Appendix D1 – Geotechnical Report

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RECONNAISSANCE REPORT AND DESK TOP STUDY ON THE GEOTECHNICAL CONDITIONS ENCOUNTERED AT FIVE REVISED PROPOSED SITES FOR THE CONVERSION OF SUN ENERGY TO ELECTRICITY

I INTRODUCTION

1 APPOINTMENT

Soilkraft cc was appointed by Mr Dick Berlijn of Subsolar Energy to conduct a desk top study and reconnaissance survey of five revised sites in the North West Province and Northern Cape to provide early indications as to the suitability of these sites to establish infrastructure for converting sun energy to electricity. This survey constitutes a follow-up, supplementary investigation to the investigation previously conducted.

The professional team involved with the project includes the following:

- *Client:* Subsolar Energy.
- *Geotechnical Consultant*: Soilkraft cc.
- *In-situ Testing Contractor*: Profile Projects cc.

2 INVESTIGATION CONSTRAINTS

The report reflects the conditions as determined from a desk top study and reconnaissance survey of limited extent only. It is therefore essential that a detailed geotechnical survey of each site be conducted to refine the results and recommendations as set out in this report. This is important as in most cases a depth of three meters of testing could not be reached prior to refusal of testing due to the presence of very dense soil material or hard rock.

3 TERMS OF REFERENCE

3.1 Soil Profiling

Soil descriptions for test pit profiling were done according to the provisions of the guidelines as proposed by the Geotechnical Division of SAICE and SAIEG[Reference V.1]. For the benefit of the non-geotechnical reader of this document, these guidelines are summarised in the attached Table I.1 : Soil Profiling Parameters.

3.2 Penetration Testing

In southern Africa considerable use is made of a local standard of the Dynamic Probe Super Heavy Test (ISSMFE Technical Committee on Penetration Testing, 1988), alongside the Standard Penetration Test (SPT). A 60° disposable cone, 50mm in diameter, is fitted onto the bottom of an E-size rod and driven into the ground by a 63,5kg hammer falling through 762mm. The number of blows required to drive the cone through successive 300mm intervals of penetration is recorded. In the interpretation of the results, some 30% loss of energy is accepted as standard, resulting in an eventual energy application of approximately 500 Joule, while the installation equipment for future construction imparts 1000 Joule. Refusal of DPSH penetration testing can be associated with the presence of medium hard rock to hard rock.

Based on the results of the DPSH testing, the following soil parameters were calculated as per the NovoSPT 2.1 software:

- Friction angle as per Peck et al applicable to both cohesive and non-cohesive soils (1953).
- Young's modulus (E_s) for non-cohesive material as per Schultze and Muhs (1967).
- Soil consistency as per Terzaghi and Peck applicable to both cohesive and non-cohesive soils (1967).
- California Bearing Ratio applicable to non-cohesive soils as per Kleyn (1975).

4 METHOD OF INVESTIGATION

4.1 Desk Top Study

For purposes of the investigation literature detailing the climate, landscape, geology and previous investigations of the areas under consideration were consulted. The existing data consulted included the following:

- Topographical maps of the study areas

- Regional geological maps of the study areas
- Existing reports compiled as part of this project, as well as other projects conducted in the line of consulting in the larger vicinity of the study areas.

The findings related to each of the areas investigated will be reflected in the discussion involving each study area.

4.2 Field Work

Co-ordinates for each site were provided by the client. Field work was conducted on 1 March and 2 March 2012 by a team of Profile Projects. Each site was investigated by field work consisted of the following:

4.2.1 Trial Holes

A single trial hole was excavated on each of the proposed sites. The trial hole depths were restricted to a depth of 1500mm (maximum) due to current health and safety requirements. Alternatively, excavation was halted if refusal of excavation was encountered. The test pit profiles are contained in Addendum A to this document.

4.2.2 DPSH Penetration Testing

One DPSH test in the direct vicinity of the test pit, but located a sufficient distance to ensure that the results are not influenced by the presence of the test pit.

The results of the penetration testing are contained in Addendum B to this report, but for convenience applicable probes are summarised in each section of discussion, as applicable to the various study areas.

For the sake of clarity, Table I.2 summarises the corresponding test positions (i.e. trial holes and DPSH probes) under consideration in this report.

