FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT IN SUPPORT OF AN APPLICATION FOR AMENDMENT (SPLITTING) OF THE ENVIRONMENTAL AUTHORISATION (Dated 21 January 2013)

PROPOSED POWER LINE FOR THE MULILO SONNEDIX PRIESKA PHOTOVOLTAIC ENERGY PLANT ON FARM HOEKPLAAS NEAR COPPERTON, NORTHERN CAPE (DEA Ref. No. 12/12/20/2503 & NEAS Ref. No. DEAT/EIA/0000605/2011)

REPORT 2: GRID CONNECTION

April 2016

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PROJECT DETAILS

DEA Reference No. : 12/12/20/2503

Title : Final Environmental Impact Assessment Report in support of an Application For Amendment (Splitting) of the Environmental Authorisation (Dated 21 January 2013)

Report 2 - Proposed Grid Connection associated with the Mulilo Sonnedix Prieska Photovoltaic Energy Plant On Farm Hoekplaas Near Copperton, Northern Cape

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BACKGROUND AND PURPOSE OF THE SPLIT FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Mulilo Prieska Sonnedix PV (Pty) Ltd obtained Environmental Authorisation for the photovoltaic facility on the Farm Hoekplaas near Copperton, Northern Cape (DEA Ref: 12/12/20/2503) in January 2013. Aurecon South Africa undertook an Environmental Impact Assessment (EIA) process on behalf of Mulilo Renewable Energy (Pty) Ltd, in terms of the EIA Regulations of 2010 GN R. 543, 544 and 545 of the National Environmental Management Act (No. 107 of 1998). The Final Environmental and Social Impact Assessment Report was submitted to the National Department of Environmental Affairs (DEA), as the competent authority, in June 2011. The project was awarded preferred bidder status under the Department of Energy (DoE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme in Round 3 of the programme and is currently under construction.

The 132kV transmission line and substation / switching station were assessed separately from the PV facility in the original EIA report (Aurecon, April 2012), however a single EIA process was followed and a single EA received for both the facility and the grid connection. In order to meet the requirements of Eskom, a separate EA is required for the grid connection infrastructure (i.e. 132kV transmission line and switching station) to connect the facility to the electricity grid. Under the Self Build Agreement entered into between the applicant and Eskom, the EA and Environmental Management Programme (EMPr) for Eskom's part of the works (i.e. 132kV transmission line and Eskom's portion of the substation) will be transferred to Eskom's name. Two separate authorisations are therefore required, i.e. one EA for the PV facility and a separate EA for the grid connection.

Splitting of the Environmental Authorisation into two separate authorisations is required, as follows:

1) Main Authorisation for the 100MW PV Facility
2) Grid Connection Authorisation for the substation and power line associated with the PV facility

Each of these EAs should include authorisation for the relevant associated infrastructure.

It is proposed that the original EIA report be amended into 2 separate documents in support of the separate authorisations, i.e. one considering and assessing the impacts associated with the main facility and one considering and assessing the impacts associated with the grid connection respectively. The EMPr will also be amended to separately consider the PV facility and the grid connection.

An amendment application in this regard has been submitted to the Department of Environmental Affairs. The DEA has advised that this application is considered to be a Part 2 amendment as contemplated in terms of Regulation 31.

Savannah Environmental (Pty) Ltd has prepared a "split" Final Environmental Impact Assessment Report (FEIR) as a motivation in support of the application for amendment to the Environmental Authorisation on behalf of Mulilo Sonnedix Prieska PV (Pty) Ltd. This is split Report 2 which assesses the impacts of the grid connection only (on-site substation and power line) and is effectively a "repackage" of the final EIA report submitted to DEA in April 2012 in order to provide relevant and applicable information (i.e. the relevant activities, properties, impact assessment, and mitigation for the grid infrastructure). No new information to that provided within the final EIA report is presented in this report. The PV Facility is assessed in Report 1 which deals with the solar energy facility only. Regulation 32 of NEMA (Act 107 of 1998) deals with the process and consideration of application for amendment as follows

(1) The holder must— (a) within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority a report, reflecting— (i) an assessment of all impacts related to the proposed change; (ii) advantages and disadvantages associated with the proposed change; (iii) measures to ensure avoidance, management and mitigation of impacts associated with such proposed change; and (iv) any changes to the EMPR;	i) No environmental impacts will result. The report is effectively a "repackage" of the final EIA report already submitted to DEA in April 2012. This report considers the grid connection infrastructure and provides an assessment of the impacts in this regard, as originally presented in the EIA Report for the project (Aurecon, 2012). No new information has been provided. ii) The need for the split is presented on page (i) of split report. There are no environmental advantages or disadvantages *per se* associated with the amendment. However, should the amendment not be granted, the applicant will not be able to meet the requirements of Eskom. iii) No additional mitigation measures are proposed as a result of the amendment since no additional environmental impacts are associated with the proposed change. The mitigation measures presented in this split report are relevant to the grid connection infrastructure as presented in the EIA Report (Aurecon, 2012). iv) The EMPr has been amended to only include those measures applicable to the grid connection infrastructure and is included as Appendix D. The mitigation measures presented in this split report are relevant to the grid connection infrastructure as presented in the EIA Report (Aurecon, 2012). No additional mitigation measures are proposed since

	no new impacts occur. Mitigations and recommendations relating only to the main facility component have been removed from this EMPr since they are no longer applicable.
which report— (i) had been subjected to a public participation process, which had been agreed to by the competent authority, and which was appropriate to bring the proposed change to the attention of potential and registered interested and affected parties, including organs of state, which have jurisdiction in respect of any aspect of the relevant activity, and the competent authority, and (ii) reflects the incorporation of comments received, including any comments of the competent authority; or	The split EIA report is available for a 30 day review period from **4 May – 3 June 2016**. It is available for download at www.savannahsa.com or on request from Savannah Environmental. All relevant organs of state and I&APs have been notified of the availability of this report, and an advert has been placed in the Volksblad & Gemsbok newspapers and on site. Following the public review period, all comments received will be included in a comments and response report for submission to the DEA.

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GLOSSARY OF TERMS

Environment	The surroundings (biophysical, social and economic) within which humans exist and that are made up of i. the land, water and atmosphere of the earth; ii. micro-organisms, plant and animal life; iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;
Environmental Impact Assessment (EIA)	A study of the environmental consequences of a proposed course of action.
Environmental Impact Report Assessment (EIAR)	A report assessing the potential significant impacts as identified during the Scoping phase.
Environmental impact	An environmental change caused by some human act.
Environmental Management Programme (EMP)	A document that provides procedures for mitigating and monitoring environmental impacts, during the construction, operation and decommissioning phases.
Photovoltaic (PV)	Method to convert solar radiation into direct current electricity[1].
Public Participation Process	A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development
Scoping	A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail
Scoping Report	A report describing the issues identified
Wetland	"Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soils." (SA Water Act of1998).

[1] http://en.wikipedia.org/wiki/Photovoltaics (Accessed on: 21/10/2011)

ABBREVIATIONS

BID	Background Information Document
CRR	Comments and Response Report
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEANC	Department of Environmental Affairs and Nature Conservations
DEAT	Department of Environmental Affairs and Tourism
DM	District Municipality
DME	Department of Minerals and Energy
DSR	Draft Scoping Report
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioner of South Africa
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
GN	Government Notice
ha	Hectares
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEC	International Electro-technical Commission
IEIM	Integrated Environmental Information Management
IEP	Integrated Energy Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilovolt
LM	Local Municipality
MW	Megawatts
NEAS	National Environmental Authorisation System
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (No. 25 of 1999)
NIRP	National Integrated Resource Plan
NWA	National Water Act (No 36 of 1998)
PPA	Power Purchase Agreement
PV	Photovoltaic
REFIT	Renewable Energy Feed-In Tariffs
SAHRA	South African Heritage Resources Agency
SACNSP	South African Council for Natural Scientific Professions
SDF	Spatial Development Framework
ToR	Terms of Reference
VIA	Visual Impact Assessment
WMA	Water Management Area

1 INTRODUCTION AND BACKGROUND

The purpose of this Chapter is to introduce the project and describe the relevant legal framework within which the project takes place. Other applicable policies and guidelines are also discussed. The Terms of Reference, scope of and approach to the Environmental Impact Assessment are described and assumptions and limitations are stated.

1.1 INTRODUCTION

Mulilo Renewable Energy (Pty) Ltd (Mulilo) proposes to construct a photovoltaic (PV) solar energy plant on a farm, near Copperton in the Northern Cape. Aurecon South Africa (Pty) Ltd (Aurecon) undertook the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mulilo. The facility requires a 132kV power line to feed electricity into the grid and associated switching station.

It is proposed that a 132kV power line be constructed from the on-site substation to the Kronos substation ~1km west of the site.

In terms of the National Environmental Management Act (No. 107 of 1998) (as amended) (NEMA), the proposed development triggers a suite of activities, which require authorisation from the competent environmental authority before they can be undertaken. As this proposed project triggers listed activities in terms of NEMA, it accordingly requires environmental authorisation. Since the project is infrastructure as part of an energy eneration project, and energy projects are dealt with by the national authority, the competent authority is the national Department of Environmental Affairs (DEA). DEA's decision will be based on the outcome of this EIA process.

The EIA Phase is the last phase in the EIA process. Accordingly, this EIA Report (EIAR)[2] aims to collate, synthesise and analyse information from a range of sources to provide sufficient information for DEA to make an informed decision on whether or not the potential environmental impacts associated with the proposed project are acceptable from an environmental perspective (the EIA process and sequence of documents produced as a result of the process are illustrated in **Figure 1.2**). Accordingly the EIAR:

- Outlines the legal and policy framework;
- Describes the Public Participation Process undertaken to date;
- Describes strategic and planning considerations;
- Describes the proposed project and its alternatives;
- Describes the assessment methodology used; and
- Assesses potential impacts and possible mitigation measures.

[2] Section 31 of EIA Regulation No. 543 of NEMA lists the content required in an EIAR.

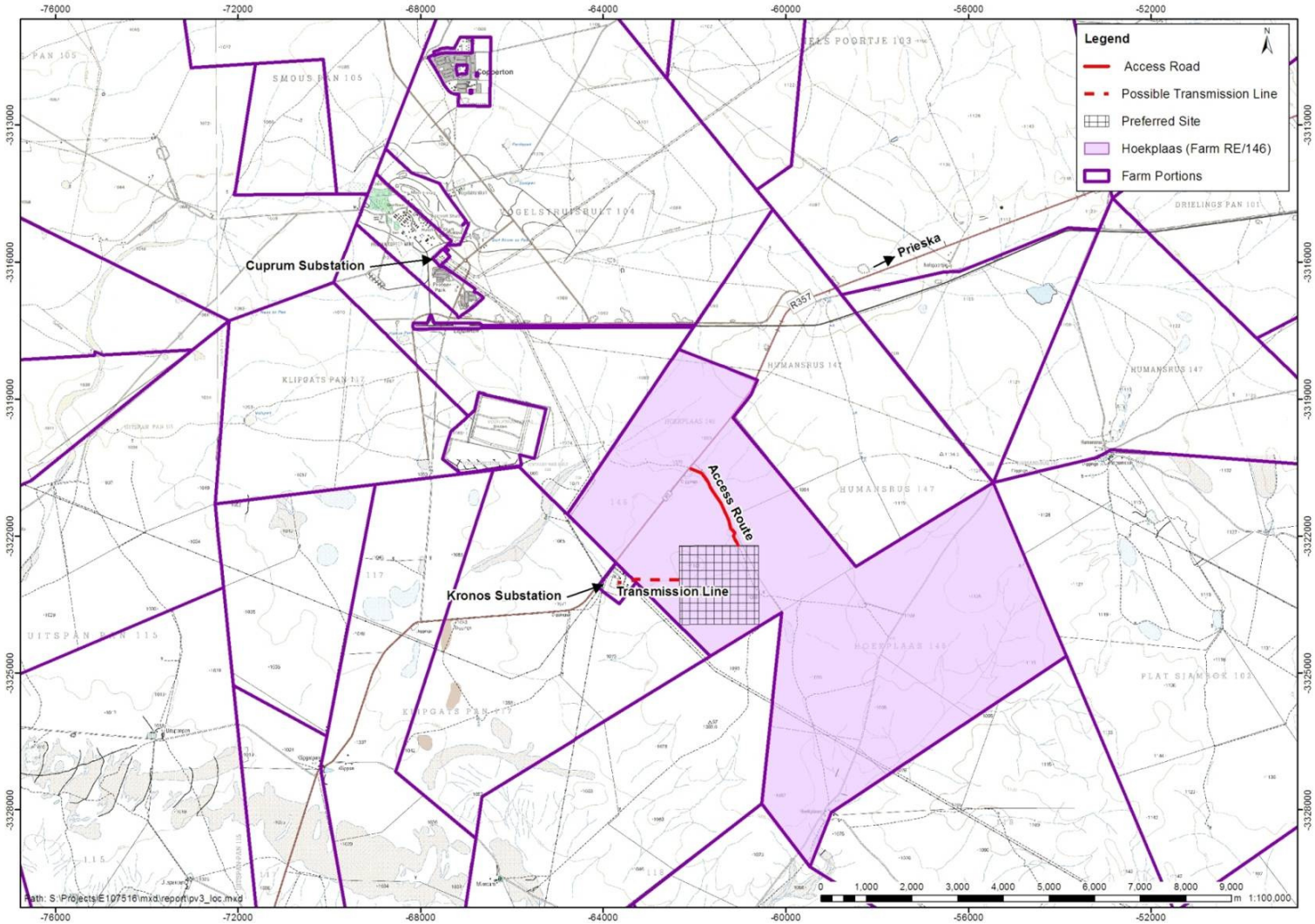

Figure 1.1: Location of the proposed PV plant on Farm Hoekplaas near Copperton, Northern Cape (2922 CD). The red dashed line shows the proposed power line route.

1.2 LEGAL REQUIREMENTS

1.2.1 National Environmental Management Act, No. 107 of 1998

NEMA, as amended, establishes the principles for decision-making on matters affecting the environment. Section 2 sets out the National Environmental Management Principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that "every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such pollution or degradation cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution or degradation.

Mulilo has the responsibility to ensure that the proposed activity as well as the EIA process conforms to the principles of NEMA. In developing the EIA process, Aurecon has been cognisant of this need, and accordingly the EA process has been undertaken in terms of NEMA and the EIA Regulations promulgated on 18 June 2010[3].

In terms of the EIA regulations, certain activities are identified, which require authorisation from the competent environmental authority, in this case DEA, before commencing. Listed activities in Government Notice (GN) No. 545 require Scoping and EIA whilst those in GN No. 544 and 546 require Basic Assessment (unless they are being assessed under an EIA process). The activities being applied for in this EIA process are listed in **Table 1.1**.

Table 1.1: Listed activities in terms of NEMA GN No. 544, 545 and 546, 18 June 2010, to be authorised for the proposed PV plant

NO.	LISTED ACTIVITY
GN No. R544, 18 June 2010	
10	The construction of facilities or infrastructure for the transmission and distribution of electricity - • outside urban areas or industrial complexes with a capacity of more than 33 , but less than 275 kilovolts; or • inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.
GN No. R546, 18 June 2010	
14	The clearance of an area of 5 hectares or more of vegetation where 75 % or more of the vegetation cover constitutes indigenous vegetation (a) in the Northern Cape (i) All areas outside urban areas.

Since the proposed project is based in the Northern Cape, DEA will work closely with the provincial Department of Environmental Affairs and Nature Conservation (DEANC), to ensure that the provincial environmental concerns are specifically identified and addressed.

[3] GN No. R 543, 544, 545, 546 and 547 in Government Gazette No. 33306 of 18 June 2010.

Further information on the EIA approach is provided in **Section 1.4**.

1.2.2 National Heritage Resources Act, No. 25 of 1999

In terms of the National Heritage Resources Act (No. 25 of 1999) (NHRA), any person who intends to undertake *"any development … which will change the character of a site exceeding 5 000 m^2 in extent"*, *"the construction of a road…powerline, pipeline…exceeding 300 m in length"* or *"the rezoning of site larger than 10 000 m^2 in extent…"* must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely the South African Heritage Resources Agency (SAHRA) or the relevant provincial heritage agency. These agencies would in turn indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken.

Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of an EIA process. Accordingly, since the impact on heritage resources would be considered as part of the EIA process outlined here, no separate HIA would be required. SAHRA or the relevant provincial heritage agency would review the EIA reports and provide comments to DEA, who would include these in their final environmental decision. However, should a permit be required for the damaging or removal of specific heritage resources, a separate application would have to be submitted to SAHRA or the relevant provincial heritage agency for the approval of such an activity, if Mulilo obtains authorisation and makes the decision to pursue the proposed project further.

1.2.3 National Water Act, No 36 of 1998

The National Water Act (NWA) (Act No 36 of 1998) provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA.

In terms of Section 21 (c) and (i)[4] of the NWA any activity which takes place within 500 m radius of the boundary of any wetland is excluded from the General Authorisation for these water uses and as such, must be licensed. Should the proposed development occur within 500 m radius of a wetland (including ephemeral pans such as are found on site) it may be necessary to submit a water use license application to the Department of Water Affairs (DWA). If a water use licence application is required it would fall outside of the scope of

[4] (c) Impeding of diverting the flow of water in a watercourse; (i) altering the bed, banks, course or characteristics of a watercourse.

this EIA and would be addressed by Mulilo as part of their broader project planning. Comment will also be sought from DWA as part of the EIA process.

1.2.4 Conservation of Agricultural Resources Act, No. 43 of 1983

The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) makes provision for the conservation of the natural agricultural resources of South Africa through maintaining the production potential of land, combating and preventing erosion, preventing the weakening or destruction of the water sources, protecting vegetation, and combating weeds and invader plants. Regulation 15 of CARA lists problem plants (undesired aliens, declared weeds, and plant invaders). Plants listed in this regulation must be controlled by the landowner.

As part of the EIA process, recommendations should be made to ensure that measures are implemented to maintain the agricultural production of land, prevent soil erosion, and protect any water bodies and natural vegetation on site. Mulilo together with the relevant landowners should also ensure the control of any undesired aliens, declared weeds, and plant invaders listed in the regulation that may pose as a problem as a result of the proposed PV plant.

1.3 TERMS OF REFERENCE AND SCOPE OF THE EIA

In October 2011, Mulilo appointed Aurecon to undertake an EIA process, in terms of NEMA, for the proposed PV plant and power line near Copperton in the Northern Cape. This EIA process specifically excludes any upgrades of existing Eskom infrastructure (i.e. the existing grid) that may be required but does include new connections to the grid.

1.3.1 Guidelines

This EIA process is informed by the series of national Environmental Guidelines[5] where applicable and relevant:

- Integrated Environmental Information Management (IEIM), Information Series 5: Companion to the NEMA EIA Regulations of 2010 (DEA, 2010);
- Implementation Guidelines: Sector Guidelines for the EIA Regulations (draft) (DEA, 2010);
- IEIM, Information Series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT), 2002);
- DEAT. 2002. IEIM, Information Series 3: Stakeholder Engagement (DEAT, 2002);
- IEIM, Information Series 4: Specialist Studies (DEAT, 2002);
- IEIM, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004);

[5] Note that these Guidelines have not yet been subjected to the requisite public consultation process as required by Section 74 of R385 of NEMA.

