Report No: 7580a/109378

PROPOSED PV2-PV7 PHOTOVOLTAIC ENERGY PLANTS ON FARM KLIPGATS PAN NEAR COPPERTON, NORTHERN CAPE

FINAL SCOPING REPORT
23 JULY 2013

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PROJECT DETAILS

DEA REFERENCE NO.	Project	DEA Ref. No.	NEAS Ref. No.
	PV2	14/12/16/3/3/2/486	DEAT/EIA/0001766/2013
	PV3	14/12/16/3/3/2/487	DEAT/EIA/0001767/2013
	PV4	14/12/16/3/3/2/488	DEAT/EIA/0001768/2013
	PV5	14/12/16/3/3/2/489	DEAT/EIA/0001769/2013
	PV6	14/12/16/3/3/2/490	DEAT/EIA/0001770/2013
	PV7	14/12/16/3/3/2/491	DEAT/EIA/0001771/2013

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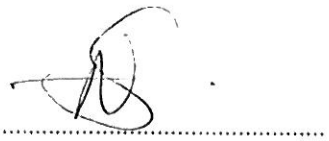

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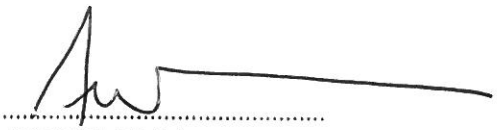

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GLOSSARY OF TERMS

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] Source: http://en.wikipedia.org/wiki/Photovoltaics .(Accessed on: 2013)

ABBREVIATIONS

AC	Alternating current
BID	Background Information Document
CRR	Comments and Response Report
DEA	Department of Environmental Affairs (previously Department of Environmental Affairs and Tourism)
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

Updating of the DSR to the FSR

Minor changes have been made to the Draft Scoping Report (DSR) to update the document to the Final Scoping Report (FSR), as well as respond to comments raised by I&APs. Information that has been added is underlined.

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 six additional 75 MW alternating current (AC) photovoltaic (PV) solar energy plants[2] on a farm, near Copperton in the Northern Cape. Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the requisite environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998), as amended, on behalf of Mulilo.

Aurecon undertook an Environmental Impact Assessment (EIA) process during 2012 on behalf of Mulilo for the authorisation of a 100 MW PV plant on farm Klipgats Pan (Portion 4 of Farm No. 117) near Copperton[3]. An Environmental Authorisation was issued by the Department of Environmental Affairs (DEA) on 13 August 2012. The approved PV facility will hereafter be referred to as Klipgats Pan PV1. Mulilo is now investigating an additional six PV plants of 75 MW Alternative current (AC) each on farm Klipgats Pan as described in Chapter 2 (see **Figure 1.1**). Alternatively, three PV plants of 225 MW, 150 MW and 300 MW respectively are proposed.

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 a number of listed activities in terms of NEMA, it accordingly requires environmental authorisation. Since the project is for the generation of energy, 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.

This report serves to document the Scoping Phase of the EIA process. Please refer to **Section 1.4** for more information on the EIA process and sequence of documents produced as a result of the process.

[2] Please refer to Annexure E for more information on the photovoltaic affect.
[3] DEA Ref. No.: 12/12/20/2503; NEAS Ref. No.: DEAT/EIA/0000605/2011

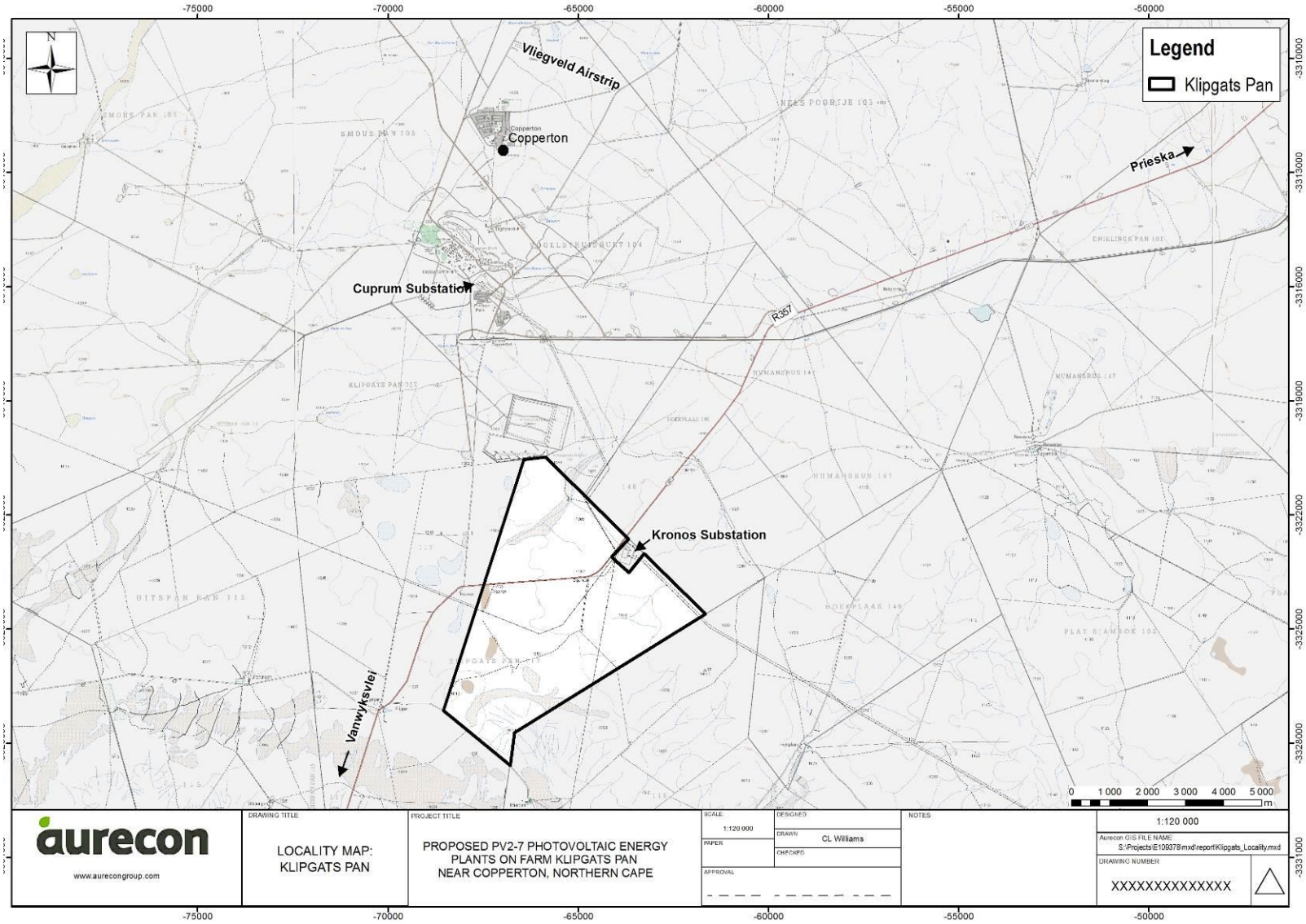

Figure 1.1 Location of farm Klipgats Pan near Copperton, Northern Cape (2922 CD)

The purpose of this Scoping Report[4] is to provide the background and outline the scope of work proposed to be undertaken in the EIA Report (EIAR) phase. Accordingly, the Scoping Report:

- Outlines the legal and policy framework;
- Describes the proposed project and its alternatives;
- Describes the Public Participation Process undertaken to date;
- Describes the biophysical and socio-economic context;
- Describes the range of alternatives that require further investigation in the EIA Phase.
- Identifies potential impacts, including cumulative impacts, that would be assessed in the EIA Phase, inclusive of specialist studies that would be undertaken; and
- Details the assessment methodology that would be adopted for the project.

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 Environmental Authorisation (EA) process has been undertaken in terms of NEMA and the EIA Regulations promulgated on 18 June 2010[5].

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 plants

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

[4] Section 28 of EIA Regulation No. 543 of NEMA lists the content required in a Scoping Report.
[5] GN No. R 543, 544, 545, 546 and 547 in Government Gazette No. 33306 of 18 June 2010.

NO	LISTED ACTIVITY
	GN No. R544, 18 June 2010
	• inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.
11	The construction of - (x) buildings exceeding 50 square metres (m^2) in size; or (xi) infrastructure or structures covering 50m^2 or more where such construction occurs within a watercourse or within 32m of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
15	Physical alteration of undeveloped, vacant or derelict land for residential retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more.
	GN No. R545, 18 June 2010
1	The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 MW 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.

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 000m^2 in extent*", "*the construction of a road…powerline, pipeline…exceeding 300m in length*" or "*the rezoning of site larger than 10 000m^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 projects further.

1.2.3 Astronomy Geographic Advantage Act, No. 21 of 2007

The Astronomy Geographic Advantage Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto.

Chapter 2 of the act allows for the declaration of astronomy advantage areas whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following:

- Restrictions on use of radio frequency spectrum in astronomy advantage areas;
- Declared activities in core or central astronomy advantage area;
- Identified activities in coordinated astronomy advantage area; and
- Authorisation to undertake identified activities.

On 19 February 2010, the Minister of Science and Technology (the Minister) declared the whole of the territory of the Northern Cape province, excluding Sol Plaatje Municipality, as an astronomy advantage area for radio astronomy purposes in terms of Section 5 of the Act and on 20 August 2010 declared the Karoo Core Astronomy Advantage Area for the purposes of radio astronomy.

The area consists of three pieces of farming land of 13 407 hectares in the Kareeberg and Karoo Hoogland Municipalities purchased by the National Research Foundation. The Karoo Core Astronomy Advantage Area will contain the MeerKAT radio telescope and the proposed core of the planned Square Kilometre Array (SKA) radio telescope that will be used for the purposes of radio astronomy and related scientific endeavours. The proposed plant falls outside of the Karoo Core Astronomy Advantage Area (KCAA), but inside the general astronomy advantage area.

The Minister may still declare that activities prescribed in Section 23(1) of the Act may be prohibited within the area, such as the construction, expansion or operation of any fixed radio frequency interference sources and the operation, construction or expansion of facilities for the generation, transmission or distribution of electricity. It should be noted that solar energy facilities are unlikely to cause radio frequency interference. While the Minister has not yet prohibited these activities it is important that the relevant astronomical bodies are notified of the proposed project and provided with the opportunity to comment on the proposed project.

1.2.4 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.

If a water use licence application is required it would fall outside of the scope of this EIA and would be addressed by Mulilo as part of their broader project planning. Comment will also be sought from the Department of Water Affairs DWA as part of the Scoping and EIA process.

1.2.5 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.

1.2.6 Other applicable legislation and policies

This section provides an overview of the policy and legislative context in which the development of renewable energy projects takes place in South Africa. The following policies and legislative context are described:

- White Paper on the Energy Policy of the Republic of South Africa (1998);
- White Paper on Renewable Energy (2003);
- National Energy Act (2008);
- National Electricity Regulation Act (2006);
- Integrated Energy Plan for the Republic of South Africa (2003);
- Integrated Resource Plan (2011);
- Independent Power Producer (IPP) Procurement Process; and
- Policies regarding greenhouse gas and carbon emissions.

a) White Paper on the Energy Policy of the Republic of South Africa (1998)

As required by the Constitution of the Republic of South Africa (Act No. 108 of 1996), the White Paper on the Energy Policy of the Republic of South Africa (1998) was published by the Department of Minerals and Energy in response to the changing political climate and socio-economic outlook. Key objectives are identified in terms of energy supply and demand, as well as co-ordinated with other social sectors and between energy sub-sectors.

The White Paper commits to government's focused support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications. With the aim of drawing on international best practice, specific emphasis is given to solar and wind energy sources, particularly for rural and often off-grid areas.

While considering the larger environmental implications of energy production and supply, the White Paper looks into the future to adopting an integrated resource planning approach,

integrating the environmental costs into economic analysis. It is with this outlook that the renewable energy, including solar energy, is seen as a viable, attractive and sustainable option to be promoted as part of South Africa's energy policy towards energy diversification.

b) White Paper on Renewable Energy (2003)

Published by the Department of Minerals and Energy (DME) in 2003, the White Paper on renewable Energy supplements the above-mentioned Energy Policy which identified the medium- and long-term potential for renewable energy as significant. The White Paper sets out the vision, policy principles, strategic goals and objectives in terms of renewable energy. At the outset the policy refers to the long term target of "*10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013."* The aim of this 10-year plan is to meet this goal via the production of mainly biomass, wind, solar and small-scale hydro sources. It is estimated that this would constitute approximately 4% of projected energy demand for 2013.

The White Paper presents South Africa's options in terms of renewable energy as extensive and a viable and sustainable alternative to fossil fuel options. A strategic programme of action to develop South Africa's renewable energy resources is propose, particularly for power generation and reducing the need for coal-based power generation. The starting point will be a number of initial investments spread across both relatively low cost technologies, such as biomass-based cogeneration, as well as technologies with larger-scale application, such as solar water heating, wind and small-scale hydro.

Addressing environmental impacts and the overarching threats and commitments to climate change, the White Paper provides the platform for further policy and strategy development in terms of renewable energy in the South African energy environment.

c) National Energy Act (No. 34 of 2008) and Electricity Regulation Act (No. 4 of 2006)

South Africa has two acts that direct the planning and development of the country's electricity sector:

i. The National Energy Act (No. 34 of 2008); and
ii. The Electricity Regulation Act (ERA) (No. 4 of 2006).

In May 2011, the Department of Energy (DoE) gazetted the Electricity Regulations on New Generation Capacity under the ERA. The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an Independent Power Producer (IPP) Bid Programme and the procurement of an IPP for new generation capacity. They also facilitate the fair treatment and non-discrimination between IPPs and the buyer of the energy[6].

In terms of the New Generation Regulations, the Integrated Resource Plan (IRP) (see **Section 1.2.6.f**) has been developed by the DoE and sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. This required, new generation capacity must be met through the

[6] Source: http://www.eskom.co.za/c/73/ipp-processes/ (Accessed on: 29/10/11)

technologies and projects listed in the IRP and all IPP procurement programmes will be undertaken in accordance with the specified capacities and technologies listed in the IRP[7].

d) IPP Procurement Process

South Africa initially aimed to procure 3 725 MW capacity of renewable energy by 2016 (the first round of procurement). This 3 725 MW is broadly in accordance with the capacity allocated to renewable energy generation in the IRP2010. It was also announced on 19 December 2012 that South Africa will move to procure an additional 3 200 MW of renewable energy capacity by 2020, over and above the 3 725 MW being procured currently under the Renewable Energy Independent Power Producer Programme (REIPPP). A brief overview of the IPP Procurement process to date is provided below and in **Table 1.2**.

On 3 August 2011, DoE formally invited interested parties with relevant experience to submit proposals for the finance, operation and maintenance of renewable energy generation facilities adopting any of onshore wind, solar thermal, solar PV, biomass, biogas, landfill gas or small hydro technologies for the purpose of entering, inter alia, an Implementation Agreement with DoE and a Power Purchase Agreement with a buyer (Eskom) in terms of the ERA. This Request for Qualification and Proposals for new generation capacity was issued under the IPP Procurement Programme. The IPP Procurement Programme has been designed to contribute towards the target of 3 725 MW and additional 3 200 MW, and towards socio-economic and environmentally sustainable growth, and to start and stimulate the renewable industry in South Africa.

In terms of this IPP Procurement Programme, Bidders will be required to bid on tariff and the identified socio-economic development objectives of DoE[8]. The tariff will be payable by the Buyer should the project be selected.

Table 1.2 Milestones of the IPP process

First Bid Submission	
First Bid Submission Date	4 November 2011
Announcement of Preferred Bidders in respect of First Bid Submission Date	7 December 2011
Solar PV capacity awarded	631.53 MW
Second Bid Submissions	
Second Bid Submission Date	5 March 2012
Announcement of Preferred Bidders in respect of Second Bid Submission Date	21 May 2012
Solar PV capacity awarded	417.1 MW
Third Bid Submission	
Third Bid Submission Date	19 August 2013
Announcement of Preferred Bidders in respect of Third Bid Submission Date	To be advised

[7] http://www.eskom.co.za/c/73/ipp-processes/ (Accessed on: 29/10/11)

[8] After the second bid submission the prices for solar PV were capped at below 285c/kWh.