Table I.2 : Test Positions

Region	Site	Trial Hole	DPSH Probe
Delareyville	Driekant 204 - IO	1	Delareyville DPSH1
Riverton	1. Zoutpansfontein 34	2	Riverton DPSH1
	2. Hanskopfontein 41	3	Riverton DPSH2
Vryburg	1. Waterloo 992 IN	4	Vryburg DPSH1
	2. Woodhouse 729 IN	5	Vryburg DPSH2
	3. Rosendal 673 IN	6	Vryburg DPSH3
	4. Rosendal 673 IN	7	Vryburg DPSH4
	5. Klondike 670 IN	8	Vryburg DPSH5

RECONNAISSANCE REPORT AND DESK TOP STUDY ON THE GEOTECHNICAL CONDITIONS ENCOUNTERED AT FIVE REVISED PROPOSED SITES FOR THE CONVERSION OF SUN ENERGY TO ELECTRICITY

III RIVERTON

1 SITE LOCATION

Two areas were investigated in Riverton. The first site is located on the farm Zoutpansfontein 34 whilst the second site is located on the farm Hanskopfontein 41. The two areas are located approximately 28km north of the Kimberley central business district and lays east of the N12 national route. Both study areas comprise of farmland.

The location of the site is indicated on the attached Figure III.1 : Riverton Site - Locality Plan.

2 METHOD OF INVESTIGATION

Both terrains were assessed by means of a single trial hole and supplementary DPSH probe. The personnel of Profile Projects therefore excavated a trial hole at the position indicated by the client and penetrated a DPSH probe within two metres of the trial hole. The location of the two test positions are as follows:

- Site One, trial hole and DPSH Probe: 25 Y0019740 X3152830.
- Site Two, trial hole and DPSH Probe: 25 Y0018265 X3153369.

3 SITE CONDITIONS

As mentioned, the areas investigated were uninhabited farm land. The land was not utilised for agricultural purposes, other than (presumably) grazing. Site photos are not available.

3.1 Climate

The site of investigation is located in an area with an approximate Weinert N-value between 7,5 and 10,0 ; and a Thornthwaite Moisture Index between -40 and -20. Climatically the area may thus be described as semi-arid. The importance of this is that mechanical breakdown of rock material will take place, rather than chemical decomposition there of that may result in the formation of expansive clay if the suitable parent material is available. Minerals such as amphiboles, pyroxenes and olivine are particularly susceptible to such weathering.

Summer and autumn rainfall occur and winters are very dry. The mean annual precipitation varies between 300mm and 500mm. Frost is frequent in the winter. The mean monthly maximum and minimum temperatures for Kimberley are 37,5°C in January and -4,1°C in July, respectively.

3.2 Landscape and Topography

Mucina and Rutherford describe the area as belonging to the Kimberley Thornveld. The vegetation and landscape features are described as plains that are often slightly irregular with a well-developed tree layer consisting mostly of various acacia species, and a well-developed shrub layer with occasional dense stands of acacia mellifera. The grass layer is open with much uncovered soil.

The two areas investigated are located close to each other and both areas are located at an altitude of roughly 1150m above mean sea level. A small, very flat ridge separates the two sites and as a result, site one drains in a westerly direction, whilst site two drains in an easterly direction. It is anticipated that the prevailing gradient on both sites do not exceed 2%.

Drainage presumably takes place by means of sheet wash and infiltration. No drainage features prevail in the immediate vicinity of the two sites; hence excess surface water is destined to infiltrate the soil.

3.3 Services

Services such as water, electricity or sewerage disposal are not provided to the site. Bulk electricity reticulation is present in the form of overhead power lines, just east of the trial hole excavated on site one.

4 DISCUSSION

4.1 Site Geology

Bedrock on site occurs as a sill of dolerite associated with the Karoo Dolerite Suite. The sill covers a huge area to the south of the site and is regarded as intrusive into the surrounding sediments of the Prince Albert Formation, Ecca Group, Karoo Supergroup. In addition, calcrete deposits are also indicated in the vicinity.

According to the regional geological map, site one is located near the edge of the dolerite intrusion, where a contact with the Prince Albert Formation occurs. Trial holes, however, revealed calcrete at the base of the excavation. It was noted that the calcrete contained inclusions of both dolerite and sandstone, with the latter being slightly more dominant. Site two, also revealed calcrete; however in this instance the dolerite inclusions were far more dominant with only limited sandstone inclusions

being noted.

From the above it must be concluded that bedrock remains to be verified; however the presence of sandstone and dolerite is very likely. The materials will presumably be encountered below the calcrete.

A kimblerlite fissure is indicated just south of site two. The presence of shear zones or fault zones could not be identified on site. The regional geology of the site is indicated on the attached Figure III.2: Riverton Site – Regional Geology.

4.2 Soil Profiles

The soil profiles encountered on the two sites were very similar. Trial holes on the two sites both encountered refusal at a depth of 500mm and both soil profiles consisted on a surface colluvial horizon of dark brown clayey sand underlain by hardpan calcrete. The following applies:

- *Surface Horizon of Sand*: The colluvial horizon had a notably low density. The material had a medium dense consistency and a very voided structure. The latter most likely contributed to the low density observed. The material is estimated to span to a depth of approximately 450mm.
- *Calcrete*: As mentioned in section 4.1 above, the hardpan calcrete contained fragments of both sandstone and dolerite. The material is very well-cemented and induced refusal of excavation by hand. This, in addition to the results of DPSH probing, reveals that the calcrete at both sites have a very dense consistency from depths as shallow as 600mm.