- IEIM, Information Series 12: Environmental Management Plans (DEAT, 2004);
- Integrated Environmental Management Guideline Series, Guideline 4: Public Participation, in support of the EIA Regulations. Unpublished (DEAT, 2005); and
- Integrated Environmental Management Guideline Series, Guideline 7: Detailed Guide to Implementation of the Environmental Impact Assessment Regulations. Unpublished (DEAT, 2007).

The following guidelines from the Department of Environmental Affairs and Development Planning (Western Cape) (DEA&DP) were also taken into consideration:

- DEA&DP. 2011. Guideline on Alternatives, EIA Guideline and Information Document Series. (DEA&DP, October 2011);
- DEA&DP. 2011. Guideline on Need and Desirability, EIA Guideline and Information Document Series. (DEA&DP, October 2011); and
- DEA&DP. 2011. Guideline on Public Participation, EIA Guideline and Information Document Series. (DEA&DP, October 2011).

1.4 APPROACH TO THE PROJECT

As outlined in **Figure 1.2**, there are three distinct phases in the EIA process, as required in terms of NEMA, namely the Initial Application Phase, the Scoping Phase and the EIA Phase. This report covers the third phase, *viz.* the EIA Report Phase.

1.4.1 Initial Application Phase

The Initial Application Phase entailed the submission of an EIA Application Form to notify DEA of the project, on 3 October 2011. Acknowledgement of receipts of the EIA Application Form was received from DEA on 19 October 2011. The Application Forms and DEA's letters of acknowledgement were included in the Scoping Report.

1.4.2 The Scoping Phase

Scoping is defined as a procedure for determining the extent of, and approach to, the EIA Report Phase and involves the following key tasks:

- Involvement of relevant authorities and Interested and Affected Parties (I&APs);
- Identification and selection of feasible alternatives to be taken through to the EIA phase;
- Identification of significant issues/impacts associated with each alternative to be examined in the EIA Report; and
- Determination of specific terms of reference for any specialist studies required in the EIA Report (Plan of Study for the EIA Report).

The Scoping Phase involved a desktop review of relevant literature, including a review of previous environmental studies in the area. These included, *inter alia*, the following:

- Pixley ka Seme Integrated Environmental Management Program (IEMP)(African EPA, 2007);
- Pixley ka Seme District Municipality Spatial Development Framework (SDF) (2007);
- Siyathemba IEMP (African EPA, 2007);
- Vegetation Map of South Africa (Mucina & Rutherford, 2006);
- Proposed Solar Farm, Prieska. Draft Environmental Impact Assessment Report (EIAR) (DJ Environmental Consultants, 2010);
- Proposed Construction of a Wind Farm and Photovoltaic (PV) Plant near Prieska, Northern Cape Province of South Africa. Draft Scoping Report (SiVEST, 2011); and
- Proposed Wind Energy Facility near Copperton, Northern Cape: Final Scoping Report. Report No. 5357A/ 106563 (Aurecon, 2011).

Other tasks undertaken included:

- Placement of advertisements in a local newspaper, the Gemsbok, notifying the broader public of the initiation of the EIA and inviting them to register as I&APs from 2 November 2011;
- Erection of a site notice at the entrance to Farm Hoekplaas on 8 November 2011;
- Lodging the DSR at Prieska (Elizabeth Vermeulen) Public Library, Ietznietz Guest House in Copperton and on the Aurecon website from 8 November 2011. All registered I&APs were notified of the availability of the DSR by means of a letter sent by fax, post and/or e-mail on 7 November 2011. The notification letters also included a copy of the Executive Summary of the DSR in English and Afrikaans;
- I&APs had 40 days, until 5 January 2012, to submit their written comments on the DSR.
- On 6 December 2011 a second notification letter was distributed to I&APs regarding the extension of the comment period from 5 January 2012 to 9 January 2012 due to a delay that occurred during the mailing of the first notification letters;
- I&APs had 40 days, until 9 January 2012, to submit their written comments on the DSR. Cognisance was taken of all comments when compiling the final report, and the comments, together with the project team and proponent's responses thereto, were included in final report;
- The Final Scoping Report (FSR) was made available to the public for review and comment until 7 February 2012 at the same locations as the DSR from 18 January 2012. Registered I&APs were informed of the FSR public comment period via a letter dated 16 January 2012 which was emailed or posted. An Executive summary together with an update page in English and/or Afrikaans was also emailed or posted to registered I&APs which highlighted the key changes made to the DSR as a result of the 40 day public comment period;
- The FSR outlined the full range of potential environmental impacts and feasible project alternatives and how these were derived. Moreover, it included a Plan of Study for EIA, which outlined the proposed approach to the current EIA Phase, including the requisite specialist investigations to be undertaken; and
- The FSR and associated Plan of Study for EIA was submitted to DEA on 16 January 2012 and accepted on 28 February 2011

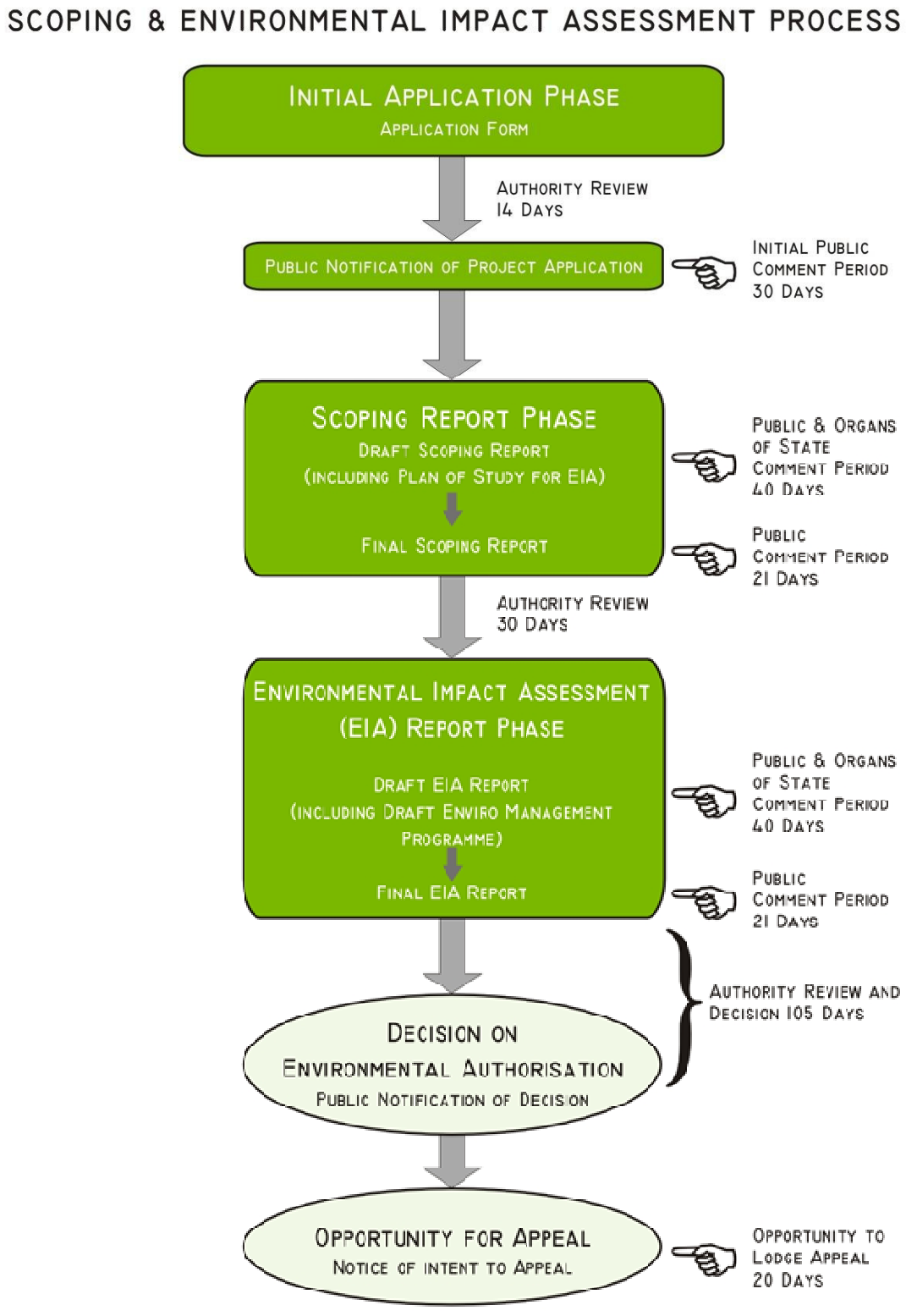

Figure 1.2: The EIA process in terms of NEMA

An inception field trip was held on 28 and 29 September 2011 with the Aurecon EIA team and various landowners. The purpose of the field trip was to gain an understanding of the key aspects such as:

- Biophysical aspects, including:
  - Terrestrial fauna and flora especially avifauna;
  - Surface water resources;
  - Ecological sensitive area; and
  - Vegetation types on site.
- Socio-economic aspects, including:
  - Heritage issues;
  - Land use, including agricultural potential;
  - Visual aesthetics including the location of the project in terms of roads, topography and proximity to houses;
  - Location of local communities;
  - Dust;
  - Employment opportunities; and
  - Tourism.

The information gathered during the site visit was used in refining the Plan of Study for the EIA process and Terms of Reference (ToR) for the specialist studies which were undertaken during the EIA Phase.

1.4.3 The EIA Phase

The Scoping Phase is followed by the EIA Phase, during which the specialist investigations are undertaken and a comprehensive EIAR documents the outcome of the impact assessments.

This report covers the third and final phase of the EIA process, namely the EIA Phase. The purpose of the EIAR is to describe and assess the range of feasible alternatives identified during the Scoping process in terms of the potential environmental impacts identified. The ultimate purpose is to provide a basis for informed decision making, firstly by the applicant with respect to the option(s) they wish to pursue, and secondly by the environmental authority regarding the environmental acceptability of the applicant's preferred option.

The approach to the EIA Phase entailed undertaking further review of relevant literature and specialist studies. The results of this have been used to describe and assess the significance of the identified potential impacts associated with the proposed project. This EIA Report synthesises the key issues arising out of the PPP to date, to provide a balanced view of the proposed activities and the implications for the environment.

1.4.4 The public participation process

Consultation with the public forms an integral component of this investigation and enables I&APs (e.g. directly affected landowners, national, provincial and local authorities, environmental groups, civic associations and communities), to identify their issues and concerns, relating to the proposed activities, which they feel should be addressed in the EIA process.

To create a transparent process and to ensure that I&APs are well informed about the project, as much information as is available has been included upfront to afford I&APs numerous opportunities to review and comment on the proposed project. A summary of the public participation process is provided in **Chapter 1**.

Currently there are 59 I&APs registered on the project database (see **Annexure B** for a list of current I&APs). To date comment was received from Department of Agriculture, Forestry & Fisheries (DAFF), Eskom and the South African Civil Aviation Authority (SACAA) on the Draft EIAR which has been included in Comments Response Report 3 (CRR 3) included in **Annexure B**.

1.4.5 Authority involvement

Authority consultation represents the first stage of the public consultation process. An EIA Application Form was submitted to DEA to notify the Department of the proposed project. DEA Acknowledged receipt of the EIA Application Form and issued a reference number for the proposed project.

As indicated earlier, DEA will fulfil the role of the competent environmental authority for this project and will make a decision in light of the information presented in the final EIAR. However, given that the project is located in the Northern Cape Province, DEA will work closely with DEA&NC in the decision-making process.

Where the need arises, Focus Group meetings will be arranged with representatives from the relevant national and provincial departments and local authorities. The purpose of these meetings will be to ensure that the authorities have a thorough understanding of the need for the project and that Aurecon has a clear understanding of the authority requirements. It is anticipated that beyond providing key inputs into the EIA, this authority scoping process will ultimately expedite the process by ensuring that the final documentation satisfies the authority requirements and that the authorities are fully informed with respect to the nature and scope of the proposed solar energy facility.

There are other authorities who have a commenting role to play in the EIA process. Their comments on the EIA Report will help to inform DEA's decision making. These authorities include:

- SiyaThemba Local Municipality;

- Pixley ka Seme District Municipality;
- South African Heritage Resources Agency;
- Northern Cape Provincial Heritage;
- Northern Cape DEANC;
- Department of Energy (Northern Cape): Regional Energy Director;
- Department of Agriculture (Northern Cape);
- Department of Agriculture, Forestry and Fisheries; and
- Department of Water Affairs.

DEA accepted the FSR on 28 February 2012 (refer to **Annexure A** for a copy of the letter from DEA).

1.4.6 Decision making

The Final EIAR, together with all I&AP comments on the Draft EIAR, will be submitted to DEA for their review and decision-making. DEA must, within 60 days, do one of the following:

- Accept the report;
- Notify the applicant that the report has been referred for specialist review;
- Request amendments to the report; or
- Reject the report if it does not materially comply with regulations.

If the report is accepted, DEA must within 45 days:

- Grant authorisation in respect of all or part of the activity applied for; or
- Refuse authorisation in respect of all or part of the activity.

Once DEA issues their decision on the proposed project, all registered I&APs on the project database will be notified of the outcome of the decision within 12 calendar days of the Environmental Authorisation having been issued. Should anyone (a member of public, registered I&AP or the Applicant) wish to appeal DEA's decision, a Notice of Intention to Appeal in terms of Chapter 7 of the EIA Regulations (GN No. 543) in terms of NEMA must be lodged with the Minister of Water and Environmental Affairs within 20 calendar days of the decision being issued and the substantive Appeal must be lodged within 30 days of the Notice.

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 Assumptions

In undertaking this investigation and compiling the EIAR, the following has been assumed:

- The strategic level investigations undertaken by the Department of Energy regarding South Africa's proposed energy mix prior to the commencement of the EIA process are technologically acceptable and robust.
- The information provided by the applicant and specialists is accurate and unbiased.

- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed PV plant and connection to the grid. The project does not include any infrastructure upgrades which may be required from Eskom to allow capacity in the local grid for the proposed project.

1.5.2 Gaps in knowledge

This EIA Report has identified the potential environmental impacts associated with the proposed power line. However, Mulilo is undertaking further work on the proposed project and investigations in parallel with this EIA process from a technical feasibility perspective. As such the nature and significance of the impacts presented in this report could change, should new information become available, or as the project description is refined.

The planning for the proposed facility is at a feasibility level and therefore some of the specific details are not available to the EIA process. This EIA process forms a part of the suite of feasibility studies, and as these studies progress, more information will become available. This will require the various authorities, and especially DEA, to issue their comments and ultimately their environmental decision to allow for the type of refinements that typically occur during these feasibility studies and detailed design phase of projects. Undertaking the EIA process in parallel with the feasibility study does however have a number of benefits, such as integrating environmental aspects into the layout and design and therefore ultimately encouraging a more environmentally sensitive and sustainable project.

1.6 INDEPENDENCE

1.6.1 Aurecon

The requirement for independence of the environmental consultant is aimed at reducing the potential for bias in the environmental process. Neither Aurecon nor any of its sub-consultants are subsidiaries of Mulilo nor is Mulilo a subsidiary to Aurecon. Furthermore, all these parties do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

The Project Director, Mr Andries van der Merwe, Project Manager, Miss Louise Corbett, and the Project Staff, Miss Franci Gresse, are appropriately qualified and registered with the relevant professional bodies. Mr van der Merwe is a certified Environmental Engineer registered with the Engineering Council of South Africa (PrEng). Miss Corbett is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNSP). Aurecon is bound by the codes of conduct for the Environmental Assessment Practitioner of South Africa (EAPSA) and SACNSP.

1.6.2 Savannah Environmental

Neither Savannah Environmental nor any of its specialist sub-consultants are subsidiaries of or are affiliated to Eskom. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

1.7 DETAILS AND EXPERTISE OF THE EAPS WHO COMPILED THE EIAR

1.7.1 Aurecon

As noted above, the Project Director, Mr Andries van der Merwe is appropriately qualified and registered with the relevant professional bodies. Mr van der Merwe is a certified Environmental Engineer registered with the Engineering Council of South Africa (PrEng). Mr van der Merwe has a B Eng (Civil) degree and over 13 years' experience in the field of impact assessments. Miss Louise Corbett is an Environmental Practitioner with six years' experience in the field. Miss Corbett has a BSc Honours degree in Environmental and Geographical Science and is also a Professional Natural Scientist with SACNASP. Miss Franci Gresse is an Environmental Practitioner with over three years' experience in the field. Miss Gresse has a BSc Honours degree in Conservation Ecology. Aurecon and the above environmental assessment practitioners (EAPs) are bound by the codes of conduct for EAPSA and SACNASP. The CV summaries of the key Aurecon staff were included in the Plan of Study for EIA in Chapter 5 of the Scoping Report or can be requested from Aurecon, should further detail be required.

1.7.2 Savannah Environmental

The Savannah Environmental team has considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation.

John von Mayer - the principle author of this report holds an Honours Bachelor degree in Environmental Management and 8 years of experience in the environmental field. His key focus is on environmental impact assessments, public participation and environmental management programmes for variety of environmental projects. He is currently involved in several EIAs for renewable energy projects EIAs across the country.

Jo-Anne Thomas - the principle Environmental Assessment Practitioner (EAP) for this project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 18 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy and power line projects across the country.

1.8 STRUCTURE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Table 1.5 presents the structure of the EIAR as well as the applicable sections that address the required information in terms of NEMA. Specifically, Section 31 of the EIA Regulations requires that the following information is provided:

Table 1.2: Information required by NEMA for inclusion in the EIA documentation

	SECTION 31 OF REGULATION 543	CHAPTER OR SECTION
	Section 31(2) of Regulation 543	
(a)	Details of: (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out an EIA;	Section 1.7 (summaries of EAP CVs provided in Chapter 5 of FSR)
(b)	a detailed description of the proposed activity;	Chapter 1
(c)	a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is: (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken;	Chapter 2
(d)	a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;	Chapter 2 and 4
(e)	details of the public participation process conducted in terms of subregulation (1), including- (i) steps undertaken in accordance with the plan of study; (ii) a list of persons, organisations and organs of state that were registered as interested and affected parties; (iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and (iv) copies of any representations and comments received from registered	Chapter 3 and **Annexure B**

	SECTION 31 OF REGULATION 543	CHAPTER OR SECTION
	interested and affected parties;	
(f)	a description of the need and desirability of the proposed activity;	Chapter 2
(g)	a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;	Chapter 4
(h)	an indication of the methodology used in determining the significance of potential environmental impacts;	**Annexure E**
(i)	a description and comparative assessment of all alternatives identified during the environmental impact assessment process;	Chapter 6
(j)	a summary of the findings and recommendations of any specialist report or report on a specialised process;	Chapter 4
(k)	a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;	Chapter 4
(l)	an assessment of each identified potentially significant impact, including- (i) cumulative impacts; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated;	Chapter 4
(m)	a description of any assumptions, uncertainties and gaps in knowledge;	Section 1.5
(n)	a reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 5, Section 5.5.2
(o)	an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; and (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;	Chapter 4
(p)	a draft environmental management programme containing the aspects contemplated in regulation 33;	**Annexure D**
(q)	copies of any specialist reports and reports on specialized processes complying with regulation 32;	**Annexure C**
(r)	any specific information that may be required by the competent authority; and	**Annexure F**
(s)	any other matters required in terms of sections 24(4)(a) and (b) of the Act.	
	Section 31(3) of Regulation 543	
	The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by Section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in subregulation 31(2)(g), exist.	Chapter 1 and 4

2 THE PROPOSED ACTIVITY

This chapter considers the need for the proposed project, briefly outlines the nature of the proposed activities and then considers and screens the various project alternatives in order to focus the EIA Phase on the most feasible alternatives.

