ARC • LNR

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DG Paterson

18th November 2016

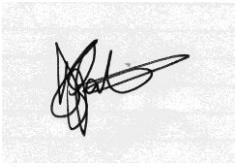
To whom it may concern:

Regarding the reports produced by ARC regarding soils and agricultural potential for the three proposed Kloofsig PV projects and supplied to SRK Consulting, the response to the standard requirement that a detailed soil investigation be undertaken, is as follows:

> The majority of solar power applications in the specified area of the Northern Cape comprise areas with very low agricultural potential that, with **hot, dry conditions** and often shallow, sandy soils with rock outcrops. A site visit would only confirm this situation. There might well be a soil erosion hazard regarding either wind or water erosion, but that is mentioned in the reports with a range of mitigation measures specified, and a site visit would also not add significant value to that assessment.
>
> Where a specialist soil investigation for an environmental impact assessment is concerned, if there is any possibility of medium or high potential agricultural soils, or if there is any other specific situation that justifies a site visit, that would definitely be recommended in the report, but this is not the case for the Kloofsig project area.

Therefore, given the nature of the development and the shallow, low potential soils occurring in the study area, there should be no need for any site visit to supply an amendment to the above-mentioned reports.

Yours sincerely,



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SCOPING REPORT

On contract research for

SRK Consulting (South Africa) (Pty) Ltd.

Environmental Screening Investigation for the proposed Kloofsig 1 PV Project, Northern Cape

Soils and Agricultural Potential

By

D.G. Paterson (Pr. Sci. Nat. 400463/04)

Report Number GW/A/2016/xx

October 2016

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DECLARATION

I hereby declare that I am qualified to compile this report as a registered Natural Scientist and that I am independent of any of the parties involved and that I have compiled an impartial report, based solely on all the information available.

D G Paterson

October 2016

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1. TERMS OF REFERENCE

The ARC-Institute for Soil, Climate and Water (ARC-ISCW) was contracted by SRK Consulting (South Africa) (Pty) Ltd to undertake a soil investigation near Petrusville, in the south-east of the Northern Cape Province. The purpose of the investigation is to contribute to the scoping phase of the Environmental Impact assessment (EIA) process for a proposed Kloofsig PV solar project.

Scoping Report

The scoping report must include:

» a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project

» a description and evaluation of environmental issues and potential impacts (including direct, indirect and cumulative impacts) that have been identified

» Direct, indirect and cumulative impacts of the identified issues must be evaluated within the Scoping Report in terms of the following criteria:

- ☐ the nature, which shall include a description of what causes the effect, what will be affected and how it will be affected;
- ☐ the extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international

» a statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts

» identification of potentially significant impacts to be assessed within the EIA phase and details of the methodology to be adopted in assessing these impacts.

Legislation

In terms of the Subdivision of Agricultural Land Act (Act 70 of 1970), any application for change of land use must be approved by the Minister of Agriculture, while under the Conservation of Agricultural Resources Act (Act 43 of 1983) no degradation of natural land is permitted.

The following section summarises South African Environmental Legislation with regard to handling of topsoil to be considered for similar projects:

- The law on **Conservation of Agricultural Resources Act** (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal.

- The **Bill of Rights** states that environmental rights exist primarily to ensure good health and well-being, and secondarily to protect the environment through reasonable legislation, ensuring the prevention of the degradation of resources.

- The Environmental right is furthered in the **National Environmental Management Act** (No. 107 of 1998), which prescribes three principals, namely the precautionary principle, the "polluter pays" principle and the preventive principle.

- It is stated in the above-mentioned act that the individual/group responsible for the degradation/pollution of natural resources is required to rehabilitate the polluted source.

- Soils and land capability are protected under the **National Environmental Management Act** 107 of 1998, the Environmental Conservation Act 73 of 1989, the Mineral and Petroleum Resources Development Act 28 of 2002 and the Conservation of Agricultural Resources Act 43 of 1983.

- The **National Veld and Forest Fire Bill** of 10 July 1998 and the **Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act** 36 of 1947 can also be applicable in some cases.