4.3 Groundwater

- *Perched Water*: Perched water was not encountered during the investigation of either site. Considering the natural environment, one can expect that perched water may theoretically occur immediately above the calcrete, but due to the semi-arid climate, such conditions are unlikely to manifest.
- *Permanent Water*: Vegter indicates the probability for drilling successfully for water in the area to exceed 60%, and the probability that such a borehole will yield more than 2l/s to be between 30% and 40%. Groundwater is expected to occur at depths between 20m and 30m in pores in disintegrated and decomposed, partially decomposed rock and fractures which are restricted to a zone directly below ground water level. The contact aureole between intrusive igneous bodies and surrounding sedimentary rock are particularly likely to yield water.

4.4 Founding Conditions

Based on the results of the DPSH testing a safe bearing capacity of 100kPa is achieved at a depth of

600mm in the residual dolerite. The attached Table III.1 : Riverton – DPSH Interpretation provides a summary of the geotechnical parameters normally required for foundation design.

Of importance is the following:

- *Heave*: Conditions of heave are not anticipated on either of the two sites.
- *Settlement*: The very pronounced voided structure of colluvial soils encountered on both sites suggests that the materials will likely be susceptible to consolidation and/or collapse settlement. Without applicable material testing, the amount of expected settlement can not be quantified.

4.5 Excavation Potential

Based on the results of the DPSH penetration testing and the excavation classification as per SANS 1200, the following conditions are expected to prevail on *both* sites:

- *Colluvium*: The colluvial soils are expected to be excavatible by backhoe, but with some effort. In a desiccated or dry state the material is likely to be moderately difficult to excavate and hand excavation may not be viable.
- *Calcrete*: The calcrete deposits encountered induced refusal of excavation and DPSH probing. As such, difficult excavation is anticipated and may require the use of pneumatic equipment, large excavation equipment or even possibly blasting. DPSH probe refusal was encountered at depths of 1200mm and 900mm on sites one and two, respectively.

Other considerations are:

- Conditions of wet excavation are not expected to occur in the area.
- Conditions of clayey excavation are not expected to occur in the area.
- The side slopes of the excavations are expected to be stable to the depth of refusal of penetration testing.

4.6 Materials Utilisation

The results of the DPSH penetration testing indicate an in-situ California Bearing Ratio of less than five to be present in the aeolian sand, improving rapidly to more than 12 in the underlying calcrete. This is indicative of fairly favourable conditions for pavement construction. Practical experience of the materials has taught that the aeolian sand is usually not suitable for layer work construction, but the calcrete is a sought after material for the construction of selected layer works and sometimes for sub-base course construction.

4.7 Seismicity

The closest source of seismic measurements to Riverton under control of the Council for Geoscience is Hagesdam at 29,33°S and 25,83°E. Kijko indicates the following:

- The annual probability for an earthquake with intensity of 4,5 on the Modified Mercalli Scale to occur in the area is less than $10^{-0,9}$; and with an intensity of 7,5 to occur the probability is 10^{-4}.
- The annual probability for an earthquake with an acceleration of $10^{-1,9}$g to occur in the area is less than $10^{-1,0}$; and with an acceleration of $10^{-1,0}$g to occur in the area is less than $10^{-3,6}$.
- A 10% probability exists that an earthquake with Peak Ground Acceleration exceeding of 0,12g may take place once in 50 years.

4.8 Other Considerations

Apart from the individual conditions as discussed, the following is applicable:

- *Undermined Ground*: The area has not been subjected to mining activity and is not undermined.
- *Dolomite and Limestone Stability*: The area is not subject to the presence of dolomite and limestone related instabilities.
- *Cemetery Sites*: Graves were not encountered in the area of investigation.
- *Historic Monuments:* There are no historic monuments on the site.

5 CONCLUSIONS

It is anticipated that there is very little difference between the two areas investigated in terms of expected geotechnical properties. Both sites can therefore be regarded as suitable for the proposed establishment of solar power facilities. The following conditions prevail:

- *Geology*: The area of investigation is located on calcrete deposits containing fragments of both sandstone and dolerite. Bedrock material was not encountered on either of the two sites.
- *Soil Profiles:* The soil profiles encountered on the two sites were nearly identical and consisted of a surface colluvial cover, underlain by hardpan calcrete, presumably hosted in sandstone or dolerite. Soil profiles on both terrains were limited to a depth of 500mm.
- *Groundwater*: In general terms, it is expected that seasonal perched water will not be present on site. Permanent groundwater is expected to be present at depths exceeding 20m.
- *Founding Conditions*: Safe bearing capacities exceeding 100kPa are present from depths exceeding 600mm. Conditions of heave do not prevail on site. Slight settlement of structures may take place.