2.1 THE NEED FOR THE PROPOSED ACTIVITY

The 2011 DEA&DP Guideline for Need and Desirability[6] highlights the obligation for all proposed activities which trigger the environmental regulations to be considered in light of (amongst others) the National Framework for Sustainable Development[7], the spatial planning context, broader societal needs and financial viability. This information allows the authorities to contemplate the strategic context of a decision on the proposed activity. This section seeks to provide the context within which the need and desirability of the proposed activity should be considered.

The need for renewable energy is well documented and reasons for the desirability of solar energy include:

- Utilise resources available to South Africa;
- Meeting nationally appropriate emission targets in line with global climate change commitments;
- Enhancing energy security by diversifying generation; and
- Creating a more sustainable economy.

2.1.1 Utilise resources available to South Africa

The substation and power line is required in order to connect the proposed Prieska-Sonnedix PV facility to the Eskom electricity grid.

The proposed PV plant is considered to be of national importance in anticipation of its contribution to electricity supply and reduced reliance on fossil energy sources. The IRP2010 allows for an additional 14 749 MW of renewable energy in the electricity blend in South Africa by 2030. While there are a number of renewable energy options (including, *inter alia,* wind, solar, and hydropower) being pursued in South Africa, many more renewable energy projects are required to meet the targets set by the IRP2010. Consequently, based on this requirement for renewable energy, Mulilo has identified various projects for PV solar energy generation.

[6]DEA&DP (2011) Guideline on Need and Desirability, NEMA EIA Regulations Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP), October 2011.
[7]Republic of South Africa (2008) People – Planet – Prosperity: A National Framework for Sustainable Development in South Africa**.** Pretoria: Department of Environmental Affairs (DEA), Republic of South Africa [Internet]. Available from: http://www.environment.gov.za [Accessed on: 29/03/2011].

2.1.2 Meeting nationally appropriate emission targets in line with global climate change commitments

The power line is required in order to connect the proposed Hoekplaas PV facility to the Eskom electricity grid.

Targets for the promotion of renewable energy now exist in more than 58 countries, of which 13 are developing countries. The South African Government has recognised the country's high level of renewable energy potential and presently has in place targets of 10 000 GWh of renewable energy by 2013 (to be produced mainly from biomass, wind, solar and small-scale hydro). This amounts to approximately 4 % (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

Due to concerns such as climate change and the on-going exploitation of non-renewable, resources, there is increasing international pressure on countries to increase their share of renewable energy generation. The proposed Hoekplaas PV project is expected to contribute positively towards climate change mitigation.

Solar energy is a source of "green" electricity as for every 1 MWh of "green" electricity used instead of traditional coal powered stations, one can:

- Save 1 290 litres of water;
- Avoid 8.22 kg of sulphur dioxide (SO_2) emissions;
- Avoid 1 000 kg of carbon dioxide (CO_2) emissions including transmission losses;
- Avoid 142 kg of ash production; and
- Contribute to social upliftment.

2.1.3 Enhancing energy security by diversifying generation

The power line is required in order to connect the proposed Hoekplaas PV facility to the Eskom electricity grid. The establishment of the proposed Hoekplaas PV plant would strengthen the existing electricity grid for the area. Moreover, the project would contribute towards meeting the national energy target as set by the Department of Energy (DoE), of a 30 % share of all new power generation being derived from independent power producers (IPPs). Renewable energy is recognized internationally as a major contributor in protecting the climate, nature and the environment, as well as providing a wide range of environmental, economic and social benefits that can contribute towards long-term global sustainability. Should the proposed PV plant identified by Mulilo be acceptable, it is considered viable that long term benefits for the community and society in the Copperton / Prieska area would be realized as highlighted above. The proposed project would also have international significance as it contributes to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, and United Nations Convention on Biological Diversity (UNCBD) all of which South Africa is a signatory to.

2.1.4 Creating a more sustainable economy

The power line is required in order to connect the proposed Hoekplaas PV facility to the Eskom electricity grid. The Northern Cape, and particularly the Copperton area, has large tracts of land which are very dry and the farmers do their best to earn a living from the land. The towns are generally small and operate on a survival socio-economic level. The need to improve the quality of life for all, and especially for the poor, is critical in South Africa. It is expected that the proposed project would contribute directly to the upliftment of the individuals and the societies in which they live.

Skills development and the transfer thereof would be one of the top priorities and local community involvement would be enhanced as far as possible. Up to 900 job opportunities could be created during the construction (installation) phase depending on the procurement method and the primary contractor.

Additional potential benefits include:

- Reducing the demand on scarce resources, such as water;
- Local economic development; and
- Local skills development.

Table 2.1: Specific questions as detailed in the Need and Desirability Guideline

NEED (TIMING) **Question**	**Response**
1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP?	*The area proposed is currently zoned as Agricultural land. However the farmer has signed a lease agreement with Mulilo for the site. The portion leased has relatively low agricultural potential. Furthermore the additional income will safeguard the economic sustainability of the farm.* *Even though the IDP does not specifically allow for renewable energy projects, solar energy was identified as one of the local municipality's (LM) strong points which should be developed. Other needs that were identified include sustainable developments (economically, socially and environmentally) and job creation.* *The proposed power line would create job opportunities for a wide skill level. In addition, Mulilo has committed to developing a training strategy to train and employ people from the*

	local community.
2. Should development, or if applicable, expansion of the town/ area concerned in terms if this land use (associated with the activity being applied for) occur at this point in time?	*Yes. The activity is in line with the Pixley ka Seme District Spatial Development Framework which recognises the need for sustainable land management, job creation and the development of new skills.*
3. Does the community/ area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority but within specific local context it could be inappropriate).	*Yes. The proposed power line would not only be a source of income for the landowner, but it would create job opportunities for the local community as the construction and operation of the PV plant require a wide range of skill levels.* *Secondary economic impacts may include an increase demand on the service industry through the demand for accommodation and other services.*
4. Are there necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	*The project would strengthen the existing electricity grid for the area resulting in a positive impact on the available electrical services.*
5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services and opportunity costs)?	*No. It should be noted that once the proposed power line is operational, there would be a very limited requirement for municipal services.*
6. Is this project part of a national programme to address an issue of national concern or importance?	*Yes. The establishment of the proposed project would strengthen the existing electricity grid for the area.*
DESIRABILITY (PLACING) **Question**	**Response**
1. Is the development the best practicable environmental option (BPEO) for this land/ site?	*Copperton is a very arid region and farmers are struggling to make a living from the land. The area being proposed for the power line has moderate to low agricultural potential (grazing) and the income generated by the landowners from the proposed project would greatly assist in future agricultural developments and the viability of the property.*

2. Would the approval of this application compromise the integrity of the existing approved and credible Municipal IDP and SDF as agreed to by the relevant authorities.	*No. The activity is in line with the Siyathemba IEMP and Pixley ka Seme District SDF which recognizes the need for:* • *Sustainable developments;* • *New skills development; and* • *Economic development.* *The proposed power line would also create job opportunities for the local community.*
3. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified from in terms of sustainability considerations?	*No. According to the Siyathemba IEMP land degradation, especially from overgrazing, is one of the key issues that need attention. The proposed development would provide additional income to the landowner which could be used for sustainable agricultural development practices on his farm.*
4. Do location factors favour this land use (associated with the activity applied for) at this place?	*Yes. The sites were selected based on the following criteria:* • *Solar resource potential based on historic satellite data;* • *Grid connectivity and close proximity to strong grid access;* • *Flat, level, and open land; and* • *Unpopulated and non-arable or low arable potential land.* *Desktop studies furthermore assessed potential sensitivities of fauna, flora, heritage, visual and other technical aspects.* *The area proposed has low agricultural significance and is in close proximity to Eskom's existing transmission lines.*
5. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/ natural environment)?	*Potential impacts associated with the power line are discussed in Chapter 4 of the EIAR.*
6. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	*Potential impacts associated with the power line are discussed in Chapter 4 of the EIAR.*
7. Will the proposed activity or the land use associated with the activity applied for, result in	*Potential impacts associated with the power line are discussed in Chapter 4 of the EIAR.*

unacceptable opportunity costs?	
8. Will the proposed land use result in unacceptable cumulative impacts?	*Potential impacts associated with the power line are discussed in Chapter 4 of the EIAR.*

2.2 DESCRIPTION OF THE PROPOSED ACTIVITY

2.2.1 Description of the site

Mulilo proposes to construct a power line of approximately 1.5km to connect the Mulilo Sonnedix Prieska PV plant to the electricity grid on farm Hoekplaas (Remainder of Farm No. 146) near Copperton in the Northern Cape (see **Figure 1.1**). This portion is privately owned Mr H.G. Human and Mrs M.J. Human, who has entered into a long term agreement with Mulilo for the proposed project. The co-ordinates for the power line are given in **Table 2.2**.

Table 2.2 Start, Middle and End Co-ordinates of power line

	Latitude	Longitude
Start	30° 1'33.41"S	22°21'9.82"E
Middle	30° 1'32.37"S	22°20'48.48"E
End	30° 1'31.62"S	22°20'25.49"E

Hoekplaas lies approximately 7.8 km to the south of Copperton and borders to the Kronos substation. The farm is approximately 5 014 ha in size and split into two portions by the R357. The proposed power line would cross land which is currently used for cattle and sheep grazing.

The PV Power Systems (PVPS) requires transmission infrastructure to feed electricity into the grid, unlike the Stand-alone PV Power System that requires batteries to store electricity for use later. This grid connection infrastructure is the subject of this report.

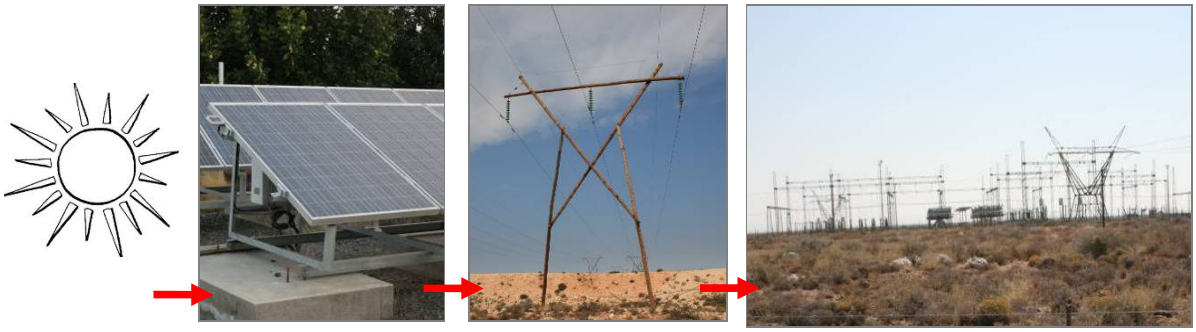

Figure 2.3: Basic PV system layout

2.2.2 Construction phase

The substation and power line would be constructed over a period of approximately 10 months. During the construction phase of the PV facility and power line a maximum of 100 individuals would be employed onsite depending on the procurement method used as well as the primary contractor. If non-locals are employed they would be housed in temporary dwellings on site or in accommodation within Copperton and Prieska.

It is estimated that between 65 and 75% (130 – 150 category 1 and 2 workers) would be sourced locally and provided with the necessary training. This workforce would already have accommodation in the area and would be transported by bus to and from the site on a daily basis or housed at Copperton. The remaining 25 – 35% (50 – 70 high level staff {category 3, 4, and 5}) will be housed within the locally available accommodation in the towns and surrounding farm areas (guest houses, etc.).

Site clearance would take place in sections that are limited to the actual footprint required for construction.

2.2.3 Operational phase

The project is expected to last the full period of the PPA which is approximately 20 years. Decommissioning phase

The PV site (and therefore the associated substation and power line) would be decommissioned at the end of the PPA (20 years from the date of commissioning). The decommissioning would be undertaken in a manner similar to that included in **Annexure G** (an extract from Gestamp Solar, 2012).

2.3 CONSIDERATION OF ALTERNATIVES

2.3.1 Introduction

NEMA requires that alternatives are considered during the EIA process. An important function of the Scoping Phase is to screen alternatives to derive a list of feasible alternatives that need to be assessed in further detail in the EIA Phase. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004).

"Alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to -

a) the property on which or **location** where it is proposed to undertake the activity;
b) the type of **activity** to be undertaken;
c) the design or **layout** of the activity;
d) the **technology** to be used in the activity
e) the **operational** aspects of the activity; and
f) the option of not implementing the activity.

The alternatives most pertinent to the proposed project include the following:

- Location alternatives - alternative locations for the entire project proposal or for components of the project proposal;
- Activity (type) alternatives - also referred to as project alternatives. Requires a change in the nature of the proposed activity. This category of alternatives is most appropriate at a strategic decision-making level. Activity alternatives are not assessed in this report since the power line is required as part of the PV facility.
- Layout alternatives - site layout alternatives permit consideration of different spatial configurations of an activity on a particular site; and
- Technology alternatives - technology alternatives permit consideration of different types of technology used in the project. Technology alternatives are not assessed in this report as the power line technology is standardized;

The above categories of alternatives are the ones most pertinent to this EIA process, and will be explored in detail below. The purpose of this section of the report is to describe all potential alternatives that are assessed in the EIA Phase of the project for further assessment.

2.3.2 Location alternatives

Mulilo has considered the option to develop large scale PV power generation in South Africa over the last three years, given the good solar resource which is available over a large portion of the western part of the country. Aspects that were taken into consideration included, but were not limited to, irradiation levels, distance to the grid, site accessibility,

founding conditions, topography, fire risk and current land use. Three potential sites[8] were identified by Mulilo for PV plants in the near vicinity of Copperton, including the proposed project discussed in this document (PV3). The two additional sites are of 100 MW each and located on the farms Struisbult (Farm 104/1) (PV2) and Klipgats Pan (Farm 117/4) (PV4) respectively. Mulilo further has received an Environmental Authorisation for a 20 MW PV plant (PV1) located on the Struisbult farm (Farm 104/1). The locations of these sites, as well as the approved site, are given in **Figure 2.4**.

The proposed sites were selected based on the following criteria:

- Solar radiation based on historic satellite data;
- Grid connectivity and close proximity to strong grid access points;
- Availability of flat, level and open land;
- Land use in terms of population numbers and non-arable / low potential agricultural land;
- Potential sensitive receptors and features, such as fauna, flora, heritage, visual and other technical aspects such as the SKA.

Originally Mulilo proposed to install a plant with an electricity generation output of 150 MW with a footprint area of 450 ha on Hoekplaas. However changes to the bidding process in terms of the National Energy Regulator Act (No. 40 of 2004) and REFIT (see **Section 1.2.5(f)**) resulted in a reduction of the plant size to 100 MW[9] and a footprint area of 300 ha.

[8] Please refer to *Proposed Photovoltaic Energy Plant on the Farm Klipgats Pan near Copperton in the Northern Cape (DEA Ref. No: 12/12/20/2501 / NEAS Ref. No: DEAT/EIA/0000611/2011)* and *Proposed Photovoltaic Energy Plant on Struisbult Farm near Copperton, Northern Cape* (*DEA Ref. No: 12/12/20/2502 / NEAS Ref. No: DEAT/EIA/0000605/2011),* which is available on the Aurecon website (www.aurecongroup.com – indicate "Current Location" as "South Africa" and follow the Public Participation link) for comment.

[9] Note that even though the IPP procurement process only allows for one 75 MW solar plant per farm portion, the decision was made to request authorisation for a 100 MW sites. This would allow Mulilo to increase the electricity output of the plant without having to go through a second environmental authorisation process should the decision be made to increase the allowable output per farm portion.

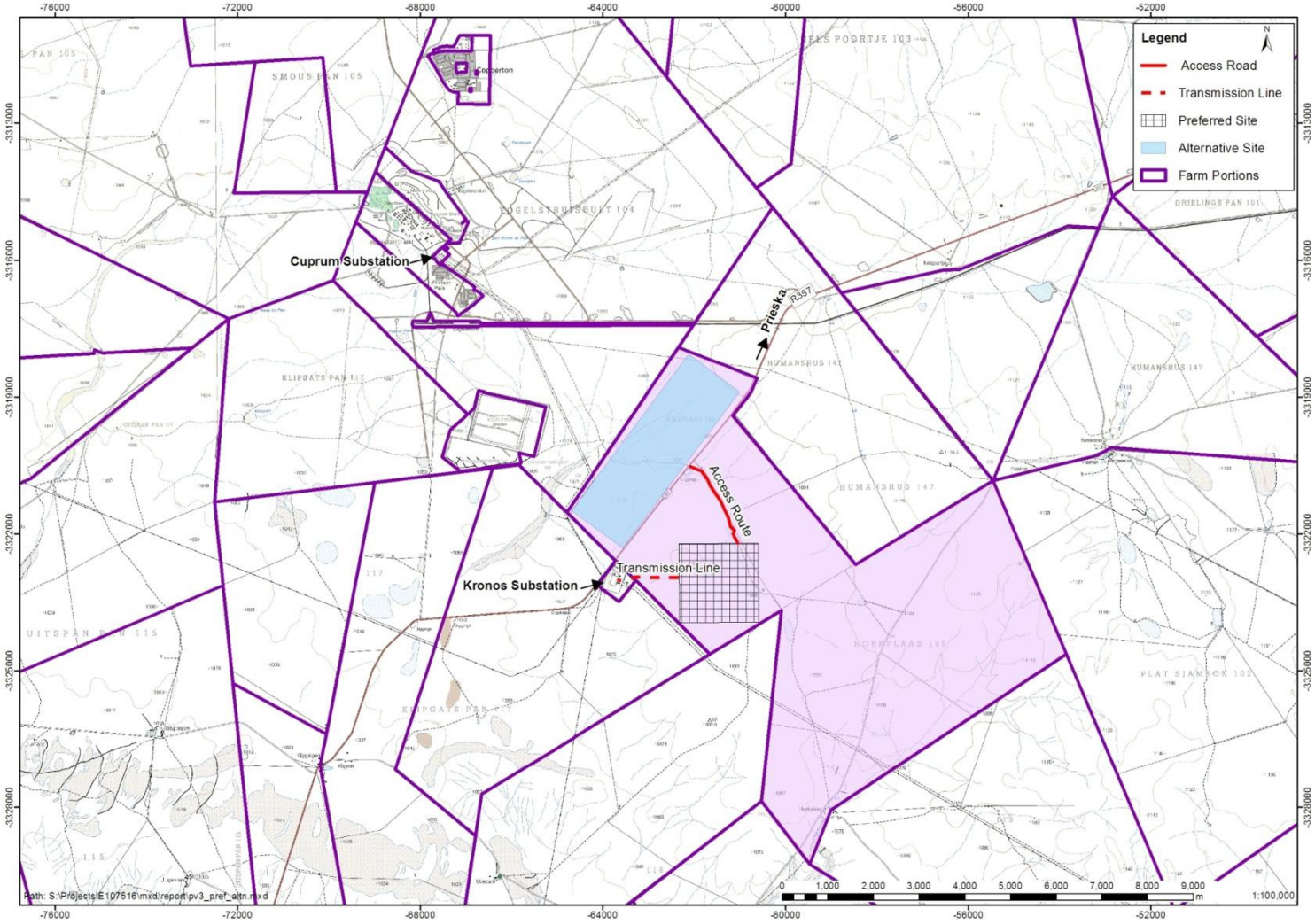

Figure 2.4: Map showing the preferred and alternative locations for the proposed PV plant on Farm Hoekplaas, near Copperton. Only one option was identified for the power line (indicated by the red dashed line).

