activities applied for. We believe that the proposed Boesmanland Solar Farm will be sustainable in the long term and that the proposed development will be an asset to the Aggeneys area, Northern Cape region and the broader South African society through supplementing the electricity supply for the National Eskom Grid.

This Draft Scoping Report (DSR) is made available for stakeholder review and comment for a period of 40-days, extending from **Monday 28 May 2012 to Friday 6 July 2012**. All comments received, will be considered and addressed, and feedback will be provided to registered stakeholders.

Following this comment period, the Final Scoping Report will be prepared. Should the Final Scoping Report include significant amendments to this Draft report, it will once again be made available to registered Interested and Affected Parties (I&APs) for comment, for a further 21 day period. Should the amendments include only minor changes to this Draft Scoping Report, the Final Scoping Report will be submitted directly to the Department of Environmental Affairs (DEA) and only be made available for stakeholder information purposes. Whatever the case, all registered stakeholders will be kept informed throughout the remainder of the environmental process.

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

Comments must be submitted, in writing, to the following address no later than 6 July 2012

Cape Environmental Assessment Practitioners

Att: **Mrs. Siân Holder**

PO Box 2070, George, 6530

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

ABBREVIATIONS

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

SAHRA	South African National Heritage Resources Agency
SANBI	South Africa National Biodiversity Institute
SANS	South Africa National Standards
SDF	Spatial Development Framework
TOPS	Threatened and Protected Species

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