- *Excavation Potential*: Colluvial soils may be considered excavatible by backhoe, but the effort required will be dictated by the moisture state of the material. Hardpan calcrete makes for conditions of difficult excavation, inducing refusal of excavation at depths of 500mm on both sites. DPSH probes encountered refusal at depths between 900mm and 1200mm.
- *Materials Utilisation*: It is expected that the calcrete will be suitable to be used for the construction of earthworks.
- *Historic Monuments:* There are no historic monuments on the site.
- *Cemetery Sites:* There are no cemeteries or graves on the site. The property is not regarded as suitable for cemetery site development.
- *Dolomite Stability*: The site is not subject to instabilities due to the presence of dolomite.
- *Undermining*: The area is not subject to undermining or surface gravel procurement.
- *Seismicity*: The annual probability for an earthquake with intensity of 4,5 on the Modified Mercalli Scale to occur in the area is less than $10^{-0,9}$; and with an intensity of 7,5 to occur the probability is 10^{-4}. The annual probability for an earthquake with an acceleration of $10^{-1,9}$g to occur in the area is less than $10^{-1,0}$; and with an acceleration of $10^{-1,0}$g to occur in the area is less than $10^{-3,6}$. A 10% probability exists that an earthquake with Peak Ground Acceleration exceeding of 0,12g may take place once in 50 years.

6 RECOMMENDATIONS

Based on the geotechnical conditions as determined by this reconnaissance investigation, it appears that both sites are favourable for the proposed establishment of a solar plant. There is very little to choose from between the two terrains in terms of geotechnical properties. The exception is that the requirement of investigation to a depth of 3000mm deep could not be met due to shallow refusal of excavation (i.e. 500mm) and DPSH penetration tests (i.e. between 900m and 1200mm).

With the above in mind, it is recommended that one of the two sites be selected based on secondary requirements (e.g. accessibility, economic viability, etc.) and subjected to more detailed investigation. Supplementary investigation should include at least the following:

- Excavate test pits over the entire site on a grid pattern with a TLB or (preferably), an excavator.
- Verify the results of the trial holes with DPSH penetration tests to obtain reliable indicators of the geotechnical parameters of the soil.
- Conduct applicable soil testing to verify the properties of heave and settlement of the soil. If necessary, the suitability of the soil for construction purposes must also be verified.

V SOURCES OF REFERENCE

V.1 SAIEG-AEG-SAICE: *Guidelines for Soil and Rock Logging* – Proceedings of the 1990 Geoterminology Workshop.

V.2 Mucina L *et al*.: *The Vegetation of South Africa, Lesotho and Swaziland*, page 335, published in 2006 by SANBI.

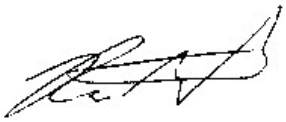
V.3 Vegter JR: *An Explanation of a Set of National Groundwater Maps*, published in 1995 by the Water Research Commission.

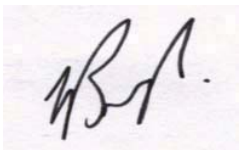
V.4 Kijko A *et al*: *Probabilistic Peak Ground Acceleration and Spectral Seismic Hazard Maps for South Africa*, Report 2003-0053 by the Council for Geoscience.

V.5 National Department of Housing: *Geotechnical Site Investigations for Housing Developments (Generic Specification GFSH-2)*, Table 3 on page 7, issued in September 2002.

V.6 SABS Standards Division: *SANS 1936 Parts One to Three – Development of Dolomite Land*, draft edition issued in 2012.

V.7 Meintjes HAC : *A Case History of Structural Distress on Heaving Clay – Colinda Primary School*, as contained on pages 99 to 104 of Volume I of the Proceedings of the Tenth Regional Conference for Africa on Soil Mechanics and Foundation Engineering and the Third International Conference on Tropical and Residual Soils, 23 to 27 September 1991.





IJ Breytenbach (Pr. Sci. Nat.)
26 March 2012
For Soilkraft cc

FJ Breytenbach (Pr. Eng.)

TABLE I.1 : SOIL PROFILING PARAMETERS

CONSISTENCY : GRANULAR SOILS

SPT N	GRAVELS & SANDS Generally free draining soils		DRY DENSITY (kg/m^3)
<4	Very loose	Crumbles very easily when scraped with geological pick. Requires power tools for	<1450
4-10	Loose	Small resistance to penetration by sharp pick point. requires many blows by pick point	1450-1600
10-30	Medium dense	Considerable resistance to penetration by sharp pick point.	1600-1750
30-50	Dense	Very high resistance to penetration by sharp pick point. Requires many blows by pick point for excavation.	1750-1925
>50	Very dense	High resistance to repeated blows of geological pick. Requires power tools for excavation.	>1925