- The **National Environmental Management Act** 107 of 1998 requires that pollution and degradation of the environment be avoided, or, where they cannot be avoided, minimized and remedied.

- The **Conservation of Agriculture Resources Act** (Act 43 of 1983) requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

The objectives of the study are;

- To obtain all existing soil information and to produce a soil map of the specified area as well as

- To assess broad agricultural potential.

2. SITE CHARACTERISTICS

2.1 Location

The broad study area is located approximately 15 km north west of the town of Petrusville, in the Northern Cape Province (see Figure 1 below) on the farm Kalkpoort 18. Within the broader study area (black outline), three separate projects have been identified, and this report refers to Phase 1 (marked **in blue**).

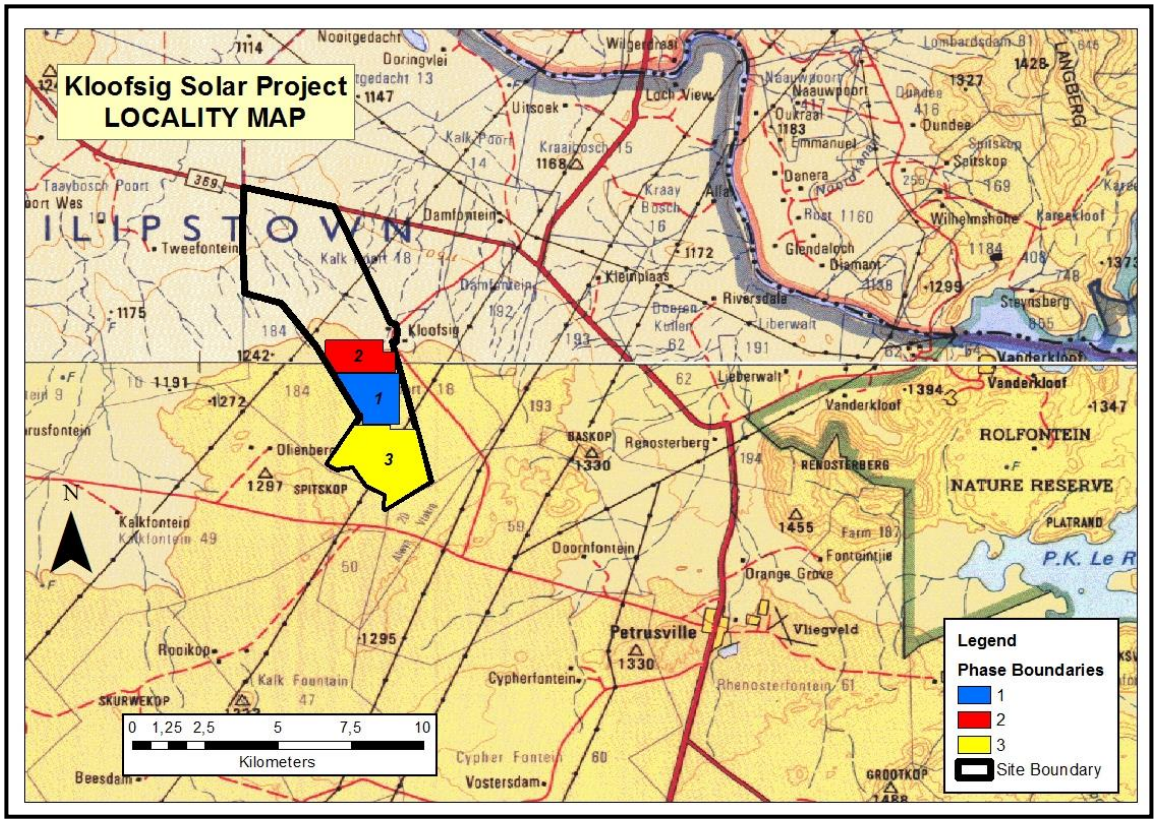

Figure 1 Locality map

2.2 Terrain

The area is generally very flat, with slopes less than 2% and lies at a height of approximately 1 200 – 1 220 metres above sea level. No permanent drainage ways, and only a few very small non-perennial channels, occur in the vicinity.