2.3.3 Site layout alternatives

Originally a site for the facility was identified to the south of the preferred site but was reduced to 100 MW after the recent changes to the bidding process (as explained in **Section 2.3.2**). Based on information obtained from specialist studies undertaken for the EIA phase of this project, the site layout was moved to an area that is less sensitive to the proposed development and this forms the current preferred alternative layout. A second alternative layout was also considered. The development of these layouts were based on *inter alia* the following criteria:

- Technical constraints
    - Spatial orientation requirements of solar panels and associated infrastructure (e.g. roads); and
    - Layout relative to other existing infrastructure, such as power lines.
- Environmental constraints
    - Topographical constraints, including surface and groundwater;
    - Botanical and avifaunal constraints (presence of sensitive or protected plant communities or avifauna);
    - Location of heritage (archaeology and palaeontology) resources; and
    - Aesthetics.

No alternative routes for the substation and power line were assessed due to the relatively short length of the power line (approximately 1.5km).

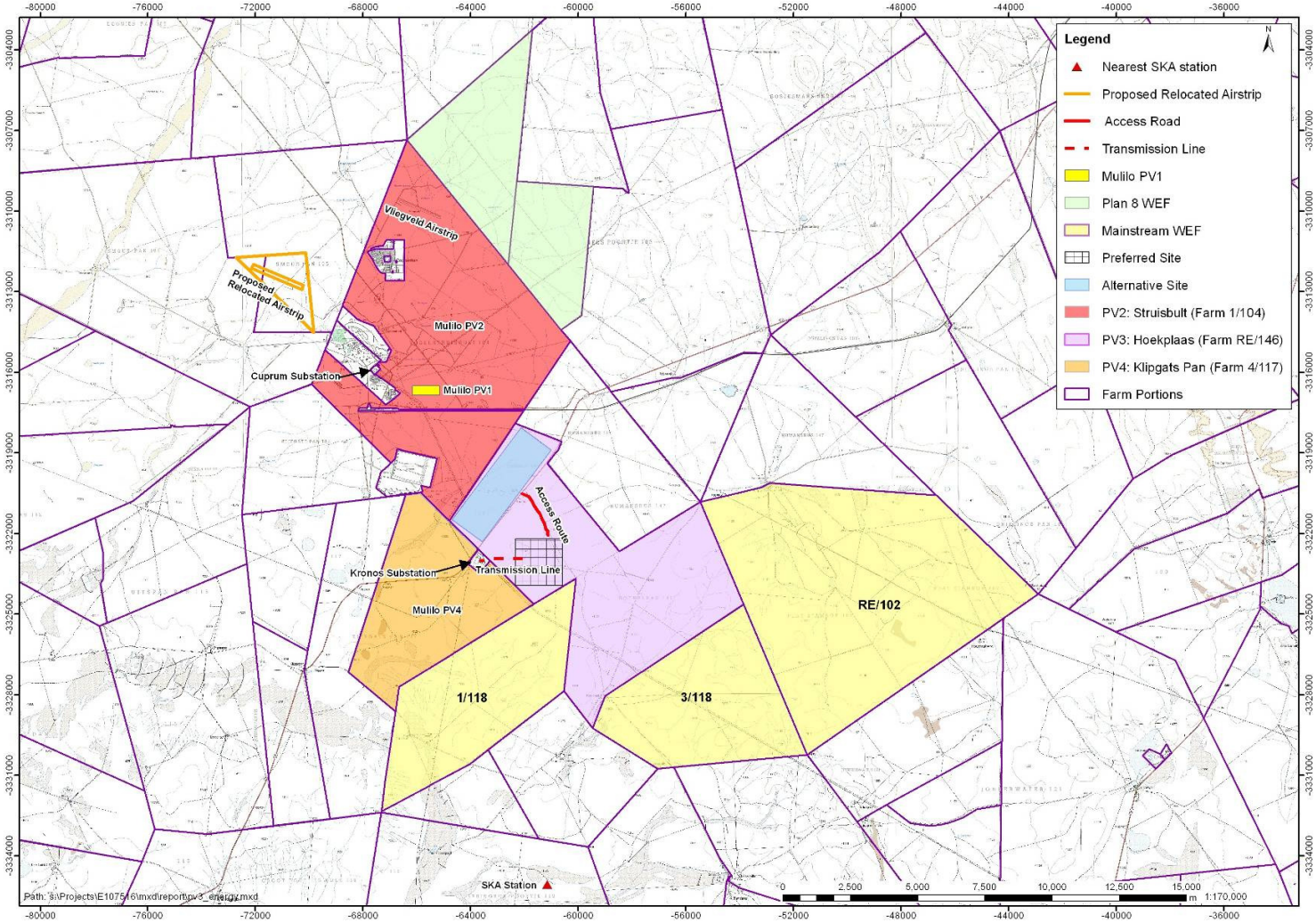

Figure 2.5: Other renewable energy projects (solar and wind) proposed for the Copperton area. Each facility has an associated substation and power line

2.3.4 Summary of alternatives

To summarise, the feasible alternatives which are assessed in the EIAR include the following:

- Location alternatives:
  - One location for the proposed Hoekplaas PV plant; and
  - Electricity distribution via a 1.5 km 132 kV connection to Kronos substation.
- Activity alternatives:
  - "No-go" alternative to solar energy production.
- Site layout alternatives:
  - Two layout alternatives (100 MW with 300 ha footprint and 150 MW with 450 ha footprint).

3 THE PUBLIC PARTICIPATION PROCESS

The purpose of this Chapter is to provide an outline of the Public Participation Process, a summary of the process undertaken to date, and the way forward with respect to public participation as part of the EIA Phase of this project.

3.1 INTRODUCTION

Consultation with I&APs forms an integral component of an EIA process (see **Figure 1.2**) and enables *inter alia* directly affected landowners, neighbouring landowners, stakeholders, communities and interested parties to identify the issues and concerns relating to the proposed activity, which they feel should be addressed in the process. The approach to this public participation process, summarised in the Plan of Study for EIA (Chapter 5 of the FSR), has taken cognisance of the DEAT Guideline on Stakeholder Engagement (2002).

Public participation, as required in terms of the EIA Regulations can, in general, be separated into the following phases:

Comment on Draft and Final Reports
During the Scoping and EIA Phases, registered I&APs are provided with an opportunity to comment on draft and final versions of the reports. This is enabled by the lodging of the reports at suitable locations for review and invitations to public meetings/open houses to discuss the content of the relevant report.

Decision and Appeal period
This is the final phase of the public participation process. Once the competent authority has made their decision and issued an Environmental Authorisation, the applicant and I&APs are notified of the decision and have the opportunity to appeal to the national Minister of Water and Environmental Affairs, within the stipulated timeframes.

Progress with respect to these various stages for the current project is discussed in more detail below. It should be noted that the public participation process developed for this investigation meets the minimum requirements of NEMA.

All public participation related information is included in **Annexure B** of the Draft EIAR.

3.2 SUMMARY OF THE PUBLIC PARTICIPATION PROCESS TO DATE

3.2.1 Initiation of the public participation process

The approach adopted for the current investigation was to identify as many I&APs as possible initially, through a suite of activities, as follows:

- Placing advertisements in local newspapers (the Gemsbok);
- Placing a notice board at the site;
- Providing written notice and an Executive Summary to potential I&APs, including surrounding landowners, organs of state, ward councillors and relevant authorities;
- Informing I&APs registered for existing EIAs, being run by Aurecon, in the areaabout the project and providing them with an opportunity to register for this project as well; and
- Requesting potential I&APs to recommend other potential I&APs to include on the database (chain referral process).

The initial database of I&APs was compiled using an existing database for the proposed wind energy facility on an adjacent site, through identification of neighbours and through liaison with the local municipality, personal communication with the landowner and other organisations in the area. The initial database included the landowner, neighbouring landowners, relevant district and local municipal officials, relevant national and provincial government officials, and organisations in the area. This database is augmented via chain referral, and is continually updated as new I&APs are identified throughout the project lifecycle. The current list of I&APs, comprising approximately 59 individuals and organisations, is included in **Annexure B**. The sectors of society represented by I&APs on the database are listed below.

(i) Provincial government (Northern Cape);
(ii) Local government (Siyathemba LM and Pixly ka Seme District Municipality);
(iii) Organised agriculture;
(iv) Business/Commerce;
(v) Industry;
(vi) Scientific and research based organisations
(vii) Local landowners; and
(viii) Local communities and other community based organisations in the project area.

Thereafter, the remainder of the communications was be focused on registered I&APs and on local advertising. Consequently, the initial advertising campaign was broad and thorough and invited the members of the public to register as I&APs.

3.2.2 Public participation related to the Scoping Phase (DSR)

The public participation process was initiated at the Draft Scoping Report Phase and the I&APs were notified of the DSR and associated comment period in the following way:

- Placement of advertisements in a local newspaper, the Gemsbok, notifying the broader public of the initiation of the EIA and inviting them to register as I&APs from 2 November 2011;
- Erection of a site notice at the entrance to Farm Hoekplas on 8 November 2011;
- Lodging the DSR at Prieska (Elizabeth Vermeulen) Public Library, Ietznietz Guest House in Copperton and on the Aurecon website from 8 November 2011. All

registered I&APs were notified of the availability of the DSR by means of a letter sent by fax, post and/or e-mail on 7 November 2011. The notification letters also included a copy of the Executive Summary of the DSR in English and Afrikaans;

- I&APs had 40 days, until 5 January 2012, to submit their written comments on the DSR;
- On 6 December 2011 a second notification letter was distributed to I&APs regarding the extension of the comment period from 5 January 2012 to 9 January 2012 due to a delay that occurred during the mailing of the first notification letters; and
- I&APs had 40 days, until 9 January 2012, to submit their written comments on the DSR. Cognisance was taken of all comments when compiling the final report, and the comments, together with the project team and proponent's responses thereto, were included in final report.

3.2.3 Public participation related to the Scoping Phase (FSR)

Based on the comments received on the DSR during the 8 November 2011 to 9 January 2012 public comment period the DSR was updated and called the FSR. The second stage of the PPP involved the lodging of the FSR for review and comment at the same locations as the DSR.

- I&APs were provided with 21 calendar days to comment on the FSR between 18 January 2012 and 7 February 2012; and
- Registered I&APs were informed of the FSR public comment period via a letter dated 16 January 2012 which was emailed or posted. An Executive summary together with an update page in English and/or Afrikaans was also emailed or posted to registered I&APs which highlighted the key changes made to the DSR as a result of the 40 day public comment period.

3.2.4 Issues and concerns raised during the scoping phase

Issues were submitted during the DSR comment period from 8 November 2011 until 9 January 2012 and FSR comment period from 18 January 2012 to 7 February 2012. Comments and concerns raised by I&APs (with regards to the proposed activities) have been incorporated into CRR 1 (see **Annexure D** of the FSR) and CRR 2 (see **Annexure B**) which summarise all the issues and concerns raised by I&APs during the Scoping Process, and provide the project team and proponent's response thereto. The issues raised by I&APs to date relates to the processes required in terms of the NHRA and NWA. A comment was also received regarding a prospecting permit on a nearby farm portion.

3.2.5 Public participation related to the EIA phase (Draft EIAR)

The Draft EIAR was lodged at the Prieska (Elizabeth Vermeulen) Public Library, Ietznietz Guest House in Copperton and on the Aurecon website (www.aurecongroup.com - change "Current Location" to "South Africa" and follow the Public Participation link).

All registered I&APs were notified of the availability of the Draft EIAR by means of a letter sent by post, fax or e-mail on 2 March 2012. The notification letters also included a copy of the Executive Summary in English and Afrikaans.

I&APs had 40 days, from 5 March 2012 until 16 April 2012, to submit their written comments on the Draft EIAR. Cognisance was taken of all comments in compiling the final report, and the comments, together with the project team and proponent's responses thereto, have been included in the final report. Where appropriate, the report has been updated.

3.2.6 Public participation related to the EIA phase (Final EIAR)

The report has been updated in light of the comments received during the 40 day public comment period on the Draft EIAR and is called the Final EIAR. Comments on the Draft EIAR have been included and responded to in the CRR 3 which has been made available to I&APs.

3.3 REVIEW AND DECISION PERIOD

The Final EIAR will be submitted to DEA for their review and decision-making. DEA must, within 60 days, do one of the following:

- Accept the report;
- Notify the applicant that the report has been referred for specialist review;
- Request amendments to the report; or
- Reject the report if it does not materially comply with regulations.

If the report is accepted, DEA must within 45 days:

- Grant authorisation in respect of all or part of the activity applied for; or
- Refuse authorisation in respect of all or part of the activity.

Once DEA issues their decision on the proposed project, all registered I&APs on the project database will be notified of the outcome of the decision within 12 calendar days of the Environmental Authorisation having been issued. Should anyone (a member of public, registered I&AP or the Applicant) wish to appeal DEA's decision, a Notice of Intention to Appeal in terms of Chapter 7 of the EIA Regulations (GN No. 543) in terms of NEMA must be lodged with the Minister of Water and Environmental Affairs within 20 calendar days of the decision being issued and the substantive Appeal must be lodged within 30 days of the Notice.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This Chapter forms the focus of the EIAR. It contains a detailed assessment of the operational (or long-term) impacts as well as the construction phase impacts on the biophysical and socio-economic environments. A summary table of the assessment of all the potential impacts is also provided.

4.1 INTRODUCTION

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the proposed activities described in Chapter 1. These include potential impacts, which may arise during the operation of the proposed development (i.e. long-term impacts) as well as the potential construction related impacts (i.e. short to medium term). The assessment of potential impacts will help to inform and confirm the selection of the preferred alternatives to be submitted to DEA for consideration. In turn, DEA's decision on the environmental acceptability of the proposed project and the setting of conditions of authorisation (should the project be authorised) will be informed by this chapter, amongst other information, contained in this EIAR.

The potential impacts identified during the Scoping Phase of this project, and updated where necessary, are as follows:

- Operational phase impacts on the biophysical environment:
    - Impact on flora;
    - Impact on avifauna;
    - Impacts fauna; and
    - Impact on freshwater resources.
- Operational phase impacts on the social environment:
    - Visual impacts;
    - Impact on energy production;
    - Impact on climate change;
    - Impact on local economy (employment) and social conditions;
    - Impact on agricultural land; and
    - Impact on surrounding land uses.
- Construction phase impacts on the biophysical and social environments:
    - Disturbance of flora, avifauna and fauna;
    - Sedimentation, erosion of water ways and aquatic ecology;
    - Impact on heritage resources (including palaeontology);
    - Impact on traffic;
    - Noise pollution;
    - Storage of hazardous substances on site; and
    - Dust impact.

Each of these impacts is assessed in detail in a section below. The baseline and potential impacts that could result from the proposed development are described and assessed. Mitigation measures are recommended. Finally, comment is provided on the potential cumulative impacts[10] which could result should this development, and others like it in the area, be approved.

Please note that specialists assessments have been completed on the original preferred layout and technology alternatives as presented in the FSR. These layouts and technology alternatives were updated based on specialist input and a DoE emphasis on local procurement. Specialists have provided written confirmation that their assessments are not significantly impacted on by these changes to alternatives, and this confirmation is included in the relevant annexure along with their report. It should however be noted that the Visual Impact Assessment was updated with the revised technology alternative (CPV) due to the significant changes on this aspect resulting from the new preferred technology. The revised layouts and technology alternatives are assessed below.

The methodology used to assess the potential impacts is detailed in **Annexure E**. Note that the (+) or (-) after the significance of an impact indicates whether the impact is positive or negative, respectively.

4.2 OPERATIONAL PHASE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

4.2.1 Impact on flora

The vegetation on Hoekplaas and along the power line route is moderately grazed and mostly intact. The proposed substation and power line would impact on this vegetation. As such Dr Dave McDonald of Bergwind Botanical Surveys & Tours cc was appointed to undertake a Botanical Impact Assessment. A site visit was conducted by Dr McDonald on 24 and 25 November 2011 in order to inform the assessment. The study considered locality, topography, geology, climate vegetation types and conservation status. The Botanical Impact Assessment and comment on the revised layout and technology alternatives is included in **Annexure C**. The summary below includes findings and recommendations of the specialist.

a) Description of the environment

The study area falls within the Nama Karoo Biome which covers a large part of the Northern Cape Province. According to the national classification of the vegetation of South Africa (Mucina *et al.* 2006 in Mucina and Rutherford, 2006) the vegetation found at the study site is mainly Bushmanland Basin. Although there are few statutory conservation areas in this

[10] EIA's are typically carried out on specific developments, whereas cumulative impacts result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

type, it forms agricultural rangelands and is conserved for its grazing potential. The National Spatial Biodiversity Assessment (Rouget *et al.* 2004) classifies this vegetation type as Least Threatened and it is not listed in the National List of Threatened Terrestrial Ecosystems (Government Gazette No. 34809. 2011).

Two vegetation communities occur across the sites, namely *Rhigozum trichotomum* (granaatbos) and Asteraceous Shrubland. The *Rhigozum trichotomum* (granaatbos) is a tough woody shrub and is scattered throughout the study area but tends to be concentrated and dominant in areas where there is an accumulation of red sand and surface rocks. The Asteraceous Shrubland is the most extensive vegetation type in the study area and it also has the greatest diversity of species. It may be described as "bossieveld" to distinguish it from areas of grassland. This vegetation occurs on shallow sandy-loam soils often with bedrock, mostly as hardpan calcrete and it is not ecologically sensitive (see **Figure 4.1**).

Figure 4.1: Asteraceous Shrubland on red sandy clay loam with pebbles scattered on the surface (courtesy McDonald, 2012)

Plant species noted include: *Psilocaulon junceum* (asbos), *Pentzia incana* (ankerkaroo) *Pteronia incana* (asbos), low tufted grass *(Enneapogon desvauxii*), *Eriocephalus* sp., *Zygophyllum retrofractum* and *Rhigozum retrofractum*. Occasional shallow depressions are found where water would collect in the wet season. Otherwise the terrain is undulating with no noticeable relief. There is less vegetation in these depressions giving them an open appearance.