CONSISTENCY : COHESIVE SOILS

SPT N	SILTS & CLAYS and combinations with SANDS, Generally slow draining soils		UCS (kPa)
<2	Very soft	Pick point easlily pushed in 100mm. Easily moulded by fingers.	<50
2-4	Soft	Pick point easlily pushed in 30mm to 40mm. Moulded by fingers with some pressure.	50-125
4-8	Firm	Pick point penetrates to 10mm. Very difficult to mould with fingers.	125-250
8-15	Stiff	Slight indentation by pick point. Cannot be moulded by fingers. Penetrated by thumb nail.	250-500
15-30	Very stiff	Slight indentation by blow of pick point. Requires power tools for excavation.	500-1000

SOIL TYPE

SOIL TYPE	PARTICLE SIZE(mm)
Clay	<0,002
Silt	0,002-0,06
Sand	0,06-2,0
Gravel	2,0-60,0
Cobbles	60,0-200,0
Boulders	>200,0

MOISTURE CONDITION

Dry	No water detectable
Slightly moist	Water just discernable
Moist	Water easily discernable
Very moist	Water can be squeezed out
Wet	Generally below water table

COLOUR

Speckled	Very small patches of colour <2mm
Mottled	Irregular patches of colour 2-6mm
Blotched	Large irregular patches 6-20mm
Banded	Approximately parallel bands of varying colours
Streaked	Randomly orientated streaks of colour
Stained	Local colour variations : Associated with discontinuity surfaces

SOIL STRUCTURE

Intact	No structure present.
Fissured	Presence of discontinuities, possibly cemented.
Slickensided	Very smooth, glossy, often striated discontinuity planes.
Shattered	Presence of open fissures. Soil break into gravel size blocks.
Micro shattered	Small scale shattering, very closely spaced open fissures. Soil breaks into sand size crumbs.
Residual structures	Residual bedding, laminations, foliations etc.

ORIGIN

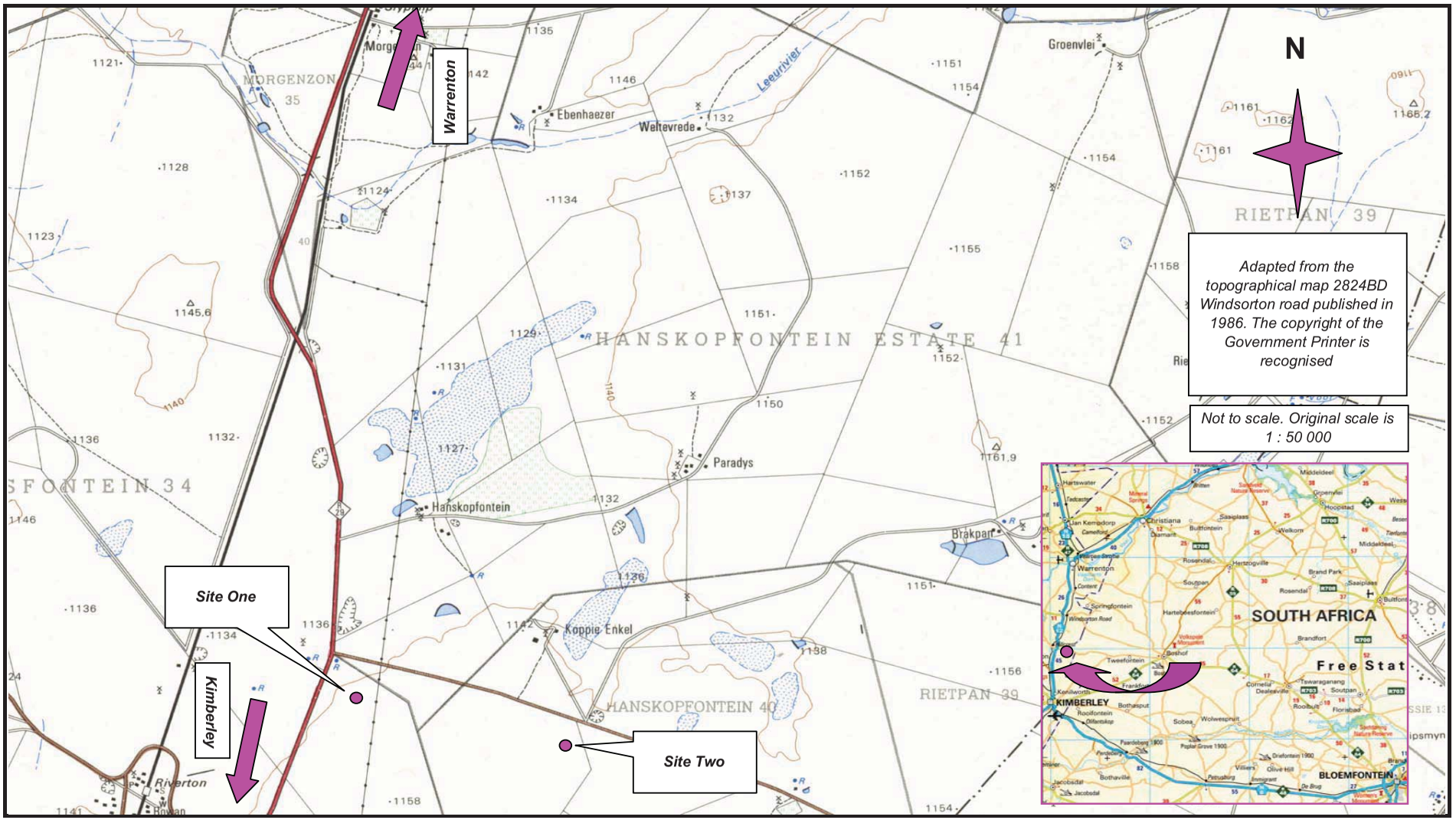
Transported	Alluvium, hillwash, talus etc.
Residual	Weathered from parent rock, eg residual granite
Pedocretes	Ferricrete, silcrete, calcrete etc.