2.3 Climate

The climate of the study area (Koch, 2012) can be regarded as warm to hot with occasional rain in summer and cold, dry winters. The long-term average annual rainfall in this region of the Northern Cape is only 320 mm, with a year-round distribution, but a peak in the summer months. Rainfall is erratic, both locally and seasonally and therefore cannot be relied on for agricultural practices. The average evaporation is over 2 000 mm per year, peaking at around 9.5 mm per day in December.

Temperatures vary from an average monthly maximum and minimum of 30.6ºC and 13.4ºC for January to 20.3ºC and -4.5°C for July respectively. The extreme high temperature that has been recorded is 39°C and the extreme low –8.2ºC. Frost occurs most years on 5 days on average between early May and early August.

2.4 Parent Material

The geology of the area (Figure 2) comprises shale parent material from the Volksrust Formation, Karoo Sequence (Geological Survey, 1984).

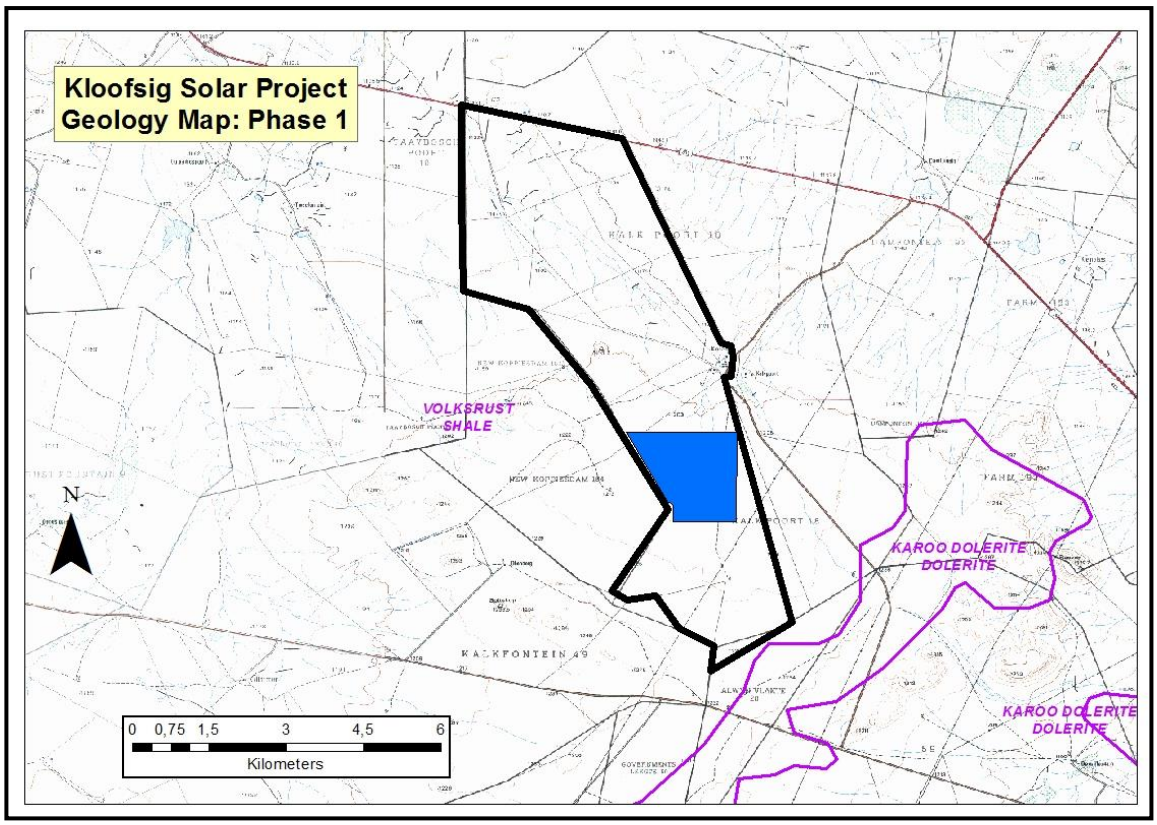

Figure 2 Geological units in project site

3. METHODOLOGY

Existing information was obtained from the map sheet 3024 Colesberg (Geers & Eloff, 1992) from the national Land Type Survey, published at a scale of 1:250 000. A land type is defined as an area with a uniform terrain type, macroclimate and broad soil pattern. The soils are classified according to MacVicar *et al* (1977).