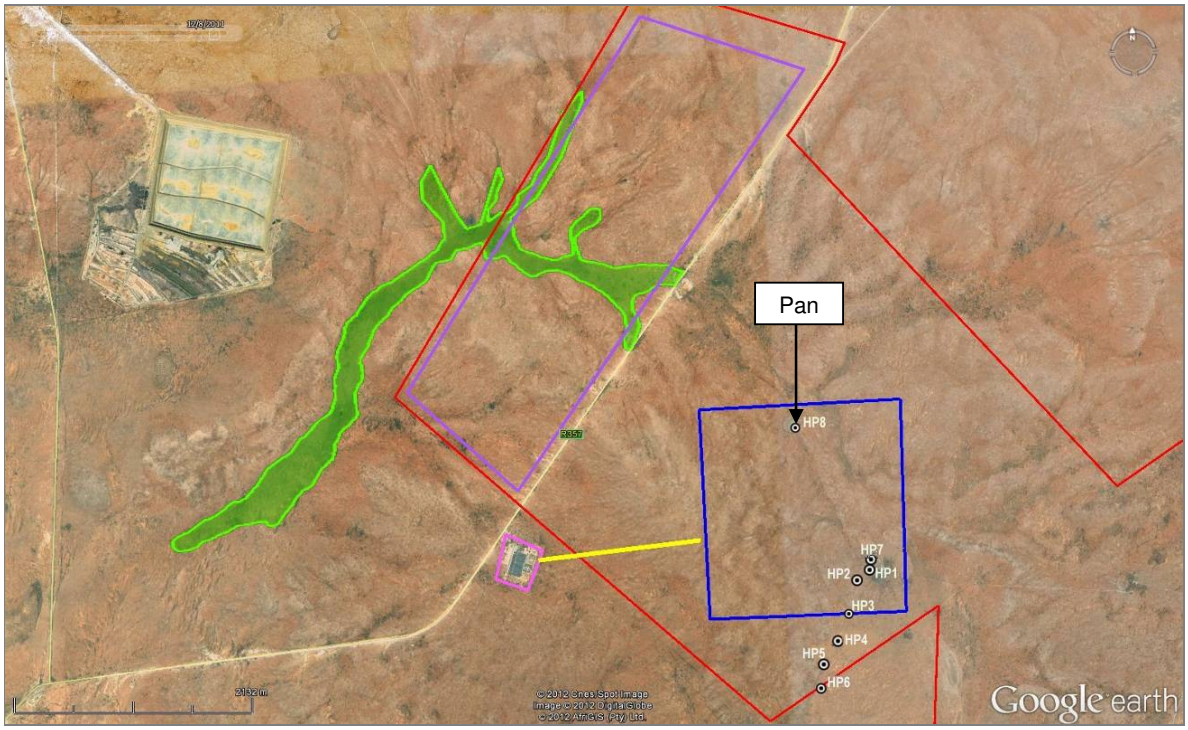

Figure 4.2: Map showing the sensitive drainage channel and pan at Hoekplaas (blue: original preferred site; purple: Alternative 2; yellow: power line) (courtesy McDonald, 2012)

b) Impact assessment

The potential impacts of the proposed project on the vegetation would include the loss of vegetation (plant species) and habitat as well as the loss of ecological processes. If the proposed energy facility and associated grid infrastructure is constructed most of the vegetation over a 300 or 450 ha area (preferred alternative or alternative, respectively) would be lost. It is also likely that vegetation in the surrounding area may be impacted on due to trampling and movement of vehicles. The potential impact for the preferred alternative and associated power line is considered to be of low magnitude, local extent and long term and therefore of **low (-)** significance, without mitigation. No difference in significance would result from the proposed technology alternatives.

In contrast, Alternative 2 would impact on the sensitive drainage system described above. The potential impact would be of high magnitude, local extent and long term and therefore of **high (-)** significance, without mitigation. No difference in significance would result from the proposed technology alternatives. This alternative should therefore be viewed as a 'No Go' site from a botanical and ecological perspective.

c) Mitigation measures

The following mitigation measures are recommended:

- A rehabilitation plan for the site should be compiled and implemented with the aid of a rehabilitation specialist; and
- Shallow depressions and well defined pans (specifically the pan shown on **Figure 4.2**) should be avoided, with buffer zones of at least 50 m around pans.[11]

d) Cumulative impacts

The vegetation types in the Copperton area of the Northern Cape are widespread and not under threat. The cumulative impact of loss of these vegetation types as a result of the proposed solar energy facility and associated power line, and other proposed developments such as photovoltaic and wind energy facilities on nearby farms is considered to be low.

4.2.2 Impact on avifauna

At least 215 bird species are likely to occur in the area, of which 68 are endemic or near endemic species, 18 red listed species and five species are red listed endemics. The expected impacts of solar energy facilities on avifauna are related to footprint impacts associated with:

- Habitat destruction;
- Disturbance by construction and maintenance activities and possibly by the operation of the facility;
- Displacement or disturbance of sensitive species; and
- Mortality caused by collision with the associated power line network and electrocution of avifauna.

A desktop review of relevant literature and a site visit on 7 January 2012 informed the avifaunal study. The avifaunal study is included in **Annexure C**. The findings and recommendations of the avifauna study are summarised below.

a) Description of the environment

The broader impact zone of the proposed PV facility is contained within an extensive tract of undulating, remote, arid Bushmanland Karoo, while the immediate vicinity includes degraded natural veld with some anthropogenic influences. The broader area could support over 200 bird species, including up to 18 red-listed species, 68 endemics, and five red-listed endemics. The birds of greatest potential relevance and importance to the proposed PV facility and associated power line are likely to be local populations of endemic, and possibly red-listed passerines, seasonal species, locally resident of passing raptors and possibly over-flights of commuting wetland birds (see **Table** 4.1).

- [11] The power line already avoids these areas.

Table 4.1 List of priority bird species that could potentially occur on site (Avisense Consulting, 2012)

Common name	Scientific name	SA conservation status & Global conservation status	Regional endemism	Estimated importance of local population
Ludwig's Bustard	*Neotis ludwigii*	SA: Vulnerable Global: Endangered	Near-endemic	Moderate-High
Kori Bustard	*Ardeotis kori*	SA: Vulnerable	-	Moderate
Tawny Eagle	*Aquila rapax*	SA: Vulnerable	-	Low
Martial Eagle	*Polemaetus bellicosus*	SA: Vulnerable Global: Near-threatened	-	Moderate-High
Secretarybird	*Sagittarius serpentarius*	SA: Near-threatened Global: Vulnerable	-	Moderate
Lanner Falcon	*Falco biarmicus*	SA: Near-threatened	-	Moderate
Greater Flamingo	*Phoenicopterus ruber*	SA: Near-threatened	-	Low
Lesser Flamingo	*Phoenicopterus minor*	SA: Near-threatened	-	Low
Red Lark	*Calendulauda burra*	SA: Vulnerable Global: Vulnerable	Endemic	Low
Sclater's Lark	*Spizocorys sclateri*	SA: Near-threatened	Endemic	Moderate

Furthermore, pigeons, crows, weavers, sparrows and some raptor species may perch, roost, forage or even nest on or around the facility and cause fouling problems. It should be noted that the site is on the southern edge of a recent range expansion by Sociable Weaver (*Philetarius socius).* The huge communal grass nests built by this species may require active management if any are attached to critical infrastructure of the development.

Surveys of large raptors nesting on the steel pylons supporting Eskom's transmission lines in the area place irregularly active Martial Eagle nests within 1 km south of the proposed development area. The specialist was however unable to determine if this area is included in the eagle's territory as the site visit was carried out well outside the Martial Eagle breeding season.

Greater Kestrels have been found breeding in Pied Crow (*Corvus alba)* nests on 132 kV power poles, and Southern Pale Chanting Goshawk (*Melierax canorus)* nests have been found in trees along drainage lines within/close to the proposed development area. Densities of regional endemics such as Northern Black Korhaan (*Afrotis afraoides)*, Karoo Korhaan (*Eupodotis vigorsii)*, Sabota Lark (*Calendulauda sabota)*, Eastern Clapper Lark (*Mirafra fasciolata)*, Spike-heeled Lark (*Chersomanes albofasciata)* and Rufous-eared Warbler (*Malcorus pectoralis)* may be particularly high in the area.

Overall, the avifauna of the development site itself is almost entirely replaceable. Given the nomadic nature and huge space requirements of birds in this semi-arid environment, and

given that the area of the site is relatively small and homogeneous in nature, it is unlikely to support any significant populations of any priority species. The possibility that Martial Eagles may breed well within the broader are is however of some concern.

b) Impact Assessment

The potential impacts of the proposed projects on birds include habitat loss, disturbance and displacement of sensitive species by maintenance activities and possible operation of the facility.

Habitat loss – destruction, disturbance and displacement

Power line service roads or servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance and to prevent vegetation from intruding into the legally prescribed clearance gaps between the ground and the conductors. These activities have an impact on birds breeding, foraging and roosting in or in close proximity to the servitude, and retention of cleared servitudes can have the effect of altering bird community structure along the length of any given power line .

Collision with power lines

Power lines pose a significant collision risk to birds, affecting a particular suite of collision prone species. Collision prone birds are generally either:

(i) large species and/or species with high ratios of body weight to wing surface area (wing loading), which confers low manoeuvrability (cranes, bustards, vultures, gamebirds, waterfowl, falcons);
(ii) species which fly at high speeds (gamebirds, pigeons and sandgrouse, swifts, falcons);
(iii) species which are distracted in flight - predators or species with aerial displays (many raptors, aerial insectivores, some open country passerines[12]);
(iv) species which habitually fly in low light conditions; and
(v) species with narrow fields of forward binocular vision.

Exposure is greatest in very aerial species, species inclined to make regular and/or long distance movements (migrants, any species with widely separated resource areas - food, water, roost and nest sites) and species that regularly fly in flocks (increasing the chances of incurring multiple fatalities in a single collision incident).

Electrocution on power infrastructure

Avian electrocutions occur when a bird perches or attempts to perch on an electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. Electrocution risk is strongly influenced by the voltage and design of the power lines erected (generally occurring on lower voltage infrastructure where air gaps are relatively small), and mainly affects larger,

[12] Perching birds and songbirds.

perching species, such as vultures, eagles and storks, easily capable of spanning the spaces between energised components.

Specific impacts of the proposed site are most likely to be manifested in the following ways:

- Disturbance and displacement of resident/breeding raptors (especially Martial Eagle and possibly Lanner Falcon) from nesting and/or foraging areas and /or mortality of these species in collisions with new power lines or by electrocution when perched on power infrastructure;
- Disturbance and displacement of resident/breeding Karoo endemics (including Sclater's Lark and possibly even Red Lark);
- Disturbance and displacement of seasonal influxes of large terrestrial birds (especially Ludwig's Bustard and Kori Bustard) from nesting and/or foraging areas and /or mortality of these species in collisions with new power lines while commuting between resource areas; and
- Injury or mortality of wetland birds (especially flamingos) using possible flight lines in and out of resource areas in the broader vicinity, in collisions with the PV infrastructure or associated new power lines.

Based on the above the potential impact on birds is considered to be of medium magnitude, local extent and long term and therefore of **medium to high (-)** significance without mitigation for all alternatives. With the implementation of mitigation measures this is anticipated to reduce to **low to medium (-)** significance for all alternatives. Although there would be a slightly greater impact due to the new preferred CPV technology alternative (as opposed to conventional PV technology), the significance of the potential impact would not be significantly different.

c) Mitigation measures

The following mitigation measures are recommended:

- Minimize the footprint of the development to the actual area required for the development;
- Minimize noise and disturbance associated with maintenance activities once the power line becomes operational;
- Relocate the Martial eagle nest structure to a pylon more than 1 km away in order to put greater distance between the resident eagles and the disturbance sources of the development. This would have to be done outside of the eagle and falcon breeding seasons (i.e. between December/January and February/March, and would involve deconstructing all affected nest structures in the area, and re-building at least one structure in a specially designed galvanized steel basket, and positioning this in the 'waist' area of a tower. Such an exercise would require the cooperation of Eskom, and the practical assistance of their live-line maintenance team, as well as active supervision by an experienced avian specialist at all times. However, if successful it would greatly reduce the potential impact of the proposed solar development, and

would have the added benefit of removing the large eagle nest/s from locations above the conductors (where they could cause streamer-related outages) to safe positions below the conductors;

- Use bird-safe structures (ideally with critical air gaps greater than 2 m) for above-ground power lines that exclude birds physically from high risk areas of live infrastructure and comprehensively insulate such areas to avoid bird electrocution;
- Power lines and cables should be below ground. Where this is not possible, all new aboveground lines should be fitted with bird flight diverters. Mark above-ground lines for their entire length as there is currently insufficient data to indicate high risk areas. Recommendations from bird monitoring could indicate high risk areas to remain marked in the future. Where new lines run in parallel with existing, unmarked power lines, this approach has the added benefit of reducing the collision risk posed by the older line; and
- Instituting a comprehensive impact monitoring scheme, and using the results of this scheme to inform and refine a dynamic approach to mitigation.

d) Cumulative impacts

All the potential impacts identified above are likely to be enlarged should there be additional renewable energy projects in the area. Therefore the potential impact on birds is considered to be of medium-high magnitude, local extent and long term and therefore of medium-high (-) significance, without mitigation. With the implementation of mitigation measures for each potential project proposed in the area, this is anticipated to reduce to low-medium (-) significance.

4.2.3 Impact on fauna

Animals likely to be found on site and the surrounding environment include small antelope, mongoose, Black-backed Jackals, Caracal, snakes, etc. Various faunal species, or evidence of these animals, were observed during a site visit on 28 September 2011, namely Black Korhaan, Meerkat, Pied Crow, Steenbok and various pipits and larks. The landowner also indicated that Black-backed Jackal, Aardvark, Aardwolf, Brown Hyaena (*Parahyaena brunnea*) and Small Spotted Cat (*Felis nigripes*) (also called the Black-Footed Cat) occur in the area. The Small Spotted Cat is listed as Vulnerable on the IUCN Red List[13], whilst the Brown Hyaena is listed as Near Threatened[14].

The Black-footed Cat is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds, and hence is likely to breed and feed in the area. The Brown Hyena is more likely to be an occasional visitor to the area as its presence would have been noticed by local farmers due to its relatively large size and it is likely the local

[13] http://www.iucnredlist.org/apps/redlist/details/8542/0 (Accessed on: 31/10/2011)
[14] http://www.iucnredlist.org/apps/redlist/details/10276/0 (Accessed on: 31/10/2011)

farmers would have tried to kill any hyena based on common negative perceptions of this animal.

Black-footed cats are threatened primarily by habitat degradation by grazing and agriculture, as well as by poison and other indiscriminate methods of pest control (IUCN, 2011). Brown Hyena are often shot, poisoned, trapped and hunted with dogs in predator eradication or control programmes, or inadvertently killed in non-selective control programmes (IUCN, 2011).

Agricultural developments (habitat degradation) and predator eradication or control programmes are considered to be the main threats to these species.

As the vegetation type is considered to be Least Threatened it is unlikely that the animals occurring within this vegetation type would be rare or endangered, as large areas of habitat remain (see **Section 4.2.1**).

a) Impact assessment

The potential impact of the proposed project on fauna is considered to be of low magnitude, local extent and long term (and therefore of **low (-)** significance), with or without mitigation. No difference in significance would result from the proposed alternative location or technology.

b) Mitigation measures

No mitigation measure is recommended for the substation and power line.

c) Cumulative impacts

Although a number of energy projects (and associated grid infrastructure) are proposed for the area, these are widely spaced apart and are unlikely to result in cumulative impacts on animals, which can continue to forage in the large areas between projects.

4.3 OPERATIONAL PHASE IMPACTS ON THE SOCIO-ECONOMIC ENVIRONMENT

4.3.1 Impact on visual aesthetics

The area surrounding the site is located at some 1 100 – 1 200 metres above mean sea level. The area is gently undulating to flat, with a very gradual slope east to west. The landscape is covered in shrubs with a few sparse trees. Any tall structures, such as existing power lines, are visible for many kilometres. The potential therefore exists that the proposed PV plant and associated infrastructure would be visible from many kilometres away. As such Mrs Karen Hansen, a private consultant, was appointed to undertake a Visual Impact Assessment (VIA) to determine potential visual impacts of the proposed

project. The site was assessed, and also areas of the general area from where the site appeared to be likely to be visible during the months of November and December 2011. The VIA, and comment on the revised layout and technology alternatives, is contained in **Annexure C.**

The VIA included a desktop survey of various maps and aerial photography. Terrain analysis software, Global Mapper, was also used to start the visual envelope definition process. A photographic survey of the site and parts of the surrounding areas was carried out and used to determine the extent of the visibility of the site. The findings and recommendations of the study are provided below.

a) Description of the environment

The overall landscape is defined as wide open, flat, remote, sparsely populated land, typical of the rural open plains of the Karoo. The landscape is covered in grasslands and scrub with few scrubs on site and few trees, apart from those planted around Copperton and the farmhouses. The dominant land use is agriculture with pasture mainly for sheep, goats and a few cattle.

The town of Copperton, a small settlement consisting of about 42 single storey houses and an estimated 1.5 km^2 in extent, is situated close to the mine. The disused copper mine is situated approximately 4 km to the north of the proposed site and occupies about 4.5 km^2. The remaining built structures consist of a tall mineshaft, a large, tall concrete shed, concrete storage tanks and unused lighting pylons.

Alkantpan is situated 13 km from the site, south west of Copperton and consists of a high security area with low concrete bunkers and low observation buildings. A few scattered farmsteads are within 5 km of the site, although not all are still regularly inhabited.

Existing vertical elements in the landscape are the lines of transmission pylons leading to and from existing substations, telegraph poles, the mine shaft and other tall and bulky remnant mine buildings. These bring some industrial character into this rural area.

A landscape may be valued for many reasons, which may include landscape quality, scenic quality, tranquillity, wilderness value, or consensus about its importance either nationally or locally, and other conservation interests and cultural associations. The site landscape appears to have some value for its grazing; however the site does not have a strong or identifiable sense of place, although it would be valued to a degree for scenic remoteness.

The 5 km viewshed considered for the proposed project includes transportation corridors, local places of habitation and work and includes the development site and peripheral areas, including Kronos, and the R357 and local gravel roads.

b) Impact assessment

The proposed project is a semi-industrial land use and would be located in an agricultural area, although there are industrial uses in the vicinity. It would be especially visible to users of the R357 road.

The degree to which the proposed project would be visible is determined by the height of the infrastructure and extent of the area under development. Visibility is moderated by the distance over which this would be seen, the weather and season conditions and some back-grounding effect from the environment. Factors affecting visibility are the open quality of the site and the surrounding land uses and land cover.

Visual exposure refers to the visibility of the site in terms of the capacity of the surrounding landscape to offer screening. This is determined by the topography, tree cover, built form, etc. In the case of the substation and power line, the visual exposure is high i.e. there is little screening offered by the landscape.

The Zones of Visual Influence or Theoretical Visibility (i.e. affected area) for the proposed project is considered to be high as it would influence the view and act as a visual focus.