DEGREE OF CEMENTATION OF PEDOCRETES

TERM	DESCRIPTION	UCS (MPa)
Very weakly cemented	Some material can be crumbled between finger and thumb. Disintegrates under knife blade to a friable state.	0,1-0,5
Weakly cemented	Cannot be crumbled between strong fingers. Some material can be crumbled by strong pressure between thumb and hard surface. Under light hammer blows disintegrate to a friable state.	0,5-2,0
Cemented	Material crumbles under firm blows of sharp pick point. Grains can be dislodged with some difficulty by a knife blade.	2,0-5,0
Strongly cemented	Firm blows of sharp pick point on hand-held specimen show 1-3mm indentations. Grains cannot be dislodged by knife blade.	5,0-10,0
Very strongly cemented	Hand-held specimen can be broken by single firm blow of hammer head. Similar appearance to concrete.	10,0-25

TABLE II.2 : EARTHQUAKE MAGNITUDE AND INTENSITY

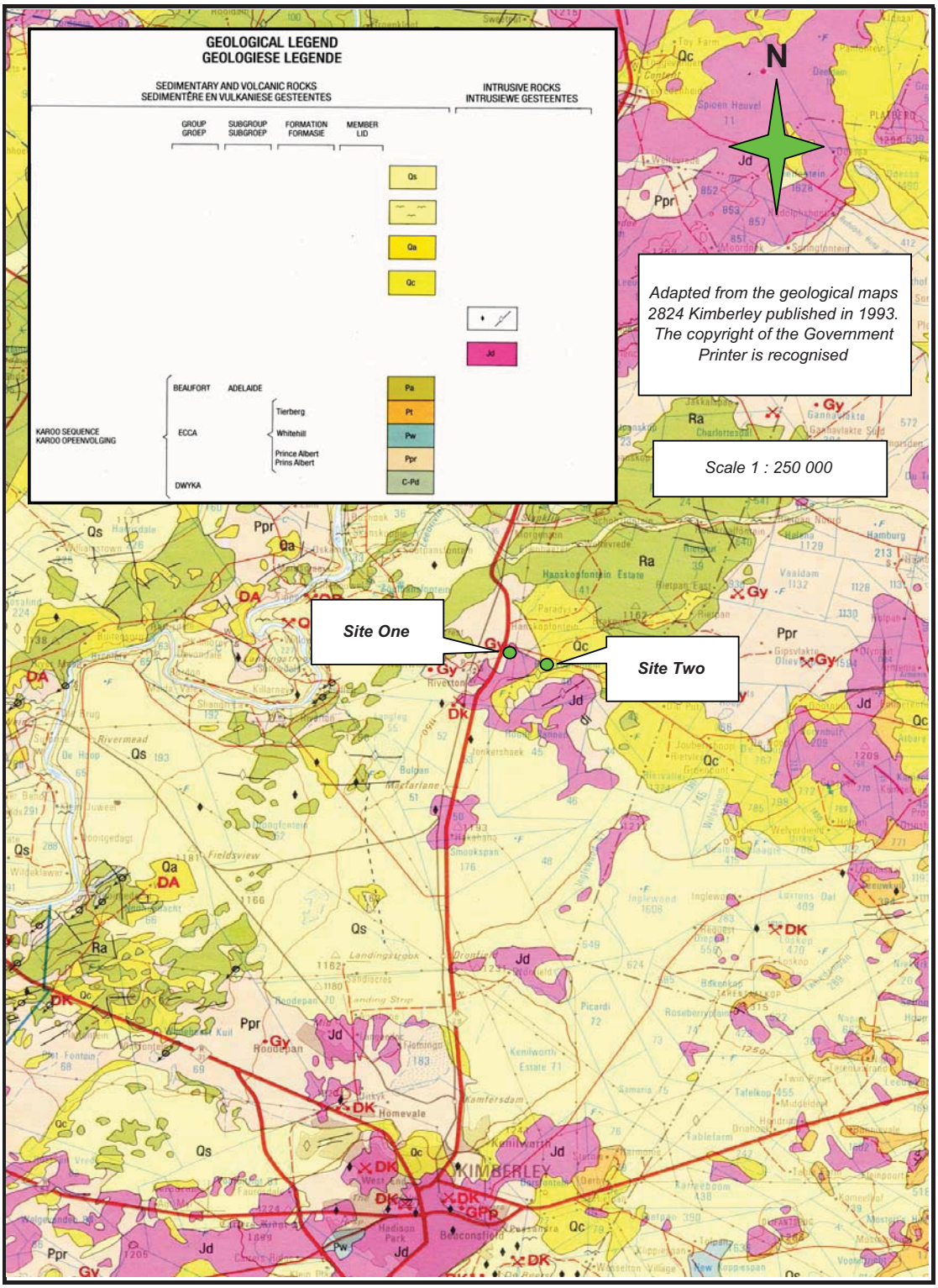
MODIFIED MERCALLI INTENSITY SCALE	INTENSITY	DESCRIPTION	RICHTER SCALE MAGNITUDE	RADIUS OF PERCEPTIBILITY (km)
I	Instrumental	Detected only by seismography		
II	Feeble	Noted only by sensitive people	3.5 to 4.2	3 to 24
III	Slight	Like the vibrations due to a passing lorry. Felt by people at rest, especially on upper floors		
IV	Moderate	Felt by people while walking. Rocking of loose objects, including vehicles	4.3 to 4.8	24 to 48
V	Rather strong	Felt generally ; most sleepers are awakened and bells ring		
VI	Strong	Trees sway and suspended objects swing ; damage by overturning and flling of loose objects	4.9 to 5.4	48 to 112
VII	Very strong	General public alarm ; walls crack ; plaster falls	5.5 to 6.1	110 to 200
VIII	Destructive	Car drivers seriously disturbed; masonry fissured ; buildings damaged	6.2 to 6.9	200 to 400
IX	Ruinous	Houses collapse ; pipes break		
X	Disasterous	Ground cracks badly ; buildings destroyed ; railway lines bent ; landslides on steep slopes	7.0 to 7.3	400 to 700
XI	Very disasterous	Few buildings remain standing; bridges destroyed ; all services out of action ; great landslides and floods	7.4 to 8.1	400 to 700
XII	Catastrophic	Total destruction ; objects thrown into the air; ground rises and falls in waves	>8.1	400 to 700