The broad study area is covered by only one single land type, as shown on the map in the Appendix, namely:

- **Ae144** (red, apedal, high base status soils)

It should be clearly noted that, since the information contained in the land type survey is of a reconnaissance nature, only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type. Also, other soils that were not identified due to the scale of the survey may also occur. **The site was not visited during the course of this study, and so**

the detailed composition of the specific land types has not been ground-truthed.

A summary of the dominant soil characteristics of the land type is given in Table 1 below.

The distribution of soils with high, medium and low agricultural potential within each land type is also given, with the dominant class shown **highlighted in bold type**.

4. SOILS

A summary of the dominant soil characteristics is given in **Table 1** below.

Table 1 Land types occurring (with soils in order of dominance)

Land Type	Depth (mm)	Dominant soils	Percent of land type	Characteristics	Agric. Potential (%)
Ae144	300-600	Hutton 33/36/43	38%	Reddish, structureless, sandy loam to sandy clay loam soils, occasionally calcareous, on hard to weathering rock	High: 9.3 **Mod: 62.3** Low: 28.4
	200-300	Hutton 33/36	12%	Reddish, structureless, sandy loam to sandy clay loam soils, on hard to weathering rock	
	>1200	Oakleaf 26/27/46/47	14%	Reddish-brown, structureless to weakly structured, sandy clay loam to clay alluvial soils, calcareous	

Note: Agricultural Potential, as shown in the right-hand column, refers to ***soil characteristics only*** and no climatic or other restrictions are taken into account.

5. AGRICULTURAL POTENTIAL

Much of the area comprises a mixture of red to reddish-brown, apedal (structureless) soils of the Hutton form, along with smaller areas of more clayey, alluvial and duplex soils (Table 1). Both groups of soils have varying depth to the underlying rock, and there are some smaller areas of shallow lithosols and surface rock also occurring. For the duplex ("two-layered") soils, which comprise approximately 20% of the broader land type **Ae144** (and thus the whole Kloofsig PV 1 area), the topsoil is relatively sandy and abruptly overlies a structured, clayey, often calcareous subsoil horizon. These soils are very susceptible to erosion when the topsoil horizon becomes exposed, either by agricultural activity or, more likely in such a dry environment, by overgrazing by livestock. As a consequence, the agricultural potential is low, but there is a strong requirement for continuous management measures if any soils are disturbed.