The selection process to determine the preferred bidders will be based on both price and other economic development criteria in a 70% and 30% ratio respectively (Creamer, T. 2011). If the maximum MW allowance for any particular technology has been allocated during any particular window, then the subsequent bidding opportunities will not be opened for that technology. The MW capacity per technology is indicated in **Table 1.3**.

IPPs that wish to connect to Eskom's network will be required to apply for a connection, pay a connection charge and sign a connection and use-of-system agreement[9]. All IPPs will be provided non-discriminatory access to Eskom's network, subject to the IPP's obtaining its required approvals such as EIA's and a generating and trading licence from the National Energy Regulator South Africa.

Table 1.3 Megawatts capacity per technology

Technology	Initial MW	Additional MW	Total MW per Technology
Onshore wind	1,850MW	1,470MW	3,320MW
Concentrated solar thermal	200MW	400MW	600MW
Solar PV	1,450MW	1,075MW	2525MW
Biomass solid	12.5MW	47.5MW	60MW
Biogas	12.5MW	47.5MW	60MW
Landfill gas	25MW	-	25MW
Small hydro	75MW	60MW	135MW
Small projects[10]	100MW	100MW	200MW
TOTAL	**3,725MW**	**3,200MW**	**6,925MW**

e) Integrated Energy Plan for the Republic of South Africa

Commissioned by DME in 2003, the Integrated Energy Plan (IEP) aims to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance in providing low cost electricity for social and economic developments, ensuring security of supply and minimising the associated environmental impacts.

The IEP projected that the additional demand in electricity would necessitate an increase in electricity generation capacity in South Africa by 2007. Furthermore, the IEP concluded that, based on energy resources available in South Africa, coal would be the primary fuel source in the 20 year planning horizon, which was specified as the years 2000 to 2020, although other cleaner technologies continue to be investigated as alternatives in electricity generation options. Therefore, though the next two decades of energy generation are anticipated to remain coal-based, alternative technologies and approaches are available and need to be contextually considered.

[9] Source: http://www.eskom.co.za/c/article/150/independent-power-prodicers-ipp/. 2011
[10] Small projects are less than or equal to 40MW.

f) Integrated Resource Plan

The Integrated Resource Plan (IRP) is a National Electricity Plan, which is a subset of the Integrated Energy Plan. The IRP is also not a short or medium-term operational plan but a plan that directs the expansion of the electricity supply over the given period.

The IRP, indicating the schedule for energy generation programmes, was first gazetted on 31 December 2009. A revised schedule was gazetted on 29 January 2010 and the schedule has once again been revised and the final IRP (IRP2010-2030) was gazetted on 6 May 2011.

Developed for the period of 2010 to 2030, the primary objective of the IRP2010, as with its predecessors, is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing, and cost. While promoting increased economic development through energy security, the IRP2010 aims to achieve a "*balance between an affordable electricity price to support a globally competitive economy, a more sustainable and efficient economy, the creation of local jobs, the demand on scarce resources such as water and the need to meet nationally appropriate emission targets in line with global commitments*".

As can be seen by **Table 1.4** below the current final IRP provides for an additional 20,409 MW (shaded in grey) of renewable energy in the electricity mix in South Africa by 2030.

Table 1.4 Policy adjusted scenario of the IRP2010 as gazetted on 6 May 2011

	Total generating capacity in 2030		Capacity added (including committed) from 2010-2030		New (uncommitted) capacity options from 2010-2030	
Technology	**MW**	**%**	**MW**	**%**	**MW**	**%**
Coal	41,074	45.9	16,383	29.0	6,250	14.7
OCGT	7,330	8.2	4,930	8.7	3,910	9.2
CCGT	2,370	2.6	2,370	4.2	2,370	5.6
Pumped Storage	2,912	3.3	1,332	2.4	0	0
Nuclear	11,400	12.7	9,600	17.0	9,600	22.6
Hydro	4,759	5.3	2,659	4.7	2,609	6.1
Wind	9,200	10.3	9,200	16.3	8,400	19.7
CSP	1,200	1.3	1,200	2.1	1,000	2.4
PV	8,400	9.4	8,400	14.9	8,400	19.7
Other	890	1.0	465	0.8	0	0
Total	**89,532**	**100**	**56,539**	**100**	**42,539**	**100**

The final IRP2010 reflects both the consultation process on the draft IRP2010 currently being undertaken with stakeholders and the further technical work undertaken in this period. It is noted that *"given the rapid changes in generation technologies and pricing, especially for "clean" energy sources, the IRP will have to be reviewed on a regular basis, for instance every two years, in order to ensure that South Africa takes advantage of emerging technologies. This may result in adjustments in the energy mix set out in the balanced revised scenario within the target for total system capacity."*

g) Policies regarding greenhouse gas and carbon emissions

Gases that contribute to the greenhouse effect are known to include carbon dioxide (CO_2), methane (CH_4), water vapour, nitrous oxide, chlorofluorocarbons (CFCs), halons and peroxyacylnitrate (PAN). All of these gasses are transparent to shortwave radiation reaching the earth's surface, but trap long-wave radiation trying to leave the earth's surface. This action leads to a warming of the earth's lower atmosphere, resulting in changes in the global and regional climates, rising sea levels and extended desertification. This in turn is expected to have severe ecological consequences and a suite of implications for mankind.

Electricity generation using carbon based fuels is responsible for a large proportion of carbon dioxide (CO_2) emissions worldwide. In Africa, the CO_2 emissions are primarily the result of fossil fuel burning and industrial processes, such coal fired power stations. South Africa accounts for some 38% of Africa's CO_2 emissions. The global per capita CO_2 average emission level is 1.23 metric tonnes. In South Africa however, the average emission rate is 2.68 metric tonnes per person per annum. The International Energy Agency (2008) estimates that nearly 50% of global electricity supplies will need to come from renewable energy sources in order to halve CO_2 emissions by 2050 and minimise significant, irreversible climate change impacts

The United Nations Framework Convention on Climate Change (UNFCCC) has initiated a process to develop a more specific and binding agreement on the reduction of greenhouse gas (GHG) emissions. This led to negotiations with a particular focus on the commitments of developed countries, and culminated in the adoption of the Kyoto Protocol in 1997, which came into effect in February 2005. Using the above framework to inform their approach, the Kyoto Protocol has placed specific legal obligations in the form of GHG reduction targets on developed countries and countries with 'Economies in Transition'. The developed countries listed in Annex 1 of the UNFCCC are required to reduce their overall emissions of six GHGs by at least 5% below the 1990 levels between 2008 and 2012. 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. More recently under the Copenhagen Accord 2010, countries representing over 80% of global emissions have submitted pledges on emission reductions. South Africa's commitment is to reduce GHG emissions 34% by 2020 and 42% by 2025.

The Kyoto Protocol, to which South Africa is a signatory, was informed by the principles of sustainable development which resulted in related policies and measures being identified to promote energy efficiency while protecting and enhancing the 'sinks and reservoirs' of greenhouse gases (forests, ocean, etc.). Other methods/approaches included encouraging more sustainable forms of agriculture, in addition to increasing the use of new and renewable energy and the adoption/implementation of advanced and innovative environmentally sound technologies. South African policies are being informed by the Kyoto Protocol (which is valid until 2012) and its partial successor the Copenhagen Accord 2010 and associated sustainable development principles whereby emphasis is being placed on industries for 'cleaner' technology and production.

1.3 TERMS OF REFERENCE AND SCOPE OF THE EIA

In February 2013, Mulilo appointed Aurecon to undertake an EIA process, in terms of NEMA, for the six proposed PV plants 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[11] 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);
- 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. 2013. Guideline on Public Participation (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Alternatives (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Need and Desirability (DEA&DP, March 2013).
- DEA&DP. 2013. Guideline on Appeals (DEA&DP, March 2013).

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 second phase, *viz.* the Scoping Report Phase.

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

1.4.1 Initial Application Phase

The Initial Application Phase entailed the submission of EIA Application Forms to notify DEA of the proposed projects, in March 2013. Acknowledgements of receipt of the EIA Application Forms were received from DEA on 26 March 2013. The Application Forms and DEA's letters of acknowledgement are included in **Annexure A**.

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).

To date various methods and sources were utilised to identify the social and environmental aspects associated with the proposed project and to develop the Terms of Reference (ToR) for the required specialist studies. The sources of information for the preparation of this EIA report include, amongst others, the following:

- Proposed PV Energy Plant on Farm Hoekplaas near Copperton, Northern Cape: Final EIA Report (Aurecon, 2012);
- 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 (EIA Report) (DJ Environmental Consultants, 2010);
- Proposed Construction of a Wind Farm and PV Plant near Prieska, Northern Cape Province of South Africa. Draft Scoping Report (SiVEST, 2011);
- Proposed Wind Energy Facility near Copperton, Northern Cape: Final Scoping Report. Report No. 5357A/ 106563 (Aurecon, 2011);
- Proposed Prieska Solar Energy Facility and Associated Infrastructure, Northern Cape (Savannah Environmental Pty (Ltd) January 2013); and
- Proposed Garob Wind Energy facility project, located near Copperton in the Northern Cape, (Savannah Environmental Pty (Ltd), December 2012).

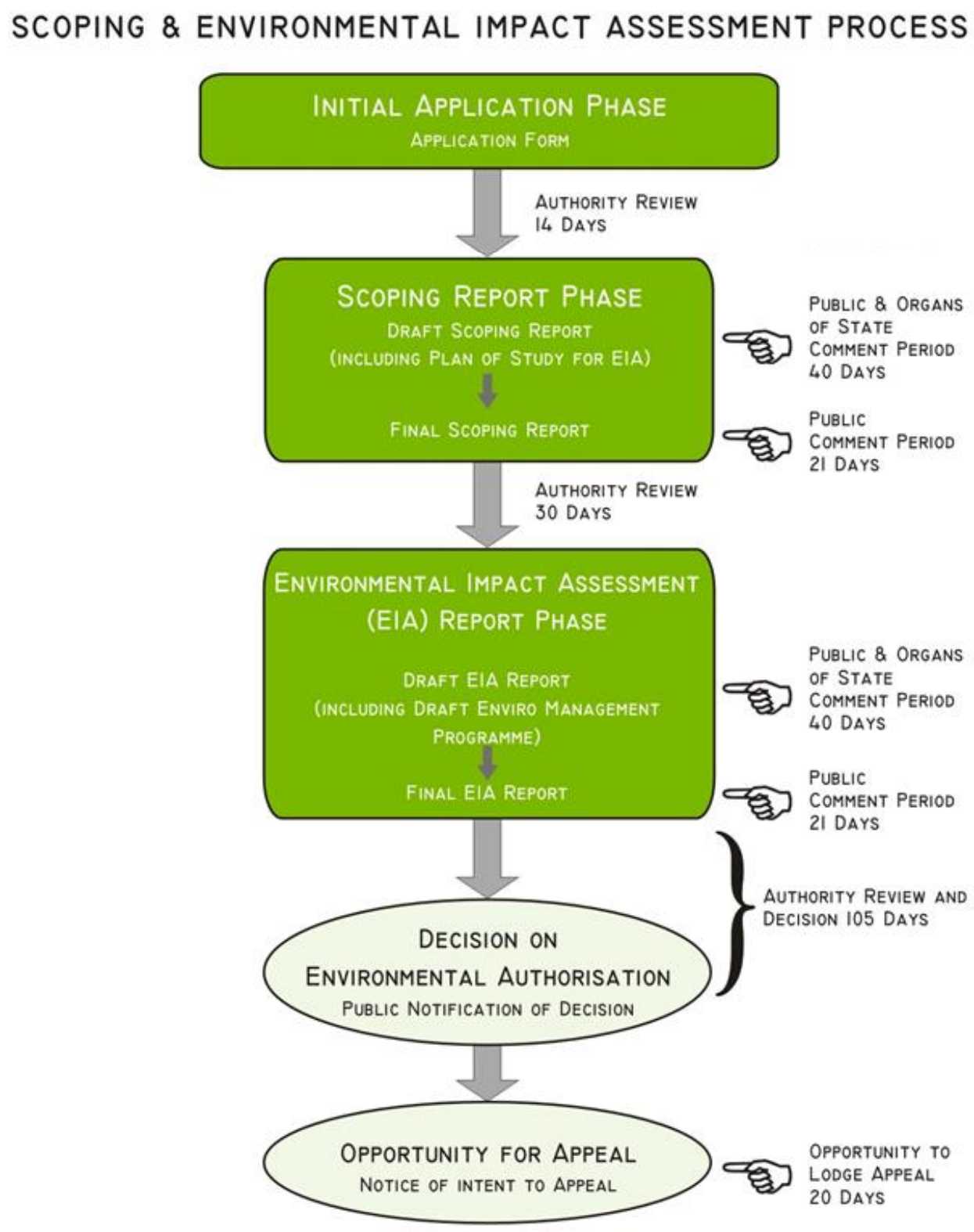

Figure 1.2 The EIA process in terms of NEMA

:

Other tasks undertaken include:

- Advertisements were placed in a local newspaper, the Gemsbok, notifying the broader public of the initiation of the EIA and inviting them to register as I&APs on 26 April 2013; and
- A site notice was placed at the entrance to Farm Hoekplaas on 17 April 2013 the site notices are included in **Annexure B**).

Due to Aurecon's involvement in the 2012 EIA process undertaken on farm Klipgats Pan, no fieldtrips were undertaken by the EAP for these current applications. Specialists will however be required to undertake detailed site assessments as included in the Plan of Study for the EIA process and their Terms of Reference (ToR).

1.4.3 The EIA Phase

The Scoping Phase will be followed by the EIA Phase, during which the specialist investigations will occur, and will culminate in a comprehensive Environmental Impact Assessment Report (EIAR) documenting the outcome of the impact assessments.

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 3**.

1.4.5 Authority involvement

Authority consultation represents the first stage of the public consultation process. EIA Application Forms were submitted to DEA to notify the Department of the proposed projects. The DEA acknowledged receipt of the EIA Application Forms and issued reference numbers for the proposed projects in March 2013. The Application Forms and DEA's letters of acknowledgement are included in **Annexure A.**

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 projects 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 PV plants.

The Draft Scoping Report (DSR) was provided to the following authorities for comment, namely:

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

1.4.6 Decision making

The DSR was made available to the public for a prerequisite 40 day comment period. All comments received during the comment period were included in a Comments and Responses Report (CRR) and annexed to the Final Scoping Report (FSR).

The competent authority (DEA) must, within 30 days of receipt of the DSR, or receipt of the required information, reports, or comments or an amended scoping report, consider it, and in writing –

(a) Accept the report and advise the Environmental Assessment Practitioner (EAP) to proceed with the tasks contemplated in the Plan of Study for EIA;
(b) Request the EAP to make such amendments to the report as the component authority may require, or
(c) Reject the Scoping Report if it
    (i) Does not contain material information required in terms of these regulations, or
    (ii) Has not taken into account guidelines applicable in respect of Scoping Reports and Plans of Study for EIA.

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 Assumptions

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

- The strategic level investigations undertaken by DoE 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 plants and connections to the grid.

1.5.2 Gaps in knowledge

This Scoping Report has identified the potential environmental impacts associated with the proposed activities. However, the scope of impacts presented in this report could change, should new information become available during the EIA Phase. The purpose of this section is

therefore to highlight gaps in knowledge when the Scoping phase of the project was undertaken, these include:

- Lack of confirmation of service's capacity from the municipality.
- Lack of clarity on the accommodation of construction workers.

The planning for the proposed facility is at a feasibility level and therefore some of the specific details are not available at this stage of 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 to inform the EIA process. 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

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 Leader, Miss Franci Gresse, and the Project Staff, Miss Nomvelo Siwela, are appropriately qualified and registered with the relevant professional bodies and/or are in the process of registering. Mr van der Merwe is a certified Professional Engineer of South Africa (EAPSA). Miss Gresse has a BSc (Hons) degree in Conservation Ecology and has been involved in a number of renewable energy projects in the Western and Northern Cape provinces. Miss Siwela has a B-Tech degree in Environmental Management. The CV summaries of the key Aurecon staff are included in the Plan of Study for EIA contained in **Chapter 5**.

1.7 STRUCTURE OF THE SCOPING REPORT

Table 1.5 presents the structure of the Scoping report as well as the applicable sections that address the required information in terms of NEMA. Specifically, Section 28 (1) of the EIA Regulations requires that the following information is provided:

Table 1.5 Information required by NEMA for inclusion in the EIA documentation

REGULATION	CONTENT AS REQUIRED BY NEMA	SECTION / ANNEXURE
28(1)(a)	(i) Details of the EAP who prepared the report; and	***Project Detail***
	(ii) Details of the expertise of the EAP to carry out scoping procedures.	***Section 5.9***
28(1)(b)	A description of the proposed activity.	***Section 2.2***
28(1)(c)	A description of any feasible and reasonable alternatives that have been identified.	***Section 2.3***
28(1)(d)	A description of the property on which the activity is to be undertaken and the location of the activity on the property.	***Section 2.2 and Section 4.2***
28(1)(e)	A description of the environment that may be affected by the activity and the manner in which the activity may be affected by the environment.	***Section 4.2***
28(1)(f)	An identification of all legislation and guidelines that have been considered in the preparation of the scoping report.	***Section 1.2***
28(1)(g)	A description of environmental issues and potential impacts, including cumulative impacts that have been identified.	***Sections 4.3 – 4.5 and Section 5.3***
28(1)(h)	Details of the public participation process conducted in terms of regulation 27(a), including –	***Chapter 3***
	(i) The steps that were taken to notify potentially interested and affected parties of the application;	***Section 3.2***
	(ii) Proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given;	***Sections 3.2.1, 3.2.2; 3.2.3***
	(iii) A list of all persons, organisations and organs of state that were registered in terms of regulation 55 as interested and affected parties in relation to the application; and	***Annexure C***
	(iv) A summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues.	***Sections 3.3 – 3.5***
28(1)(i)	A description of the need and desirability of the proposed activity.	***Section 2.1***
28(1)(j)	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 on the community that may be affected by the activity.	***Section 2.3 and Sections 4.3 – 4.5***
28(1)(k)	Copies of any representations, comments received in connection with the application or the scoping report from interested and affected parties.	***Final Scoping Report***
28(1)(l)	Copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants.	***Final Scoping Report***
28(1)(m)	Any response by the EAP to those representations and comments and views.	***Final Scoping Report***
28(1)(n)	A plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include:	***Chapter 5***

REGULATION	CONTENT AS REQUIRED BY NEMA	SECTION / ANNEXURE
	(i) A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;	***Section 5.2 and Section 5.3***
	(ii) An indication of the stages at which the competent authority will be consulted;	***Section 3.5; 3.6; and Section 5.7***
	(iii) A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and	***Section 5.3.2***
	(iv) Particulars of the public participation process that will be conducted during the environmental impact assessment process.	***Chapter 3 and Section 5.7***
28(1)(o)	Any specific information required by the competent authority.	***N/A***
28(1)(p)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	***N/A***
28(2)	In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application.	***Section 1.3***
28(3)	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) if the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation (1)(c), exist.	***N/A***

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 2013 DEA&DP Guideline for Need and Desirability[12] 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[13], 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

As illustrated in **Figure 2.1** South Africa is subject to some of the highest levels of solar radiation in the world with an average daily solar radiation that varies between 4.5 and 6.5 kWh/m^2. This in comparison to the ± 3.6 kWh/m^2 received by parts of the United States and ± 2.5 kWh/m^2 for Europe and the United Kingdom (DME, 2003), indicates that South Africa has considerable solar resource potential which should be utilised.

South Africa generates most of its required electricity from coal of which there is a ready supply of at the local level. However, national government is on the verge of augmenting the existing generation capacity of thermal and nuclear power plants with renewable energy power generation, thereby creating a framework that will lead to an increase in the supply of clean energy for the nation.

The proposed PV plant would convert shortwave radiation (sunlight) directly into electricity via cells through a process known as the PV Effect. The PV cells are made of silicone which acts

[12] DEA&DP (2013) Guideline on Need and Desirability, NEMA EIA Regulations Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

[13] 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].

as a semi-conductor. The cells absorb light energy which energizes the electrons to produce electricity. Individual solar cells can be connected and packed into standard modules behind a glass sheet to protect the cells from the environment while obtaining the desired currents and voltages. These modules are grouped together to form a panel and can last up to 25 years due to the immobility of parts, as well as the sturdiness of the structure. However, the Power Purchase Agreement (PPA) is only valid for a period of 20 years after which the plant would most likely be decommissioned and the site rehabilitated.

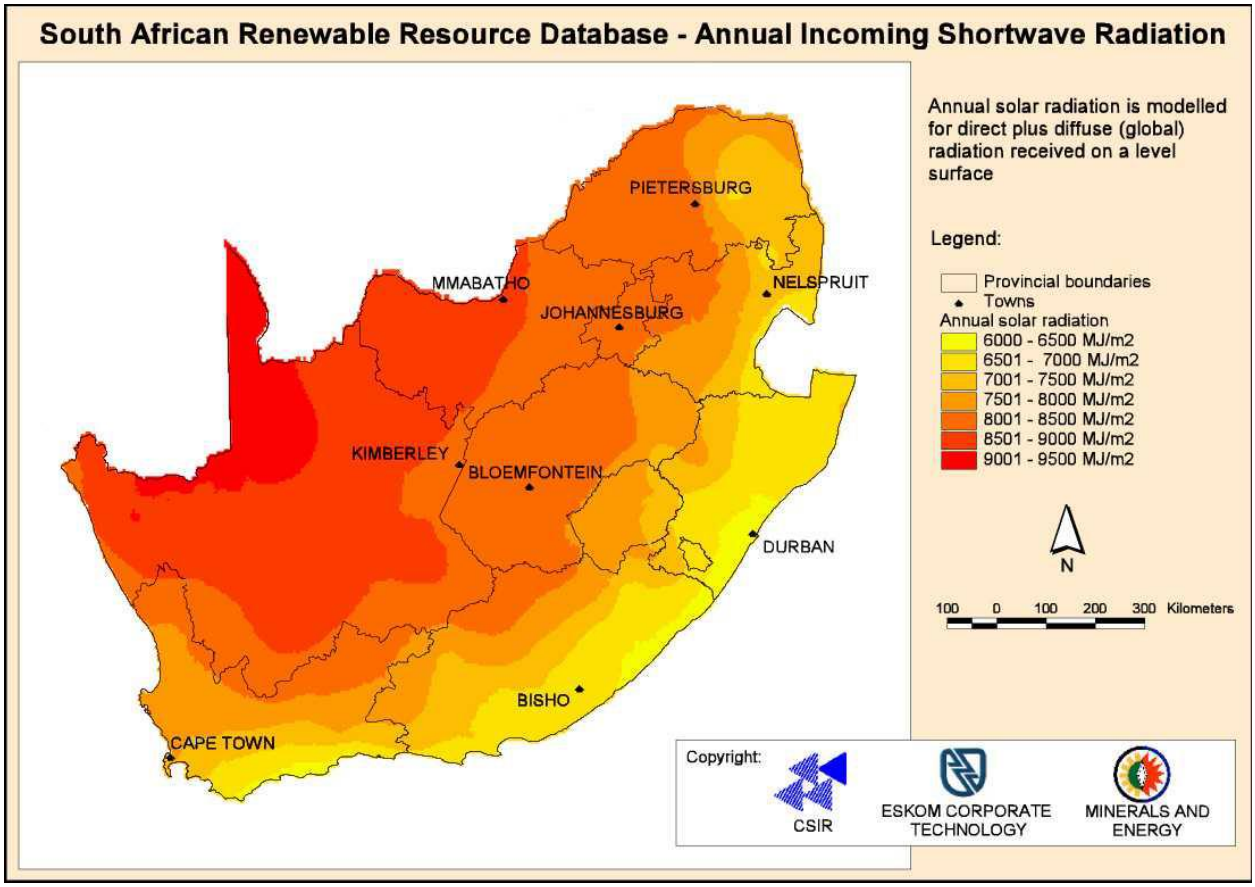

Figure 2.1 Annual solar radiation for South Africa (DME, 2003)

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

As can be seen by the numerous policies and legislation described in **Section 1.2**, the need for renewable energy is well documented. 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 PV projects are expected to contribute positively towards climate change mitigation.

Furthermore, 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.

Solar energy is also a source of "green" electricity as for every 1MWh of "green" electricity used instead of traditional coal generated electricity, 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 establishment of the six (6) proposed Klipgats Pan PV plants 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). Should the proposed PV plants 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 too.

2.1.4 Creating a more sustainable economy

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 will contribute directly to the upliftment of the individuals and the societies in which they live.

Skills development and the transfer thereof will be one of the top a priority priorities and local community involvement will be enhanced as far as possible. Approximately 2,800 man months will be required during the construction phase depending on the procurement method and the primary contractor.

In addition, the following potential benefits could be realised:

- Reducing the demand on scarce resources, such as water as the generation of energy from PV facilities uses less water per MW/h than coal-fired facilities;
- Reducing pollution as the generation of energy from PV facilities produces far less pollution per MW/h than coal-fired facilities;
- 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 IDP?	*The area proposed is currently zoned as Agricultural land. The farmer has signed a lease agreement with Mulilo for the site which 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 for development. Other needs that were identified include sustainable developments (economically, socially and environmentally) and job creation.* *The proposed PV plants 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. The following employment and economic opportunities are envisioned.*
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)?	*Yes. The proposed PV plants 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 (as explained in Question 1 above) 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?	*It is anticipated that water requirements during the construction and operational phases would be met via the Alkantpan pipeline. However, the applicant still needs to confirm whether sufficient capacity is available.* *Estimated water requirements:* • *Construction Phase: Each 75 MW AC plant would require roughly 1400 kℓ over a period of 12 to 24 months* • *Operational Phase: 508 kℓ of water per year or 1.4 kℓ per day.* *Furthermore, the establishment of the proposed Klipgats Pan PV plants 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)?	*No. It should be noted that once the proposed PV plants are operational, there would be a very limited requirement for municipal services in terms of water, waste and sewage 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 Klipgats Pan plants would strengthen the existing electricity grid for the area. Moreover, the projects would contribute towards meeting the national energy target as set by the DoE.*
DESIRABILITY (PLACING) **Question**	Response
1. Is the development the best practicable environmental option (BPEO) for this land/ site?	*The proposed development would provide additional income to the landowner which could be used for sustainable agricultural practices on his farm.*
2. Would the approval of this application compromise the integrity of the existing approved 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 PV plants would not only be a source of income to the farmers, but it would also create job opportunities for the local community as the construction and operation of the PV plants would require a wide range of skill levels.*
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;* • *Close proximity to Eskom's existing transmission lines;* • *Flat, level, and open land; and* • *Unpopulated and non-arable or low arable potential land.* *In addition, specialist studies undertaken during 2012 on*

	the farm found that it was suitable for solar energy projects. *Furthermore, the benefit of combining multiple plants on one farms includes:* • *Sharing of supply infrastructure such as water, sewage and electricity.* • *Reducing the impact on the environment by "concentrating" infrastructure and footprints.* • *Reducing the cost of electricity as a result of reduced development, construction and operational costs due to the combined sharing of infrastructure, etc.* • *Utilizing a single laydown area and construction camp, minimizing traffic and associated impacts with multiple camps.* • *Allowing a phased approach to construction activities, thereby extending the construction period and employment opportunities.* • *Reducing the need for multiple electricity grid upgrades in the long term.*
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 proposed PV plants (see Chapter 4) will be discussed and assessed during the EIA phase. Please refer to the Plan of Study for EIA in Chapter 5.*
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.)?	*Please refer to Chapter 4 which deals with potential impacts that will be further assessed in the EIA Phase. Also see the Plan of Study for EIA in Chapter 5.*
7. Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	*The socio-economic impacts will be assessed and discussed in the EIA phase. Refer to the Plan of Study for EIA in Chapter 5.*
8. Will the proposed land use result in unacceptable cumulative impacts?	*Please refer to Chapter 4 which deals with potential impacts that will be further assessed in the EIA Phase. Also see the Plan of Study for EIA in Chapter 5.*

2.2 DESCRIPTION OF THE PROPOSED ACTIVITY

Mulilo proposes to construct six additional PV plants to generate approximately 75 MW AC on the farm Klipgats Pan (Portion 4 of Farm No. 117) near Copperton in the Northern Cape. The total extent of the proposed facilities would be approximately 1,095 ha as set out in **Table 2.2** below.

Table 2.2 Footprints, capacities and coordinates of the proposed PV plants (preferred)

Plant	Footprint (ha)	Capacity (MW)	Coordinates (middle point)
PV2	221	75	30°00'48.29" S 22°18'37.88" E
PV3	220	75	30°01'17.15" S 22°19'35.73" E
PV4	248	75	30°02'00.43" S 22°20'20.08" E
PV5	201	75	30°02'27.17" S 22°18'07.52" E
PV6	180	75	30°02'35.28" S 22°20'39.11" E
PV7	235	75	30°03'18.29" S 22°19'01.97" E

Alternatively three PV plants with generation capacities of 225 MW (Alternative PV2), 150 MW (Alternative PV3) and 300 MW (Alternative PV4) are proposed. The total extent of the three alternative PV plants would be approximately 2147 ha (see **Table 2.3**).

Table 2.3 Footprints, capacities and coordinates of the proposed PV plants (alternatives)

Plant	Footprint (ha)	Capacity (MW)	Coordinates (middle point)
PV2A	693	225	30°01'10.49" S 22°19'07.91" E
PV3A	408	150	30°02'21.40" S 22°20'35.72" E
PV4A	1046	300	30°03'06.47" S 22°18'44.44" E

The proposed layouts (see **Figures 2.2 and 2.3**) have taken cognisance of the environmental sensitive areas identified during the previous EIA undertaken for PV1 (Aurecon, 2012).

Each of the proposed PV facilities would consist of the following:

- **Solar energy plant:** A photovoltaic component comprising of numerous arrays of PV panels and associated support infrastructure to generate up to 75 MW AC per plant, through the PV effect (see Annexure E).
- **Transmission lines:** 132 kV overhead transmission lines (see **Figure 2.4**) to connect each facility to the central onsite substation or an existing Eskom substation which is situated offsite (i.e. Kronos or Cuprum).
- **Substations:** An onsite 132 kV, 3 bay substation per project and two central mulitbay 132 kV substations with a maximum of six incoming bays and two outgoing.
- **Boundary fence:** Each 75 MW AC facility would have an electrical fence for safety and security reasons.

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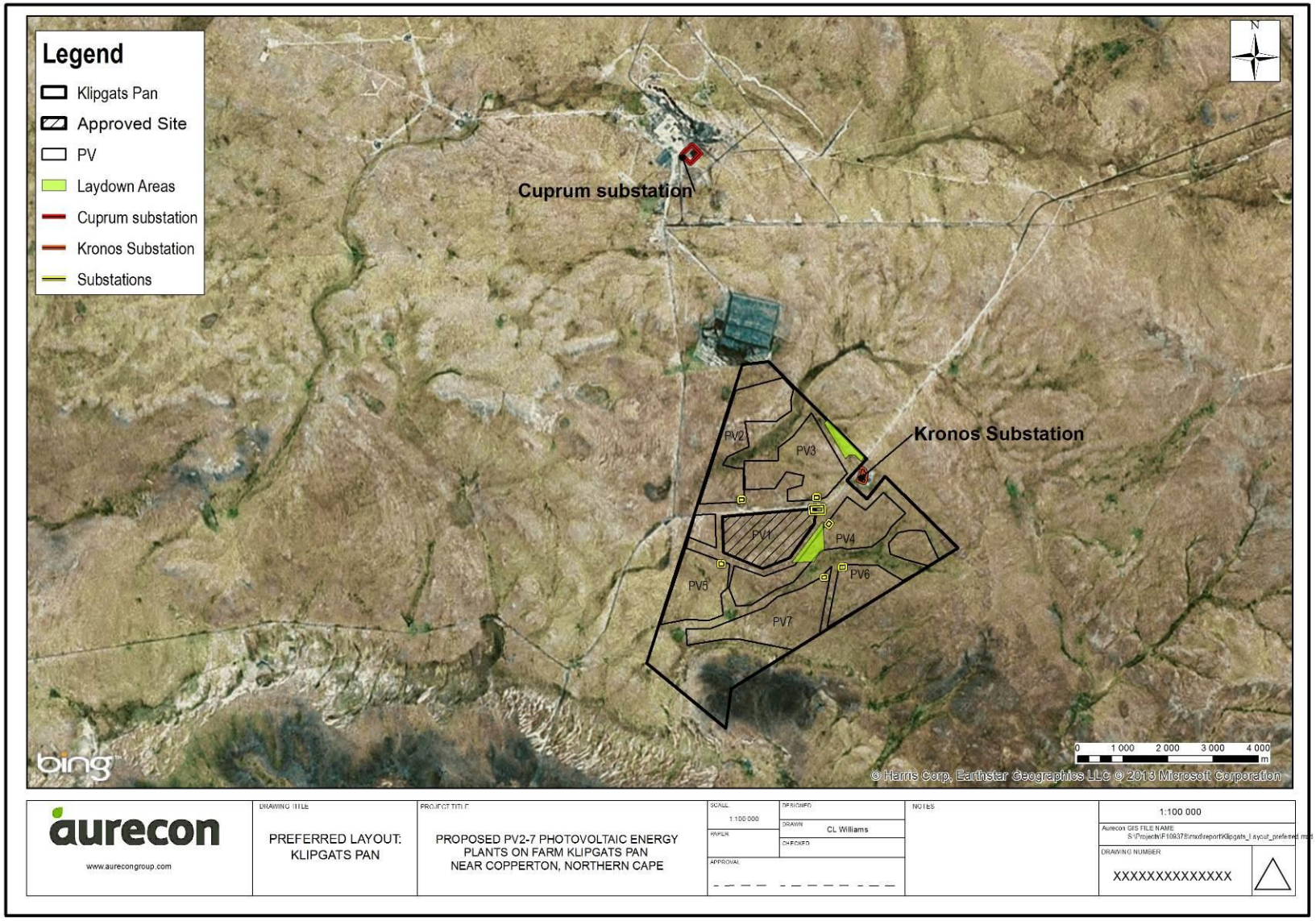

Figure 2.2 Preferred layout for the six proposed 75 MW AC PV plants on farm Klipgats Pan

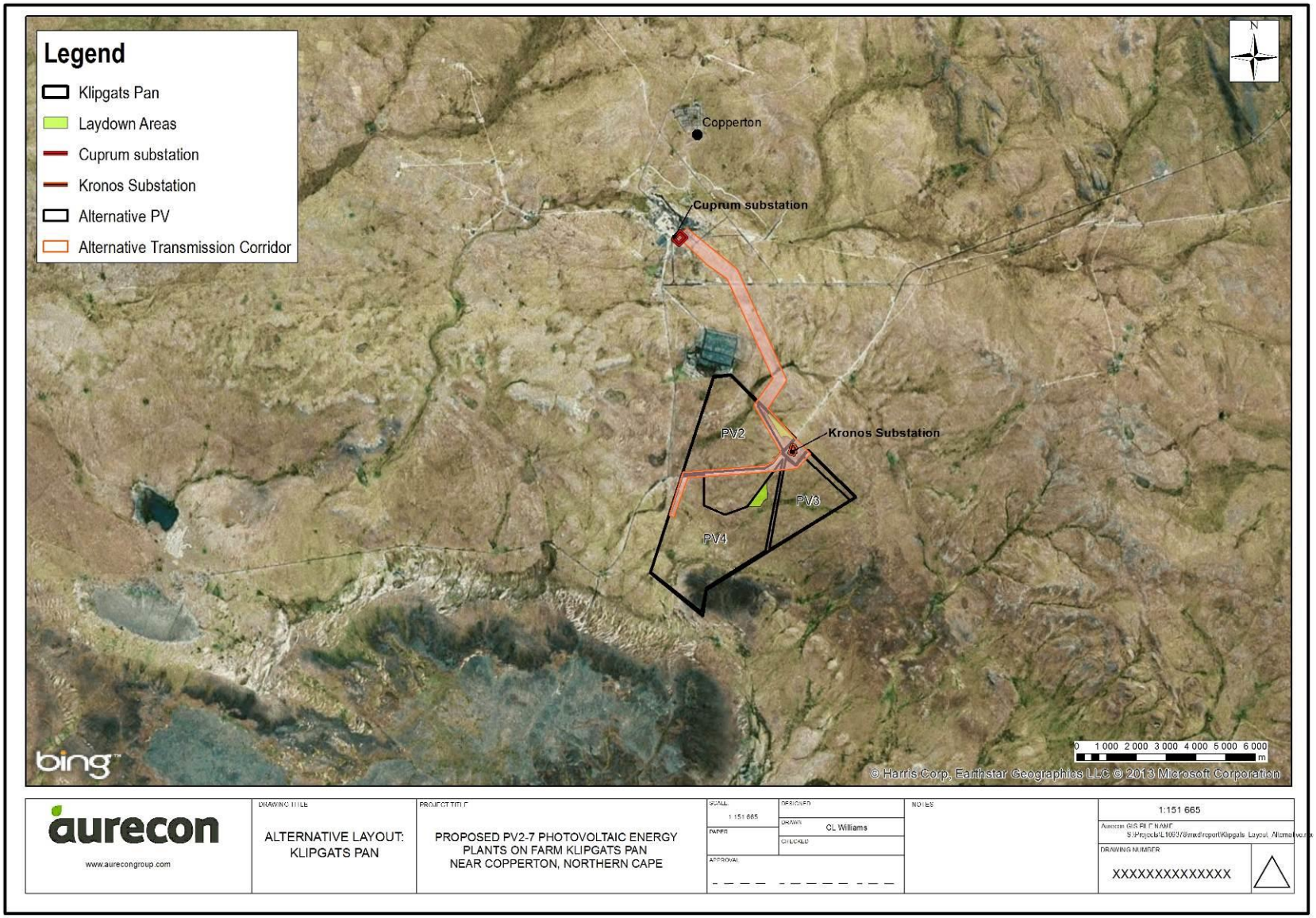

Figure 2.3 Alternative layout for the three proposed PV plants on farm Klipgats Pan

Figure 2.4 Example of an existing 132 kV transmission line (taken 29/09/2011)

It is also proposed that the following infrastructure be shared among the six PV plants to limit the impact on the surrounding environment, as well as reduce costs:

- **Central substation:** One central 132 kV substation and connection to Eskom grid. This central substation would connect the PV plants with Eskom's Kronos (preferred) or Cuprum (alternative) substation via new 132 kV transmission lines.
- **Roads:** Main access road and internal access roads for servicing and maintenance of the site (existing roads would be use where possible).
- **Water supply infrastructure:** Surplus water that has been allocated to PV1 from the Alkantpan pipeline would be used for the proposed plants. Requests for additional water would be submitted to Alkantpan and the LM for consideration.
- **Stormwater infrastructure:** Including drainage channels, berms, detention areas and kinetic energy dissipaters.
- **Buildings:** Buildings would likely include onsite substations, a connection building, control building, guard cabin and solar resource measuring substation.

2.2.1 Project components

Each of the project components are described in the sections below.

Transmission lines and substations

It is envisaged that each PV facility would require an onsite substation specific to each PV plant i.e. six onsite substations. These substations would feed into one central onsite substation by means of onsite overhead 132kV transmission lines.

Additional infrastructures

Three additional access roads leading from the R357 will be required. Internal access roads (gravel) will lead from the main access roads to connect the six PV plants. These roads will coincide with the existing dirt tracks where possible (see in **Figure 2.3**).

Two laydown areas have been identified (**Figure 2.3**) and would be used during the construction phases of all six proposed PV plants. Septic tanks would be constructed at the site offices and serviced by the municipality on a monthly basis.

The natural water flow of the site will be interrupted by the proposed roads, and therefore stormwater infrastructure will be required to facilitate surface water flow and to prevent erosion channels from developing.

2.2.2 Construction phase

The construction phase of each 75 MW AC PV plant would last approximately 12 to 24 months. Employment opportunities created by the construction phase equates to approximately 2 800 man months of which 80% would be allocated to South African citizens. These employment opportunities can be divided into the following employment categories:

- 50% would be for black citizens.
- 15% would be skilled employees.
- 8% would be black skilled employees.
- 30% of the jobs created would be from the local community.

Accommodation will be provided for the non-local construction work-force, either in in temporary dwellings on site or in accommodation within Copperton or Prieska. More detail will be provided on the accommodation of staff in the EIA phase.

Approximately 1 400 *kℓ* of water would be required per facility during the duration of the construction phase. This water would be sourced via the Alkantpan pipeline.

Construction vehicles are likely to make use of the existing roads, including the R357 and N10, to transport equipment and material to the construction site. Approximately 450 truckloads transporting in total 900 40-foot containers would be required during the construction period per 75 MW AC plant. These deliveries would be distributed across the construction period.

2.2.3 Operational phase

It is anticipated that the PV plants would last the full period of the PPA which is approximately 20 years. The remainder of the farm will continue to be used as grazing fields.

Employment opportunities to be created during the operational phase equates to approximately 35 man months of which 80% would be allocated to South African citizens. These employment opportunities can once again be divided into the following employment categories:

- 50% would be for black citizens
- 45% would be skilled employees
- 14% would be black skilled employees
- 54% of the jobs created would be from the local community.

Approximately 500 ℓ of fuel and 50 ℓ of lubrication oil would be stored on site. The combined volume falls well below the thresholds listed in terms of NEMA. However, the necessary precaution measures will be in place and will be included in the Life-cycle Environmental Management Plan.

Regular cleaning of the panels will be required to ensure that maximum quantities of sunrays can be captured by the PV panels. Dust, dirt, pollen, and bird excretions can reduce the efficiency of PV panels. The frequency of panel cleaning would depend on the site conditions.

Panels would be washed with water. Approximately 508 *kℓ* of water per annum would be required per 75 MW AC PV plant.

2.2.4 Decommissioning phase

The PV plants would be decommissioned at the end of the PPA (20 years from the date of commissioning). The decommissioning is expected to take between 6 to 12 months per 75 MW AC PV plant

After disconnecting the PV infrastructure from the electricity network, the module components would be removed and recycled as far as possible. The structures would be dismantled and the concrete pile foundations would be removed. All underground cables would be excavated and removed. The buildings will be demolished and removed by an authorised company.

The rehabilitation of the disturbed areas would form part of the decommissioning phase. The aim would be to restore the land to its original substratum characteristics (or as near as possible).

2.3 CONSIDERATION OF ALTERNATIVES

2.3.1 Introduction

NEMA requires that alternatives be considered during the EIA process. According to DEAT "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 ("No-Go" alternative).

In addition to the list above, the 2013 DEA&DP Guidelines on Alternatives also considers the following as alternatives:

- **Demand alternative:** Arises when a demand for a certain product or service can be met by some alternative means (e.g. the demand for electricity could be met by supplying more energy or using energy more efficiently by managing demand).
- **Input alternative:** Input alternatives are applicable to applications that may use different raw materials or energy sources in their process (e.g. Industry may consider using either high sulphur coal or natural gas as a fuel source).
- **Routing alternative:** Consideration of alternative routes generally applies to linear developments such as power line servitudes, transportation and pipeline routes.

- **Scheduling and timing alternative:** Where a number of measures might play a part in an overall programme, but the order in which they are scheduled would contribute to the overall effectiveness of the end result.
- **Scale and Magnitude alternative:** Activities that can be broken down into smaller units and can be undertaken on different scales (e.g. for a housing development there could be the option 10, 15 or 20 housing units. Each of these alternatives may have different impacts).

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:** Requires a change in the nature of the proposed activity.
- **Layout alternatives:** Site layout alternatives in terms of scale and magnitude;
- **Routing alternatives:** Transmission line route alternatives; and
- **Technology alternatives:** Consideration of different types of technology used.

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 identify (scope) and describe all potential alternatives and determine which alternatives should be carried through to 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 four 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. Mulilo have already received four approvals for PV plants on farms in the Copperton area and is now applying for six proposed PV projects (i.e. the application listed in this report) on farm Klipgats Pan and 10 proposed PV projects of 75 MW AC each on the farm Hoekplaas (Remainder of Farm 146)[14]. The locations of these sites are provided in **Figure 2.5**.

[14] **PV2**: DEA Ref. No.14/12/16/3/3/2/493; NEAS Ref No.DEA/EIA/0001754/2013; **PV3**: DEA Ref. No.14/12/16/3/3/2/494; NEAS Ref. No.DEA/EIA/0001755/2013; **PV4**: DEA Ref. No.14/12/16/3/3/2/495; NEAS Ref No. DEA/EIA/0001756/2013; **PV5**: DEA Ref No14/12/16/3/3/2/496; NEAS Ref. No.DEA/EIA/0001757/2013; **PV6**: DEA Ref No.14/12/16/3/3/2/497; NEASDEA/EIA/0001758/2013; **PV7**: DEA Ref. No.14/12/16/3/3/2/498; NEAS Ref.No.DEA/EIA/0001759/2013; **PV8**: DEA Ref.No 14/12/16/3/3/2/499; NEAS Ref No.DEA/EIA/0001760/2013: **PV9**: DEA Ref. No.14/12/16/3/3/2/500; NEAS Ref. No.DEA/EIA/0001761/2013; **PV10**: DEA Ref No. 14/12/16/3/3/2/501; NEAS Ref. No.DEA/EIA/0001762/2013; **PV11**: DEA Ref.No.14/12/16/3/3/2/502; NEAS Ref. No.DEA/EIA/0001763/2013

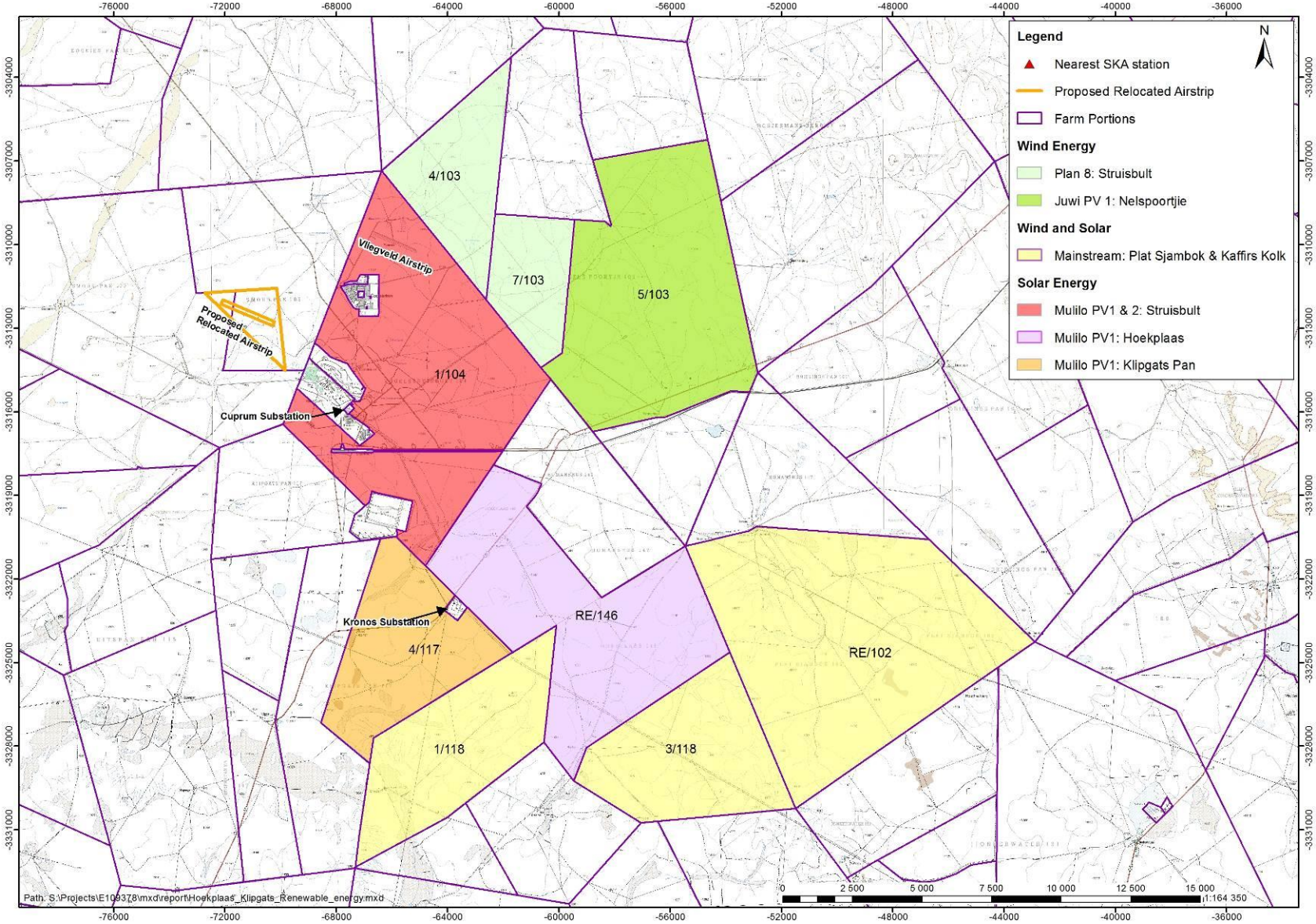

Figure 2.5 Other renewable energy projects (solar and wind) proposed for the Copperton area

To summarise, 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.

Furthermore, as explained in **Table 2.1**, the concentration of the proposed PV plants on one farm would provide various positive benefits:

- Sharing of supply infrastructure such as water, sewage and electricity.
- Reducing the impact on the environment by "concentrating" infrastructure and footprints to one farm portion.
- Reducing the cost of electricity as a result of reduced development, construction and operational costs due to the combined sharing of infrastructure, etc.
- Utilizing shared laydown areas and construction camps, minimizing traffic and associated impacts with multiple camps.
- Allowing a phased approach to construction activities, thereby extending the construction period and employment opportunities.
- Reducing the need for multiple electricity grid upgrades in the long term.

Therefore, only one location alternative will be considered for the six proposed PV plants on farm Klipgats Pan.

2.3.3 Site layout alternatives

As can be seen by the numerous policies and legislation described in **Section 1.2.4** the need for additional energy generation in South Africa is well documented. Furthermore, these policies and legislation also indicate the mixture of renewable and non-renewable energy which South Africa wishes to pursue. These strategic documents provide the road map for the activity alternatives available to South Africa. Based on these requirements for renewable energy, Mulilo has identified a number of projects for solar energy generation.

Projects for wind generated electricity, (see **Figure 2.5**) are also located in the Copperton area. This indicates that the proposed site could also be suitable for wind power. However, the selection of the site was based on the requirements for solar energy. As such the only activity alternative, other than the no-go alternative, which will be investigated in this project specific EIA is solar energy.

The no-go alternative is the baseline against which all alternatives are assessed. It consists of the *status quo*, and as such will not be explicitly assessed.

2.3.4 Site layout alternatives

The DoE introduced a capacity limit of 75 MW for solar plants as part of the IPP bidding process. Mulilo are hopeful that the DoE will realise the benefits of having combined facilities,

as discussed, and are therefore proposing two scale and magnitude alternatives. Therefore, the capacity (MW) of the proposed plants will determine the layout of the facilities.

Layout Alternative 1 (preferred)

This alternative consists of the six proposed 75 MW AC PV plants and associated infrastructure and are referred to as PV2, PV3, PV4, etc. These layouts take cognisance of the 75 MW DoE cap and the environmentally sensitive areas that were identified in the 2012 EIA process for farm Klipgats Pan. Please refer to **Table 2.2** for more information on the footprint sizes, capacities and coordinates.

Layout Alternative 2

This alternative consists of three PV facilities of 225 MW, 150 MW and 300 MW each (see **Table 2.3**). The site layouts were developed by extending and combining some of the proposed 75 MW AC plants. This alternative is thus not limited to the DoE's 75 MW cap per project. The benefit of developing larger plants relates to the reduction of associated development and construction costs which in turn reduces lending rates and essentially lower the tariff of electricity sold.

2.3.5 Routing alternatives

Due to the large number of local renewable energy projects (see **Figure 2.5**) that could potentially connect to the grid via the Kronos Substation, two potential routing alternatives for transmission lines will be considered.

Routing Alternative 1 (preferred)

It is envisaged that each PV plant would have an onsite substation. These substations would feed into one central onsite multibay substation by means of onsite overhead 132 kV transmission lines before connecting to the Kronos Substation. The shortest routes were identified for the proposed transmission lines to limit the visual impact and area of disturbance, as well as reduce costs.

Routing Alternative 2

Alternatively the transmission lines could connect to the Cuprum Substation should the Kronos Substation not have sufficient capacity. A corridor of approximately 7 km in length (measured from the farm boundary) and 400 m wide has therefore been identified for the transmission lines.

2.3.6 Technology alternatives

Technology alternatives in terms of solar panel type and mounting systems are being considered for the proposed PV plants.

a) Solar panel type

Three solar panel types were considered for the proposed plants: concentrated PV (CPV), concentrated solar power (CSP) and conventional PV solar cells. Information gathered through previous EIAs (Aurecon; 2012), as well as the recent technology advances informed this investigation.

CPV technology makes use of optics, such as lenses or curved mirrors, to concentrate sunlight onto a small area of solar PV cells to generate electricity. This technology type is considered to be more cost effective than conventional PV solar cells in that it requires a smaller area of PV material. However, it does require active solar tracking to be effective [3].

Similar to CPV technology, **CSPs** use mirrors or lenses to concentrate sunlight onto a small area to generate electricity directly via a heat engine, e.g. a steam turbine.

Figure 2.6 Photographs of CPV (left)[15], CSP (middle)[16] and conventional PV (right)[17] technology

Conventional PV technology on the other hand does not make use of any mirrors or lenses and generates electricity by converting solar radiation energy into a DC current which then needs to be converted to an AC current to connect to the grid.

The conventional PV and CPV technologies require less water (19 L/MWh of water) than the CSP system) which needs approximately 3,420L/MWh of water during the operational period. Due to the scarcity of water in the project area, and the large volume of water required for the CSP system, **only conventional PV (preferred) and CPV technologies will be considered** for the proposed solar plants.

b) Mounting system

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. Single axis tracking systems will be considered along with fixed axis tracking systems. This decision will be made by the proponent closer to detail design phase after taking into consideration the economic viability, water requirements, land requirements, efficiency and potential environmental impacts of the proposed solar panel types.

In a fixed axis tracking system the PV panels are installed at a set tilt and cannot move, whereas in a single axis tracking system the panels follow the sun to ensure maximum exposure to sunlight as indicated in **Figure 2.7**.

[15] Courtesy: Mulilo

[16] Source: http://upload.wikimedia.org/wikipedia/commons/e/eb/PS10_solar_power_tower.jpg. Accessed on 15 April 2013

[17] Courtesy: Mulilo

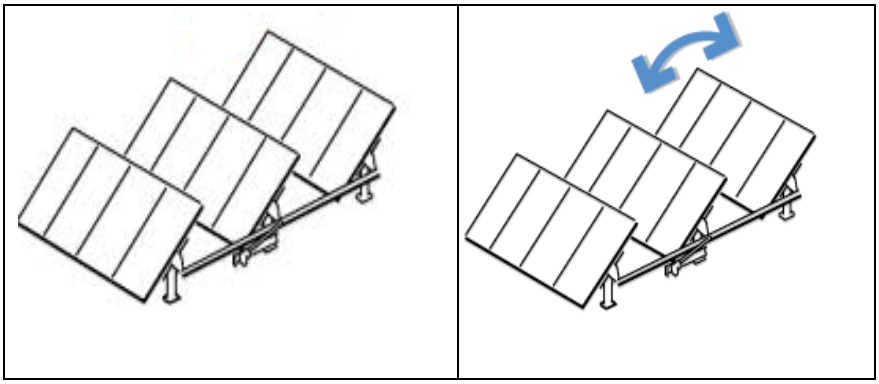

Figure 2.7: Fixed axis tracking system (left) and single axis tracking system (right)

The proposed PV panels would be approximately 2 m wide and 1 m long. These panels are arranged into modules that can last up to 25 years.

The frame supports are fixed on top of steel piles. Due the occurrence of hardpan calcrete layers and cobbles/boulders on site at shallow depths, the steel piles would be embedded into a concrete pile. However, the final design of the foundations will depend on the geotechnical conditions of the site which will be determined at a later stage.

2.3.7 Summary of alternatives

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

Alternative Type	Description
Location alternatives	• One location for the proposed Klipgats Pan PV plants
Activity alternatives	• Solar energy generation via a PV plant • No-go" alternative to solar energy production
Site layout alternatives	• Six 75 MW AC PV plants (Layout Alternative 1) • Three (3) PV plants of 225 MW AC, 150 MW AC and 300 MW AC, respectively (Layout Alternative 2)
Technology alternatives	• Conventional PV vs. CPV technology • Single Axis vs. Fixed Axis PV tracking technology

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), has taken cognisance of the DEA&DP Guideline on Public Participation (DEA&DP March 2013)

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.

3.2 INITIATION OF 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 projects in the area on which Aurecon is involved with about 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).

Thereafter, the remainder of the communications will 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.

3.2.1 Compilation of I&AP database

The I&AP database compiled during the 2012 EIA process for PV1 on farm Klipgats Pan served as the baseline I&AP register for this EIA process. This database will be augmented via chain referral during the EIA process, and will be continually updated as new I&APs are identified throughout the project lifecycle. The current list of potential I&APs, comprising approximately of 71 individuals and organisations, is included in **Annexure C**. The sectors of society represented by I&APs on the database are listed below.

- National Government;
- Provincial government (Northern Cape);
- Local government (Siyathemba LM and Pixly ka Seme District Municipality);
- Organised agriculture;
- Business/Commerce;
- Industry;
- Scientific and research based organisations;
- Local landowners; and
- Local communities and other community based organisations in the project area.

3.2.2 Advertising in local newspapers

Advertisements for the DSR process appeared in a local newspaper, the Gemsbok, on 26 April 2013 The content of the advertisements are included in **Annexure B**. Copies of the actual advertisements will be included in the FSR.

3.2.3 Site notices

A site notice was placed on site at the site entrance on the 17 April 2013. The notice provided a description of the proposed activities and EIA process, and invited members of the public to register as I&APs, and raise any initial issues or concerns. The content of the site notice is included **Annexure B**.

3.3 COMMENT ON THE DRAFT SCOPING REPORT

The DSR in Prieska was lodged (Elizabeth Vermeulen) Public Library, Ietznietz Guest House in Copperton and on the Aurecon website (www.aurecongroup.com - indicate “Current Location” as “South Africa” and follow the Public Participation link).

All registered I&APs were notified of the availability of the DSR by means of a letter sent by post, fax or e-mail on 23 April 2013. The notification letters also included a copy of the Executive Summary in English and Afrikaans.

I&APs had 40 days, from 30 April 2013 until 10 June 2013 to submit their written comments on the DSR. Cognisance will be taken of all comments in compiling the final report, and the comments, together with the project team and proponent's responses thereto, will be included in the final report. Where appropriate, the report has been updated.

Comments should be directed to:

Aurecon South Africa (Pty) Ltd
Miss Nomvelo Siwela or Miss Franci Gresse
P O Box 494, Cape Town, 8000
Tel: (021) 526 6025
Fax: (021) 526 9500
Email: nomvelo.siwela@aurecongroup.com

3.4 COMMENT ON THE FINAL SCOPING REPORT

As is required by the NEMA EIA Regulations, I&APs must be given the opportunity to comment on all draft and final reports. Consequently, the Scoping Report has been finalised and made available for a 21 day comment period from **23 July 2013 to 12 August 2013**. The report will be made available in the same locations in which the DSR was made available, and I&APs will be notified of the availability of the FSR in writing.

3.5 REVIEW AND DECISION PERIOD

The FSR will be submitted to DEA for their review and decision regarding acceptance of the report and related Plan of Study for EIA. The DEA will thereafter issue a letter accepting the Scoping Report and Plan of Study for EIA and advise the EAP to proceed with the tasks contemplated in the Plan of Study, or request amendments or reject the Scoping Report and Plan of Study for EIA.

4 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The purpose of this Chapter is to provide a brief description of the affected environment and the potential impacts that could result from the proposed project. Where additional information is required for detailed assessment in the EIAR, the Terms of Reference for specialist studies are given.

4.1 INTRODUCTION

The description of the affected environment provided below draws on existing knowledge from published data, previous studies, site visits to the area and discussions with various role-players. The identification of potential impacts which may occur as a result of the proposed activities described in **Chapter 2** of this report is broad, to cover the operational phase as well as the construction phase of the project. In cases where there is currently inadequate information to facilitate assessment of the potential impact, a draft Terms of Reference (ToR) and proposed specialist consultant is provided. Impacts of lesser importance are also screened out, with reasons provided, to ensure that the EIAR is focused on the potentially significant impacts.

4.2 BROAD DESCRIPTION OF THE AFFECTED BIOPHYSICAL AND SOCIO-ECONOMIC ENVIRONMENT

4.2.1 Description of site

The site consists of the farm Klipgats Pan (Farm 117/4) (see **Figure 1.1**). This portion is privately owned by Mrs J.J. Bernard, who has entered into a long term agreement with Mulilo for the proposed project. Currently the property is leased by Mr Eckhardt. The coordinates of the approximate centre of each site are provided in **Table 2.2**. Klipgats Pan lies approximately 9 km to the south of Copperton and borders to the Kronos substation. The farm is approximately 2 620 ha in size and split into two portions by the R357.

4.2.2 Climate

The Northern Cape experiences typical semi-desert and desert climatic conditions. The summers are hot and dry and the winters cold and frosty. The maximum temperate is recorded as 40^{o}C during the summer months whereas an average minimum of -10oC occurs during winter. The mean annual rainfall varies between 130 mm and 300 mm and occurs during the summer months in the form of thunderstorms (Pixley ka Seme District Municipality, 2011).

4.2.3 Topography

The topography of the area is relatively flat, although a few ridges are present in the landscape, as can be seen in **Figure 4.1**. The Pixley ka Seme IEMP (2007) notes that ridges and koppies should be conserved and kept clear of transformation or development of any kind.

Figure 4.1 Photograph from a low point within the site (taken 28/9/2011)

4.2.4 Flora

The site 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 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).

The 2012 specialist botanical assessment (McDonald, 2012) noted a well-defined and extensive seasonal drainage area or watercourse located on the northern section of the farm. The drainage system is vegetated principally with *Rhigozum trichotomum* Shrubland) and is considered to be botanically sensitive, not specifically due to its species composition but rather due to the habitat created. This area has therefore been excluded from the proposed layout footprints of PV2 and PV3 (see **Figure 4.3**).

4.2.5 Fauna (including avifauna)

Animals likely to be found on site and the surrounding environment are likely to include small antelope, mongoose, Black-backed Jackals, Caracal, snakes, etc. Various faunal species, or evidence of these animals, were observed during the site visit that was undertook for the PV1 EIA process in September 2011. These include Black Korhaan, Meerkat, Pied Crow, Steenbok and various pipits and larks. The farmer also indicated that Black-backed Jackal, Aardvark, Aardwolf, Brown Hyaena (*Parahyaena brunnea*) and Small Spotted Cat (*Felis nigripes*) occur in

the area. The Small Spotted Cat is listed as Vulnerable on the IUCN Red List[18], whereas the Brown Hyaena is listed as Near Threatened[19]. 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.

In terms of avifauna, the broader area could support over 200 bird species, including up to 18 red-listed species, 68 endemics, and five red-listed endemics. The species of greatest potential relevance and importance to the proposed PV facility 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**).

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
Secretary bird	*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

4.2.6 Surface and groundwater

The study area falls within the arid region of South Africa and is located within a National Freshwater Ecosystem Priority Area (NFEPA). Average annual rainfall is low (130 mm – 300 mm) and as such it is expected that few rivers and low groundwater tables will be found in the area. The site is located within the D54D quaternary catchment of the Lower Orange River. With few rivers draining the area, apart from the Orange River 42 km east of the site, endorheic (inward flowing) pans occur. Pans are an important wildlife habitat, particularly for birds

[18] Source: http://www.iucnredlist.org/apps/redlist/details/8542/0. Accessed on April 2013
[19] Source: http://www.iucnredlist.org/apps/redlist/details/10276/0. Accessed on April 2013

(especially migratory birds), mammal species and invertebrates. Numerous small pans are located on the site (see **Figure 4.2**). Numerous small dry drainage lines cross the area.

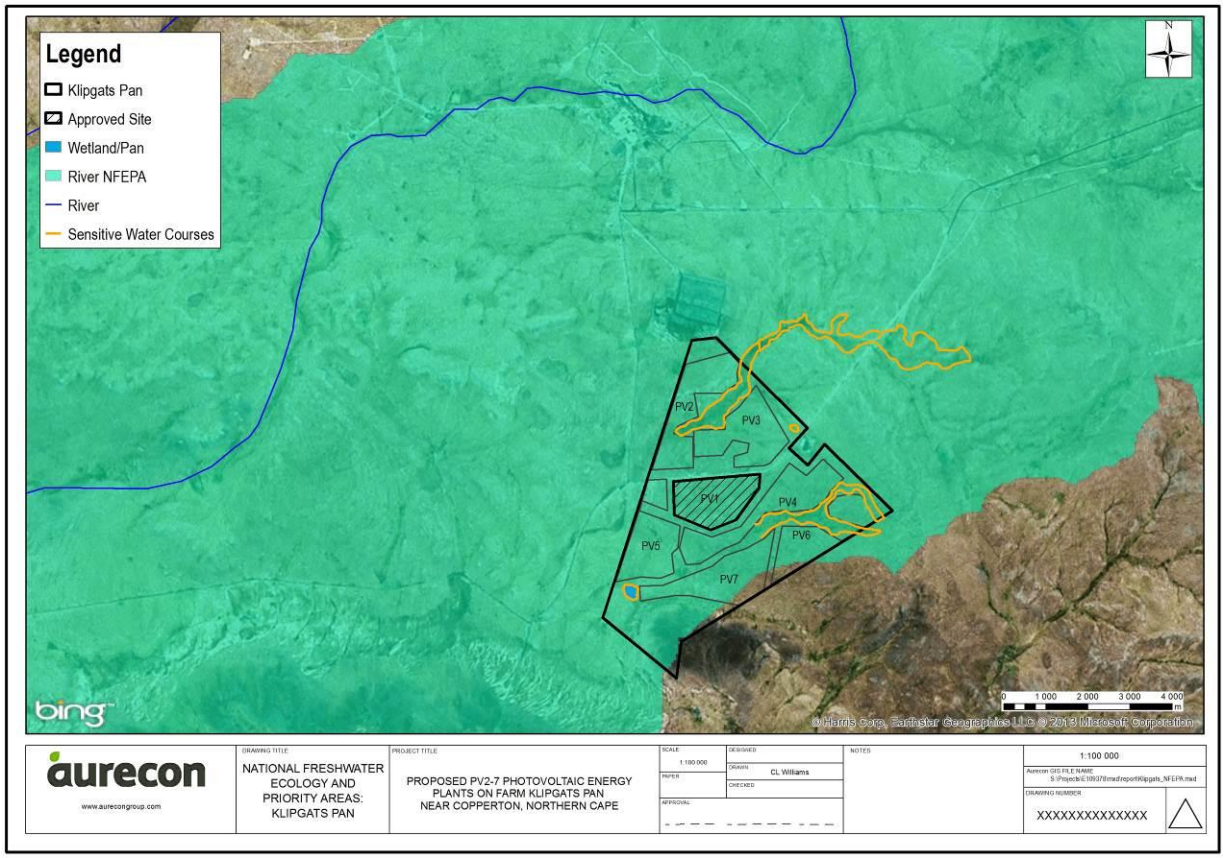

Figure 4.2 Map indicating pans and dry rivers on site and in the surrounding environment

4.2.7 Geology

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 4.3**). 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.

The copper-zinc mine at Copperton (opened 1972 (Roussouw, 2003) and closed 1991 by Anglovaal Mining Group), is situated in Precambrian gneisses of the Copperton Formation which is partly covered by Dwyka tillite (Aurecon, 2011).

Soils are generally base-rich, weakly structured and shallow. They drain freely, usually with less than 15 % clay and have characteristic high levels of salt (Mucina and Rutherford, 2006).

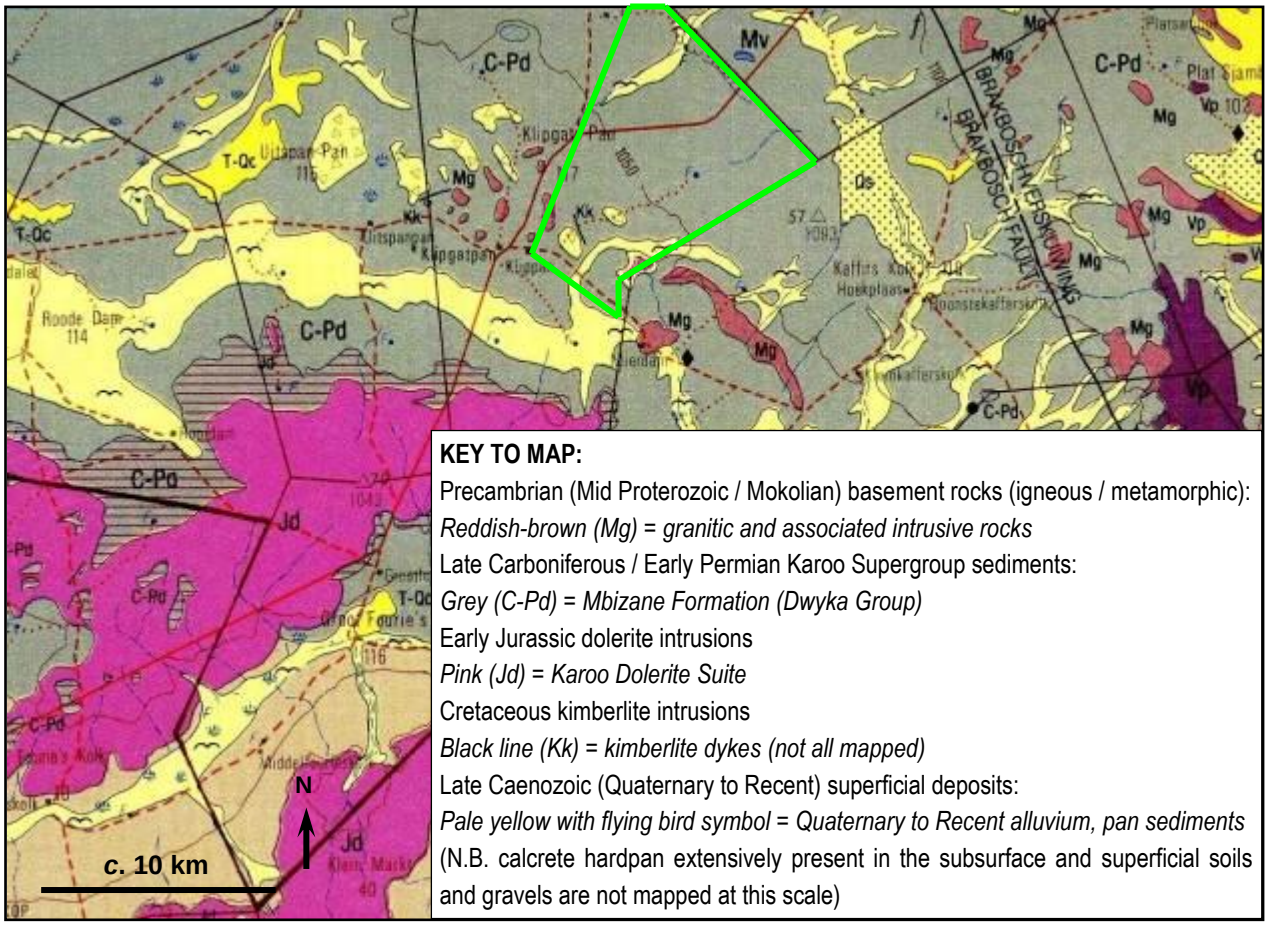

Figure 4.3 Extract from 1: 250 000 geology map 3022 Britstown showing approximate outline of Klipgats Pan near Copperton (green polygon) (Courtesy: Almond, 2012)

4.2.8 Heritage and cultural material

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) artefacts 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 dating back to the period when indigenous people or Bushman lived in the area are widely known 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.

The 2012 specialist archaeological assessment (ACO, 2012) identified three large clusters of LSA occupation material (1) atop the elevated terrace at the far north end of farm Klipgats Pan, (2) in the southern area on elevated ground overlooking the pan to the west and (3) at the ephemeral pans, just north of the R357. Most examples of MSA and ESA material were in the form of background scatter and included heavily weathered stone material such as hand-axes. LSA material includes stone implements of quartzite, ostrich eggshell and bone fragments.

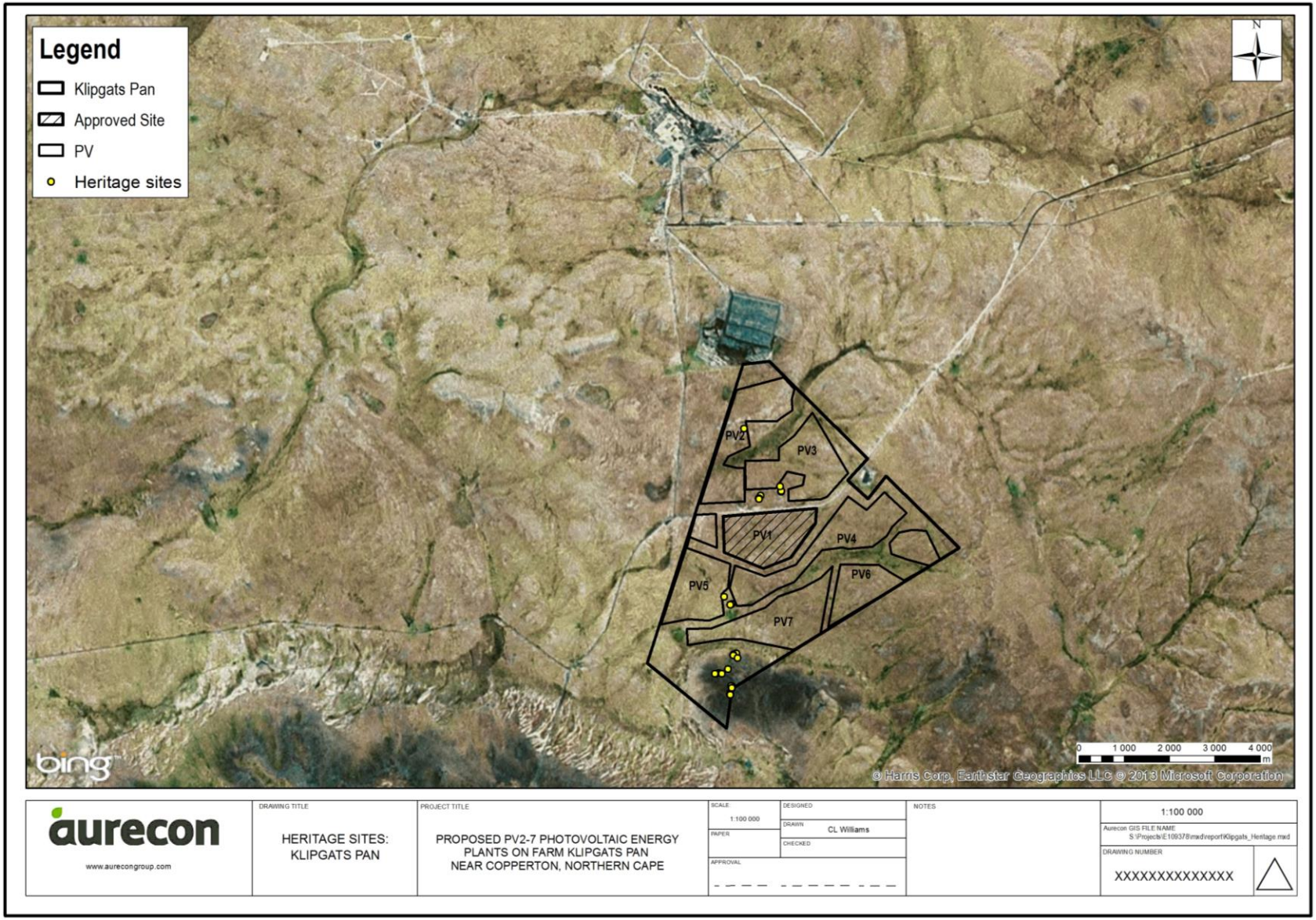

Figure 4.4 Location of recorded sensitive archaeological occurrences at Klipgats Pan

A number of ruined structures and artefact scatters were also identified on the farm (ACO, 2012). The ruined structures include a pillar, stone walls and structures associated with a historical farm house complex. Scatters of glass, ceramic and stone artefacts dating from the late 19th or early 20th century was also found around the farm complex.

Furthermore, a windmill, watering/feeding troughs and a stone-lined dam comprise the cultural landscape. Two shale quarries located on the hill were used for sourcing the stone for construction of the farm buildings and are also of significance (ACO, 2012). 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.

4.2.9 Population demographics

Copperton falls within the Siyathemba 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[20].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 be 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 (a weapons testing facility located to the west of Copperton).

4.2.10 Surrounding land uses

The surrounding land uses are mainly agricultural, consisting mostly of sheep grazing. An abandoned Copperton mine is located approximately 5 km to the northwest of Farm Hoekplaas. Further west of the farm is Alkantpan, a weapons testing range, used by many countries for weapons testing. It should be noted that there are a number of environmental applications (at various stages of approval) for renewable energy generation projects within the Copperton area (see **Figure 2.5**) and are in various stages of gaining environmental authorisation. Currently, Mulilo has four approved solar energy facilities in the area, of which one includes the 100 MW PV1 plant on Farm Hoekplaas.

A 1.7 km airstrip, owned by a local landowner, is also located to the north of the site and is used by a number of aeroclubs (e.g. Aeroclub SA). Copperton town, consisting of a few dwellings and a small shop is also located immediately west of the site (see **Figure 2.5**). It is proposed to move this airstrip approximately 7 km east of its current location as part of the Plan 8 wind energy facility. The site itself is used for agriculture (grazing).

[20] Source: http://www.siyathemba.co.za/demographics.htm. 2013

4.3 OPERATIONAL PHASE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

This section of the report describes the biophysical environment and considers the long-term or operational phase impacts on the biophysical environment that may be associated with the proposed activities, including the following:

- Impact on the flora;
- Impact on fauna (including avifauna); and
- Impact on freshwater resources.

Long-term impacts on the socio-economic environment are described in **Section 4.4**, while the construction phase impacts are outlined in **Section 4.5**.

4.3.1 Impact on flora

As noted in **Section 4.2.4** the vegetation type found in the vicinity of the site, Bushmanland Basin Shrubland, is considered to be Least Threatened. Furthermore, grazing of the site is likely to have impacted on the biodiversity of the site negatively. No conservation areas are located within 10 km of the site.

The proposed project could have impacts on flora through the footprint of its infrastructure, including access roads. Disturbance to the site could also result in the increase spread of invasive vegetation such as mesquite (*Prosopis glandulosa*). Although the vegetation on site is not considered sensitive it is recommended that a specialist botanical assessment be undertaken, focused within the site, due to the possible extent of potential impact. The proposed ToR for this specialist study is as follows:

Undertake the requisite field work and compile a report which includes the following aspects:

- A broad description of the botanical characteristics of the site and surrounds;
- Identification and description of biodiversity patterns at community and ecosystem level (main vegetation type, plant communities in vicinity and threatened/ vulnerable ecosystems species), at species level (Red Data Book species, presence of alien species) and in terms of significant landscape features;
- An assessment of the potential direct and indirect and cumulative impacts resulting from the proposed developments (including the associated infrastructure e.g. access roads and transmission lines), both on the footprints and the immediate surrounding area during construction and operation;
- Comment on whether or not biodiversity processes would be affected by the proposed projects, and if so, how these would be affected;
- A detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts and improve positive impacts for each phase of the project, where required; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: “Guideline for involving biodiversity specialists in EIA processes” (Brownlie, 2005) as well as the requirements of the Botanical Society of South Africa (BotSoc) and CapeNature in developing an approach to the botanical investigation.

It is proposed that Dr Dave McDonald of Bergwind Botanical Surveys and Tours cc undertake the requisite assessment. Dr McDonald is a botanical ecologist with 30 years of experience in the field of vegetation science and was involved with the 2012 EIA process on farm Klipgats Pan. Dr McDonald is registered as an Ecological Scientist with the South African Council for Natural Scientific Professions (SACNASP), Registration No. 400094/06.

4.3.2 Impact on fauna (including avifauna)

As noted in **Section 4.2.5** a number of small to medium sized animals are found in the vicinity of the site. These animals are likely to breed and forage on the site and surrounds. Furthermore, as noted in **Section 4.2.5**, a large number of red listed birds may be found on site.

The proposed project could disturb animals through physical barriers, and may cause animals to leave the area. Impacts from the associated infrastructure such as the transmission line could also impact on avifauna.

It is suggested that the botanical study form a proxy for the potential impact on fauna. This is based on the assumption that impacts on the botanical environment, which forms the habitat of the fauna, are indicative of the impacts on fauna. As such the EAP will use the botanical study and available literature to assess the impacts on fauna.

It is however recommended that a specialist avifaunal study be undertaken to ascertain potential impacts on avifauna. The proposed ToR for this specialist study is as follows:

- Undertake the requisite field work to directly assess the habitats present within the inclusive impact zone, and to determine the in situ avifauna and identify any significant bird flight corridors present in the area;
- Integrate the site information with bird atlas (SABAP 1 & 2) and any other relevant bird data available for the general area to develop an inclusive, annotated list of the avifauna expected to occur on the site;
- Highlight Red Data species, endemic, restricted-range or other species of particular concern which may be present in the study area;
- Identify, describe and assess potential direct and indirect and cumulative impacts resulting from the proposed developments both on the footprint and the immediate surrounding area during construction and operation; and
- Recommend mitigation measures to reduce or eliminate potential negative impacts on avifauna and improve positive impacts.

It is proposed that Dr Andrew Jenkins of Avisense Consulting cc undertake the requisite assessment due to his involvement with the PV1 EIA process in 2012 on farm Klipgats Pan. Dr Jenkins is an avifaunal specialist with a doctorate in behavioural ecology. He has extensive knowledge of energy and power line projects and experience in undertaking similar assessments.

4.3.3 Impact on surface water resources

As noted in **Section 4.2.6** surface water drains into endorheic (inward flowing) pans which are very common in the area. These pans are an important wildlife habitat, particularly for birds (especially migratory birds), mammal species and invertebrates.

The proposed projects could disturb these pans and/or cause erosion to occur in sensitive areas such as these pans or drainage lines. This in turn could have an impact on the distribution of fauna and flora, as well as agricultural use. As such it is recommended that specialist Aquatic and Hydrology Impact Assessments be undertaken to ascertain potential impacts on surface water resources and features. The proposed ToR for the aquatic specialist study is as follows:

- Study all available information pertaining to surface water (streams, dams and wetlands) in close vicinity of the property;
- Undertake a site visit;
- Evaluate (a) magnitude, frequency of occurrence, duration and probability of impacts, (b) the local, regional, and national significance of predicted impacts, (c) the level of confidence in findings relating to potential impacts, (d) the degree to which the impact can be reversed, and (e) cumulative impacts that may occur as a result of the activities;
- Recommend mitigating measures aimed at minimising the predicted negative impacts and conflicts while retaining reasonable operational efficiencies. In the event that mitigating measures are required, determine the levels of responsibility and/or financial accountability;
- Assess the potential impact of the change in site hydrology (quantity) and water chemistry (quality) on the streams, dams and wetlands during the construction and operational phases;
- List additional or required permitting and/or licensing requirements; and
- Take cognisance of the Wetland Delineation Guideline Document of the Department of Water, and if applicable the DEA&DP draft guideline: "Guideline for involving biodiversity specialists in EIA processes"[21].

It is propose that James MacKenzie undertake the aquatic specialist study as he was also involved with the PV1 EIA process in 2012 on farm Klipgats Pan. Mr MacKenzie has 15 years of experience in riparian specialist work including vegetation surveys, determination of Environmental Flow Requirements (IFR, EFR. EWR), assessment of Ecological Importance and Sensitivity, assessment of Habitat Integrity, the development of monitoring protocols (e.g. RHAM) and programmes, the development and definition of management goals for Strategic Adaptive Management (SAM) (Ecological Specification and Thresholds of Probable Concern), the development of Flow Stressor Response techniques for hydrological scenario assessment, development of VEGRAI (Riparian Vegetation Response Assessment Index), and presentation of VEGRAI training. He also worked as a research ecologist at the Centre for Water in the Environment at the University of the Witwatersrand for a period of 7 years.

The proposed ToR for the storm water specialist study is as follows:

- Prepare a stormwater management plan: The purpose of the stormwater management plan is to assess the pre- and post-development stormwater runoff from the sites and make recommendations to mitigate and / or accommodate increased and concentrated runoff for a range of storm recurrence intervals (typically 1:5 year and 1:100 year recurrence intervals). Increased and concentrated runoff

[21] Brownlie, S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning.

would mainly manifest from the large impermeable solar panel surface areas and would require careful planning of a conceptual local stormwater drainage system.

It is proposed that Dr Nick Walker of Aurecon prepare a conceptual stormwater management plan. Dr Walker holds a PhD in hydrology and is a registered Professional Natural Scientist with the South African Council for Natural Scientific Professionals. He has more than a decade of research and consulting experience. Dr Walker is currently involved in water resource projects, including hydrological modelling, floodline analysis and hydrological studies for Environmental Impact Assessments (EIAs).

4.4 OPERATIONAL PHASE IMPACTS ON THE SOCIO-ECONOMIC ENVIRONMENT

This section of the report describes the socio-economic environment and considers the long-term or operational phase impacts on the social environment that may be associated with the proposed activities, including the following:

- Impact on heritage resources (including palaeontology);
- Visual impacts;
- Impact on energy production;
- Impact on local economy (employment) and social conditions;
- Impact on agricultural land; and
- Impact on surrounding land uses.

4.4.1 Visual impacts

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 powerlines, are visible for many kilometres. The potential therefore exists that the proposed PV plants and associated infrastructure would be visible from many kilometres away. As such it is recommended that a specialist Visual Impact Assessment (VIA) be undertaken to ascertain potential impacts on visual aesthetics. The proposed ToR for this specialist study are as follows:

- Source and review baseline information and participate in the finalisation of these ToR;
- Undertake a level 3 impact assessment to include the following areas of study for the preferred layout, alternatives, and the 'No-go' alternative in a Visual Impact Assessment report:
  - Identify issues raised relating to visual, aesthetic and scenic resources through any existing reports, baseline studies and framework plans, any public scoping phase, and site visits. The study must take into account the expected community response as well as the applicable South African standards;
  - Describe the receiving environment and the proposed project in terms of landscape types, landscape character and land use patterns;
  - Describe the sense of place and contributing factors, (spatial and non-spatial);
  - Establish the view catchment area, view corridors, viewpoints and receptors;

  - Determine the relative visibility or visual intrusion of the proposed project;
  - Determine the relative compatibility or conflict of the project with the surrounding land uses in terms of visibility;
  - Determine significant/sensitive receptors;
  - Indicate potential visual impacts using established criteria, as well as:
    - Potential lighting impacts at night;
    - Consideration of impacts at the construction phase; and
    - Consideration of the implications of the phased development.
  - Describe alternatives, mitigation measures and monitoring programs; and
  - Describe the opportunities and constraints of the alternatives.
- Use mapping and photo-montage techniques as appropriate; and
- In terms of evaluation criteria, use the criteria specific for Visual Impact Assessments listed in the Department of Environmental Affairs and Development Planning guideline document "Guideline for involving visual and aesthetic specialists in EIA processes".

The Visual Impact Assessment will be undertaken by Mr Steve Stead of Visual Resources Management Africa. Mr Stead is a member of the Association of Professional Heritage Practitioners (APHP) Western Cape and also an accredited Visual Impact Assessment practitioner member of the Association (2011).

4.4.2 Impact on energy production

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; 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 PV plant would be able to provide power to assist in meeting the energy demand within South Africa as it would come online by 2016.

Given that there is a large body of literature with regards to energy demand in South Africa, it is proposed that the EAP assess the potential impact of the proposed project on energy production in South Africa.

4.4.3 Impact on local economy (employment) and social conditions

As noted in **Section 4.2.9** the site is located in a rural area and as such the population density is very low, with neighbours located kilometres away. Employment opportunities in the immediate area stem from farming, the local accommodation lodge, Ietznietz, and Alkantpan (a weapons testing facility).

The establishment of the proposed PV plants would provide a number of direct, indirect and induced jobs. Direct jobs are created during manufacturing, construction and installation, operation and maintenance. Increased employment opportunities would allow for an improvement in social conditions for those who obtain employment. The proposed projects would also result in an increase in the revenue of the Local Municipality through increased rates

and taxes. This in turn could result in an increase in municipal spending on social programmes. Due to the number of local, direct jobs which would be created and the limited additional income into the area this potential impacts will be assessed by the EAP.

4.4.4 Impact on agricultural land

As noted in **Section 4.2.10** the site is used for agricultural purposes, consisting mostly of cattle grazing. The proposed PV plants would cover most of the farm and be fenced off for security reasons. However, the revenue that the landowner would receive from the proponent could be used for future agricultural improvements on the remainder of his properties. As such it is recommended that a specialist Agricultural Impact Assessment be undertaken to ascertain potential impacts on agricultural potential. The proposed ToR for this specialist study is as follows:

- Compile a detailed desktop assessment for the proposed development areas;
- Broadly assess the soil and agricultural potential of the sites and receiving environment by interrogating relevant climate, topographic, land use and soil datasets;
- Identify major soil and agricultural impacts related to the proposed developments; and
- Recommend whether a full agricultural impact assessment would be required.

The Agricultural Impact Assessment will be undertaken by Mr Kurt Barichievy of SiVEST. Mr Barichievy is a registered Professional Natural Scientist (Registration No. 400129/11) and holds a MSc. degree in Hydrology. Mr Barichievy has undertaken a number of soil surveys and agricultural assessments, including an agricultural assessment for wind farms near Prieska and the 2012 PV1 project on farm Klipgats Pan.

4.4.5 Impact on surrounding land uses

As noted in **Section 4.2.10** the surrounding land is used for agricultural purposes. A number of renewable energy projects (wind and solar) are also proposed in the vicinity (see **Section 4.2.10**). Furthermore, a 1.7 km airstrip, is located to the west 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 Plan 8 wind energy facility receive approval.

Also, the proposed site falls within the general astronomy advantage area and is located approximately 12 km north of the nearest SKA station (see **Figure 2.5**). The proposed development could potentially impact on the SKA project as a result of radio frequency interference and would require a separation distance of at least 10 km at ground level according to various SANS standards relevant to the SKA project. Furthermore, a view shed analysis (see **Figure 4.5**) indicates that some of the proposed PV sites are located within the potential line of sight of the SKA station. It is however proposed that this potential impact be assessed by the EAP, in consultation with SKA.

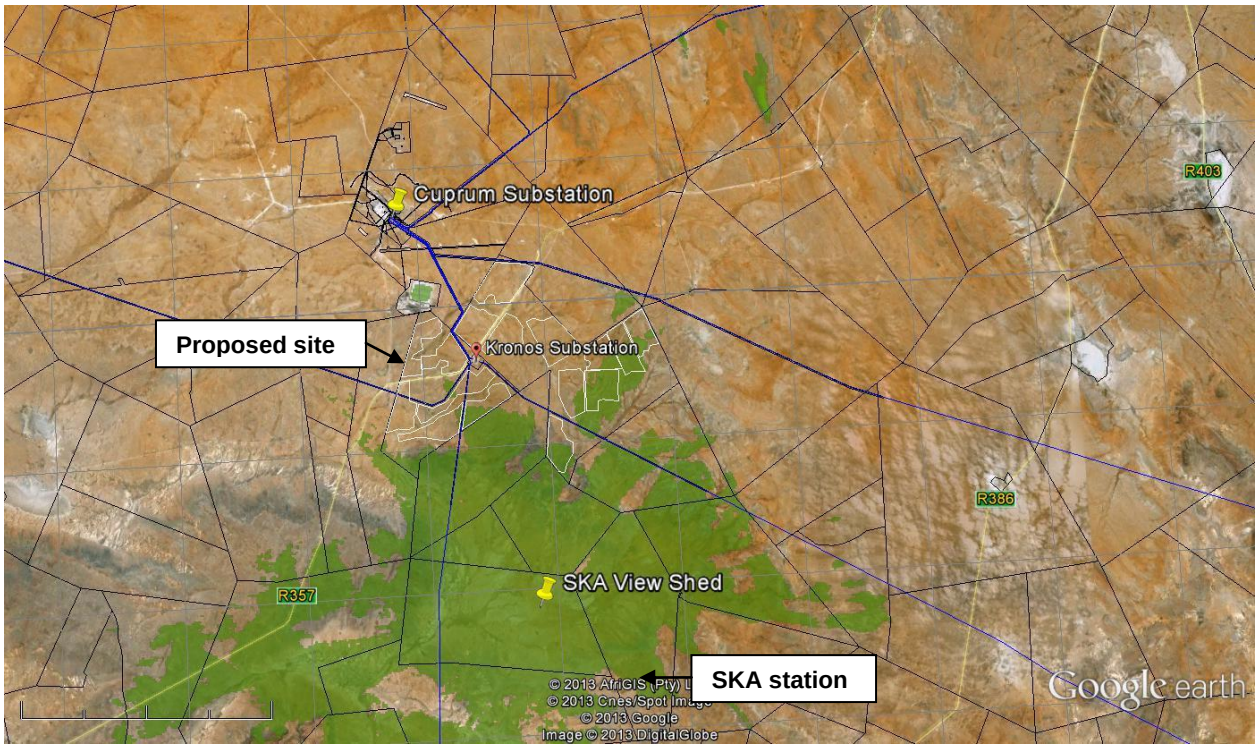

Figure 4.5 Results from a view shed analysis (areas indicated in green) undertaken by Mulilo to identify potential impacts on the nearest SKA station (Courtesy: Mulilo)

4.5 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 and fauna;
- Sedimentation and erosion of water ways;
- Impact on traffic;
- 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 should last approximately 12 to 24 months. Many of the construction phase impacts could be mitigated through the implementation of an appropriate EMP. During the EIA Phase, the construction phase impacts on the biophysical and socio-economic environment will be assessed, in terms of the methodology outlined in the Plan of Study for EIA (see **Chapter 5**). Furthermore, an EMP will be compiled as part of the EIA process, and submitted as part of the EIAR, to provide mitigation and ascribe responsibilities for many of the construction phase impacts.

4.5.1 Disturbance of flora and fauna

A number of small to medium sized animals are found in the Copperton area. These animals are likely to breed and forage on the site and surrounds.

During the construction phase the vegetation within the footprint of the activity will be cleared in order to construct the PV facilities. This might result in a loss of habitat and/or habitat fragmentation. It should be borne in mind that the site is currently being used for grazing which would over time have had an impact on the biodiversity.

The proposed projects could disturb animals through physical barriers, which may cause animals to leave the area. It is expected that any affected fauna or avifauna would generally be 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. The significance of this impact must nonetheless be considered beyond the permanent footprint of the proposed PV plants.

4.5.2 Impact on heritage resources

Heritage resources include archaeological material (e.g. rock paintings, stone tools), palaeontological material (e.g. fossilised materials) and cultural heritage material (e.g. old graveyards, fences or ruins of buildings). Since some potential heritage material is buried, it is often only found during the construction phase of a project.

As a result of the relatively undisturbed nature of the sites, and the findings of the 2012 heritage assessments that were undertaken on Farm Hoekplaas during 2012, it is likely that archaeological or cultural material of importance would be found on the proposed site. Furthermore, due to the underlying geology of the area there is a low possibility of finding palaeontological material. A large scale development such as the proposed projects could have a negative impact on the archaeological and cultural heritage resources (including visual, landscape and sense of place impacts) by damaging or destroying such material or by requiring the material to be removed and stored *in situ*. It is therefore necessary to assess the potential impacts of the proposed developments at an early stage in order to best determine the course of action for heritage resources on site. It is therefore recommended that a Heritage Impact Assessment (HIA), including input on archaeological, heritage and visual considerations be undertaken.

Furthermore, as noted in **Section 1.2.2** "*any development … which would 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 be subjected to a heritage study in terms of NHRA, and be approved prior to the commencement of the construction process. The ToR for the assessments are provided below.

Undertake a Heritage and Archaeological Impact assessment of the sites in accordance with the requirements of Section 38(3) of the NHRA which would include:

- Conducting a detailed desk-top level investigation to identify all archaeological, cultural and historic sites in the proposed development areas;
- Undertaking field work to verify results of desktop investigation;

- Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;
- Submit the relevant application form, as required by South African Heritage Resources Agency and Northern Cape Provincial Heritage (Boswa ya Kapa Bokone);
- Compile a report which would include:
    - Identification of archaeological, cultural and historic sites within the proposed development areas;
    - Assess the sensitivity and significance of archaeological remains in the site;
    - Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction (medium term), more than 10 years after construction (long term));
    - Recommendation of mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance;
- The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also guidelines on procedures to be implemented if previously unidentified cultural resources are uncovered during later developments in the area;
- Consideration of relevant guidelines; and
- Cognisance must be taken of the Department of Environmental Affairs and Development Planning guideline: "Guideline for involving heritage specialists in EIA processes"[22].

The HIA would be undertaken by ACO Associates which was established in late 2008. With 22 years of accumulated experience, and having completed over 800 projects (including an HIA of Farm Hoekplaas in 2012), members of ACO Associates cc are equipped to handle assignments ranging from detailed, sensitive excavations, to large-scale field surveys and assessments of historic places.

Dr John Almond of Natura Viva cc would be appointed to undertake the palaeontology desktop study. Dr Almond has a doctorate in Earth Sciences (Palaeontology) and over 25 years' experience in palaeontology. He was also responsible for the 2012 palaeontological assessment of Farm Hoekplaas that formed part of the PV1 EIA process.

4.5.3 Sedimentation and erosion

The sediment loads of any drainage depressions or pans may increase due to the excavations on the site, the laying of linear infrastructure across drainage lines and other construction related activities. This would be exacerbated during the wet season and during any intense rainfall events.

4.5.4 Impact on traffic

Construction vehicles are likely to make use of the existing roads to transport equipment and material to the construction site. Per 75 MW AC PV plant, these vehicles would include:

[22] Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 053 E. Republic of South Africa, Provincial Government of the Western Cape, DEA&DP.

- 450 truckloads transporting 900 40-foot containers;
- Two to five digger loaders for land clearing; and
- Five to ten trucks with cranes to assemble the plant.

The impact on traffic is however not expected to be significant as these truckloads would be distributed throughout the construction period.

4.5.5 Storage of hazardous substances on site

As at any construction site, various hazardous substances 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.

4.5.6 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.

4.5.7 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.

5 PLAN OF STUDY FOR EIA

The purpose of this Chapter is to detail the Plan of Study for the EIA Phase to ensure that this EIA process satisfies the requirements of NEMA.

5.1 PURPOSE OF THIS PLAN OF STUDY FOR EIA

The Scoping process has been documented in this Scoping Report, which has identified various potential environmental impacts and project alternatives that require detailed investigation. This Plan of Study is the culmination of the Scoping Phase and its purpose is to ensure that the EIA Phase of this EIA process satisfies the requirements of NEMA. Accordingly, this Plan of Study for EIA outlines the anticipated process and products for the EIA Phase.

This Plan of Study for EIA has been compiled in terms of GN No R.33306 of 18 June 2010 of NEMA and will be submitted to DEA for their consideration.

5.2 DESCRIPTION OF THE ACTIVITY

The nature of the activity is described in detail in **Chapter 2**, but in brief includes the following:

- Construction of 10 x 75 MW AC (preferred alternative) or three alternative PV plants with generation capacities of 225 MW (Alternative PV2), 290 MW (Alternative PV3) and 500 MW (Alternative PV4);
- Associated infrastructure including:
  - **Solar energy plant:** A photovoltaic component comprising of numerous arrays of PV panels and associated support infrastructure to generate up to 75MW per plant, through the photovoltaic effect.
  - **Transmission lines:** 132 kV overhead transmission lines to connect each facility to the central onsite substation or an existing Eskom substation (i.e. Kronos or Cuprum).
  - **Substations:** An onsite 132 kV, 3 bay substation per project and two central multibay 132 kV substations with a maximum of six incoming bays and two outgoing.
  - **Boundary fence:** Each 75 MW AC facility would have an electrical fence for safety and security reasons.

5.3 DESCRIPTION OF TASKS TO BE PERFORMED

5.3.1 Potential environmental impacts identified during Scoping

Chapter 4 has reviewed the range of potential environmental impacts associated with the proposed PV plants near Copperton in the Northern Cape. Pursuant to this scoping exercise,

which was based on available literature, input from the authorities, I&APs and various specialists, a shortlist of potentially significant environmental impacts was identified for further, more detailed investigation during the EIA Phase. Specifically the following potential environmental impacts have been identified:

- ***Operational phase impacts on the biophysical environment:***
  - Impact on the flora;
  - Impact on fauna (including avifauna); and
  - Impact on freshwater resources.
- ***Operational phase impacts on the socio-economic environment:***
  - Impact on heritage resources (including palaeontology);
  - Visual impacts;
  - Impact on energy production;
  - 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 socio-economic environments:***
  - Disturbance of flora and fauna;
  - Sedimentation and erosion of water ways;
  - Impact on traffic;
  - Storage of hazardous substances on site;
  - Noise pollution; and
  - Dust impact.

5.3.2 Method of assessing the significance of potential environmental impacts

This section outlines the proposed method for assessing the significance of the potential environmental impacts outlined above. As indicated, these include both operational and construction phase impacts.

For each impact, the EXTENT (spatial scale), MAGNITUDE and DURATION (time scale) would be described (see table 5.1). These criteria would be used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place (see table 5.2). The mitigation described in the EIAR would represent the full range of plausible and pragmatic measures but does not necessarily imply that they would be implemented.[23]

The tables on the following pages show the scale used to assess these variables, and defines each of the rating categories.

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in (Table 5.2).

[23] The applicant will be requested to indicate at the Draft EIAR stage which alternative and mitigation measures they are prepared to implement.

Once the significance of an impact has been determined, the PROBABILITY of this impact occurring as well as the CONFIDENCE in the assessment of the impact, would be determined using the rating systems outlined in **Table 5.3** and **Table 5.4** respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the REVERSIBILITY of the impact is estimated using the rating system outlined in Table 5.5.

Table 5.1 Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Regional**	Beyond a 10 km radius of the candidate site.
	Local	Within a 10 km radius of the candidate site.
	Site specific	On site or within 100 m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	**High**	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact	**Construction period**	Up to 2 years
	Short Term	Up to 5 years after construction
	Medium Term	5-15 years after construction
	Long Term	More than 15 years after construction

Table 5.2 Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	• High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and medium term duration or a local extent and long term duration • Medium magnitude with a regional extent and long term duration
Medium	• High magnitude with a local extent and medium term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long term duration

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
Low	• High magnitude with a site specific extent and construction period duration • Medium magnitude with a site specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long term duration
Very low	• Low magnitude with a site specific extent and construction period duration • Very low magnitude with any combination of extent and duration except regional and long term
Neutral	• Zero magnitude with any combination of extent and duration

Table 5.3 Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 5.4 Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 5.5 Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is in all practical terms permanent.
Reversible	The impact is reversible within 2 years after the cause or stress is removed.

5.4 NEED FOR ADDITIONAL INFORMATION: SPECIALIST STUDIES

In reviewing the potential environmental impacts, all impacts initially identified during the Scoping Phase have been identified as being of concern and requiring further investigation. Accordingly, it is proposed to undertake the following specialist studies, in order to address a suite of potential environmental impacts.

STUDY	CONSULTANT AND ORGANISATION
Botanical assessment	Dr Dave McDonald of Bergwind Botanical Tours and Surveys
Agriculture potential assessment	Mr Kurt Barichievy of SiVEST
Aquatic assessment	Mr James Mackenzie of Mackenzie Ecological & Development Services
Hydrology assessment / Stormwater	Dr Nick Walker of Aurecon[24]
Avifauna assessment	Dr Andrew Jenkins of Avisense Consulting
Heritage assessment:	
Archaeology / Cultural	Mr Jayson Orton of ACO Associates
Palaeontology	Dr John Almond of Natura Viva
Visual assessment	Mr Steven Stead of VRM Africa cc

The ToR for these investigations as well as the identified specialists are outlined **Chapter 4**. A short summary of the various specialist consultants is given below the ToR in **Chapter 4**. CVs are available upon request.

5.5 REASONABLE PROJECT ALTERNATIVES IDENTIFIED DURING SCOPING

Chapter 2 reviewed a range of project alternatives associated with the proposed activities. Pursuant to this Scoping exercise, which was based on input from the authorities, I&APs and various specialists, a shortlist of reasonable project alternatives has been identified for further, more detailed investigation during the EIA Phase, namely:

Alternative Type	Description
Location alternatives	• One location for the proposed Klipgats Pan PV plants
Activity alternatives	• Solar energy generation via a PV plant • No-go" alternative to solar energy production
Site layout alternatives	• Six 75 MW AC PV plants (Layout Alternative 1) • Three (3) PV plants of 225 MW AC, 150 MW AC and 300 MW AC, respectively (Layout Alternative 2)
Technology alternatives	• Conventional PV vs. CPV technology • Single Axis vs. Fixed Axis PV tracking technology

[24] Please note that the specialist team has been amended to include a new hydrology specialist. Please refer to Section 4.3.3 for more information on the specialist and the assessment terms of reference.

Other potential alternatives were considered and screened out in **Chapter 2**. These are documented in **Section 2.3**.

5.6 THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The purpose of the EIAR would be to undertake a comparative assessment of the relative significance of the potential environmental impacts for the six proposed PV plants location and activity alternatives. The EIAR would thus include the following:

- A brief overview of the potential environmental impacts and reasonable alternatives identified during the Scoping investigation;
- A summary of the key findings of the various specialist studies as they pertain to the affected environment;
- An overview of the public participation process conducted during the compilation of the EIA Report;
- A detailed assessment of the significance of the potential environmental impacts for the various project alternatives. This assessment, which would use the methodology outlined in **Section 5.3.2**, would be informed by the findings of the specialist studies, and professional judgement;
- An overview of the full range of mitigation measures including an indication of how these would influence the significance of any potential environmental impacts, together with a lifecycle EMP. The mitigation measures would be informed by the specialist studies, professional experience and comment received from the I&APs; and
- A set of recommendations regarding the way forward would be provided, should any of the proposed alternatives be authorised in terms of NEMA.

5.7 PUBLIC PARTICIPATION PROCESS

The purpose of the public participation process would be to provide I&APs with adequate opportunity to have input into the environmental process. The public participation process would include the following:

5.7.1 Public comment on the Draft EIAR

Following the completion of the Draft EIAR (refer to **Section 5.6** above), it will be lodged at the Prieska (Elizabeth Vermeulen) Public Library, Ietznietz in Copperton and on Aurecon's website (www.aurecongroup.com). Registered I&APs will be notified of the lodging by means of letters, and given 40 days in which to comment on the report.

All written correspondence will be in English and Afrikaans.

The public comments would be consolidated into an annexure of the EIAR. This would take the form of a CRR, which would summarise the issues raised and provide the project team's

responses thereto. The draft report would also be revised in light of feedback from the public, where necessary.

5.7.2 Public comment on the Final EIAR

Once the EIAR has been finalised, it will be made available for a 21 day comment period. The report will be made available in the same locations in which the Draft EAIR was made available, and I&APs will be notified of the availability of the Final EIAR in writing. Any comments received will not be included in a CRR but will instead be collated and forwarded directly to DEA.

5.7.3 Opportunity for appeal

All registered I&APs would be notified in writing of the issuing of the Environmental Authorisation. They would be reminded of their right to appeal against DEA's decision to the Minister of Environmental Affairs in terms of NEMA.

5.8 PROPOSED PROGRAMME

It is envisaged that EIA process would take approximately 12 months to complete.

5.9 PERSONNEL

Aurecon have selected a group of highly experienced specialists and multi-disciplinary practitioners in order to execute this project as efficiently as possible. 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*) and holds a BEng (Civil) degree. Mr van der Merwe has over 13 years' experience in the field of impact assessment.

Miss Franci Gresse is an Environmental Practitioner with over five years' experience in the field. Miss Gresse holds a BSc(Hons) degree in Conservation Ecology from the University of Stellenbosch and has been involved in a number of renewable energy project in the Western and Northern Cape provinces.

Miss Nomvelo Siwela is an Environmental Practitioner with two years' experience in the field. She holds a B-Tech Degree in Environmental Management from the Cape Peninsula University of Technology. Miss Siwela was previously employed by the Department of Environmental Affairs and Development Planning and is well versed in the field of environmental compliance and enforcement and water quality management.

6 CONCLUSIONS AND WAY FORWARD

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

6.1 CONCLUSIONS

As per the requirements of NEMA, this Scoping investigation has reviewed a range of project alternatives and contemplated the array of potential environmental impacts associated with the following proposed activities in Copperton, namely:

- Construction of 10 x 75 MW AC (preferred alternative) or three alternative PV plants with generation capacities of 225 MW AC (Alternative PV2), 290 MW AC (Alternative PV3) and 500 MW AC (Alternative PV4);
- Associated infrastructure including:
  - **Solar energy plant:** A photovoltaic component comprising of numerous arrays of PV panels and associated support infrastructure to generate up to 75 MW AC per plant, through the photovoltaic effect.
  - **Transmission lines:** 132 kV overhead transmission lines to connect each facility to the central onsite substation or an existing Eskom substation (i.e. Kronos or Cuprum).
  - **Substations:** An onsite 132 kV, 3 bay substation per project and two central mulitbay 132 kV substations with a maximum of six incoming bays and two outgoing.
  - **Boundary fence:** Each 75 MW AC facility would have an electrical fence for safety and security reasons

The following feasible alternatives have been identified for further consideration in the EIAR:

Alternative Type	Description
Location alternatives	• One location for the proposed Klipgats Pan PV plants
Activity alternatives	• Solar energy generation via a PV plant • No-go" alternative to solar energy production
Site layout alternatives	• Six 75 MW AC PV plants (Layout Alternative 1) • Three (3) PV plants of 225 MW AC, 150 MW AC and 300 MW AC, respectively (Layout Alternative 2)
Technology alternatives	• Conventional PV vs. CPV technology • Single Axis vs. Fixed Axis PV tracking technology

Specifically the following potential environmental impacts have been identified for further consideration in the EIAR:

- ***Operational phase impacts on the biophysical environment:***
  - Impact on the flora;

- Impact on fauna (including avifauna); and
- Impact on freshwater resources.

- ***Operational phase impacts on the socio-economic environment:***
  - Impact on heritage resources (including palaeontology);
  - Visual impacts;
  - Impact on energy production;
  - 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 socio-economic environments:***
  - Disturbance of flora and fauna;
  - Sedimentation and erosion of water ways;
  - Impact on traffic;
  - Storage of hazardous substances on site;
  - Noise pollution; and

Dust impact

The following specialist studies and specialists will be commissioned to provide more detailed information on those environmental impacts which have been identified as potentially being of most concern, and/or where insufficient information is available, namely:

STUDY	CONSULTANT AND ORGANISATION
Botanical assessment	Dr Dave McDonald of Bergwind Botanical Tours and Surveys
Agriculture potential assessment	Mr Kurt Barichievy of SiVEST
Aquatic assessment	Mr James Mackenzie of Mackenzie Ecological & Development Services
Hydrology assessment / Stormwater	Dr Nick Walker of Aurecon[25]
Avifauna assessment	Dr Andrew Jenkins of Avisense Consulting
Heritage assessment:	
Archaeology / Cultural	Mr Jayson Orton of ACO Associates
Palaeontology	Dr John Almond of Natura Viva
Visual assessment	Mr Steven Stead of VRM Africa cc

The rationale for these specialist investigations and the ToR has been outlined under the relevant impacts in **Chapter 4** of this report.

The approach to the EIA Phase should be conducted in terms of the guidelines outlined in the Plan of Study for EIA in **Chapter 5**.

[25] Please note that the specialist team has been amended to include a new hydrology specialist. Please refer to Section 4.3.3 for more information on the specialist and the assessment terms of reference.

6.2 THE WAY FORWARD

I&APs had 40 days, until 10 June 2013, to submit their written comments on the DSR. Cognisance was taken of all comments in compiling the final report, and the comments, together with the project team and proponent's responses thereto, are included in the final report. Where appropriate, the report will be updated.

As is required by the NEMA EIA Regulations, I&APs must be given the opportunity to comment on all draft and final reports. Consequently, the FSR is available for a 21 day comment period in the same locations in which the DSR was made available. I&APs will be notified of the availability of the FSR in writing.

The FSR has been completed and all I&AP comments have been incorporated into the report, as necessary, and the proponent has approved the report. The FSR will be submitted to DEA and the Northern Cape DEANC for their review and comment, respectively. DEA will either reject the application or instruct the applicant to proceed to the EIA Phase, either as proposed in the Plan of Study for EIAR, or direct that amendments are made before continuing.

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