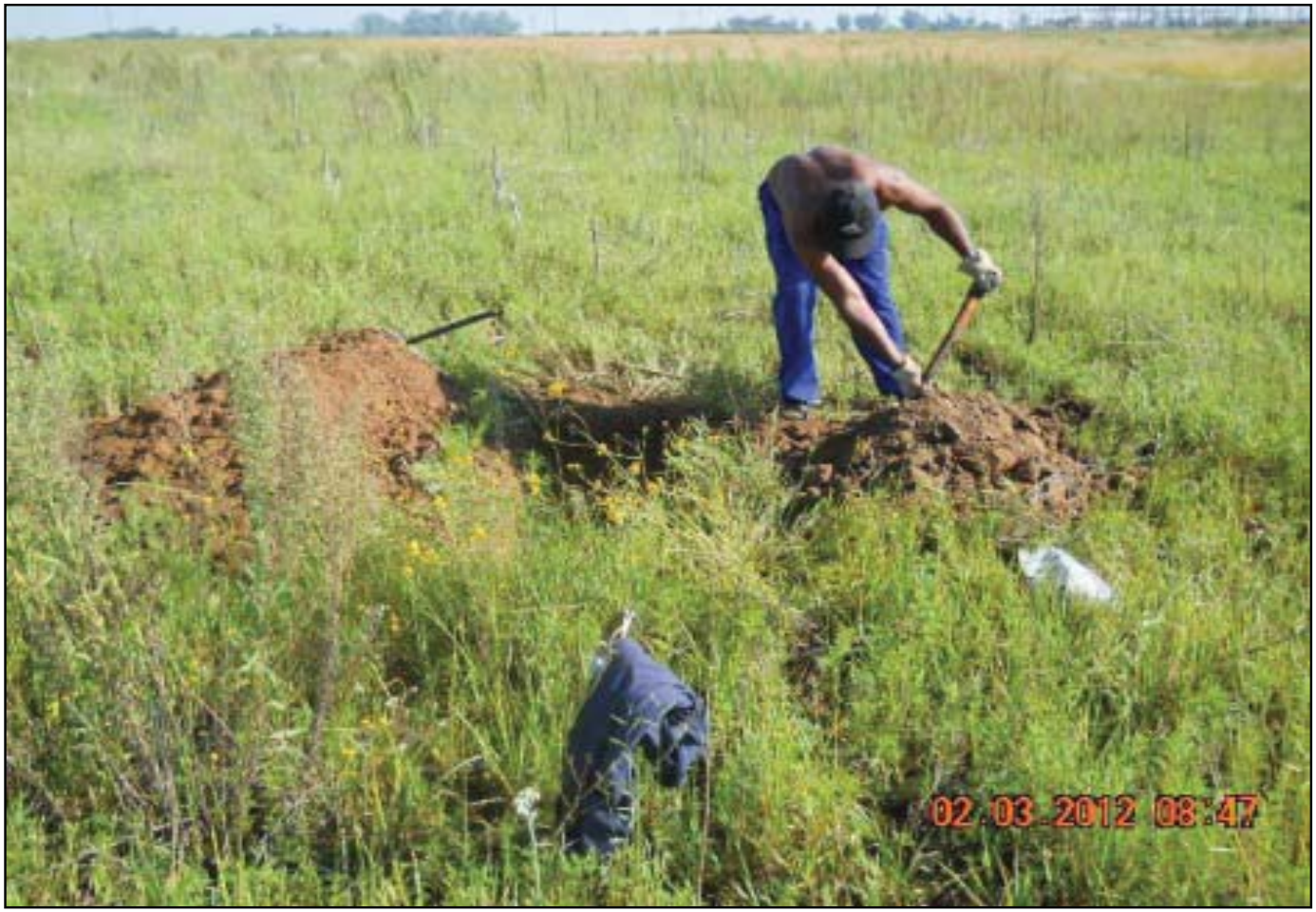
SOIL KRAFT

RIVERTON - LOCALITY PLAN

FIGURE III.1



SOIL KRAFT	RIVERTON - REGIONAL GEOLOGY	FIGURE III.2



SOIL KRAFT

SITE CONDITIONS - DELAREYVILLE

PHOTO II.1

TABLE III.1 : DPSH INTERPRETATION - RIVERTON

	DPSH 1						DPSH 2				
Depth (mm)	Blows per 300mm	Consistency	Friction angle Degrees	E-Modulus MPa	CBR	Depth (mm)	Blows per 300mm	Consistency	Friction angle Degrees	E-Modulus MPa	CBR
0.3	16	Medium Dense	28.9	58.4	7.0	0.3	19	Medium dense	29.0	63.9	9.0
0.6	38	Dense	29.9	81.4	26.0	0.6	80	Very dense	31.2	111.8	
0.9	80	Very dense	31.2	111.8		0.9	Refuse				
1.2	Refuse					1.2					

TRIAL HOLE: TP 2

PROJECT: *Proposed Solar to Electricity Conversion Facilities*

LOGGED BY: *IJB*

SITE NAME: *Zoutpansfontein 34, Riverton*

DATE LOGGED: *23/03/2012*

CLIENT: *Subsolar Energy*

LOCATION: *25 Y0019740 X3152830*

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or soilkraft@mylan.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Sample Depth (m)	SAMPLE Symbol	Remarks
0.00		Ground Surface				**NOTES:**
		Slightly moist, grey brown, medium dense, voided, *clayey SAND.* Colluvium. Material has a low density.				1 No seepage water encountered.
0.20						2 No refusal of excavation encountered.
0.40		Dry, grey white, medium dense, intact, *sandy GRAVEL.* Contains fragments of dolerite and sandstone. Hardpan calcrete.				
0.60						