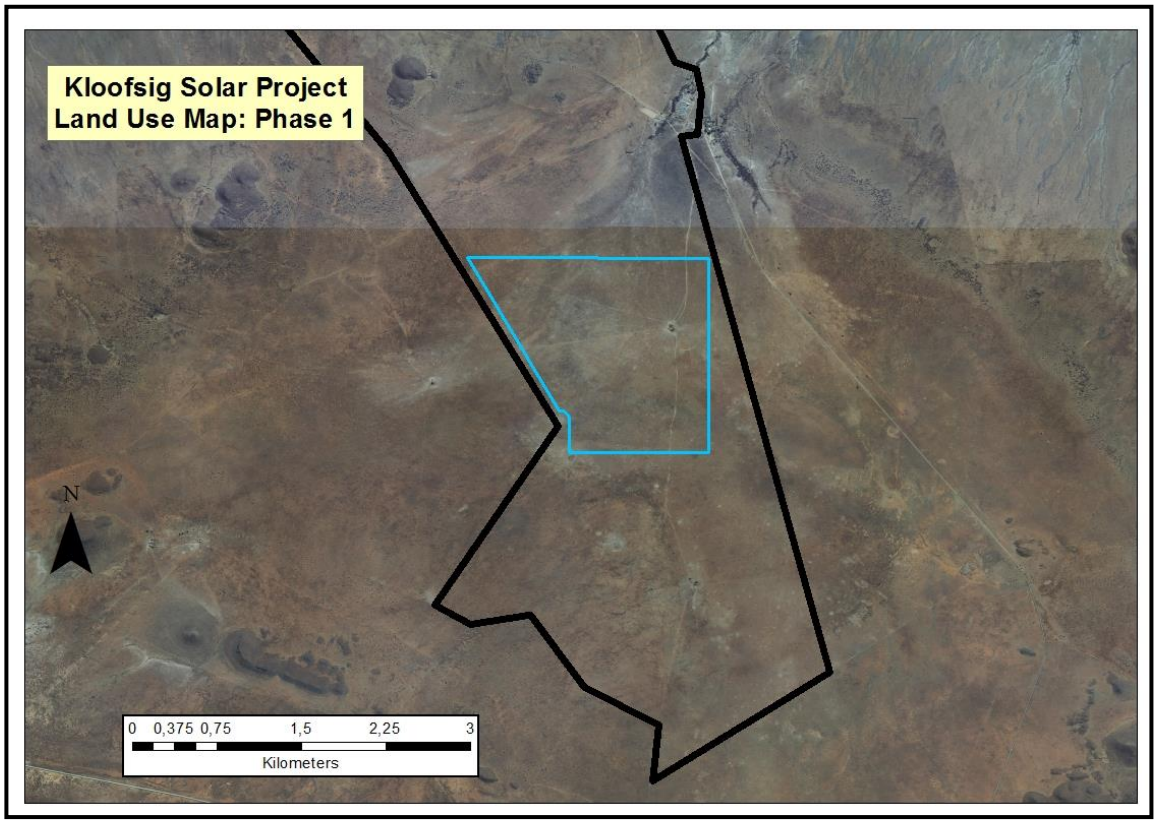

Figure 3 Google Earth image of study area

In addition, the very low rainfall in the area (Section 2.3) means that the only means of cultivation would be by irrigation and the Google Earth image (Figure 3) shows virtually no signs of any agricultural infrastructure and certainly none of irrigation.

It would seem that the project site is currently very extensively utilized for sheep and game farming. The long-term grazing capacity of the surrounding area is fairly low, around 20-22 ha/LSU (ARC-ISCW, 2004).

6. IMPACTS

The first major impact on the natural resources of the study area would be the loss of arable land due to the construction of the various types of infrastructure. However, this impact would in all probability be of limited significance and would be local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact, especially given the low prevailing agricultural potential.

The impact can be summarized as follows:

Table 3a Impact significance

Nature of impact: Loss of agricultural land *Land that is no longer able to be utilized due to construction of infrastructure.*		
Criteria	**Definition**	**Score**
A. Extent of impact	Local (project area only)	1
B. Intensity (Magnitude) of impact	Medium (functions & processes modified)	2
C. Duration of impact	Long-term (>15 yrs)	3
Consequence of impact (A+B+C)	Medium	6
Probability of impact	Improbable (<40% chance of occurring)	
Significance (comb. consequence/probability)	**Low** (medium consequence + improbable)	
Status (positive or negative)	Negative	
Confidence	High	
Can impacts be mitigated	Yes	
Mitigation factors	The maximum agricultural potential is for grazing, so the main mitigation would be to ensure that as little surface disturbance as possible occurs, so that grazing land is minimally affected.	
Residual Impacts:	If infrastructure is remained at the end of the project life, rehabilitation to an acceptable degree of agricultural production (probably grazing potential) should be possible.	

Erosion is a common occurrence on construction sites where soil is loosened and vegetation cover is stripped. The nature of the development should only include the partial clearance of vegetation within the development footprint. Vegetation should

be permitted to remain on the surface for the maximum possible area and should be maintained throughout the operation phase. Due to the sporadic occurrence of duplex soils, as mentioned above, the hazard of ***water erosion*** when the topsoil is disturbed may be present, as such areas are mapped as "highly susceptible" (ARC-ISCW, 2004).

Table 3b Impact significance

Nature of impact: Increased susceptibility to water erosion *Some of the project site potentially comprises duplex soils. These soils are very susceptible to erosion, especially water erosion when the topsoil is disturbed.*		
Criteria		
Definition	**Score**	
A. Extent of impact	Local (project area only)	1
B. Intensity (Magnitude) of impact	Low (functions & processes modified)	2
C. Duration of impact	Long-term (>15 yrs)	3
Consequence of impact (A+B+C)	Medium	6
Probability of impact	Improbable (<40% chance of occurring, **only if not properly mitigated**)	
Significance (comb. consequence/probability)	**Low** (medium consequence + improbable)	
Status (positive or negative)	Negative	
Confidence	High	
Can impacts be mitigated	Yes	
Mitigation factors	The main mitigation would be to ensure that as little surface disturbance as possible occurs. Where vegetation is removed for construction, specific measures would need to be put in place during both the construction and operational phases, which would include: absolute minimum removal of vegetation; soil conservation measures; re-vegetation as soon as possible; regular monitoring of erosion situation.	
Residual Impacts:	Loss of topsoil through erosion can occur unless appropriate mitigation is implemented. In such cases, loss of soil resource is usually irreversible.	

Cumulative impacts are those which may be expected when, for example, more than one project is planned in relatively close proximity, so that off-site or other impacts from one site might affect another. In this case, there is a possibility of sediment removal by water erosion from one site to another, especially if shared infrastructure, such as access roads, are established.

Regarding possible cumulative impacts, appropriate soil erosion management measures must be implemented during construction to minimize loss of topsoil resources. These would include soil conservation techniques such as geotextiles, contouring or construction of berms, culverts etc and immediate re-vegetation and regular monitoring of all disturbed areas. In addition, regular and focused communication must be implemented between representatives of all such projects in the vicinity to co-ordinate mitigation measures and monitoring where necessary.

8. CONCLUSION

The fact that soil information is only available at 1:250 000 can be considered as a knowledge gap. However, considering that the broad soil types occurring on and surrounding the site are homogeneous, coupled with the fact that there is limited potential for agricultural activity within the project site, it is envisaged no site visit would be required. It can confidently be stated that the impact on agricultural potential will be low, predominantly because of the climatic conditions and the low agricultural potential of the site.

Considering the impacts, including cumulative impacts, there is no reason why the project should not be developed.

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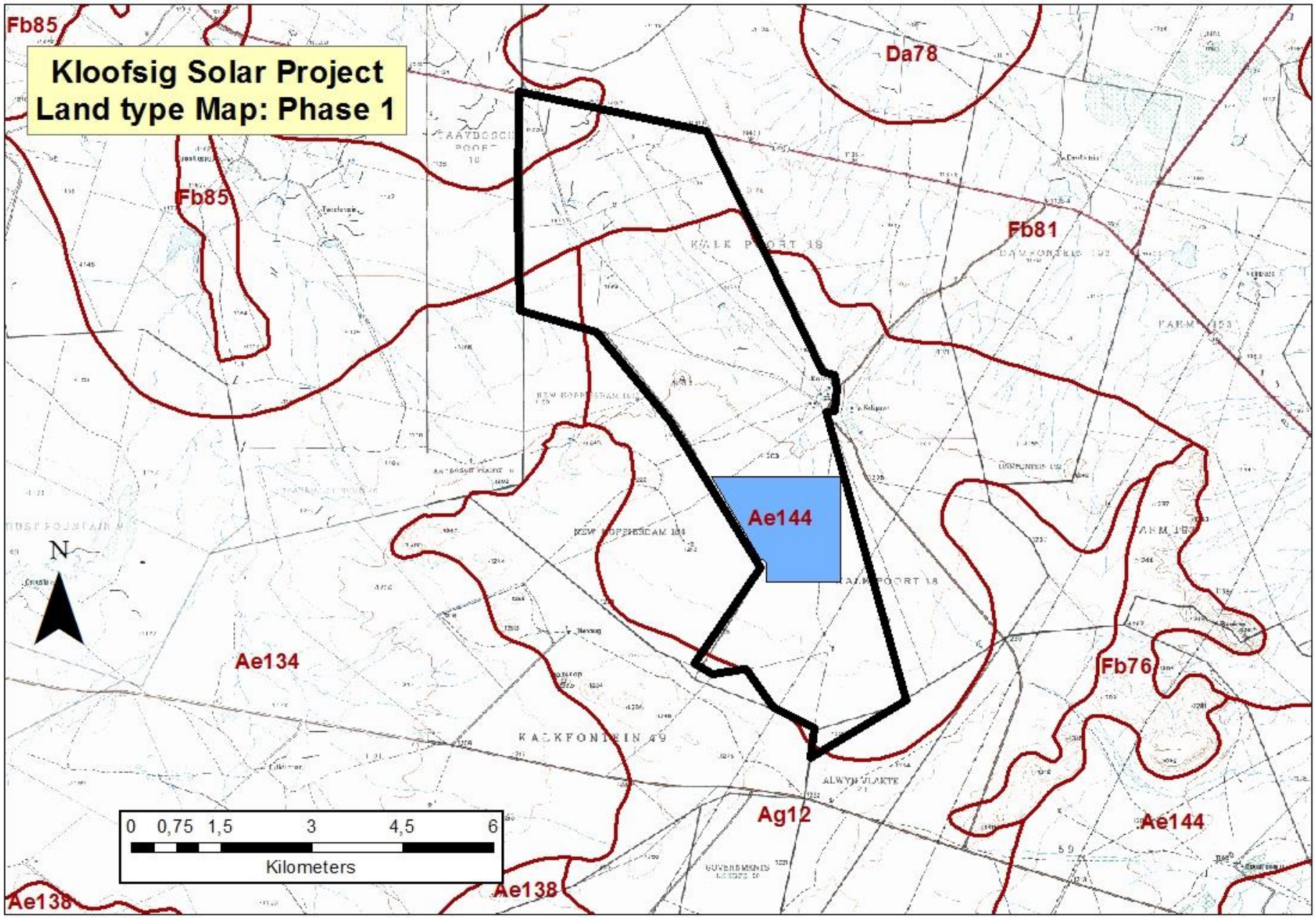
APPENDIX

MAP OF LAND TYPES


Kloofsig Solar Project
Land type Map: Phase 1
Fb85
Fb85
Da78
Fb81
Ae144
Ae134
Fb76
Ag12
Ae144
Ae138
Ae138
N
0 0,75 1,5 3 4,5 6
Kilometers

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ACADEMIC QUALIFICATIONS:

- Matriculated: 1976, Dalziel High School, Motherwell, Scotland
- BSc (Hons) Geography, 1980, University of Strathclyde, Glasgow, Scotland
- MSc (Soil Science) *cum laude*, 1998, University of Pretoria
- PhD (Soil Science), 2014, University of Pretoria

PROFESSIONAL CAREER:

- 1981-1987: Soil Scientist: Soil and Irrigation Research Institute, Pretoria
- 1987-1992: Senior Soil Scientist: Soil and Irrigation Research Institute, Pretoria
- 1992-present: Senior Soil Scientist: ARC-Institute for Soil, Climate & Water

FIELDS OF SPECIALITY AND COMPETENCE:

- Soil classification and mapping
- Soil interpretations
- Soil survey project management
- Environmental assessment
- Soil survey and land capability course presentation
- Ground penetrating radar

PUBLICATIONS (see attached list):

- Three refereed articles (S.A. Journal of Plant and Soil)
- Nine Congress papers/posters
- S.A. Soil Classification (1991) (Member of working group)
- Seven 1:250 000 Land Type Maps
- Three Land Type Memoirs
- More than 200 soil survey reports and/or maps

COURSES COMPLETED:

- Course in Project Management (University of Stellenbosch)
- Course in Junior Personnel Management (Dept of Agriculture)
- Course in Handling of Grievances and Complaints (Dept of Agriculture)
- Course in Marketing (ARC-ISCW)
- Course in National Qualifications Framework Assessment, ARC-CO
- Training Course in Ground Penetrating Radar (GSSI, USA)
- Introduction to ArcGIS 8, GIMS, 2004

PROFESSIONAL STATUS:

- Registered Natural Scientist: Soil Science (SA National Council for Natural Scientific Professions) – registration number 400463/04
- Member of South African Soil Classification Working Group, 1990-present
- Convenor of South African Soil Classification Working Group, 2013-
- Member of Soil Science Society of South Africa (1982-present)
- President of Soil Science Society of South Africa (2005-2007)
- Member of South African Soil Survey Organisation (2000-present)
- Council Member of South African Soil Survey Organisation (2002-2003)
- Member of International Erosion Control Association
- Scientific Referee, S.A. Journal for Plant and Soil
- External Examiner, University of Pretoria, University of Witwatersrand, University of Venda

AWARDS:

Best article on Soil Science, South African Journal for Plant and Soil, 2011

MISCELLANEOUS:

- Editor, Soil Science Society newsletter, 1993-present
- Member, Clapham High School (Pretoria) Governing Body 1998-2002
- Member, Northern Gauteng Football Referee's Association
- Committee Member, Rosslyn Golf Club (Club Champion 2002 and 2007)

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* Co-author as member of Working Group

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Plus ARC-ISCW Reports on:

- Ground penetrating radar investigations in: Kruger National Park; Enseleni, Natal; Weatherly, Maclear; Kleinkopje Mine

- Soil survey investigations at: Roodeplaat, Kathu, Steelpoort River, Palala River, Zeekoegat (Roodeplaat), Limpopo River, Lydenburg, Kendal, Clewer Sand (Witbank), Botha Sand (Witbank), Balmoral Colliery, Bafokeng (Rustenburg), Towoomba (Warmbaths), Hoeveld Stene (Middelburg), Quality Bricks (Witbank), Visagie Sand (Middelburg), Rosslyn, Coalbrook (Sasolburg), Stewart Coal (Delmas), Forzando Coal

(Hendrina), Vaalgro (Vereeniging), Ratanda (Heidelberg), Elspark (Boksburg), Thorncliffe Mine (Steelpoort), Jan Smuts Quarry (Boksburg), Ennerdale (Phase I & II), Thokoza, North Riding, Natalspruit (Alberton), Arnot, Kroondal (Phase I & II), Ga-Rankuwa, Hartebeespoort Dam, Kosmos, Assen, Grasmere, Magalies Moot (Pretoria), Valpre (Paulpietersburg), Cargo Carriers (Sasolburg), Waterval (Rustenburg), Rayton, Bronkhorstspruit, Zwavelpoort (Pretoria), Pietersburg, Trojan Mine (Steelpoort), Platinum Highway (Rustenburg), Moutse, Centurion, Salique (Klaserie), Northam, Greenside Colliery (Witbank), South Deep Mine (Westonaria), Bank Colliery, Steelpoort Platinum, Gautrain Route (Pta/Jbg), Rietspruit Mine (Ogies), Potgietersrus Platinum, Atok Mine (Lebowa), Blue Ridge Mine (Groblersdal), Ngodwana, Estancia (Breyton), Twickenham Mine (Steelpoort), Marikana.

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

PROPOSED 75 MW KLOOFSIG SOLAR PV ENERGY FACILITY, NORTHERN CAPE

Specialist:	ARC-Institute for Soil, Climate and Water		
Contact person:	Garry Paterson		
Postal address:	Private Bag X79, Pretoria		
Postal code:	0001	Cell:	083 556 2458
Telephone:	012 310 2601	Fax:	012 323 1157
E-mail:	garry@arc.agric.za		
Professional affiliation(s) (if any)	Soil Science Society of SA; SA Soil Surveyors Organisation; International Erosion Control Association; Registered Soil Scientist (SACNASP)		

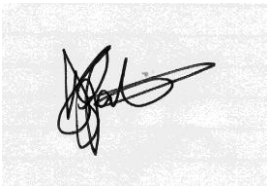
Project Consultant:			
Contact person:			
Postal address:			
Postal code:			
Telephone:			
E-mail:			

4.2 The specialist appointed in terms of the Regulations_

I, **DG PATERSON**, declare that –

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct;
  and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Name of company (if applicable):
ARC-Institute for Soil, Climate and Water

Date:
27th October 2016