There are no receptors on the development site itself or on lands around the site, apart from people working on the farm and Eskom maintenance operatives. There are no farmsteads within the viewshed.

Due to the scale of the development, the numbers and types of receptors directly affected and the semi-industrial nature of the proposed project which is compatible with the industrial uses locally the potential visual impact is considered to be of medium intensity, local extent and long term and therefore of **medium (-)** significance, without mitigation for all alternatives. With the implementation of mitigation measures this would reduce to **low (-)** significance, for all alternatives.

c) Mitigation measures

The following mitigation measures are recommended:

- Roads and hard-standings would be constructed as part of the works;
- All excess material shall be removed off-site, and the ground shall be returned to original levels/gradients as far as possible;
- New structures should be placed where they are least visible to the greatest numbers of people, in places where the topography can offer shielding, where possible;
- Visibility of the local sub-station should be reduced by cladding the buildings in non-reflective colours and materials that will blend in with natural environment. E.g. cladding with local stone or plaster and paint with earthy tones for paint colours,

roofs should be grey and non-reflective and doors and window frames should reference either the roof or wall colours;
- Finishing materials of the infrastructure (including support structures) should be of colours that are non-reflective and in dark matte colours such as dark grey or charcoal; and
- Information on the project should be provided to local people, such as through a poster at the entrance to the site.

d) Cumulative impact

The visual impact of this proposed development was assessed in the context of the other renewable energy projects and grid connection infrastructure within the Copperton area that are in various stages of approval.

The local landscape may change in character from one which is agricultural and remote to one where there are isolated hi-tech developments, i.e. wind turbines and solar installations and associated grid infrastructure. The most visually significant developments, the wind energy facilities, are far apart from each other but the one proposed by Mainstream Renewable Energy is close to this site. The solar installations would also be extensive but the scale of the landscape is sufficient to provide a setting for these developments as they are widely spaced and the area already has an industrial component. The local landscape character would be changed and made more industrial. The cumulative impact is assessed as medium (-) in significance.

4.3.2 Impact on energy production

South Africa has experienced a shortfall in electricity supply in the past few years and continues to experience constrained electricity supply. The proposed PV facility and associated grid infrastructure could impact on the ability of Eskom to provide electricity.

a) Description of the environment

Historical trends in electricity demand in South Africa have shown a consistent increase in demand. There are some years where the demand levels off or decreases but over the long term there is still an increase. Such a decrease in demand was seen in 2009 in line with the global recession, but demand growth has since resumed. As a result, the reserve margin still remains low and Eskom is still short of capacity, a situation that is expected to continue until new base load capacity can be brought online from 2012 onwards. The reserve margin will again be constrained after 2018 should no new base load power stations be constructed. The proposed wind energy facility would be able to provide power to assist in meeting the energy demand within South Africa.

In Eskom's Medium Term Adequacy Report (Week 44 of 2011) it is anticipated that the reserve margin would vary between 6.8 % (2013) and 12.7 % (2011) of Eskom's capacity and it would be necessary to import 1 500 MW of electricity annually up until 2014[15].

As noted in **Section 1.2.6d** South Africa aims to procure 3 725 MW capacity of renewable energy by 2016 (the first round of procurement). The PV project could provide 100 MW (preferred layout) or 150 MW (alternative layout), or 2.7 or 4.1 % respectively, of this figure. The proposed substation and power line would connect this facility to the electricity grid, thereby facilitating the distribution of electricity from the facility.

b) Impact assessment

Given the need for increased production capacity in South Africa, as well as the targeted renewable energy figure, the potential impact of the proposed project on energy production is considered to be of low magnitude, regional and long term and therefore of ***low (+)*** significance, without or with mitigation measures.

c) Mitigation measures

No mitigation measures are recommended.

d) Cumulative impacts

As shown in **Figure 4.5** below five other renewable energy projects are proposed for the area, with a combined capacity of 900-950 MW. The potential cumulative impact of this proposed project on South Africa's energy production would remain of **low (+)** significance.

4.3.3 Impact on climate change

The establishment of a PV plant would reduce South Africa's future reliance on energy from coal-fired power stations which could in turn reduce the future volume of greenhouse gases emitted to the atmosphere, reducing the greenhouse effect on a regional, national and international scale.

a) Description of the environment

Gases which contribute to the greenhouse effect are known to include carbon dioxide (CO_2), methane (CH_4), water vapour, nitrous oxide, chloroflurocarbons (CFCs), halons and peroxyacylnitrate (PAN). All of these gases are transparent to shortwave radiation reaching the earth's surface, but trap long-wave radiation leaving the earth's surface, acting like a greenhouse. This action leads to a warming of the earth's lower atmosphere, with changes in the global and regional climates, rising sea levels and extended desertification. This is

[15] http://www.eskom.co.za/c/article/803/adequacy-report-week-44/ (accessed 15/11/11)

turn is expected to have severe ecological consequences and a suite of implications for humans. Total greenhouse gas emissions reported to be emitted within South Africa for the 2008 year was approximately 435 million metric tons of CO_2 equivalent (UN Statistical division, 2011).

b) Impact assessment

Greenhouse gases released from a new coal-fired power station are primarily CO_2 with minor amounts of nitrous oxide (N_2O). The Medupi Power Station (4 788 MW), currently under construction near Lephalale in Limpopo, is expected to produce 29.9 million metric tons of CO_2 per annum. The emissions from Medupi Power Station would increase South Africa's CO_2 equivalent emissions (2008) by some 7 %. This is a significant increase in greenhouse gas emissions, given the aims of the Kyoto Protocol, which are to reduce overall emission levels of the six major greenhouse gases to 5 % below the 1990 levels, between 2008 and 2012 in developed countries. While South Africa, as a developing country, is not obliged to make such reductions, the increase in greenhouse gas emissions must be viewed in light of global trends to reduce these emissions significantly.

No greenhouse gases are produced by PV plants during operation, as PV plants use solar energy that generate the electricity. Although PV plants would not completely replace coal-fired power stations within South Africa, since these would still be required to provide base-load, they would reduce South Africa's reliance on them. This would assist in reducing future volumes of greenhouse gas emissions.

A life-cycle analysis looks at the entire chain of activities needed for electricity production and distribution, such as fuel extraction and transport, processing and transformation, construction and installation of the plant and equipment, waste disposal, as well as the eventual decommissioning. Every energy technology (solar, wind, hydro, coal, gas, etc) has its own very distinct fuel cycle. A comparative life-cycle analysis for the current energy technologies used in Europe was conducted by AUMA (2000). The study focused mainly on emissions from the various energy technologies. Although the results of the analysis are not necessarily entirely accurate in the South African context, they offer a good proxy for a comparative assessment of coal-fired and wind energy facilities in South Africa. The results of the analysis are illustrated graphically in **Figure 4.5** below.

Figure 4.5 Matrix of environmental impacts by categories (AUMA, 2000)

It is evident from **Figure 4.** above that environmental impacts associated with renewables, as opposed to fossil fuels such as coal, are significantly less over the entire life-cycle.

While the proposed PV plant would not provide an equivalent amount of energy to a typical new coal-fired power station (100 MW compared to 4 788 MW), when considered with regards to climate change and given the spirit of the Kyoto Protocol, the impact is deemed to be of regional extent, very low magnitude and long term and therefore of **low (+)** significance, without mitigation. The proposed substation and power line would connect this facility to the electricity grid, thereby facilitating the distribution of electricity from the facility.

c) Mitigation measures

No mitigation measures are recommended.

d) Cumulative impacts

As shown in **Figure 2.5**, five other renewable energy projects are proposed for the area, with a combined capacity of 900-950 MW. Furthermore, many more PV plants are proposed throughout South Africa. Given the number of PV plants proposed across the country, the potential reduction in future greenhouse gas emissions is considered to be of regional extent, low magnitude and long term, and therefore of medium (+) significance.

4.3.4 Impact on local economy (employment) and social conditions

The establishment of the proposed substation and power line would provide a number of direct, indirect and induced jobs. The majority of these opportunities are related to the facility and not the power line. The proposed project would also result in a large amount of expenditure in South Africa, both to procure services (e.g. transportation services) and materials (e.g. road building materials). Direct jobs are created during manufacturing, construction and installation, operation and maintenance of the power line.

a) Description of the environment

Copperton falls within the Siyathemba Local Municipality (LM). The population of Siyathemba LM is 19 360 and this is split into 74 % Coloured, 14 % African, 11 % White and 1 % Other. The total number of households is 4 542. The main employment industry is farming, followed by mining. Agricultural activities extend to sheep, wheat, maize, lucerne, cotton, beans, vineyards and peanuts. There are 12 schools in the LM and, four clinics (one of which is in Prieska) and one hospital[16].

The site is located in a rural area and as such the population density is very low, with neighbours located kilometres away. Whilst Copperton itself was once a populated town, providing accommodation for the mine workers, this is no longer the case and the majority of houses have been demolished. A few houses are however still rented to retired farmers. According to the Pixley ka Seme DM SDF (2007) the 2001 population of Copperton (which fell under the DM's management, prior to being assimilated into the Siyathemba LM) was 37, with nine households. Employment opportunities in the immediate area stem from farming, the local accommodation lodge, Ietznietz, and Alkantpan weapons testing facility.

[16] Taken from http://www.siyathemba.co.za/demographics.htm (accessed 02/01/11)

b) Impact assessment

Up to 100 operation and maintenance jobs would be created during the operational phase. Indirect and induced jobs would also result from the proposed project. It is important to note that the number of jobs does not equate to the number of people employed.

The operating expenditure of the proposed project would be roughly R 30 million per year, of which up to R 15 million per year would be spent in South Africa. Increased spending (procurement of goods and services) in South Africa would indirectly result in more employment opportunities. Increased employment opportunities (direct and indirect) would allow for an improvement in social conditions for those who obtain employment. The project would also result in an increase in the revenue of the LM through increased rates and taxes. This in turn could result in an increase in municipal spending on social programmes.

Based on the number of employment opportunities during the operational phase the potential impact on the local economy (employment) and social conditions is considered to be medium magnitude, regional and long term and therefore of **medium (+)** significance, with or without mitigation.

c) Mitigation measures

The following mitigation measures are recommended:

- Give preference to local communities for employment opportunities; and
- Base recruitment on sound labour practices and with gender equality in mind.

d) Cumulative impacts

As noted previously, five other renewable energy projects are proposed for the area, with a combined capacity of 900-950 MW. The potential cumulative impact of these proposed projects on employment and socio-economic conditions in the local area would remain of **medium (+)** significance.

4.3.5 Impact on agricultural land

The proposed site, is located south-east of Copperton and is used as grazing land for livestock. The proposed solar energy facility would cover an area of approximately 300 ha (preferred alternative) or 450 ha (alternative), which is currently used for livestock grazing. Hence, the footprint of the proposed facility would reduce the area available for agriculture. Mr Kurt Barichievy of SiVEST (Pty) Ltd was therefore appointed to undertake a desktop Agricultural Impact Assessment. The study considered climate, geology, soils, terrain, land capability, current agricultural practices and agricultural potential. The desktop Agricultural Assessment and comment on the revised layout and technology alternatives for Hoekplaas

Farm is included in **Annexure C.** The findings and recommendations of the study are summarised below.

a) Description of the environment

For the purpose of this study, agricultural potential is described as an area's suitability and capacity to sustainably accommodate an agricultural land use of the area. In most cases the agricultural potential is benchmarked against crop production.

Climate

Copperton has an arid continental climate with a summer rainfall regime. The region typically experiences hot days and cold nights with the average summer temperature of approximately 33°C and the average winter night time temperatures of approximately 1°C. Most of the rainfall is confined to summer and early autumn. According to the Daily Rainfall Extraction Utility (Lynch, 2003) the MAP for the Copperton area is approximately 176 mm per year with 62 % of rainfall occurring between January and April. Considering that 500 mm is the minimum amount of rain required for sustainable dry land farming, the MAP of 176 mm is extremely low. Therefore without some form of supplementary irrigation, natural rainfall for the Copperton area is insufficient to produce sustainable harvests. This is reflected in the lack of dry land crop production within the area.

Geology

The proposed layouts are underlain by two primary parent materials namely sedimentary rocks and tillite of which tillite virtually dominates the entire site. Tillite consists of consolidated masses of unweathered blocks and unsorted glacial till. Non-descript sedimentary geologic materials are found towards the northern tip area of the proposed site. Both propose alternatives for the proposed solar energy facility, like the encompassing site, would completely be underlain by tillite.

Slope

The topography for the proposed site is characterised by a flat and gently sloping landscape. The average gradient is less than 10 %, making this area ideal for intensive agriculture, with high potential for large scale mechanisation. The topography is thus not a limiting factor for agriculture.

Land use

The dominant veld type for the area is classified as Bushmanland Basin Shrubland. The proposed site consists of a mix of natural veld and vacant land. Vast un-improved grazing land is interspersed by non-perennial stream beds. Stocking rates for the region are estimated at 1 small animal unit per 6 ha and 1 large animal unit per 35 ha. According to the land use data there are no signs of formal agricultural fields or cultivation on Hoekplaas Farm.

Soils

The Environmental Potential Atlas for South Africa (ENPAT) for the Northern Cape Province shows the majority of Hoekplaas Farm is dominated by a mix of both red and yellow apedal soil types. Apedal soils are weakly structured, tend to be freely drained and due to overriding climate conditions these soils will tend to be Eutropohic (high base status).The study area is classified as having an effective soil depth (depth to which roots can penetrate the soil) of less than 0.45 m deep and therefore it is a limiting factor in terms of sustainable crop production. According to the Agricultural Geo-Referenced Information System (AGIS, 2012) the soils on Hoekplaas Farm are associated with saline soils with a low water holding capacity, high pH and low organic matter content.

Agricultural potential

Restrictive climate characteristics, due to the strong summer rainfall regime, moisture stress and low winter temperatures reduce the agricultural potential of Hoekplaas Farm. The ENPAT database provides an overview of the study area's agricultural potential based on its soil characteristics although it does not take prevailing climate into account. The database indicated the study area is dominated by soils which are not suited for arable agriculture, but which can still be used as grazing land.

By taking all the site characteristics (climate, geology, land use, slope and soils) into account the agricultural potential for the majority of the site is classified as being extremely low for crop production, while moderate to moderately low for grazing. This poor agricultural potential rating is primarily due to restrictive climatic characteristics and soil depth limitations. The site is not classified as high potential nor is it a unique dry land agricultural resource.

b) Impact assessment

The proposed power line would not result in the loss of grazing land on the Hoekplaas Farm as a result of the fact that grazing could continue within the servitude. There are no centre pivots, irrigation schemes or active agricultural fields which would be influenced by the proposed power line. Consequently the overall impact on agricultural potential and production is considered to be of very low intensity, local extent and long term and therefore of **very low (-)** significance without mitigation, for both alternative layouts, due to the site's low inherent agricultural potential.

It was noted in the specialist study that a full agricultural assessment was not considered to be necessary.

c) Mitigation measures

No mitigation measures are recommended.

d) Cumulative impacts

The reduction in usable grazing owing to various solar projects (one approved and three, including this proposal, proposed) planned in and around Copperton could place increased pressure on adjacent land. However, due to the limited agricultural potential described above and on the other sites, the potential impact of this increased pressure is considered to be of **very low (-)** significance.

4.3.6 Impact on surrounding land uses

The predominant surrounding land use is agriculture. However, a few other land uses exist and the proposed project could impact on these surrounding land uses.

a) Description of the environmental

At the abandoned Copperton mine a PV power generation facility is proposed by Mulilo that recently received an Environmental Authorisation (DEA Ref. No. 12/12/20/1722). Further west of the site is Alkantpan, a weapons testing range, used by many countries for weapons testing. Other proposed activities in the area include a wind energy facility to the east proposed by Plan 8 (Pty) Ltd (DEA Ref. No. 12/12/20/2099), two PV plants to the west and north of the site on farms Klipgats Pan (DEA Ref. No. 12/12/20/2501) and Struisbult (DEA Ref. No.12/12/20/2502) and wind and solar energy facilities proposed by Mainstream Renewable Energy (Pty) Ltd (DEA Ref. No. 12/12/20/2320/1 and 12/12/20/2320/2) on three of the adjacent farms (Farms 102/RE, 118/1 and 118/3) to the east, south and west (see **Figure 2.6**). Furthermore, a 1.7 km airstrip, is located to the north of the site and is used by a number of aeroclubs (e.g. Aeroclub SA). The airstrip would however need to be relocated to Alkantpan should the wind energy facility (by Plan 8 (Pty) Ltd (DEA Ref. No. 12/12/20/2099)) receive approval.

Copperton town, consisting of a few dwellings and a small shop is also located immediately west of the site.

4.4 CONSTRUCTION PHASE IMPACTS ON THE BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENTS

The construction phase is likely to result in a number of negative impacts on the biophysical and the social environment. These could potentially include:

- Disturbance of flora, avifauna and fauna;
- Sedimentation, erosion and aquatic ecology;
- Impact on traffic;
- Impact on local economy (employment) and social conditions;
- Visual impact;
- Storage of hazardous substances on site;
- Noise pollution; and
- Dust impact.

The significance of construction phase impacts is likely to be limited by their relatively short duration, since the construction phase for the power line should last approximately six months. Many of the construction phase impacts could be mitigated through the implementation of an appropriate EMP. A life-cycle EMP is contained in **Annexure D** of this report, which specifies the mitigation measures that could be implemented to mitigate construction phase impacts, amongst others.

4.4.1 Disturbance of flora, avifauna and fauna

Flora

This impact considers impacts beyond the permanent footprint impacts. Alien plant seeds could be introduced with construction material such as sand or other materials, with any disturbed areas being particularly vulnerable.

Avifauna

The construction phase would result in temporary damage or permanent destruction of habitat. This could have a lasting impact in cases where the site coincides with critical areas for restricted range, endemic and/or threatened species. The effect could be significant in some instances, particularly given the possibility that the initial footprint of successful facilities may be expanded over time, and allowing for the possible cumulative effects of multiple facilities in one area. Furthermore, construction activities could disturb breeding, foraging or migrating birds. Bird species of particular concern, which may be affected, include Red Lark and Sclater's Lark, Martial Eagle, Lanner Falcon, Ludwig's Bustard and kori bastard and possibly wetland birds (especially flamingo).

Fauna

Any affected fauna would generally be largely mobile and would relocate during the construction phase and are likely to recolonise the area, once the construction phase has been completed and the disturbed areas rehabilitated.

Based on the above the potential impact on flora, birds and fauna during construction due to disturbance, habit loss and displacement is considered to be of low to medium magnitude, local extent and short term and therefore **low to medium (-)** significance without mitigation. With the implementation of mitigation measures this is anticipated to reduce to **low (-)** significance. There would be no difference in significance as a result of the proposed alternatives.

The following mitigation measures are recommended:

- Compile and implement a vegetation rehabilitation plan with the aid of a rehabilitation specialist, for inclusion in the Construction EMP. The specialist is to recommend species to be used in rehabilitation as well as any special measures for rehabilitation such as shade-netting and alien vegetation removal.
- The construction phase should be closely monitored by an Environmental Control Officer who should identify any areas that would require rehabilitation in the post-construction phase. The restoration of those areas must follow the construction phase.
- Demarcate no-go areas identified during pre-construction monitoring.
- Low-lying depressions and watercourses should be avoided wherever possible.
- Shallow depressions and well defined pans should be avoided and buffered by at least 50 m.
- The pan located at waypoint at the north end of the proposed solar plant must be avoided with no construction within 50 m of the 'ring' of tall shrubs fringing the pan.
- The site should be cleared in sections as required for construction and not all at once.
- The top 300 mm of the soil layer shall be stockpiled for rehabilitation purposes.
- Rehabilitation of completed sections with appropriate local indigenous vegetation shall start immediately and bare soil shall be covered by straw as protection against wind while vegetation re-establishes (or as required by the rehabilitation specialist).
- Once construction is complete, disturbed areas shall be rehabilitated and maintained with appropriate local indigenous vegetation.

4.4.2 Impact on heritage resources (including palaeontology)

A Heritage Impact Assessment (HIA) was conducted by Mr Jayson Orton of the Archaeology Contracts Office (ACO) to assess the impacts of the solar energy facility and associated grid infrastructure on the heritage resources in the project area. Information for the study was sourced from published and unpublished archaeological reports, as well as a physical survey by the specialists of the project area on 12th December 2011. The HIA and comment on the revised layout and technology alternatives are included in **Annexure C.**

A Palaeontology Impact Assessment (PIA) was undertaken by Dr John Almond as the site is located in an area of the Main Karoo Basin of South Africa that is underlain by potentially

fossiliferous sedimentary rocks of the Karoo Supergroup known for its value as potential source of palaeontology heritage. The study included a desktop review and field-based assessment on 26 January 2012 of the paleontological aspects in the project area. The PIA and comment on the revised layout and technology alternatives are included in **Annexure C.** The findings and recommendations of the studies are summarised below.

a) Description of the environment

In general the Karoo and Bushmanland area is documented to contain abundant stone artefacts from the Early (ESA) and Middle Stone Age (MSA), while occasional Later Stone Age (LSA) are also present. These artefacts are generally very well weathered in the form of background scatter. Excavations at Bundu Pan 25-30 km northwest of Copperton uncovered archaeological material regarded to be generally rare in South Africa and included findings of preserved Pleistocene faunal material, bones of wildebeest, warthog, extinct giant hartebeest, species of equid (horse/zebra), baboon, springbok and blesbok. Rock art in the form of engravings are common to the area, dating back to the period when indigenous people or Bushman lived in the area. More recent heritage includes typical flat-roofed Karoo-style houses commonly found in the small towns and war graves and a British fort at Prieska dating from the Anglo-Boer War.

Figure 4.6 shows the distribution of archaeological resources recorded during the survey. Large clusters of occurrences are situated at the large pan in the centre of the site, while the pan in the south-western area did not host archaeological material of note. Most examples of MSA and ESA material were in the form of background scatter and included relatively unweathered stone material such as hand-axes. LSA material includes a hammer stone/upper grindstone, hornfels, stone implements of quartzite and ostrich eggshell fragments.

The only MSA site found was at the quarry alongside the road where stone artefacts, faunal remains and multiple fragments of a single large tooth from an equid were found.

The site does not have any buildings or structures of heritage value, while the cultural landscape is composed of an ephemeral pan with gum trees, a windmill, water troughs and an old cement dam alongside it. The R357 connecting Prieska and Vanwyksvlei via Copperton, is a generally scenic route and contributes to the sense of place created by typical undeveloped Karoo open space.

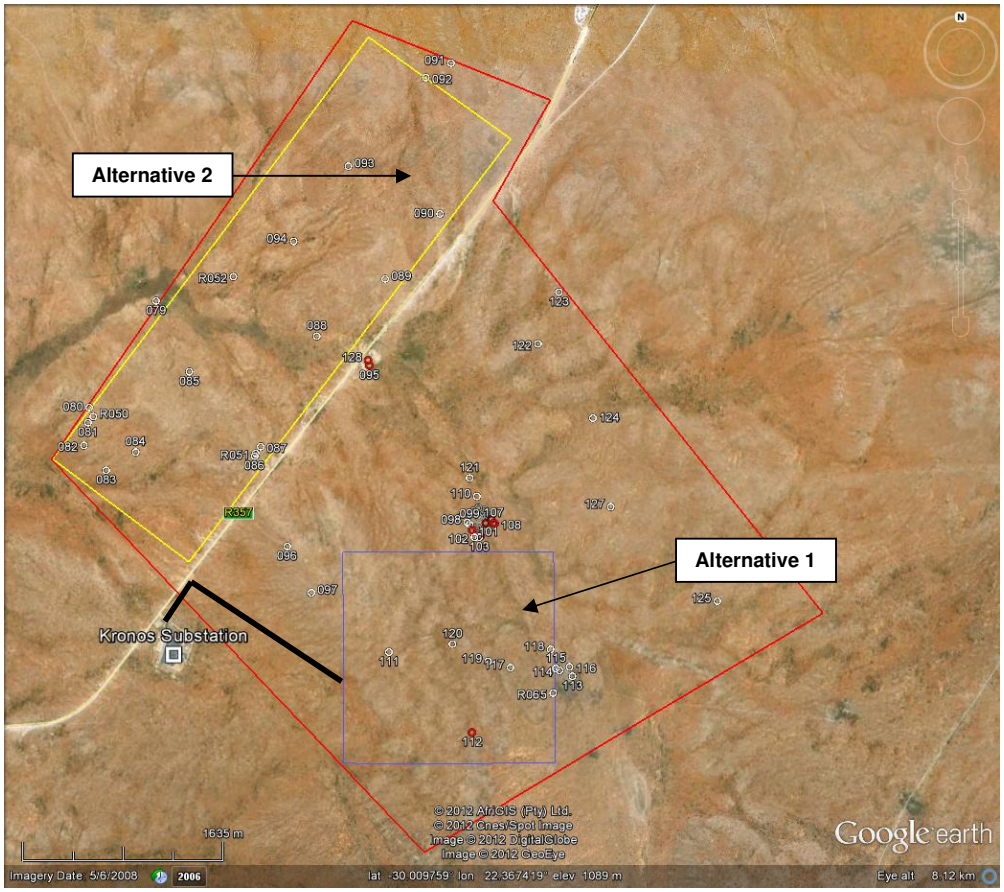

Figure 4.6: Location of recorded archaeological occurrences at Hoekplaas (red sites require mitigation, white ones do not) (courtesy ACO, 2012)

Figure 4.7: Selection of isolated artefacts from the background scatter on Hoekplaas showing the variability in materials and weathering states.

The geology of the study area consists of Permo-Carboniferous glacial sediments of the Dwyka Group (Karoo Supergroup) that overlie granitoid Precambrian basement rocks of the Namaqua-Natal Metamorphic Province and are locally intruded by Karoo dolerites and narrow kimberlite dykes of Cretaceous age (see **Figure 4.7**). These older bedrocks are widely covered by a range of superficial deposits of Pleistocene to Recent age, including alluvium, down wasted coarse gravels, calcrete hardpans, and sandy to silty soils and pan sediments.

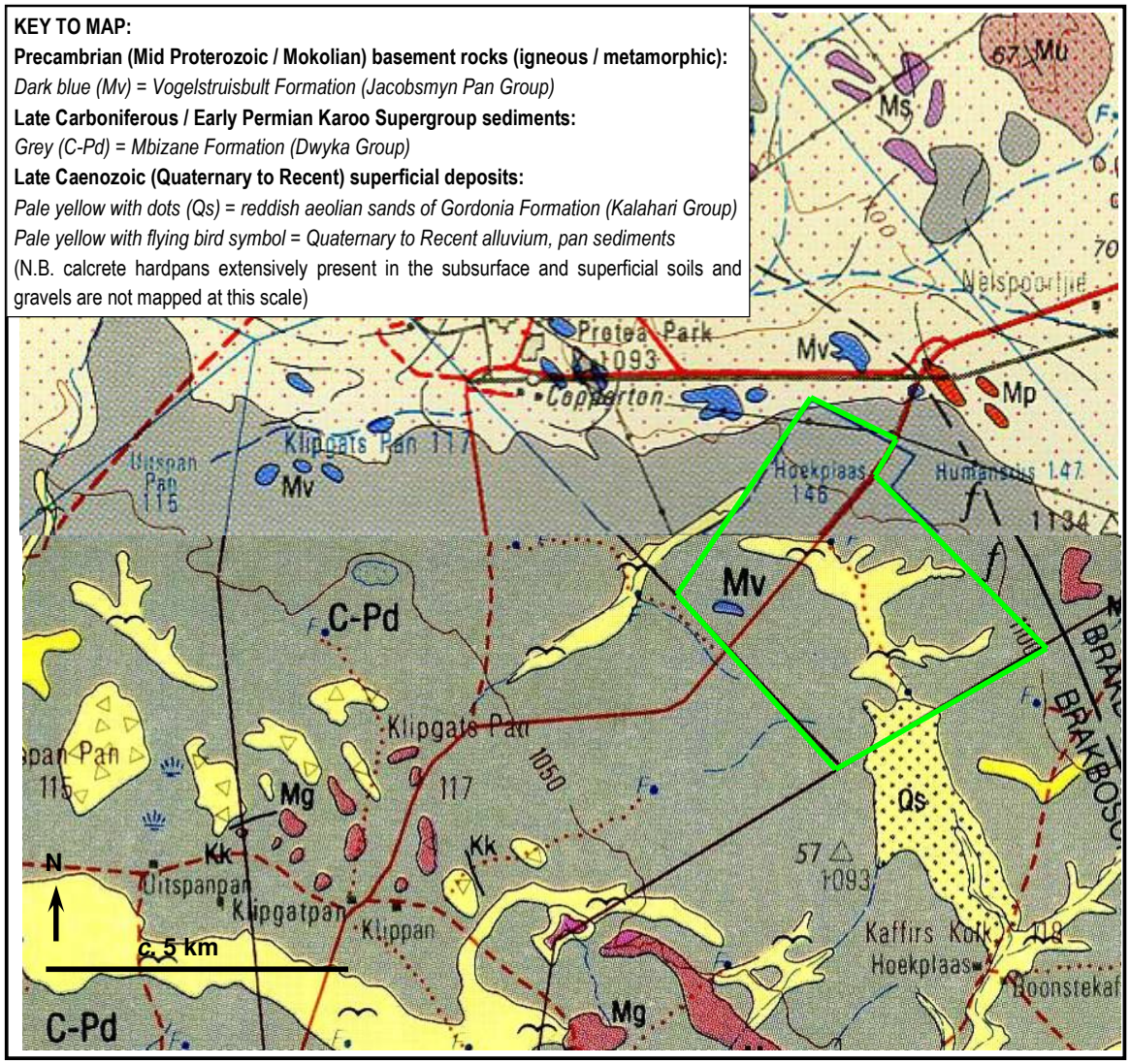

Figure 4.8: Extracts from 1: 250 000 geology maps 2922 Prieska (above) and 3022 Britstown (below) showing approximate outline of the proposed solar energy facility on farm Hoekplaas near Copperton (green polygon).

No fossil remains or petrified wood were observed within the Dwyka Group and superficial sediments on Hoekplaas. Small domical to columnar stromatolites within boulder erratics grey carbonate (probably dolomite) have been reported from the neighbouring farm

Klipgats Pan and have probably been transported by ice movement from the Campbell Rand Subgroup (Ghaap Group) that crops out in the Ghaap Plateau to the north of Prieska. It is also likely that fossil bones and teeth of mammals are preserved within buried Pleistocene fluvial and pan sediments as recorded at Bundu Pan in the same region. Fossil sites are likely to be sparsely distributed and their locations difficult to predict, given the extensive younger sedimentary cover.

b) Impact assessment

The proposed substation and power line have potential to produce a wide range of impacts that would affect the heritage qualities of an area. During the construction phase of the project, activities such as bulldozing of access roads and excavation of substation foundations may result in the following impacts on the landscape and heritage environment:

- Displacement of pre-colonial and colonial archaeology material;
- Accidental damage and/or vandalism to the build environment, such as historical structures and ruins; and
- Negative visual impact of grid infrastructure on the cultural landscape, scenic quality and sense of place of the Karoo and Bushmanland.

Most archaeology present on site is background scatter of low significance with important MSA and LSA sites mainly found around the pans. Only one significant resource is located in the footprint of the preferred layout and would require mitigation. No significant archaeological sites were found within the footprint of the alternative layout, but the visual impacts are greater for this alternative. The R357, although scenic, is little used aside from a few local farmers and is not considered an important scenic route which makes the visual impacts very low. Visual impacts are assessed in further detail in Section 4.3.1.

Based on the above considerations the potential impact on the archaeological resources of the preferred layout is considered to be of medium magnitude, local extent and long term duration and therefore of **medium (-)** significance, without mitigation. With the implementation of mitigation measures the potential impact is likely to be of **low (-)** significance. The overall potential impact on archaeological resources of the alternative layout is considered to be of **low (-)** significance, without mitigation, with a low magnitude, local extent and long term duration.

The impact on cultural heritage for the preferred layout is of low magnitude, local extent and long term duration and therefore of **low (-)** significance, without mitigation. The alternative layout is considered to be of **medium (-)** significance in terms of the cultural heritage with a medium magnitude, local extent and long term duration, without mitigation.

Extensive, deep bedrock excavations are not envisaged during the construction phase for the power line. As such, the impact significance on fossil heritage is considered to be of low

magnitude, local extent and long term and therefore of **low (-)** significance, without or with mitigation, for all alternatives.

c) Mitigation measures

The following mitigation measures are recommended:

- A 100 m buffer zone should be implemented from the edge of the pans for sites situated alongside the pans;
- Test excavations around the pans should be done to check for buried archaeological material;
- If mitigation by avoiding sensitive archaeological sites is not feasible, sampling and recording of the archaeological site before its destruction must be undertaken; and
- In the event of accidental uncovering of graves or substantial fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood), work must stop immediately and SAHRA should be notified. An archaeologist / palaeontologist should be involved to assist with the investigation and procedures to address the situation.

d) Cumulative impacts

Considering the scale of archaeological research in other parts of South Africa, relatively little is known of Bushmanland and the loss of any significant LSA sites would impact on knowledge of the wider region. Given the low overall paleontological sensitivity of the Karoo bedrocks and Pleistocene to Recent superficial sediments of the region as a whole, the cumulative impact of this development is not considered to be significantly higher than the individual impact.

4.4.3 Impact on local economy (employment) and social conditions

The proposed power line for the PV facility would employ a maximum of 50 jobs onsite depending on the procurement method used. Local labour (between 65 and 75%) would be employed during construction which could last for two years.

Increased employment opportunities would allow for an improvement in social conditions for those who obtain employment. The majority of labour could be accommodated within Copperton and Prieska, which would result in an increase in spending thereby stimulating the local economy. The project would also result in an increase in the revenue of the LM through increased rates and taxes. This in turn could result in an increase in municipal spending on social programmes.

Based on the number of employment opportunities, as well as the local expenditure, during the construction phase the potential impact on the local economy (employment) and social conditions is considered to be medium magnitude, regional and short term (for the

construction period) and therefore of ***medium (+)*** significance, with or without mitigation. No difference in impact significance would result from the proposed alternatives.

The following mitigation measures are recommended:

- Obtain a list of locally available labour and skills. Give preference to local communities for employment opportunities;
- Base recruitment on sound labour practices and with gender equality in mind; and
- Provide appropriate training, which would enable individuals to apply their skills to other construction and development projects in the region once construction is complete.

4.4.4 Visual impact

Construction activities would include upgrading the site accesses, constructing new site roads, excavating for foundations and installations of above ground infrastructure. These are expected to be most visible within 2 km, especially as the construction plant would be fitted with warning lights and sounds.

The potential construction phase visual impact is considered to be of medium intensity, site specific in extent and short term and therefore of **low (-)**[17] significance, without mitigation. With the implementation of mitigation measures this would reduce to **very low**[18]**(-)** significance. No difference in impact significance would result from the proposed alternatives.

The following mitigation measures are recommended:

- Minimise the construction period, where possible;
- Access road are to be kept tidy, and measures shall be taken to minimise dust from construction traffic on gravel roads;
- Site offices, if required, should be limited to single storey and they should be sited carefully using temporary screen fencing to screen from the wider landscape; and
- All site operatives should receive training in awareness of issues such as the use of hazardous chemical, proper disposal of waste, etc.

4.4.5 Impact on traffic

Construction vehicles are likely to make use of the existing roads to transport equipment and material to the construction site.

[17] Note that the specialist study indicates this as medium-high (-) significance, however this is incorrect according to the assessment methodology.

[18] Note that the specialist study indicates this as low-medium (-) significance, however this is incorrect according to the assessment methodology.

Transporting components to site is likely to necessitate the upgrading of sections of road to ensure clearances and bends are negotiable by trucks.

The potential impact of the project on transport is considered to be of low magnitude, regional extent and short term and therefore of **very low (-)** significance, with or without mitigation. The cumulative potential impact of energy projects on transport is considered to be of high magnitude, regional extent and short term and therefore of high (-) significance, with or without mitigation due to the significance of transporting wind turbine components. No difference in impact significance would result from the proposed alternatives.

The following mitigation measures are recommended:

- Ensure that road junctions have good sightlines;
- Implement traffic control measures where necessary;
- Transport components overnight as far as possible; and
- Engage with the roads authorities prior to construction to ensure the necessary road upgrades, permits, traffic escorts etc. are scheduled.

4.4.6 Noise pollution

An increase in noise pollution would be expected from the operation of heavy machinery during the construction period, as well as due to the increased traffic. The severity of this impact is likely to be reduced due to the low numbers of people in close proximity to the site.

4.4.7 Storage of hazardous substances on site

As at any construction site, various hazardous substances (less than 5 m^3) are likely to be used and stored on site. These substances may include amongst other things, diesel, curing compounds, shutter oil and cement. Utilisation of such substances in close proximity to aquatic environments such as pans is of greater concern than when used in a terrestrial environment.

Use of hazardous substances at a construction site is controlled by various pieces of legislation. The management and protection of the environment would however be achieved through the implementation of an EMP, which would *inter alia* specify the storage details of hazardous compounds and the emergency procedures to follow in the event of a spillage.

4.4.8 Dust impacts

Construction vehicles are likely to make use of the existing farm roads to transport equipment and material to the construction site. Earthworks would also be undertaken.

These activities would exacerbate dust especially in the dry winter months. The dust impact would be managed through the EMP, which would include procedures for dealing with dust pollution events including watering of roads, etc.

4.5 SUMMARY OF POTENTIAL IMPACTS

A summary of all the potential impacts from the proposed project assessed above is included in **Table 4.2**. While some difference in the potential impacts would result from the proposed alternatives this difference was not considered to be significant for any of the potential impacts. As such, the table below applies to all proposed alternatives.

Table 4.2 Summary of potential impacts of the proposed project

Potential impact	No mit/Mit[19]	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Conf.[20]	Reversibility
OPERATIONAL PHASE								
Impact on botany:	No mit	Local	Low	Long term	**Low (-)**	Definite	Sure	Irreversible
	Mit	Local	Low	Long term	**Low (-)**	Probable	Sure	Irreversible
Impact on birds	No mit	Local	Medium - High	Long term	**Medium - High (-)**	Probable	Sure	Irreversible
	Mit	Local	Low- Medium	Long term	**Low – Medium (-)**	Probable	Sure	Irreversible
Impact on fauna	No mit	Local	Low	Short term	**Very Low (-)**	Probable	Low	Reversible
	Mit	Local	Low	Short term	**Very Low (-)**	Probable	Low	Reversible
Visual aesthetics	No mit	Regional	Medium	Long term	**Medium (-)**	Definite	Sure	Reversible
	Mit	Regional	Low	Long term	**Low (-)**	Definite	Sure	Reversible
Impact on energy production	No mit	Regional	Low	Long term	***Low (+)***	Probable	Sure	Reversible
	Mit	Regional	Low	Long term	***Low (+)***	Probable	Sure	Reversible
Impact on climate change	No mit	Regional	Very Low	Long Term	**Low (+)**	Probable	Sure	Reversible
	Mit	Regional	Very Low	Long Term	**Low (+)**	Probable	Sure	Reversible
Impact on local economy (employment) and social conditions	No mit	Regional	Medium	Long term	***Medium (+)***	Probable	Sure	Reversible
	Mit	Regional	Medium	Long term	***Medium (+)***	Probable	Sure	Reversible
Impact on agricultural land	No mit	Local	Very low	Long term	**Very low (-)**	Probable	Sure	Reversible
	Mit	Local	Very low	Long term	**Very low (-)**	Probable	Sure	Reversible
Impact on surrounding land uses	No mit	Regional	Low	Long term	**Medium (-)**	Probable	Unsure	Reversible
	Mit				Undetermined			
CONSTRUCTION PHASE								

[19] Note that this refers to No mitigation and Mitigation.

[20] Conf.=Confidence in the assessment of the potential impact.

Potential impact	No mit/Mit[19]	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Conf.[20]	Reversibility
Impacts on flora, avifauna and fauna	No mit	Local	Low-Medium	Medium term	**Low-Medium (-)**	Probable	Sure	Reversible
	Mit	Local	Low	Medium term	**Low (-)**	Probable	Sure	Reversible
Sedimentation and erosion	No mit	Local	Medium	Short term	**Low (-)**	Probable	Sure	Reversible
	Mit	Local	Low	Short term	**Very Low (-)**	Probable	Sure	Reversible
Impact on traffic	No mit	Regional	Low	Short term	**Very Low (-)**	Probable	Sure	Reversible
	Mit	Regional	Low	Short term	**Very Low (-)**	Probable	Sure	Reversible
Impact on heritage resources:	No mit	Local	Medium	Long term	**Low (-)**	Definite	Low	Irreversible
Archaeology: Preferred layout	Mit	Local	Low	Long term	**Low (-)**	Probable	Sure	Irreversible
Archaeology: Alternative layout	No mit	Local	Medium	Long term	**Low (-)**	Definite	Low	Irreversible
	Mit	Local	Medium	Long term	**Low (-)**	Probable	Sure	Irreversible
Palaeontology	No mit	Local	Low	Long term	**Low (-)**	Unlikely	Low	Reversible
	Mit	Local	Low	Long term	**Low (-)**	Unlikely	Sure	Reversible
Cultural heritage: Preferred layout	No mit	Local	Low	Long term	**Low (-)**	Definite	Sure	Reversible
	Mit	Local	Low	Long term	**Low (-)**	Probable	Low	Reversible
Cultural heritage: Alternative layout	No mit	Local	Medium	Long term	**Medium (-)**	Definite	Sure	Reversible
	Mit	Local	Medium	Long term	**Medium (-)**	Probable	Low	Reversible
Impact on local economy (employment) and social conditions	No mit	Regional	Medium	Short term	***Medium (+)***	Probable	Sure	Reversible
	Mit	Regional	Medium	Short term	***Medium (+)***	Probable	Sure	Reversible
Visual impact	No mit	Local	Medium	Short term	**Low (-)**	Definite	Sure	Reversible
	Mit	Local	Medium	Short term	**Very Low (-)**	Probable	Sure	Reversile
Noise pollution	No mit	Local	Low	Short term	**Very Low (-)**	Probable	Sure	Reversible
	Mit	Local	Low	Short term	**Very Low (-)**	Probable	Sure	Reversible
Storage of hazardous substances on site	No mit	Local	High	Short term	**Low (-)**	Probable	Sure	Irreversible
	Mit	Local	High	Short term	**Low (-)**	Unlikely	Sure	Irreversible

Potential impact	No mit/Mit[19]	Extent	Magnitude	Duration	SIGNIFICANCE	Probability	Conf.[20]	Reversibility
Impact of dust	No mit	Local	Medium	Short term	**Low (-)**	Probable	Sure	Reversible
	Mit	Local	Low	Short term	**Very Low (-)**	Probable	Sure	Reversible

5 CONCLUSIONS AND WAY FORWARD

The purpose of this Chapter is to briefly summarise and conclude the EIAR and describe the way forward.

5.1 CONCLUSIONS

The proposed project comprises:

- Construction of the substation and power line linking the PV facility to the Kronos substation approximately 1.5km west of the site.

Aurecon concluded that this Draft EIAR provides a comprehensive assessment of the environmental issues associated with each of the feasible alternatives of the proposed project outlined in the FSR and the associated Plan of Study for EIA. These impacts and alternatives were derived in response to inputs from consultation with I&APs, provincial and local authorities, and the EIA project team.

Table 5.1 provides a summary of the significance of the environmental impacts associated with this proposed project.

Table 5.1: Summary of significance of the potential impacts associated with the proposed development

OPERATIONAL PHASE IMPACTS		**No Mit**	**With Mit**
1.1	Impact on botany: Preferred layout	L	L
1.2	No-go alternative	L	L
2	Impact on birds	M-H	L-M
3	Impact on fauna	VL	VL
4	Visual aesthetics	M	L
5	Impact on energy production	L+	L+
6	Impact on climate change	L+	L+
7	Impact on local economy (employment) and social conditions	M+	M+
8	Impact on agricultural land	VL	VL
9	Impact on surrounding land uses	M	Undetermined
CONSTRUCTION PHASE IMPACTS		**No Mit**	**With Mit**
10	Impacts on flora, avifauna and fauna	L-M	L
11	Sedimentation and erosion	L	VL
12	Impact on traffic	VL	VL
13.1	Impact on heritage resources Archaeology: Preferred layout	L	L

13.2	Archaeology: Alternative layout	L	L
13.3	Palaeontology	L	L
13.4	Cultural heritage: Preferred layout	L	L
13.5	Cultural heritage: Alternative layout	M	M
14	Impact on local economy (employment) and social conditions	M+	M+
15	Visual impact	L	VL
16	Noise pollution	VL	VL
17	Storage of hazardous substances on site	L	L
18	Impact of dust	L	VL

KEY

H	High Significance	VL	Very Low Significance
M-H	Medium to High Significance	N	Neutral Significance
M	Medium Significance	H+	High positive significance
L-M	Low to Medium Significance	M+	Medium positive significance
L	Low Significance	L+	Low positive significance
VL-L	Very Low to Low Significance		

5.2 LEVEL OF CONFIDENCE IN ASSESSMENT

With reference to the information available at the feasibility stage of the project planning cycle, the confidence in the environmental assessment undertaken is regarded as being acceptable for the decision-making, specifically in terms of the environmental impacts and risks. The EAP believes that the information contained within the FSR and this EIAR is adequate to inform Mulilo's decision making and will allow DEA to be able to determine the environmental acceptability of the proposed alternatives.

It is acknowledged that the project details will evolve during the detailed design and construction phases to a limited extent. However, these are unlikely to change the overall environmental acceptability of the proposed project and any significant deviation from what was assessed in this EIAR should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

5.3 OPERATIONAL PHASE IMPACTS

With reference to **Table 5.1**, the most significant (**medium-high (-)**) operational phase impacts on the biophysical and social environment, without mitigation was for the potential impacts of the proposed solar energy plant on visual aesthetics, birds, surrounding land use and cultural heritage. With the implementation of mitigation measures the impact on visual aesthetics would decrease to **low-medium.** The impact on visual aesthetics would decrease

to **low (-)** with the implementation of mitigation measures. However the impact on the cultural landscape would remain the same. It should be noted that three potential positive impacts on energy production, climate change and local economy (employment) and social conditions would result and these would be of **medium (+), low (+)** and **low (+)** significance (respectively), with and without mitigation measures.

The potential cumulative impacts were also considered, including other proposed renewable energy facilities in the area. The significance of these were considered to be of **low-high (-)** significance and **low-medium (+)**, without mitigation. These potential cumulative impacts would decrease, with implementation of mitigation measures for the proposed project as well as other proposed projects in the area, and are considered to be acceptable. However, it should be noted that it is not possible to assess these cumulative impacts in a project specific EIA, not least because not all the proposed projects in the area may be approved or constructed. As such it would be necessary for DEA, or a similar body, to undertake a strategic assessment in this regard.

In terms of differences in the significance of potential impacts of the feasible alternatives, the impacts associated with the preferred layout would be significant lower than the alternative layout. As such it is recommended that the preferred layout be approved.

5.4 CONSTRUCTION PHASE IMPACTS

None of the negative construction phase impacts were deemed to have a significant impact on the environment, given their duration (approximately three years) and localised extent. The construction impacts were assessed to be of **very low-medium (-)** significance, without mitigation measures. With the implementation of the recommended EMP the significance of construction phase impacts is likely to reduce to **very low-low (-)**. It should be noted that a potential positive impact on local economy (employment) and social conditions would result and would be of **medium (+)** significance, with and without mitigation measures.

5.5 RECOMMENDATIONS

Chapter 4 as outlined mitigation measures which, if implemented, could significantly reduce the negative impacts associated with the project. Where appropriate, these and any others identified by DEA could be enforced as Conditions of Approval in the Environmental Authorisation, should DEA issue a positive Environmental Authorisation. The mitigation measures are outlined below:

Operation phase impacts:

Botanical impacts

- A rehabilitation plan for the site should be compiled with the aid of a rehabilitation specialist and adhered to;

- Shallow depressions and well defined pans should be avoided, with buffer zones of at least 50 m around pans; and
- The botanically important pan specifically the pan shown on **Figure 4.2**)

Avifaunal (bird) impacts

- Minimize the footprint of the development to the actual area required for the development;
- Minimize noise and disturbance associated with maintenance activities at the plant once it becomes operational;

Surface water impacts

- Monitor both soil chemistry and erosion and mitigate if required;
- Should soil chemistry be affected (this is likely to be an increase in salinity), the nature of the washing mixture could be changed, or acceptable waste treatment employed;
- Install composting toilets that does not require water, septic tanks or soak-aways;
- Channel runoff should be diverted in such a way as to minimise erosion and if necessary, soil stabilising techniques should be implemented in vulnerable areas;
- Removal of perennial alien species such as *Prosopis glandulosa* at sites disturbed or cleared, or where panel washing occurs;
- Stormwater channels and "mitre" chutes should be constructed to direct the stormwater flows and minimize and control erosion;
- Gravel roads should be graded and shaped with a 2 % crossfall back into the slope, allowing stormwater to be channelled in a controlled manor towards the natural drainage lines;
- Where roads intersect natural, defined drainage lines, suitably sized pipe culverts or drive through causeways should be installed or constructed;
- The minor storm design period should be used to determine the size of the earth channels. A return period of 1:5 years is applicable which approximates to an average intensity of 30 mm/hour; and
- The major storm occurrence (i.e. 1:25 year, 1:50 year & 1:100 year) should be used to calculate culverts in defined drainage lines and determine flood levels where necessary. The intensities for each occurrence are: 1:25 year – 46 mm/hour, 1:50 year – 53 mm/hour and 1:100 year – 61 mm/hour respectively.

Visual impacts

- Roads and hard-standings would be constructed as part of the works;
- The first 50-100 mm of naturally occurring substrate should be retained and then spread over finished areas;
- All excess material shall be removed off-site, and the ground shall be returned to original levels/gradients as far as possible;
- New structures should be placed where they are least visible to the greatest numbers of people, in places where the topography can offer shielding, where possible;

- Visibility of buildings and the local sub-station should be reduced by cladding the buildings in non-reflective colours and materials that will blend in with natural environment. E.g. cladding with local stone or plaster and paint with earthy tones for paint colours, roofs should be grey and non-reflective and doors and window frames should reference either the roof or wall colours;
- Finishing materials of the infrastructure (including support structures) should be of colours that are non-reflective and in dark matte colours such as dark grey or charcoal; and
- Information on the project should be provided to local people, such as through a poster at the entrance to the site.

Impacts on local economy (employment) and social conditions

- Give preference to local communities for employment opportunities;
- Base recruitment on sound labour practices and with gender equality in mind; and
- Provide appropriate training, which would enable individuals to apply their skills to other construction and development projects in the region once construction is complete.

Construction phase impacts:

Flora, avifauna and fauna impacts

- Compile and implement a vegetation rehabilitation plan with the aid of a rehabilitation specialist, for inclusion in the Construction EMP. The specialist is to recommend species to be used in rehabilitation as well as any special measures for rehabilitation such as shade-netting and alien vegetation removal;
- The construction phase should be closely monitored by an Environmental Control Officer who should identify any areas that would require rehabilitation in the post-construction phase. The restoration of those areas must follow the construction phase;
- Demarcate no-go areas identified during pre-construction monitoring;
- Low-lying depressions and watercourses should be avoided wherever possible;
- Shallow depressions and well defined pans should be avoided and buffered by at least 50 m;
- The pan located at waypoint at the north end of the site must be avoided with no construction within 50 m of the 'ring' of tall shrubs fringing the pan;
- The site should be cleared in sections as required for construction and not all at once; and
- The top 300 mm of the soil layer shall be stockpiled for rehabilitation purposes.

Sedimentation, erosion and aquatic ecology impacts

- Access roads should be positioned in such a way that no clearing within no-go areas should be necessary and definite drainage areas should be avoided;
- Should additional access roads be required, these will also have to be built with culverts to prevent the impediment of water movement;

- The use of erosion control measures to minimise erosion at excavation / clearing sites or aggregate storage sites is necessary and earth moving construction activities should take place in dry season as far as possible;
- Removal of perennial alien species such as *P. glandulosa* at sites disturbed or cleared by construction activities;
- Construction of access roads should be designed for minimal impact. All construction should take place within the footprint of the proposed facility. Re-alignment of roads should not cross drainage lines.

Heritage resources (including palaeontology) impacts

- A 100 m buffer zone should be implemented from the edge of the pans for sites situated alongside the pans;
- Test excavations around the pans should be done to check for buried archaeological material;
- If mitigation by avoiding sensitive archaeological sites is not feasible, sampling and recording of the archaeological site before its destruction must be undertaken; and
- In the event of accidental uncovering of graves or substantial fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood), work must stop immediately and SAHRA should be notified. An archaeologist / palaeontologist should be involved to assist with the investigation and procedures to address the situation.

Impacts on local economy (employment) and social conditions

- Give preference to local communities for employment opportunities;
- Base recruitment on sound labour practices and with gender equality in mind; and
- Provide appropriate training, which would enable individuals to apply their skills to other construction and development projects in the region once construction is complete.

Visual impacts

- Minimise the construction period, where possible;
- Access road are to be kept tidy, and measures shall be taken to minimise dust from construction traffic on gravel roads;
- Top soil should be removed, conserved and used for rehabilitation;
- All site operatives should receive training in awareness of issues such as the use of hazardous chemical, proper disposal of waste, etc.

Transportation impacts

- Ensure that road junctions have good sightlines;
- Implement traffic control measures where necessary;
- Transport components overnight as far as possible; and
- Engage with the roads authorities prior to construction to ensure the necessary road upgrades, permits, traffic escorts etc. are scheduled.

Noise impacts

- Implement measures as provided in the EMP, which includes procedures for dealing with noise.

Storage of hazardous substances on site

- Implement measures as provided in the EMP, which *inter alia* specify the storage details of hazardous compounds and the emergency procedures to follow in the event of a spillage; and
- Comply with the various pieces of legislation controlling the use of hazardous substances at a construction site.

Dust impacts

- Implement measures as provided in the EMP, which includes procedures for dealing with dust pollution events including watering of roads, etc.

5.5.1 Opinion with respect to environmental authorisation

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

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

Associated with the proposed project are positive impacts on energy production and local economy (employment) and social conditions of **low to medium (+)** significance.

Based on the above, the EAP is of the opinion that the proposed solar energy facility and associated infrastructure, including alternatives, being applied for be authorised as the benefits outweigh the negative environmental impacts. The significance of negative impacts can be reduced with effective and appropriate mitigation through a Life-Cycle EMP, as described in this report. If authorised, the implementation of an EMP should be included as a condition of approval.

5.6 WAY FORWARD

The Draft EIAR was lodged at the Prieska (Elizabeth Vermeulen) Public Library, Ietznietz in Copperton and on the Aurecon website (www.aurecongroup.com/) "Current Location" to "South Africa" and follow the Public Participation links). All registered I&APs were notified of the availability of the Draft EIAR by means of a letter which includes a copy of the Draft

EIAR Executive Summary. The public had until 16 April 2012 to submit written comment on the Draft EIAR to Aurecon.

The Final EIAR has been completed via the addition of I&AP comments and the addition of a letter from Mulilo indicating which mitigation measures will be implemented (see **Annexure H**). The Final EIAR will be submitted to the Northern Cape DEANC and DEA for their review and decision-making, respectively.

The Final EIAR was made available for review at the same locations as the Draft EIAR. Any comments received on the Final EIAR were collated and forwarded directly to DEA.

Once DEA has reviewed the Final EIAR, they will need to ascertain whether the EIA process undertaken met the legal requirements and whether there is adequate information to make an informed decision. Should the above requirements be met, they will then need to decide on the environmental acceptability of the proposed project. Their decision will be documented in an Environmental Authorisation, which will detail the decision, the reasons therefore, and any related conditions. Following the issuing of the Environmental Authorisation, DEA's decision will be communicated by means of a letter to all registered I&APs and the appeal process will commence, during which any party concerned will have the opportunity to appeal the decision to the Minister of Environmental Affairs in terms of NEMA.

It is proposed that the original EIA report be amended into 2 separate documents in support of the separate authorisations, i.e. one considering and assessing the impacts associated with the main PV facility and one considering and assessing the impacts associated with the grid connection respectively. The EMPr will also be amended to separately consider the PV facility and the grid connection.

In terms of Condition 5 of the Environmental Authorisation, it is possible for an applicant to apply, in writing, to the competent authority for a change or deviation from the project description to be approved. In this regard, an application has been submitted to the Department of Environmental Affairs (DEA), as the Competent Authority, and it has been confirmed that a Part 2 process is to be followed in terms of Regulation 32 of the EIA Regulations, 2014.

Split EIA reports have been prepared by Savannah Environmental in support of the application. In terms of Chapter 6 of the EIA Regulations, these documents are being made available for public review and comment. The 30-day review period is from **4 May 2016 to 3 June 2016.** The documentation can be downloaded at **www.savannahSA.com**.

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