0.80						
1.00						
1.20						
1.40						
1.60						▽ Water encountered ▼ Water level --- Bottom of hole --- Approximate material change ● Disturbed sample ■ Undisturbed sample
1.80						
2.00						

Contractor: Profile Projects
Date Drilled: 1 - 2/03/2012
Machine: Hand Excavated

Hole Diameter: 700 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 2

FIGURE: A2

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/
NEAS Reference Number:	DEAT/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

The development of a photovoltaic solar plant, substation and associated infrastructure on a portion of Portion 24 of the farm Zoutpansfontein 34, Registration Division RD, Northern Cape Province.

Specialist:	Soilkraft CC		
Contact person:	Mr FJ Breytenbach		
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Professional affiliation(s) (if any)	Member ECSA, member SAICE, associate member SAIEG		

Project Consultant:	Environamics		
Contact person:	Ms. Carli Steenkamp		
Postal address:	PO Box 6484, Baillie Park		
Postal code:	2526	Cell:	082 220 8651
Telephone:	018 299 1505	Fax:	018 299 1580
E-mail:	Carli.Steenkamp@nwu.ac.za		

4.2 The specialist appointed in terms of the Regulations_

I, **FJ Breytenbach**, 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 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Soilkraft CC

Name of company (if applicable):

2012-04-25

Date: