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PROJECT 2010/31

HERITAGE SCOPING REPORT REVISION 1: PROPOSED KALAHARI SOLAR PROJECT ON PORTIONS OF THE FARM KATHU 465, KURUMAN REGISTRATION DIVISION, GAMAGARA LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE

PREPARED FOR

WSP Environment and Energy

DATE: 15 December 2010

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EXECUTIVE SUMMARY

This report contains a heritage scoping (basic assessment) investigation in accordance with the provisions of Sections 38(1) and 38(3) of the *National Heritage Resources Act* (NHRA) (25/1999) for purposes of developing and operating the proposed Kalahari Solar Project on portions of the farm Kathu 465 (Kuruman Registration Division) north of the town of Kathu. This investigation forms part of the process of conducting the required environmental scoping investigation that will inform the feasibility (and eventually also the final Site Development Plan) with regard to the proposed project.

Note that this investigation was not a full Heritage Impact Assessment (HIA), although it contains all the elements of an HIA. Once a final Site Development Plan has been agreed upon, the relevant heritage resources authority may request the submission of a report that assesses the actual impacts of this plan. Based on the information contained in this heritage scoping report, this authority may also approve the proposed development and exempt the applicant from complying with the requirements of a full HIA.

The proposed site is located approximately 7 km north-west of the town of Kathu on the farm Kathu 465, and lies within the Gamagara Local Municipality and the John Taolo Gaetsewe District Municipality, Northern Cape. The site is approximately 1,600 ha in size and is currently used for small-scale cattle farming.

This heritage scoping investigation contains the following elements and outcomes as required in terms of the NHRA

- A historic built environment investigation: Recent features associated with quarrying and farming
- An archaeological investigation: Isolated surface scatters of Stone Age artefacts, mainly around the rims of a number of small pans on the development site
- A palaeontological investigation: No evidence

This report is accompanied by a separate Archaeological Impact Survey report (author JA van Schalkwyk). No separate palaeontological desktop study was deemed necessary because the broader area has already been covered by desktop studies for other developments.[1] The Rubidge report for a development at Sesheng (the area closest to the development site) is attached as Appendix 4.

Group Five Construction (Pty) Ltd (Group Five) plan to develop, build, own and operate a solar power facility on the proposed site, a green field's site of approximately 1,600 hectares (ha). Group Five determined the site's suitability for large scale solar power generation based on the viability of the solar resource, the proximity to supporting infrastructure, grid access and potentially sustainable water supplies. The site has the capacity to support multiple large scale solar power plants that will produce approximately 480 megawatts (MW). This aligns with the need for large scale deployment of renewable solar energy in concentrated locations to mitigate the need for multiple grid connections.

Various technologies are available for consideration:

- Photovoltaic panels;
- Parabolic trough;
- Central receivers (tower technology); and
- Linear fresnel reflectors.

Parabolic trough has been selected as the technology of choice for the first phase of the development of the solar park. Economies of scale may dictate the following phases, when and if developed could utilise the same technology. However, as the various technologies are at different levels of commercial development and as these technologies mature, the technology of choice for the future phases of the Kalahari Solar Park may vary.

The size of the solar field for one phase of 150 MW of parabolic trough is approximately 2 kilometers (km). The power island will be connected to a central high voltage switchyard located on the site. The site switchyard will be connected to the Eskom Ferrum switchyard approximately 12 km due south of the site. A 20 km interconnecting transmission line route will need to be established.

[1] See Appendix 2

Note that the proposed Group Five KSP project is different to the proposed Kathu and Sishen solar energy projects, located on portions of the farm Wincanton 472 east of Dibeng.[2] It is also different to the proposed solar plant for the Bestwood Estate on the farm of the same name, for which Cultmatrix undertook a separate HIA in 2010, assisted by Dr C Dreyer.

The heritage scoping investigation focused on the following component of the proposed project:

- An investigation of the actual KSP site on the farm Kathu 465

The preferred servitude option for the power line connecting the plant with the ESKOM grid at the Ferrum Substation (south of the town of Kathu) was determined after the completion of the first draft heritage scoping report.[3] The preferred servitude option is to construct a 275 kV power line that would exit the site to the north-east, cross the N14 and then be redirected south once clear of the Kathu Forest, before linking up with the proposed Eskom 275 kV and 400 kV servitude that link to the Ferrum Substation from the east. Heritage studies done by Cultmatrix in 2008 and 2010 for the Bestwood Estate housing development (east of the N 14) with its own solar power plant, as well as studies for a borrow pit on the farm Bestwood (2010) have indicated the occurrence of rich deposits of Stone Age artefacts in a large area east of Kathu farm. In particular the towers of the proposed power line may affect such artefacts and hence a separate heritage scoping investigation would be necessary for the power line in accordance with Section 38 of the NHRA, which requires a heritage impact assessment for a linear development longer than 300 m.

The three proposed alternative routes of Eskom's Vryburg-Ferrum 400 KV transmission line also converge in the area proposed for the KSP's grid connection transmission link. An archaeological impact survey report for this project identified Kathu cemetery, a major Stone Age site at the cemetery (Uitkoms 2 and 4), another important site (fossils and Stone Age) on Kathu Townlands and a couple of other Stone Age sites along the N 14 that could be impacted upon by this ESKOM line and therefore should be avoided.[4] These sites have been indicated on the Google Earth image that is included as Figure 3 in this report.

The proposed KSP affects an irregularly shaped farm portion, consisting of flat grazing land subdivided by tracks and fences. Natural site features that are interesting from a heritage perspective are numerous small pans (where scatters of Stone Age artefacts were found), a drainage line (Vlermuisleegte), a patch of indigenous Kathu Forest and very dense thorny vegetation (including *swarthaak*) that can be attributed to overgrazing. The site boundaries are determined by cadastral boundaries in the west, south and east and a gravel road connecting the N 14 with Sesheng in the north. As a cultural landscape this flat and featureless environment can be classified as a degraded (relic) historic farming landscape and, to a lesser extent, a historic archaeological landscape, exhibiting the following recognisable heritage features:

- Tracks and fences
- Boreholes with wind-pumps and reservoirs
- Abandoned quarries (borrow-pits)
- Power lines
- Isolated scatters of Stone Age artefacts

The corner co-ordinates of the KSP site are:

KSP-A 27°35'44.47"S 23° 0'54.60"E
KSP-B 27°37'3.52"S 23° 4'8.36"E
KSP-C 27°39'12.95"S 23° 2'23.84"E
KSP-D 27°38'24.96"S 23° 1'51.13"E
KSP-E 27°38'25.88"S 23° 0'36.14"E

The intended development comprises a change of land use for the development of the Kalahari Solar Project and this provided the following "triggers" for an HIA:

[2] Appendix 2 contains a reference to an AIA for this project undertaken by D Morris of the McGregor Museum (Kimberley) in July 2010
[3] The heritage scoping report was submitted on 12 October 2010 and the preferred servitude option is reflected in the final environmental scoping report (November 2010)
[4] DREYER, J, 2007, First phase archaeological and cultural heritage assessment of the proposed Garona-Mercury transmission power line, Northern Cape, North-West Province and Free State. Unpublished report submitted to ESKOM.

- Development larger than 5000 square meters (approximately 1600 hectares)
- The region is known for its Stone Age artefacts and the Kathu Pan (investigated and excavated by Beaumont)[5] is a major site close to the development area (it will not be impacted by the proposed development)

The general aim of any heritage scoping and impact assessment investigation and report is to ensure that the needs of socio-economic development are balanced by the needs to preserve significant heritage resources.

The purpose of this report is to identify and assess features of heritage significance, identify possible impacts and propose management measures to mitigate possible negative impacts. This information must enable the relevant heritage authority to comment on the proposed development as required in terms of Section 38 of the NHRA.

The investigation was conducted as follows:

- Desktop study, including perusal of existing archaeological reports, completed heritage impact assessment reports and general publications about the broader area
- Field surveys in June and August 2010

Heritage impacts are categorised as:

- Neutral (no impact)
- Direct or physical impacts, e.g. alteration or destruction of heritage features within the project boundaries
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment
- Cumulative impacts that are combinations of the above

The predicted heritage impacts of the development of the KSP site itself are neutral since no heritage resources of major significance that could be affected were identified.

The predicted heritage impacts of the construction of the preferred grid connection transmission link still must be assessed through a separate heritage scoping investigation.

Visual impacts are of less importance because large portions of the wider study area have already been transformed by residential extensions to Sesheng and Kathu. The landscape horizon is characterised by power lines and the structures and dumps of the iron ore mine.

Heritage impacts can be managed through one or a combination of the following measures:

- Mitigation (minimising adverse impacts through further documentation and research before a place is altered or destroyed)
- Avoidance
- Compensation (balancing of making good the destruction of one heritage feature by the preservation of another one)
- Enhancement (positive impacts on heritage features)
- Rehabilitation (re-use of preserved heritage features)
- Interpretation (providing information on heritage features)
- Memorialisation (retaining the memory of heritage features that have been destroyed)
- No action
- Relocation (historic equipment, graves)
- Alternatives

Of the above measures, “no action” (linked to predicted impacts that are neutral) and mitigation (linked to important sub-surface chance finds) applies in the case of the **power plant site** on the farm Kathu 465.

This report complies as follows with the provisions of Section 38 (3) of the *National Heritage Resources Act* (Act 25 of 1999):

[5] See Appendix 2

(a) Identification and mapping of heritage resources
(b) Cultural significance
(c) Predicted impacts and impact management measures

See Table 1 (below).

TABLE 1: Identification of heritage features, impacts and mitigation measures

S 3(2) NHRA heritage resource	(a) Identification		(b) Significance	(c) (1) Impact		(c) (2) Recommended impact management
	Site	GPS		Study area	Impact type, certainty and significance	
Buildings, structures, places and equipment of cultural significance	Quarry 1	27°37'18.49"S 23° 3'49.81"E	Low local	KSP site	Will probably not be affected	Possible borrow pit. No action – located on periphery
	Quarry 2	27°36'46.42"S 23° 3'19.81"E	Low local	KSP site	Will probably not be affected	Possible borrow pit. No action – located on periphery
Areas to which oral traditions are attached or which are associated with intangible heritage	None	-	-	-	-	-
Historical settlements and landscapes	None	-	-	-	-	-
Landscapes and natural features of cultural significance	Kathu Forest	-	-	KSP site	Could be affected	Avoid if possible
Geological sites of scientific or cultural importance	None	-	-	-	-	-
Archaeological and palaeontological sites	Chance finds (surface and sub-surface)	Unknown	Low local?	KSP site and grid connection	Unknown	Report any hidden/sub-surface graves or archaeological features and artefacts when found during site preparation work
	Dry pans (surface isolated scatters of Stone Age artefacts)	-	Low local	KSP site	Neutral	No action
Graves and burial sites	None	-	-	-	-	-
Features associated with labour history	None	-	-	-	-	
Movable objects	None	-	-	-	-	

(d) Social and economic benefits

The development will have no direct benefits related to the conservation of heritage resources (structures) since none of significance have been identified. However, if important archaeological and palaeontological features are exposed during site preparation activities, this may present an opportunity to conduct a Phase 2 (archaeological and palaeontological) investigation that may generate new information, before such features could be destroyed.

The project has the potential to create sustainable employment in the Northern Cape while addressing some of the fundamental drivers of Climate Change. Being one of the pioneers of solar power in South

Africa the project has the inherent role of developing solar power technology for the region. The key Sponsors intend to springboard a Solar Research and Development Centre on the site to assist South Africans and local institutions in joining the global network of solar technology developers. The viability and success of this project is strategic to paving the way for sustainable power technologies in this region. This is a project of strategic and national importance and capable of enhancing South Africa's position in the global technology arena while aligning with the commitments made by South Africa in Copenhagen.

(e) Public consultation

This was part of the environmental scoping process. A public participation report must be included in the final heritage scoping reports that will be submitted to the heritage authorities.

(f) Alternatives

Three sites were considered when selecting the preferred site for the construction and operation of the solar power plants. The Kathu site was selected as the preferred alternative based on its alignment with the selection criteria. In additional, the site was deemed the most feasible alternative based on its close proximity to the Sedibeng Water pipeline, which runs adjacent to the western boundary, and its location in relation to the general wind direction and Sishen Mine.

Various servitudes for the power line route were assessed as part of the pre-feasibility study for the KSP project. A servitude route assessment was undertaken for the proposed power lines. As the proposed site is located roughly 7 km north of Kathu, and needs to be connected to the Ferrum Substation on the southern outskirts of the town, four route alternatives were considered. In the end the preferred servitude option is to construct a 275 kV power line that would exit the site to the north-east, cross the N14 a then be redirected south once clear of the Kathu Forest, before link up with the proposed Eskom 275 kV and 400 kV servitude that link to the Ferrum Substation from the east.

(g) Mitigation during construction

Except for monitoring of any chance finds (graves, archaeological and palaeontological features) during site preparation and construction work, no mitigation measures apply.

Findings and recommendations

The areas proposed for development are located in a cultural landscape classified primarily as a combination of historic farmland and an archaeological/palaeontological landscape. This class of landscape is of relatively low heritage sensitivity because it is able to absorb new development with some adverse effects.

The predicted impacts could be direct and physical, provided that significant heritage features are found during site preparation activities; otherwise the predicted impacts from a heritage perspective are neutral (no impact). The farming infrastructure is of modern origin and has low local significance. Some stone tools dating to the Middle and Later Stone Age occur sporadically (< 1/ 10m_2) around the rims of some of the pans. However, as these are surface finds, they are viewed to have a low significance.[6]

Visual intrusion as an indirect impact is not an important issue since the proposed development will be located in an environmentally degraded area (bush encroachment etc) and is bordering on land that has been transformed by housing, agriculture, mining and infrastructure. Noise, dust, pollution and restrictions of access patterns as indirect impacts are also not issues.

From a historic built environment perspective no features of heritage significance were identified and those features that are extant are typical of many others in the region.

From an archaeological perspective no finds or artefacts of real significance were identified.

From a palaeontological perspective the entire area is underlain by Precambrian rocks which are not exposed. These in turn are covered by Tertiary surface lime stones. The Precambrian rocks are not known to contain any fossils. There is a slight, but unlikely, possibility of Tertiary fossils being present in the limestone deposits.

[6] Refer to the AIA report (Van Schalkwyk)

Cultmatrix states that there are no compelling reasons not to proceed with the proposed KSP on the farm Kathu 465 (the site itself) and that the proposed development can continue provided that the following measures are adopted as heritage management mechanisms:

1. Should any hidden human remains (highly unlikely) be disturbed, exposed or uncovered during site clearing and excavations (for foundations etc), these should immediately be reported to an archaeologist. Burial remains should not be disturbed or removed until inspected by an archaeologist.
2. Site preparation activities must be monitored for the occurrence of any hidden (buried) archaeological material (Stone Age tools) and similar chance finds (such as historic middens and foundations) and if any are exposed, this should be reported to an archaeologist so that an investigation and evaluation of the finds can be made. Referring to archaeological investigations for projects on the neighbouring farm Bestwood, there is a strong possibility that artefacts could be exposed during excavations for foundations etc, since these artefacts seem to occur about one metre or more below ground level.
3. It is unlikely that the proposed development will have an impact on palaeontological heritage, but it is essential that if fossils are uncovered in the process of development activities a professional palaeontologist be bought in to access the situation.
4. An additional heritage scoping investigation should be undertaken to verify the presence or absence of heritage features (in particular Stone Age artefacts) that could be affected by the preferred power line.

RC DE JONG
Public Officer and Principal Investigator

Date: 15 December 2010

1. REPORT CONTEXT

1.1 General notes

1. The structure of this report is based on the following generally accepted standards for heritage scoping and impact assessment investigations:

    - SOUTH AFRICAN HERITAGE RESOURCES AGENCY, Heritage Impact Assessment: Notification of intent to develop (form)
    - DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING, PROVINCIAL GOVERNMENT OF THE WESTERN CAPE, 2005, Guideline for involving heritage specialists in EIA processes (document)
    - DEPARTMENT OF ENVIRONMENT AFFAIRS AND TOURISM, Integrated Environmental Management Guidelines
    - SOUTH AFRICAN HERITAGE RESOURCES AGENCY, 2006, *Minimum standards: Archaeological and palaeontological components of impact assessment reports* (unpublished).
    - PROVINCIAL HERITAGE RESOURCES AUTHORITY GAUTENG, 2010, *Report requirements for HIA reports* (unpublished).
    - WORLD BANK, *Environmental Assessment Sourcebook Update No 8, September 1994: Cultural Heritage in Environmental Assessment*.
    - Best-practice HIA reports submitted by Cultmatrix and other heritage consultants

2. This report is informed by the *National Heritage Resources Act* (25/1999) (NHRA) and is consistent with the various ICOMOS charters for places of cultural significance.

3. Recommendations contained in this application do not exempt the applicant from complying with any national, provincial and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA.

4. Rights and responsibilities that arise from this report are those of the applicant and not that of Cultmatrix cc. Cultmatrix cc assumes no responsibility for compliance with conditions that may be required by SAHRA in terms of this report.

5. Cultmatrix assumes no responsibility whatsoever for any loss or damages that may be suffered as a direct or indirect result of information contained in this application. Any claim that may however arise is limited to the amount paid to Cultmatrix for services rendered to compile this report.

6. Although all possible care is taken to identify all sites of cultural importance during the survey of study areas, the nature of archaeological and historical sites are as such that it always is possible that hidden or subterranean sites could be overlooked during the study. Cultmatrix and its subcontractors will not be held liable for such oversights or for costs incurred as a result thereof**.**

1.2 Purpose of the report

The purpose of this report is to identify and assess features of heritage significance, identify possible impacts and propose management measures to mitigate negative impacts. This information must enable the relevant heritage authority to comment on the proposed development as required in terms of Section 38 of the NHRA.

The below table lists and describes the three general categories of heritage impact assessment studies and reports, which offices are involved (i.e. to which offices reports should be submitted) and which type of response is required from these offices.

It is envisaged that the offices will respond as follows:

- Either comment and decide to approve the proposed development subject to the conditions listed in the Executive Summary and Section 4.10 of this report
- Or comment and reserve the decision to approve until a full Heritage Impact Assessment report (based on the Site Development Plan) has been prepared and submitted

TABLE 2: Applicable category of heritage impact assessment study and report

Type of study and report	Aim	Office involved	Requested response
Screening: Not this report	The aim of the screening investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives of this investigation are to screen potential heritage issues through a site inspection, to develop a broad understanding of heritage policy-related context, to review any existing data on the history and heritage significance of the site, to check if the site has any formal heritage status, to discuss the proposed development with heritage contacts and to scan the development proposals. The result of this investigation is a brief statement indicating potential heritage impacts/issues and the need for further investigation.	-	-
		-	-
		-	-
Scoping (basic assessment): This report	The aim of the scoping investigation is to analyse heritage issues and how to manage them within the context of the proposed development. The objectives are to assess heritage significance (involving site inspections and basic desktop and archival research); to identify the need for further detailed inputs by heritage specialists, to consult with local heritage groups and experts, to review the general compatibility of the development proposals with heritage policy and to assess the acceptability of the proposed development from a heritage perspective. The result of this investigation is a heritage scoping report indicating the presence/absence of heritage resources and how to manage them in the context of the proposed development.	Northern Cape Provincial Heritage Resources Authority	Comments
		SAHRA Archaeology, Palaeontology and Meteorites Unit	Comments
		-	-
Full HIA: Not this report	The aim of the full HIA investigation is to analyse and recommend heritage management mitigation measures and monitoring programmes. The objectives are to analyse heritage issues, to research the chronology of the site and its role in the broader context, to undertake a comprehensive assessment of heritage significance, to analyse the nature and scale of the proposed development, to consult with local heritage groups and experts as part of the broader EIA stakeholder engagement process, to establish the compatibility of the proposed development with heritage and other statutory frameworks and to assess alternatives in order to promote heritage conservation issues.	-	-
		-	-
		-	-

1.3 Terms of reference

- To survey the proposed KSP site
- To identify and map heritage resources that may be affected directly
- To assess the cultural significance of these heritage resources
- To assess the impact of the development on these heritage resources
- To assess the benefits of conserving these heritage resources in relationship to the socio-economic benefits of the development
- To consider alternatives if heritage resources will be affected in a negative manner
- To determine methods to mitigate negative impacts before, during and after construction activities

1.4 History of the report

This report is the second draft report and has been preceded by an interim report and a first draft report.

1.5 Legal context of the report

ACT	COMPONENT	IMPLICATION	RELEVANCE	COMPLIANCE
NHRA	S 34	Impacts on buildings and structures older than 60 years	None	-
	S 35	Impacts on archaeological and palaeontological heritage resources	None of significance identified	Monitor during site preparation work for buried artefacts

ACT	COMPONENT	IMPLICATION	RELEVANCE	COMPLIANCE
	S 36	Impacts on graves	None	-
	S 37	Impacts on public monuments	None present	-
	S 38	Developments requiring an HIA	Development is listed activity	Heritage scoping
NEMA	EIA Regulations	Activities requiring an EIA	Development is subject to an EIA	HIA is part of EIA
Other	-	-	-	-

1.6 Strategic planning context of the project

The key enablers behind this project include:

- SA Government's initiative to introduce Independent Power Producers (IPPs) into South Africa's generation arena through Eskom's Multi-Site Baseload IPP program.
- SA Government's initiative to introduce clean Renewable Energies into South Africa's generation mix through NERSA's REFIT program.
- Intensive Energy User's initiative to enhance their security of supply and in doing so, participate in assisting SA Government by adding extra capacity to the Grid.

1.7 Development criteria in terms of Section 38 of the NHRA

1.7	Development criteria in terms of Section 38(1)	Yes/No details
1.7.1	Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	No
1.7.2	Construction of bridge or similar structure exceeding 50m in length	No
1.7.3	Development exceeding 5000 sq m	Yes
1.7.4	Development involving three or more existing erven or subdivisions	No
1.7.5	Development involving three or more erven or divisions that have been consolidated within past five years	No
1.7.6	Rezoning of site exceeding 10 000 sq m	Yes
1.7.7	Any other development category, public open space, squares, parks, recreation grounds	No

1.8 Property details

1.8	Property details	
1.8.1	Name and location of property	Kalahari Solar Project
1.8.2	Erf or farm numbers	Portions of Kathu 465, Kuruman RD
1.8.3	Magisterial district	Kuruman
1.8.4	Closest town	Kathu
1.8.5	Local authority	Gamagara
1.8.5	Current use	Grazing
1.8.5	Current zoning	Agriculture
1.8.5	Predominant land use of surrounding properties	Farming
1.8.9	Total extent of property	1600 hectares

1.9 Property ownership

1.9	Property owners	
1.9.1	Farms	Kathu 465 and adjacent properties
1.9.2	Name and contract address	Kumba Resources
1.9.3	Telephone number	-
1.9.4	Fax number	-
1.9.5	E-mail	-

1.10 Developer

1.10	Developer	
1.10.1	Name and contact address	Chris Carnegie, Group Five Construction (Pty) Ltd, PO Box 5016, RIVONIA 2128
1.10.2	Telephone number	(011) 513-7652
1.10.3	Fax	(011) 513-7692
1.10.4	E-mail	ccarnegie@groupfive.co.za

1.11 Environmental practitioner

1.11	Environmental Specialist	
1.11.1	Name and contact address	Dr C Henderson, WSP Environment and Energy
1.11.2	Telephone number	(011) 361-1395
1.11.3	Fax	(011)
1.11.4	E-mail	Eden.Wildy@WSPGroup.co.za

1.12 Heritage assessment practitioners

1.12	Specialist (1)	
1.12.1	Name and contact address	Dr RC de Jong (Principal Member: Cultmatrix cc), PO Box 12013, Queenswood 0121, Pretoria
1.12.2	Qualifications and field of expertise	PhD (Cultural History) UP (1990), Post-Graduate Museology Diploma UP (1979), generalist heritage management specialist with experience in museums and heritage since 1983
1.12.3	Relevant experience in study area	HIAs for developments at Hotazel, Dibeng, Kathu, Olifantshoek, Sesheng, Bestwood
1.12.4	Telephone number	(082) 577-4741
1.12.5	Fax number	(086) 612-7383
1.12.6	E-mail	cultmat@iafrica.com

		Specialist 2
1.12.1	Name and contact address	Dr JA van Schalkwyk, PO Box 26389, Monument Park 0105
1.12.2	Qualifications and field of expertise	DLitt et Phil (UNISA), Post-Graduate Museology Diploma UP, general heritage management specialist with experience in museums and heritage, ASAPA accredited archaeologist
1.12.3	Relevant experience in study area	Archaeological studies for HIAs in the broader area including Hotazel, Dibeng, Kathu, Olifantshoek, Sesheng, Bestwood
1.12.4	Telephone number	(012) 347-7270
1.12.5	Fax number	
1.12.6	E-mail	jvschalkwyk@mweb.co.za

2. DEVELOPMENT CONTEXT

2.1 Development site/area location and boundaries

The proposed site is located approximately 7 km north-west of the town of Kathu on the farm Kathu 465, and lies within the Gamagara Local Municipality and the John Taolo Gaetsewe District Municipality, Northern Cape. The site is approximately 1,600 ha in size and is currently used for small-scale cattle farming.

FIGURE 1: General location of the study area

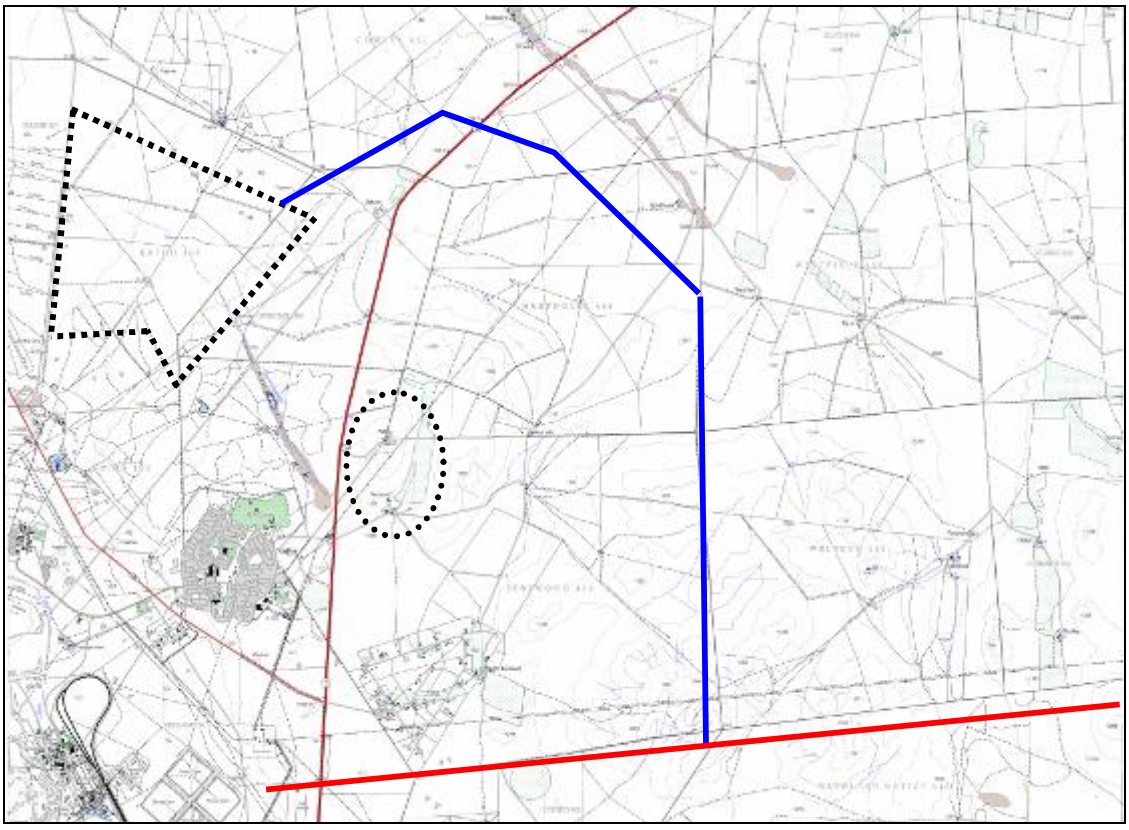

FIGURE 2: Portion of 2723 CA (Kathu) (2001) indicating the boundaries of the KSP site (dotted outline), the preferred alignment of the grid connection (blue) and the ESKOM 275 kV and 400 kV line (red). The dotted circle indicates the location of the Cultmatrix heritage investigations on Bestwood (2008-2010) where large numbers of significant Stone Age artefacts were found.

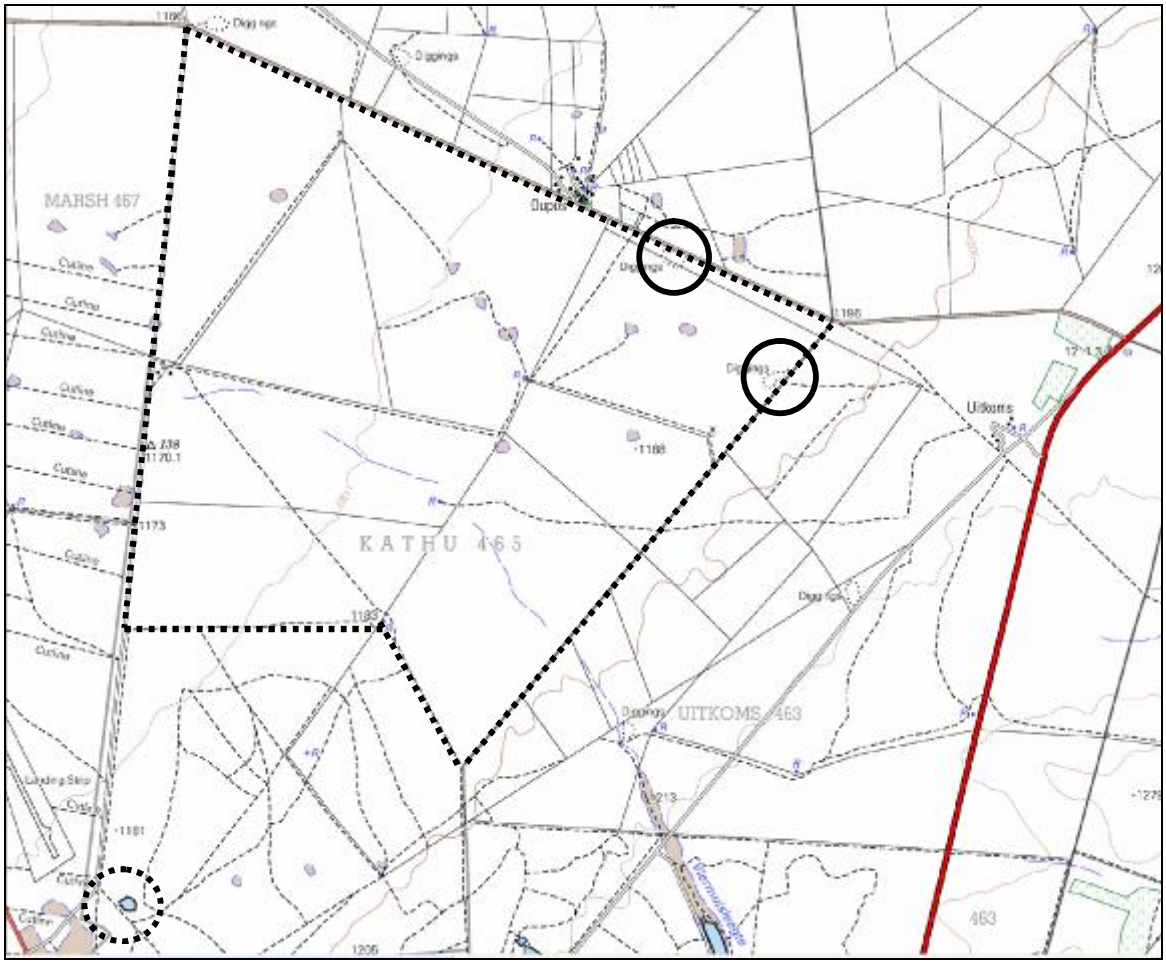

FIGURE 3: Portion of 2723 CA Kathu (2001) indicating the FSP site boundaries, the diggings (borrow pits) identified during the heritage investigation (circled) and the many small pans where isolated Stone Age artefacts were found. The dotted circle at the bottom indicates Kathu Pan, a site of major archaeological significance.

2.2 Description of distinguishing regional features

2.2.1 Environmental features

TABLE 3: Environmental features

COMPONENT	DESCRIPTION
Acocks veld type	Kalahari Thornveld and Shrubland
Geological and mining	Manganese and iron mines
Geology	Siliclastic
Hydrology	-
Land cover	Shrubland
Land use	Vacant
Vegetation	Kalahari Plains Thornveld
Landscape sensitivity index	1-3
Slope	0-9%
Terrain morphology	Plains
Wetlands	None

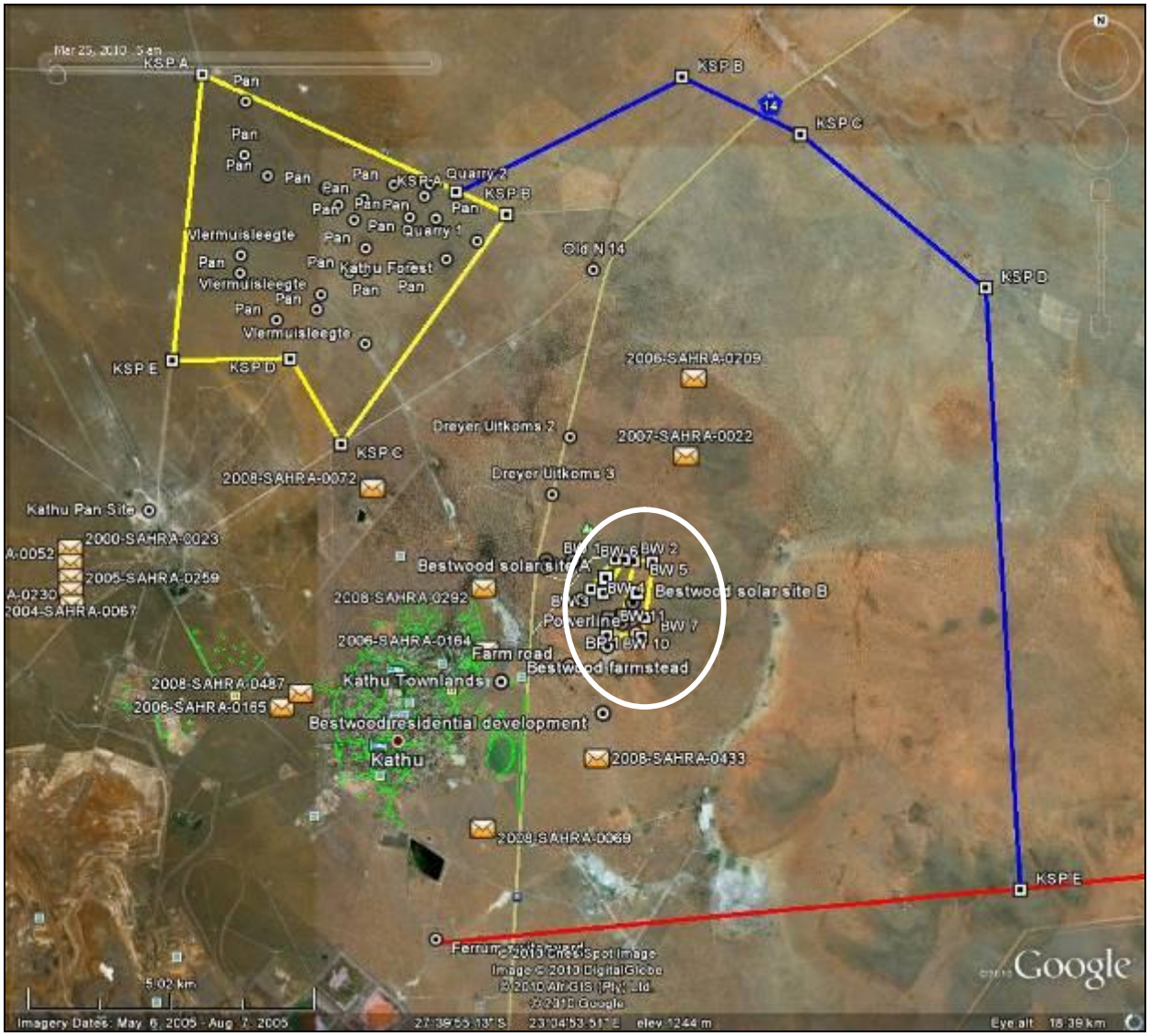

FIGURE 4: Google Earth image (2005) indicating the KSP site boundaries (yellow), the preferred grid connection (blue) and the ESKOM Ferrum power line (red). The envelopes indicate archaeological studies for other projects and the circle indicates the 2010 Bestwood investigations.

2.2.2 Heritage features

TABLE 4: Heritage features

S 3(2) NHRA heritage resource	DESCRIPTION
Buildings, structures, places and equipment of cultural significance	Tracks, fences, old roads, quarries, wind-pumps, reservoirs, boreholes
Areas to which oral traditions are attached or which are associated with intangible heritage	None
Historical settlements and landscapes	None
Landscapes and natural features of cultural significance	Kathu forest

S 3(2) NHRA heritage resource	DESCRIPTION
Geological sites of scientific or cultural importance	Dry pans and Vlermuisleegte drainage line
Archaeological and palaeontological sites	Broader area is known for Early, Middle and late Stone Age artefacts
Graves and burial grounds	None
Areas of significance related to labour history	None
Movable objects	None

2.2.3 Site description

The proposed KSP site on Kathu 465 affects an irregularly shaped farm portion, consisting of flat grazing land subdivided by tracks and fences. Natural site features that are interesting from a heritage perspective are numerous small pans, drainage line (Vlermuisleegte), a patch of indigenous Kathu Forest and very dense thorny vegetation (including *swarthaak*) that can be attributed to overgrazing. The site boundaries are determined by cadastral boundaries in the west, south and east and a gravel road connecting the N 14 with Sesheng in the north. As a cultural landscape this flat and featureless environment can be classified as a degraded (relic) historic farming landscape and, to a lesser extent, a historic archaeological landscape, exhibiting the following recognisable heritage features:

- Tracks and fences
- Boreholes with wind-pumps and reservoirs
- Abandoned quarries (borrow-pits)
- Power lines
- Isolated scatters of Stone Age artefacts

The corner co-ordinates of the KSP site are:[7]

KSP-A 27°35'44.47"S 23° 0'54.60"E
KSP-B 27°37'3.52"S 23° 4'8.36"E
KSP-C 27°39'12.95"S 23° 2'23.84"E
KSP-D 27°38'24.96"S 23° 1'51.13"E
KSP-E 27°38'25.88"S 23° 0'36.14"E

The preferred servitude option is to construct a 275 kV power line that would exit the site to the north-east, cross the N14 and then be redirected south once clear of the Kathu Forest, before linking up with the proposed Eskom 275 kV and 400 kV servitude that link to the Ferrum Substation from the east.

2.2.4 Surrounding environment

AREA	DESCRIPTION
East	Old N 14, farm land
North	Gravel road
West	Farm land
South	Farm land

2.3 Development description

2.3	Development description	
2.3.1	Nature of proposed development	See below
2.3.2	Predicted impacts on heritage value of site and contents	None
2.3.3	Structures older than 60 years affected by proposed development	No
2.3.4	Rezoning or change of land use	Yes
2.3.5	Construction work	Yes

[7] Created by the author

2.3	Development description	
2.3.6	Total floor area of proposed development	-
2.3.7	Extent of land coverage of development	1600 hectares
2.3.8	Earth moving and excavation	Yes (the site will be levelled completely)
2.3.9	Number of storeys	Immaterial
2.3.10	Maximum height above ground level	-
2.3.11	Monetary value development	Not available
2.3.12	Time frames	Urgent

Group Five Construction (Pty) Ltd (Group Five) plan to develop, build, own and operate a solar power facility on the proposed site, a green field's site of approximately 1,600 hectares (ha). Group Five determined the site's suitability for large scale solar power generation based on the viability of the solar resource, the proximity to supporting infrastructure, grid access and potentially sustainable water supplies. The site has the capacity to support multiple large scale solar power plants that will produce approximately 480 megawatts (MW). This aligns with the need for large scale deployment of renewable solar energy in concentrated locations to mitigate the need for multiple grid connections.

Various technologies are available for consideration:

- Photovoltaic panels;
- Parabolic trough;
- Central receivers (tower technology); and
- Linear fresnel reflectors.

Parabolic trough has been selected as the technology of choice for the first phase of the development of the solar park. Economies of scale may dictate the following phases, when and if developed could utilise the same technology. However, as the various technologies are at different levels of commercial development and as these technologies mature, the technology of choice for the future phases of the Kalahari Solar Park may vary. This could include photovoltaic (PV) technology, as indicated on the site development plan below.

The size of the solar field for one phase of 150 MW of parabolic trough is approximately 2 kilometers (km). The power island will be connected to a central high voltage switchyard located on the site. The site switchyard will be connected to the Eskom Ferrum switchyard approximately 12 km due south of the site. A 20 km interconnecting transmission line route will need to be established.

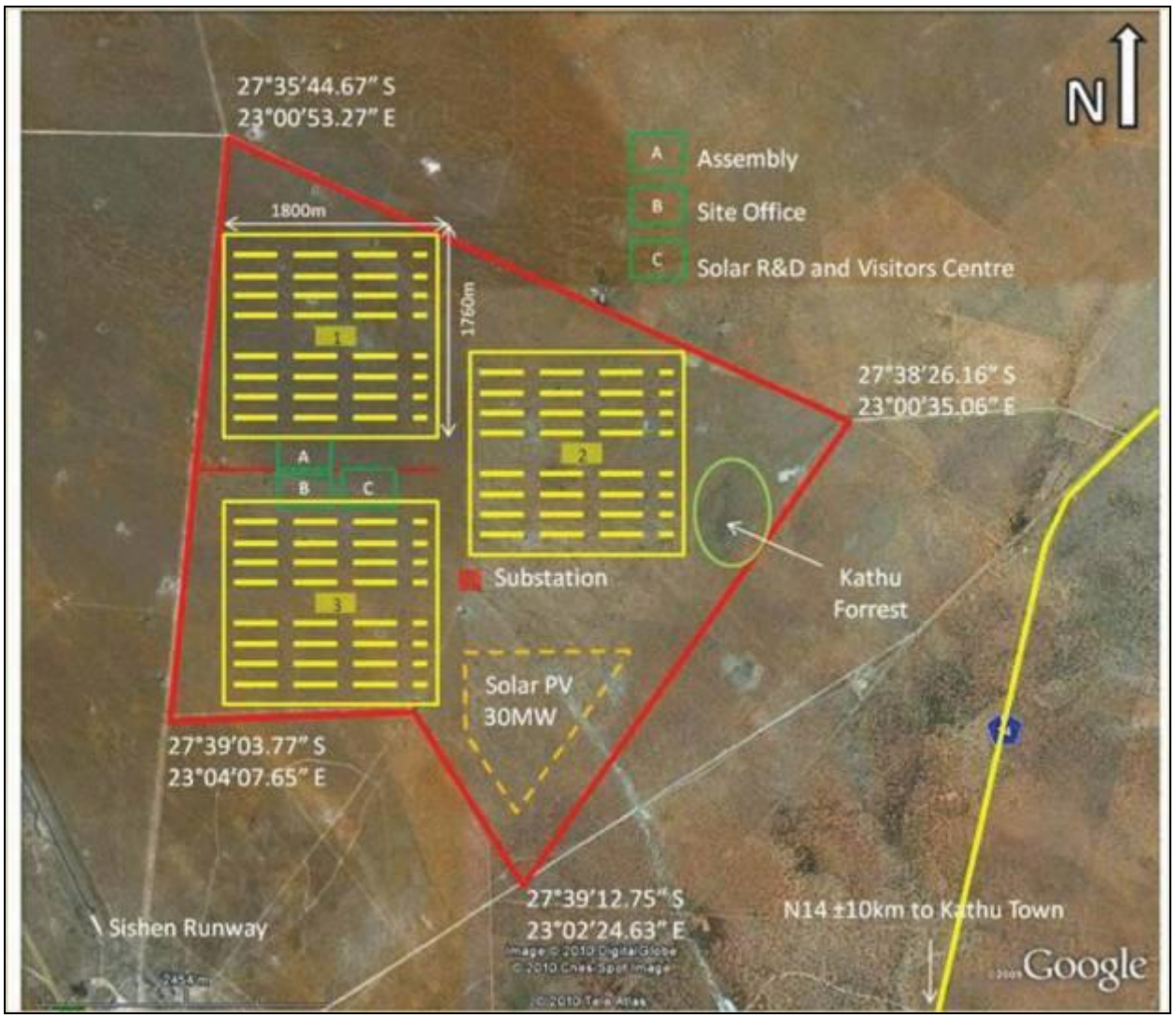

FIGURE 5: Proposed site development plan indicating the solar fields and other infrastructure (WSP 2010)

FIGURE 6: This image of the Andasol solar power plant in Spain, where the parabolic trough is used, gives an idea of the potential scale and (visual) impact of the KSP project (Flagsol 2010)

FIGURE 7: Wind-pumps and reservoirs are heritage features that occur on the KSP site

FIGURE 8: Eastern boundary of the KSP site

FIGURE 9: Large parts of the KSP site are characterised by alien and invasive vegetation and dense thorny shrubs

3. HERITAGE IMPACT CONTEXT

3.1 Cultural landscape evidence

The concept of cultural landscapes is of more recent origin and, although the definitions of the National Heritage Resources Act bear reference, is primarily grounded in international doctrinal texts in the form of Charters and Recommendations produced by ICOMOS and UNESCO. The most recent and authoritative text is the World Heritage Cultural Landscapes handbook, published by the World Heritage Centre (2009).

The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment. Cultural landscapes often reflect specific techniques of sustainable *land-use*, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. Cultural landscapes are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal. They are categorized on the basis both of their value and of their representativity in terms of a clearly defined geo-cultural *region* and also for their capacity to illustrate the essential and distinct cultural elements of such regions. The term "cultural landscape" embraces a diversity of manifestations of the interaction between humankind and its natural environment.

The World Heritage Committee distinguishes between three categories of cultural landscapes:

- Clearly defined landscapes, designed and created intentionally by people, such as parkland and urban areas
- Organically evolved landscapes that has developed over time, including relic landscapes (where a certain activity has ceased to exist) and continuing landscapes (which retain an active social role and where the evolutionary process is still in progress)
- Associative landscapes, which are essentially natural landscapes with significant human associations in the realm of the intangible heritage

All three categories exist in the study area. However, they are too broad in terms of the practical mapping and assessment of heritage elements; hence, the following criteria for classifying the type of cultural landscape have been used:

TABLE 5: Cultural landscape classification

HERITAGE LANDSCAPE CONTEXT	ELEMENTS	EVIDENCE
A. PALAEONTOLOGICAL LANDSCAPE CONTEXT	Fossil remains. Such resources are typically found in specific geographical areas, e.g. the Karoo and are embedded in ancient rock and limestone/calcrete formations.	None
B. ARCHAEOLOGICAL LANDSCAPE CONTEXT (SECONDARY LANDSCAPE)	**Archaeological remains dating to the following periods:** • **Early Stone Age** • **Middle Stone Age** • **Late Stone Age** • **Early Iron Age** • **Late Iron Age** • **Historical**	**Potential for Stone Age artefacts**
C. HISTORICAL BUILT URBAN LANDSCAPE CONTEXT	• Historical townscapes/streetscapes • Historical structures; i.e. older than 60 years • Formal public spaces • Formally declared urban conservation areas • Places associated with social identity/displacement	None

D. HISTORICAL FARMLAND CONTEXT (PRIMARY LANDSCAPE)	**These possess distinctive patterns of settlement and historical features such as:** • **Historical farm werfs** • **Historical farm workers villages/settlements** • **Irrigation furrows** • **Tree alignments and groupings** • **Historical routes and pathways** • **Distinctive types of planting** • **Distinctive architecture of cultivation e.g. planting blocks, trellising, terracing, ornamental planting.**	**Yes**
E. HISTORICAL RURAL TOWN CONTEXT	• Historical mission settlements • Historical townscapes	None
F. PRISTINE/NATURAL LANDSCAPE CONTEXT	• Historical patterns of access to a natural amenity • Formally proclaimed nature reserves • Evidence of pre-colonial occupation • Scenic resources, e.g. view corridors, viewing sites, visual edges, visual linkages • Historical structures/settlements older than 60 years • Pre-colonial or historical burial sites • Geological sites of cultural significance.	None
G. RELIC LANDSCAPE CONTEXT (Primary landscape)	• Past farming settlements • Past industrial sites • Places of isolation related to attitudes to medical treatment • Battle sites • Sites of displacement,	No
H. BURIAL GROUND & GRAVE SITE CONTEXT	• Pre-colonial burials (marked or unmarked, known or unknown) • Historical graves (marked or unmarked, known or unknown) • Human remains (older than 100 years) • Associated burial goods (older than 100 years) • Burial architecture (older than 60 years)	None
I. ASSOCIATED LANDSCAPE CONTEXT	• Sites associated with living heritage e.g. initiation sites, harvesting of natural resources for traditional medicinal purposes • Sites associated with displacement & contestation • Sites of political conflict/struggle • Sites associated with an historic event/person • Sites associated with public memory	None
J. HISTORICAL FARM WERF CONTEXT	• Setting of werf and its context • Composition of structures • Historical/architectural value of individual structures • Tree alignments • Views to and from • Axial relationships • System of enclosure, e.g. werf walls • Systems of water reticulation and irrigation, e.g. furrows • Sites associated with slavery and farm labour • Colonial period archaeology	None
K. HISTORICAL INSTITUTIONAL LANDSCAPE CONTEXT	• Historical prisons • Hospital sites • Historical school/reformatory sites • Military bases	None
L. SCENIC/VISUAL	• Scenic routes	None

K. AMENITY LANDSCAPE CONTEXT	• View sheds • View points • Views to and from • Gateway conditions • Distinctive representative landscape conditions • Scenic corridors	

3.2 Determining levels of sensitivity and potential impacts

Sensitivity is the ability of a cultural landscape (or heritage resource) to absorb changes or adapt to changes whilst maintaining an acceptable degree of cultural significance.

Within the context of this study, levels of sensitivity can generally be associated with certain classes or categories of cultural landscapes as tabulated below.

TABLE 6: Relationship between cultural landscape classes and levels of sensitivity

Sensitivity level	Implication	Landscape class	Evidence
D	**Ability to absorb without adverse effects and very little mitigation**	**Relic landscape Degraded farm land**	**Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage**
C	Ability to absorb with some adverse effects and some mitigation	Historical farmland Historical farm werfs Institutional landscapes	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context
B	Ability to absorb with considerable adverse effects and intensive mitigation	Burial grounds and graves Palaeontological and archaeological landscapes Associated landscapes	Of moderate to high intrinsic, associational and contextual value within a local context
A	No or very little ability to absorb	Historical built environments Natural landscapes Amenity/Visual/Scenic landscapes	Of high intrinsic, associational and contextual heritage value within a national, provincial and local context

3.3 Determining potential impacts

TABLE 7: Categories of development types

CATEGORY	DESCRIPTION	EVIDENCE
A: Minimal intensity development	• No rezoning involved; within existing use rights • No subdivision involved • Upgrading of existing infrastructure within existing envelopes • Minor internal changes to existing structures • New building footprints limited to less than 1000m2	No
B: Low-intensity development	• Spot rezoning with no change to overall zoning of a site • Linear development less than 100m • Building footprints between 1000m2-2000m2 • Minor changes to external envelop of existing structures (less than 25%) • Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%).	No
C: Moderate intensity development	• Rezoning of a site between 5000m2-10 000m2 • Linear development between 100m and 300m • Building footprints between 2000m2 and 5000m2 • Substantial changes to external envelop of existing structures (more than 50%) • Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%)	No

CATEGORY	DESCRIPTION	EVIDENCE
D: High intensity development	• **Rezoning of a site in excess of 10 000m2** • **Linear development in excess of 300m** • **Any development changing the character of a site exceeding 5000m2 or involving the subdivision of a site into three or more erven** • **Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)**	**Solar power plant and grid connection**

3.4 Expected impact significance

TABLE 8: Expected impact significance matrix

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	**CATEGORY B**	**CATEGORY C**	**CATEGORY D**
A: High heritage value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
B: Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
C: Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
D: Low heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	**Moderate heritage impact expected**

4. HERITAGE IMPACT ASSESSMENT

4.1 Approach

4.1.1 Definitions and assumptions

The following aspects have a direct bearing on the investigation and the resulting report:

- *Cultural (heritage) resources* are all non-physical and physical human-made occurrences, as well as natural occurrences that are associated with human activity. These include all sites, structures and artefacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development.

- The *cultural significance* of sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

- The *value* is related to concepts such as *worth*, *merit*, *attraction* or *appeal*, concepts that are associated with the (current) usefulness and condition of a place or an object. Hence, in the development area, there are instances where elements of the place have a high level of significance but a lower level of value.

- It must be kept in mind that significance and value are not mutually exclusive, and that the evaluation of any feature is based on a combination or balance between the two.

- Isolated occurrences: findings of artefacts or other remains located apart from archaeological sites. Although these are noted and samples are collected, it is not used in impact assessment and therefore do not feature in the report.

- Traditional cultural use: resources which are culturally important to people.

- All archaeological remains, artificial features and structures older than 100 years and historic structures older than 60 years are protected by the relevant legislation, in this case the National Heritage Resources Act (NHRA) (Act No. 25 of 1999). No archaeological artefact, assemblage or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorisation from the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority. Full cognisance is taken of this Act in making recommendations in this report.

- The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3, and the Australian ICOMOS Charter (also known as the Burra Charter) are used when determining the cultural significance or other special value of archaeological or historical sites.

- It should be kept in mind that archaeological deposits usually occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants would be required to be notified in order for an investigation and evaluation of the find(s) to take place (*cf*. NHRA (Act No. 25 of 1999), Section 36 (6)).

4.1.2 Limiting/Restricting factors

The investigation has been influenced by the following factors related to the overall HIA:

- Unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence)
- The archaeological visibility was down to virtually zero in most areas due to dense and thorny vegetation cover

- The SAHRA APM office in Cape Town holds various AIA reports for other developments in the area[8], but SAHRA has as yet no system for accessing these reports, which are listed in Appendix 2.

4.1.3 Field work

This was done through foot and vehicle investigations of the study area in June and August 2010. During the site inspection the respective properties were examined in some detail. Certain parts of the landscape were found generally to exhibit low archaeological visibility and were checked at random intervals, while features in the respective landscapes that were more likely to have been foci for past human activity (e.g pans, quarries) were assessed more systematically.

4.1.4 Desktop study

- Published literature
- Aerial images (contemporary)
- Cadastral diagrams
- Archival records
- Maps (historical and contemporary)

4.1.5 Verbal information

- Mr Kasper van Vuuren, farm manager

4.2 General issues of site and context

4.2.1 Context		
	(check box of all relevant categories)	*Brief description/explanation*
	Urban environmental context	• Roads • Fences • Boreholes and wind-pumps • Tracks
x	Rural environmental context	
	Natural environmental context	
Formal protection (NHRA)		
	Is the property part of a protected area (S. 28)?	No
	Is the property part of a heritage area (S. 31)?	No
Other		
x	Is the property near to or visible from any protected heritage sites?	Kathu Pan (outside development site)
	Is the property part of a conservation area or special area in terms of the Zoning Scheme?	No
	Does the site form part of a historical settlement or townscape?	No
x	Does the site form part of a rural cultural landscape?	Relic farm land
	Does the site form part of a natural landscape of cultural significance?	No
	Is the site within or adjacent to a scenic route?	No
x	Is the property within or adjacent to any other area which has special environmental or heritage protection?	Kathu Forest
x	Does the general context or any adjoining properties have cultural significance?	Sishen Mine and pans where fossils and Stone Age finds were discovered and excavated

[8] Location indicated on the Google aerial images

4.2.2 Property features and characteristics		
	(check box if YES)	*Brief description*
x	Have there been any previous development impacts on the property	Yes: Roads, tracks, grazing land, fences, borrow pits, etc.
	Are there any significant landscape features on the property?	No
x	Are there any sites or features of geological significance on the property?	Small dry pans, drainage line (Vlermuisleegte)
	Does the property have any rocky outcrops on it?	No
	Does the property have any fresh water sources (springs, streams, rivers) on or alongside it?	No
	Does the property have any sea frontage?	No
	Does the property form part of a coastal dune system?	No
	Are there any marine shell heaps or scatters on the property?	No
	Is the property or part thereof on land reclaimed from the sea?	No

4.2.3 Heritage resources on the property		
	(check box if present on the property)	*Name / List / Brief description*
Formal protections (NHRA)		
	National heritage site (S. 27)	No
	Provincial heritage site (S. 27)	No
	Provisional protection (s.29)	No
	Place listed in heritage register (S. 30)	No
General protections (NHRA)		
	structures older than 60 years (S. 34)	No
x	archaeological site or material (S. 35)	Yes (isolated Stone Age artefacts on surface, potential for larger deposits below surface)
x	palaeontological site or material (S. 35)	Possible (chance finds)
	graves or burial grounds (S. 36)	No (a farm cemetery is located close to Kathu Pan, but will not be affected)
	public monuments or memorials (S. 37)	No
Other		
	Any heritage resource identified in a heritage survey (state author and date of survey and survey grading/s)	Not inside the KSP site
x	Any other heritage resources (describe)	Kathu Pan site

4.2.4 Property history and associations		
	(check box if YES)	*Brief description/explanation*
x	Provide a brief history of the property (e.g. when granted, previous owners and uses).	See Appendix 1
	Is the property associated with any important persons or groups?	No
	Is the property associated with any important events, activities or public memory?	No

4.2.4 Property history and associations		
	Does the property have any direct association with the history of slavery?	No
	Is the property associated with or used for living heritage?	No
	Are there any oral traditions attached to the property?	No

4.3 Summarised identification and significance assessment of heritage resources

See Appendix 3 for significance assessment criteria

TABLE 9: Identification and significance assessment of heritage features

S 3(2) NHRA heritage resource category	ELEMENTS	INDICATORS OF HERITAGE SIGNIFICANCE										CUMULATIVE SIGNIFICANCE RATING (TOTAL 30) 1-9 = Low 10-19 = Medium 20-30 = High
		HISTORICAL	RARE	SCIENTIFIC	TYPICAL	AESTHETIC	TECHNOLOGICAL	PERSON COMMUNITY	LANDMARK	MATERIAL CONDITION	SUSTAINABILITY	
Buildings, structures, places and equipment of cultural significance	Quarries/ Borrow-pits	1	0	0	1	0	0	1	0	1	1	5 = Low
Areas to which oral traditions are attached or which are associated with intangible heritage	None	-	-	-	-	-	-	-	-	-	-	-
Historical settlements and landscapes	None		-	-	-	-	-	-	-	-	-	-
Landscapes and natural features of cultural significance	None	-	-	-	-	-	-	-	-	-	-	-
Geological sites of scientific or cultural importance	Small dry pans and drainage line	0	0	2	3	0	0	0	0	1	1	7 = Low
Archaeological and palaeontological sites	Stone Age artefacts and fossils (chance finds and sub-surface finds)	-	-	-	-	-	-	-	-	-	-	Unknown
	Uitkoms sites and Kathu Townlands site	3	3	3	3	3	2	2	0	1	0	21 = High
	Pans	0	0	1	1	1	1	1	0	1	0	6 = Low
Graves and burial grounds	None	-	-	-	-	-	-	-	-	-	-	-
Areas of significance related to labour history	None	-	-	-	-	-	-	-	-	-	-	-
Movable objects	None	-	-	-	-	-	-	-	-	-	-	-

4.4 Impact assessment

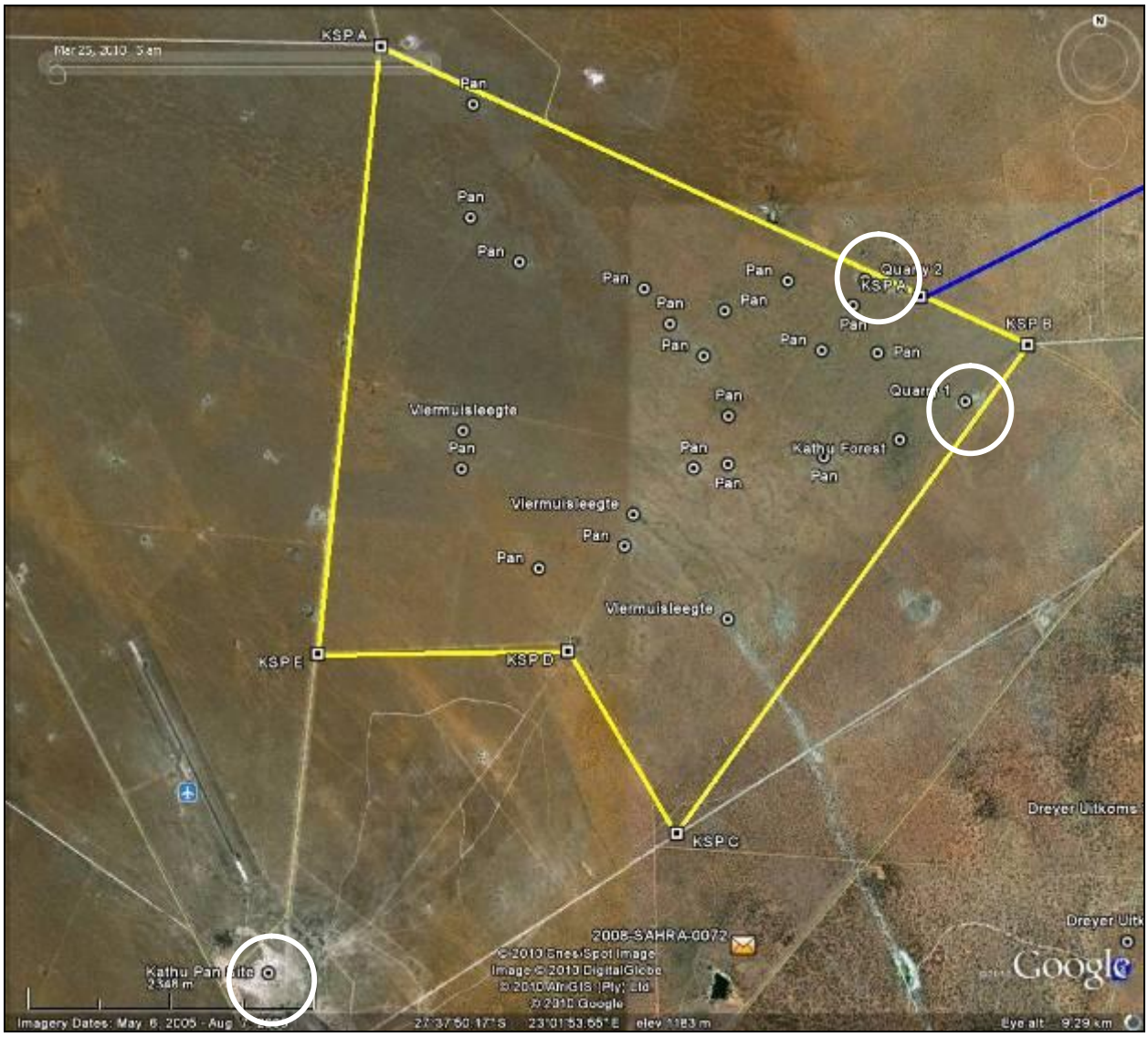

FIGURE 10: Google Earth image (2005) of the KSP site indicating the two quarries (borrow pits) and the Kathu Pan (lower left), as well as the many small pans where isolated scatters of Stone Age artefacts were found

TABLE 10: Identification of heritage features, impacts and impact management measures

S 3(2) NHRA heritage resource	(a) Identification		(b) Significance	(c) Impact		(d) Recommended impact management
	Site	GPS		Study area	Impact type, certainty and significance	
Buildings, structures, places and equipment of cultural significance	Quarry 1	27°37'18.49"S 23° 3'49.81"E	Low local	KSP site	Will probably not be affected	No action – located on periphery
	Quarry 2	27°36'46.42"S 23° 3'19.81"E	Low local	KSP site	Will probably not be affected	No action – located on periphery
Areas to which oral traditions are attached or which are associated with intangible heritage	None	-	-	-	-	-

S 3(2) NHRA heritage resource	(a) Identification		(b) Significance	(c) Impact		(d) Recommended impact management
	Site	GPS		Study area	Impact type, certainty and significance	
Historical settlements and landscapes	None	-	-	-	-	-
Landscapes and natural features of cultural significance	Kathu Forest	-	-	KSP site	Could be affected	Avoid if possible
Geological sites of scientific or cultural importance	Dry pans	-	Unknown	KSP site	Possible neutral to low negative	Mitigation: One pan per CSTP must be investigated in more detail for any fossils and Stone Age finds during site preparation work (Phase 2 investigation)
	Vlermuisleegte	-	Unknown	KSP site	Possible neutral to low negative	Mitigation: investigated in more detail for any fossils and Stone Age finds during site preparation work (Phase 2 investigation)
Archaeological and palaeontological sites	Chance finds (surface and sub-surface)	Unknown	Low local?	KSP site and grid connection	Unknown	Report and evaluate any graves or archaeological features and artefacts when found during site preparation work
Graves and burial sites	None	-	-	-	-	-
Features associated with labour history	None	-	-	-	-	
Movable objects	None	-	-	-	-	

FIGURE 11 Isolated scatterings of Stone Age artefacts found close to the northern KSP boundary and around the rims of pans

FIGURE 12: Late Stone Age flakes and tools from a borrow pit on the farm Bestwood – pocket knife 83 mm (Cobus Dreyer, 2010)

4.5 Social and economic benefits

The development will have no direct benefits related to the conservation of heritage resources (structures) since none of significance have been identified (that is on the surface). However, if important archaeological and palaeontological features are exposed during site preparation activities, this may present an opportunity to conduct a Phase 2 (archaeological and palaeontological) investigation that may generate new information, before such features could be destroyed.

The project has the potential to create sustainable employment in the Northern Cape while addressing some of the fundamental drivers of Climate Change. Being one of the pioneers of solar power in South Africa the project has the inherent role of developing solar power technology for the region. The key Sponsors intend to springboard a Solar Research and Development Center on the site to assist South Africans and local institutions in joining the global network of solar technology developers. The viability and success of this project is strategic to paving the way for sustainable power technologies in this region. This is a project of strategic and national importance and capable of enhancing South Africa's position in the global technology arena while aligning with the commitments made by South Africa in Copenhagen.

4.6 Consultation with affected communities

This is part of the EIA process.

4.7 Key mitigation measures before and during construction

Investigations for other projects on the farm Bestwood, east of Kathu, during 2008 and 2010, have indicated the potential of large sub-surface deposits of Stone Age artefacts. These are of high regional significance. Should any deposits be exposed during site preparation work on the KSP site, work should be suspended until a proper archaeological investigation can be made.

4.8 Consideration of alternatives

4.8.1 KSP site

Three sites were considered when selecting the preferred site for the construction and operation of the solar power plants (see Figure 13 below):

- Site Option A: is situated to the west of the preferred site alternative and was considered unsuitable based on the existence of a power line servitude traversing the site with voltage in excess of 11, 22 and 33 kV. In addition, as the site is located within close proximity to the Sishen Airfield the Civil Aviation Authority the authority would not allow the construction of structures of height within the proposed area.
- Site Option B: is situated to the east of Site Option A and to the west of the preferred site alternative. As with Site Option A, the site is located within close proximity to the Sishen Airfield the Civil Aviation Authority and therefore the authority would not allow the construction of structures of height within the proposed area.
- Final Site Option: was selected as the preferred alternative based on its alignment with the selection criteria listed below. In additional, the site was deemed the most feasible alternative based on its close proximity to the Sedibeng Water pipeline, which runs adjacent to the western boundary, and its location in relation to the general wind direction and Sishen Mine.

The selection criteria included availability of sunlight, proximity to an ESKOM grid connection, aviation impacts, site topography, water supply, weather, air quality, social context, site ownership, minerals potential, availability of housing, accessibility and fossil fuel supply.

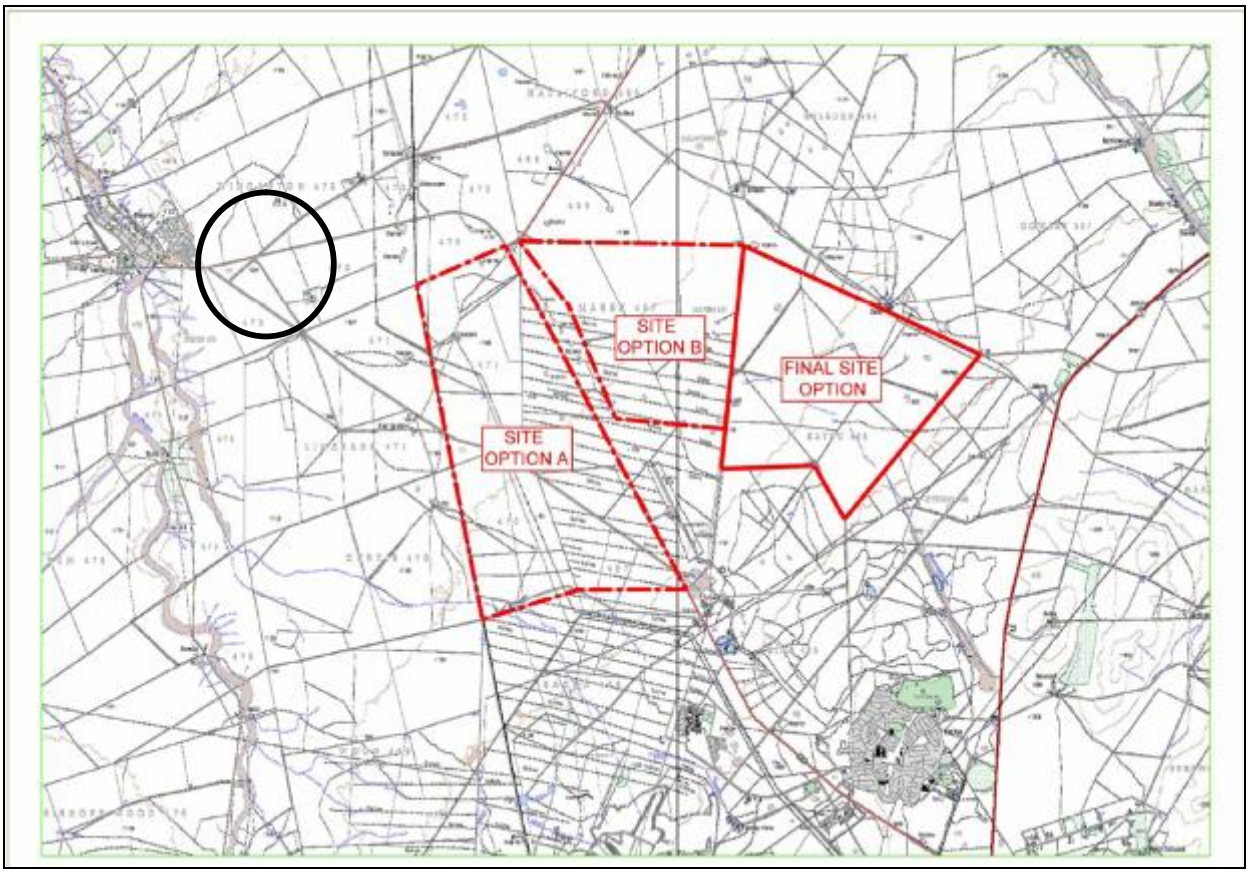

FIGURE 13: Site alternatives (Group Five, 2010). The circle indicates the proposed Kathu and Sishen solar power projects on the farm Wincanton (not part of the KSP project).

4.8.2 Power line connection link

Various servitudes for the power line route have been assessed as part of the pre-feasibility study for the KSP project. EON Engineering (Pty) Ltd has recently undertaken a servitude route assessment for the proposed power lines (EON Engineering, 2010) (see Figure 14 below).

As the proposed site is located roughly 7 km north of Kathu, and needs to be connected to the Ferrum Substation on the southern outskirts of the town, several route alternatives were considered, as follows.

Initially, it was proposed that a 275 kV power line would be developed from the northern section of the site, running towards Kathu town on the eastern boundary of the site, linking up with the existing N14

road servitude and connecting the Ferrum Substation via the R380 through Kathu. This option was rejected as the proposed power line would need to pass through the protected Kathu Forest, impacting negatively on the natural heritage resources, and would clash with planned land use in the area.

Alternate routes proposed by EON Engineering (Pty) Ltd included:

- The construction of a 275 kV power line running south along the western boundary and linking up with the existing R380 road servitude infrastructure. This route was deemed unsuitable for several reasons: it would affect an area of cultural and heritage significance south of Kathu 465 farm; it might impact on the Sishen airfield, and Kathu's town plans to expand to the west.
- The construction of a 275kV power line existing the site on the eastern boundary and running south east until connecting up with the N14 servitude. This route was also deemed unsuitable as it would impact on the adjacent Kathu forest.

The preferred servitude option is to construct a 275 kV power line that would exit the site to the north-east, cross the N14 a then be redirected south once clear of the Kathu Forest, before link up with the proposed Eskom 275 kV and 400 kV servitude that link to the Ferrum Substation from the east.

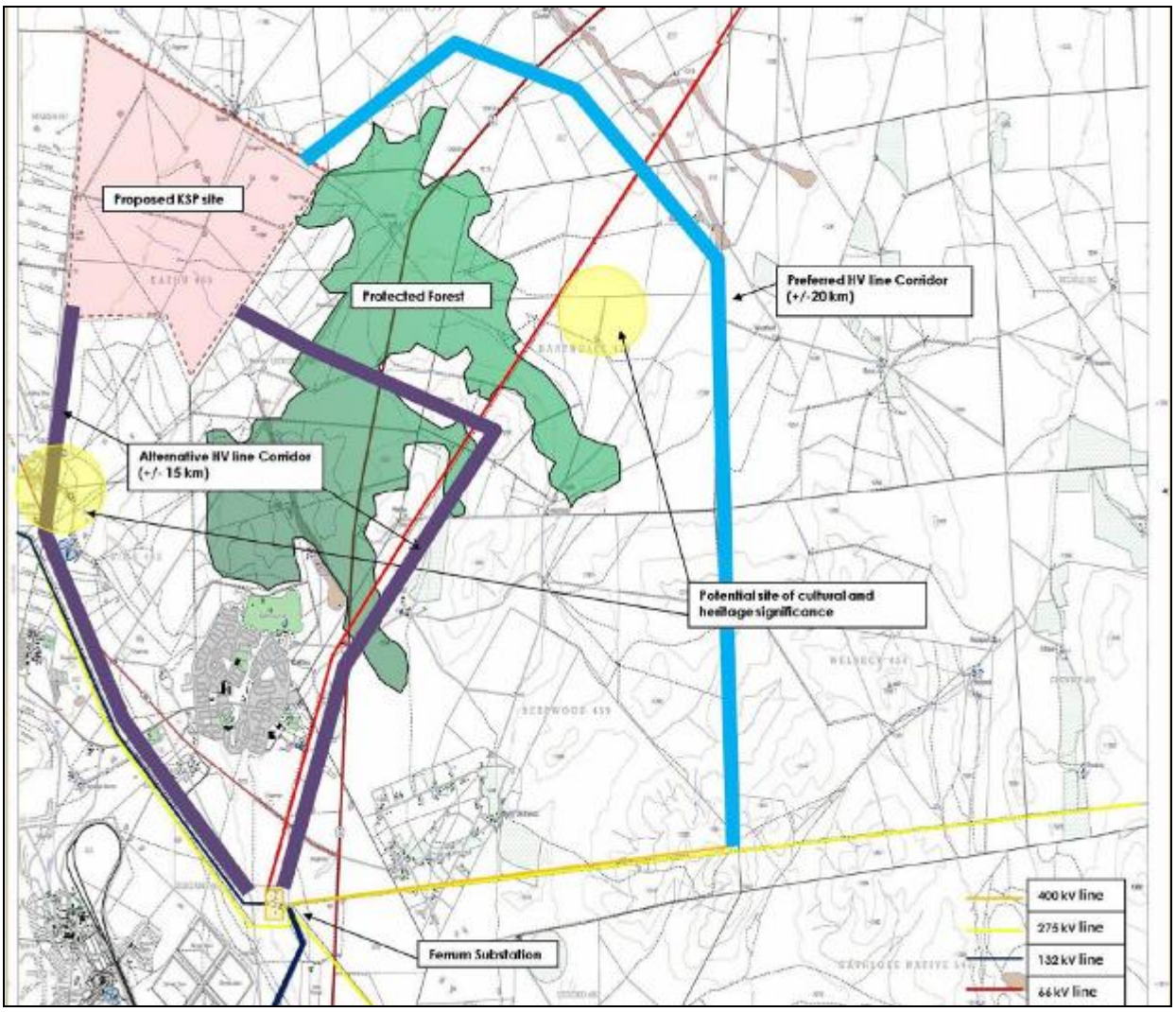

FIGURE 14: Power line alternatives (EON Engineering 2010)

4.9 Summarised findings and recommendations

The areas proposed for development are located in a cultural landscape classified primarily as a combination of historic farmland and an archaeological/palaeontological landscape. This class of landscape is of relatively low heritage sensitivity because it is able to absorb new development with some adverse effects.

The predicted impacts could be direct and physical, provided that significant heritage features are found during site preparation activities; otherwise the predicted impacts from a heritage perspective are neutral (no impact). The farming infrastructure is of modern origin and has low local significance. Some stone tools dating to the Middle and Later Stone Age occur sporadically (< 1/ 10m^2) around the rims of some of the pans. However, as these are surface finds, they are viewed to have a low significance.[9]

Visual intrusion as an indirect impact is not an important issue since the proposed development will be located in an environmentally degraded area (bush encroachment etc) and is bordering on land that has been transformed by housing, agriculture, mining and infrastructure. Noise, dust, pollution and restrictions of access patterns as indirect impacts are also not issues.

From a historic built environment perspective no features of heritage significance were identified and those features that are extant are typical of many others in the region.

From an archaeological perspective no finds or artefacts of real significance were identified.

From a palaeontological perspective the entire area is underlain by Precambrian rocks which are not exposed. These in turn are covered by Tertiary surface lime stones. The Precambrian rocks are not known to contain any fossils. There is a slight, but unlikely, possibility of Tertiary fossils being present in the limestone deposits.

Cultmatrix states that there are no compelling reasons not to proceed with the proposed KSP on the farm Kathu 465 (the site itself) and that the proposed development can continue provided that the following measures are adopted as heritage management mechanisms:

1. Should any hidden human remains (highly unlikely) be disturbed, exposed or uncovered during site clearing and excavations (for foundations etc), these should immediately be reported to an archaeologist. Burial remains should not be disturbed or removed until inspected by an archaeologist.
2. Site preparation activities must be monitored for the occurrence of any sub-surface archaeological material (Stone Age tools) and similar chance finds (such as historic middens and foundations) and if any are exposed, this should be reported to an archaeologist so that an investigation and evaluation of the finds can be made. Referring to archaeological investigations for projects on the neighbouring farm Bestwood, there is a strong possibility that artefacts could be exposed during excavations for foundations etc, since these artefacts seem to occur about one metre or more below ground level.
3. It is unlikely that the proposed development will have an impact on palaeontological heritage, but it is essential that if fossils are uncovered in the process of development activities a professional palaeontologist be bought in to access the situation.
4. An additional heritage scoping investigation should be undertaken to verify the presence or absence of heritage features (in particular Stone Age artefacts) that could be affected by the preferred power line.

[9] Refer to the AIA report (Van Schalkwyk)

APPENDIX 1: SOCIO-CULTURAL HISTORY OF DEVELOPMENT AREA

Kathu is located in a part of the Northern Cape Province commonly referred to as the "Green Kalahari". At the time of the appearance of the first hominids, the plains and hills would have consisted of widespread grasslands, scattered Bushveld and broken woodlands. These grasslands would have been dominated by large herds of mammalian grazers and the predators feeding on them. River courses had woodland fringes, which would have been home to various primates, as well as hippopotamus, lechwe and waterbuck.

During 1974 a discovery of animal fossils and Early Stone Age artefacts was made in the Kathu Pan at Kathu Townlands by Naas Viljoen, a previous manager of the Sishen farm. Many prehistoric bone fossils and artefacts were picked up by people over a wide area without realising the significance of these finds.

The first communities were hunters and gatherers who were able to make tools and weapons from stone, bone and wood. About 2,4 million years BP, early hominids known as *Australopithecus africanus* lived at Taung (a world heritage site), one of South Africa's most important palaeontological sites.

The australopithecines were gradually displaced by another early hominid, *Homo habilis*, and eventually disappeared. *Homo habilis* had evolved into the more advanced *Homo erectus* (also known as *Homo ergaster*) by 1,8 million years BP, which was responsible for the development of large stone cutters and cleavers that collectively constitute the so-called Early Stone Age (ESA).

By 250 000 years BP, the large cleavers and hand axes of the ESA disappeared and were replaced by a larger variety of smaller tools and weapons of diverse shapes and sizes, made by different techniques. This change in technology marks the beginning of the Middle Stone Age (MSA). During the MSA, early humans still settled in the open along or near water sources but also took shelter in caves. The MSA marks the transition from a more archaic *Homo* (*Homo ergaster*) to anatomically modern humans, *Homo sapiens*. With this physical development the first signs of art, decoration and symbolism began to appear.

The Later Stone Age (LSA), which occurred from about 20 000 years ago, is signalled by a series of technological innovations and social transformations within these early hunter-gatherer societies. The hunting apparatus now included two important innovations, the bow and the link-shaft arrow. Link-shaft arrows were constructed with a poisoned bone tip, a link and shaft that fell away on impact, leaving the poison tip imbedded in the animal. Other innovations included bored stones, used as digging-stick weights to aid in uprooting tubers and roots; small stone tools, often less than 25 mm in length, used for cutting meat and scraping hides; polished bone tools such as needles; twine made from plant fibre or leather; tortoiseshell bowls; fishing equipment, including hooks and sinkers; bone tools with decoration; high frequencies of ostrich eggshell beads and an increase in ornaments and artwork.

The LSA is associated with San communities as well as with Khoi groups that arrived from the northern interior about 2000 years BP.

All three Stone Age periods are well represented around Kathu but only scattered surface artefacts were found on the KSP development site. This is probably because of the absence of hills, which mainly occur further away to the east and south of Kathu. Most Stone Age artefacts and sites seem to date to the Early Stone Age. Important sites exist close to the proposed grid connection.

Early Iron Age occupation did not take place in the region and seems as if the earliest people to live settled lives here were those of Tswana-speaking origin (Tlhaping and Tlharo) that settled mostly to the north and a bit to the west of Kuruman.

While there is some evidence that the Early Iron Age continued into the 15th century in the Lowveld, on the escarpment it had ended by AD1100. The Highveld became active again from the 15th century onwards due to a gradually warmer and wetter climate. From here communities spread to other parts of the interior. This later phase, termed the Late Iron Age (LIA), was accompanied by extensive stonewalled settlements, such as the Thlaping capital Dithakong, 40 km north of Kuruman.

Sotho-Tswana and Nguni societies, the descendants of the LIA mixed farming communities, found the region already sparsely inhabited by the Late Stone Age (LSA) Khoisan groups, the so-called 'first people'. Most of them were eventually assimilated by LIA communities and only a few managed to survive, such as the Korana and Griqua. This period of contact is sometimes known as the Ceramic Late

Stone Age and is represented by the Blinkklipkop specularite mine near Postmasburg and finds at the Kathu Pan.

From LIA communities tribal societies emerged conveniently grouped according to their languages. The region became home to Western Sotho communities speaking Setswana, such as the Tlhaping, Rolong, Phiring, Fokeng, Kwena, Kgatla, Hurutshe, Taung, Tlharo and Ngwaketse tribal communities.

Factors such as population expansion, increasing pressure on natural resources, the emergence of power blocs, attempts to control trade and penetration by Griquas, Korana and white communities from the south-west resulted in a period of instability in Southern Africa that began in the late 18th century and effectively ended with the settlement of white farmers in the interior. This period, known as the *difaqane* or *Mfecane*, also affected the Northern Cape Province, although at a relatively late stage compared to the rest of Southern Africa. Here, the period of instability, beginning in the mid-1820s, was triggered by the incursion of displaced refugees associated with the Tlokwa, Fokeng, Hlakwana and Phuting tribal groups.

The *difaqane* coincided with the penetration of the interior of South Africa by white traders, hunters, explorers and missionaries. The first was PJ Truter's and William Somerville's journey of 1801, which reached Dithakong at Kuruman. They were followed by Cowan, Donovan, Burchell and Campbell and resulted in the establishment of a London Mission Society station near Kuruman in 1817 by James Read.

The Great Trek of the Boers from the Cape in 1836 brought large numbers of Voortrekkers up to the borders of large regions known as Bechuanaland and Griqualand West, thereby coming into conflict with many Tswana groups and also the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Korana and Griqua communities became involved and later also the British government. The conflict mainly centred on land claims by various communities. For decades the western border of the Transvaal Boer republic was not fixed. Only through arbitration (the Keate Arbitration), triggered by the discovery of gold at Tati (1866) and diamonds at Hopetown (1867) was part of the western border finally determined in 1871. Ten years later, the Pretoria Convention fixed the entire western border, thereby finally excluding Bechuanaland and Griqualand West from Boer domination.

Griqualand West was annexed by Britain in 1871 and this was one of the factors that eventually resulted in the Langberg Rebellion of 1878 when the Tlharo rose up against colonial domination and white settlement. A small force led by Colonel Charles Warren rapidly crushed the revolt, followed by general amnesty granted to the Tlharo in November. A "native reserve" was proclaimed for the Tlharo community in 1886, demarcating the Langberg, Deben, Kathu, Gatlhose and Maremane reserves for Tswana settlement.

Geographically, Kathu is part of a region once known as British Bechuanaland. Formerly a frontier area beyond colonial interest and control, it was proclaimed a British protectorate in 1885, primarily to secure access to Central Africa by preventing the Boers (through their Stellaland and Goosen republics) linking up with the German-occupied South-West Africa (Namibia). In 1895 the British incorporated British Bechuanaland into the Cape Colony.

In 1897 another Tswana uprising took place. This was also quelled by colonial forces. The Langberg and the other "reserves" were abolished and proclaimed as "Crown Land", which was surveyed into farms that were given out to white farmers. The Bechuanaland Native Reserves Commission, which was tasked to do this, visited the area in October 1897 and recommended that the old Kathu reserve should be divided into seven farms. JC Wessels surveyed the farm Kathu 465 in 1898.

The region remained sparsely populated until the advent of the 20th century, when cattle farming became popular; also, when the government started borehole drilling projects in order to open up new areas for farming purposes.

Indigenous communities, travellers and missionaries had been aware of the presence of iron ore in the Bestwood area, the missionary Robert Moffat recording on a journey to Kuruman in 1834 that he saw hills of glittering black rock. These hills are known today as the Gamagara Ridge that dominates the iron mine at Kathu.

In 1947 ISCOR obtained prospecting and mining rights in connection with iron ore deposits in the area. These turned out to be high-grade haematite deposits and a year later ISCOR purchased the farm Sishen. In 1952 a town named Sishen was established (today Dingleton). The rapid expansion of mining

activities necessitated the establishment of a much larger town, which was started in 1972-1974 with 2000 erven on the fringe of the Kathu Forest Reserve, about 20km from Sishen. The new town was named Kathu and it obtained municipal status in 1979.

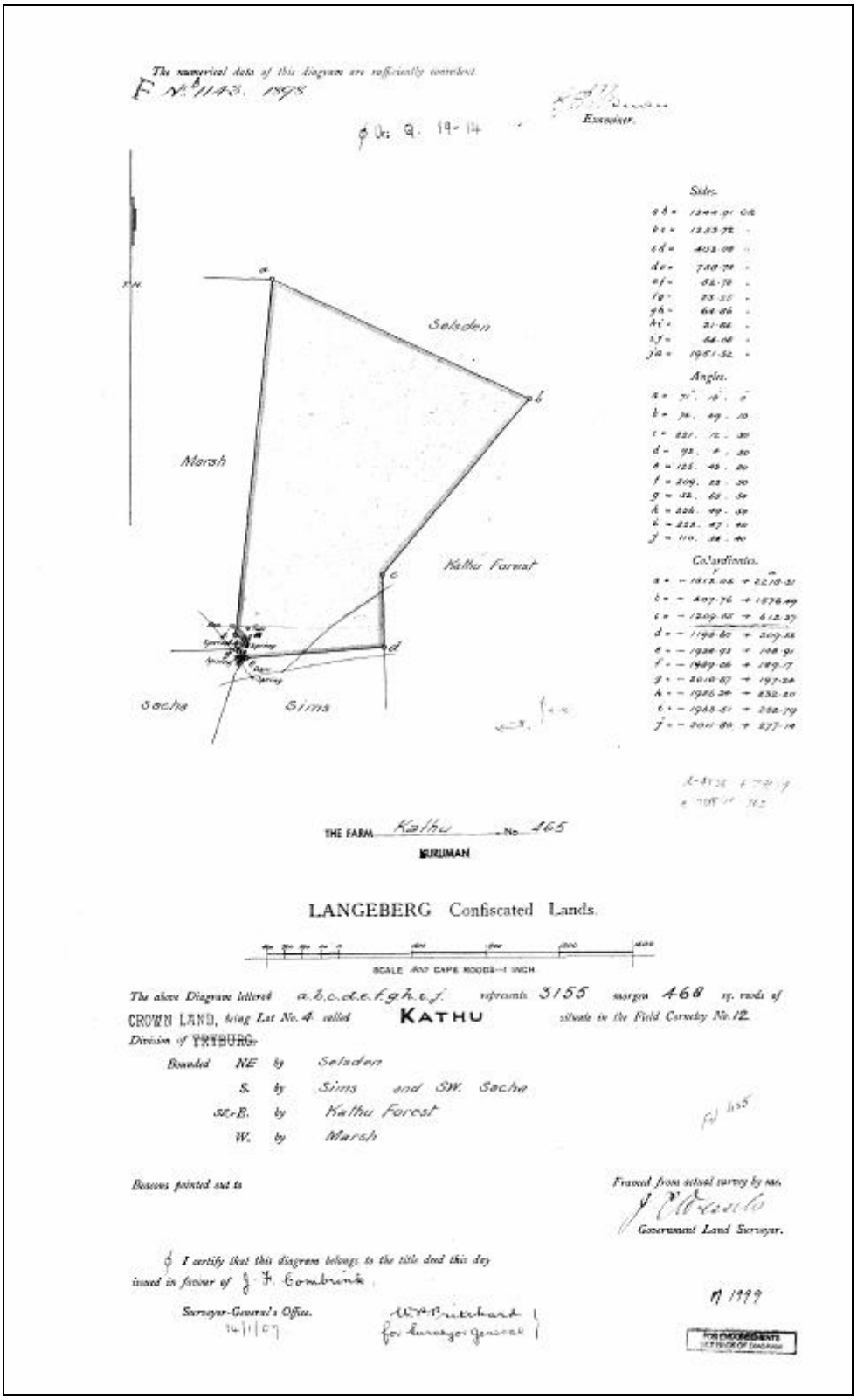

FIGURE 15: Survey diagram (1898) of the farm Kathu

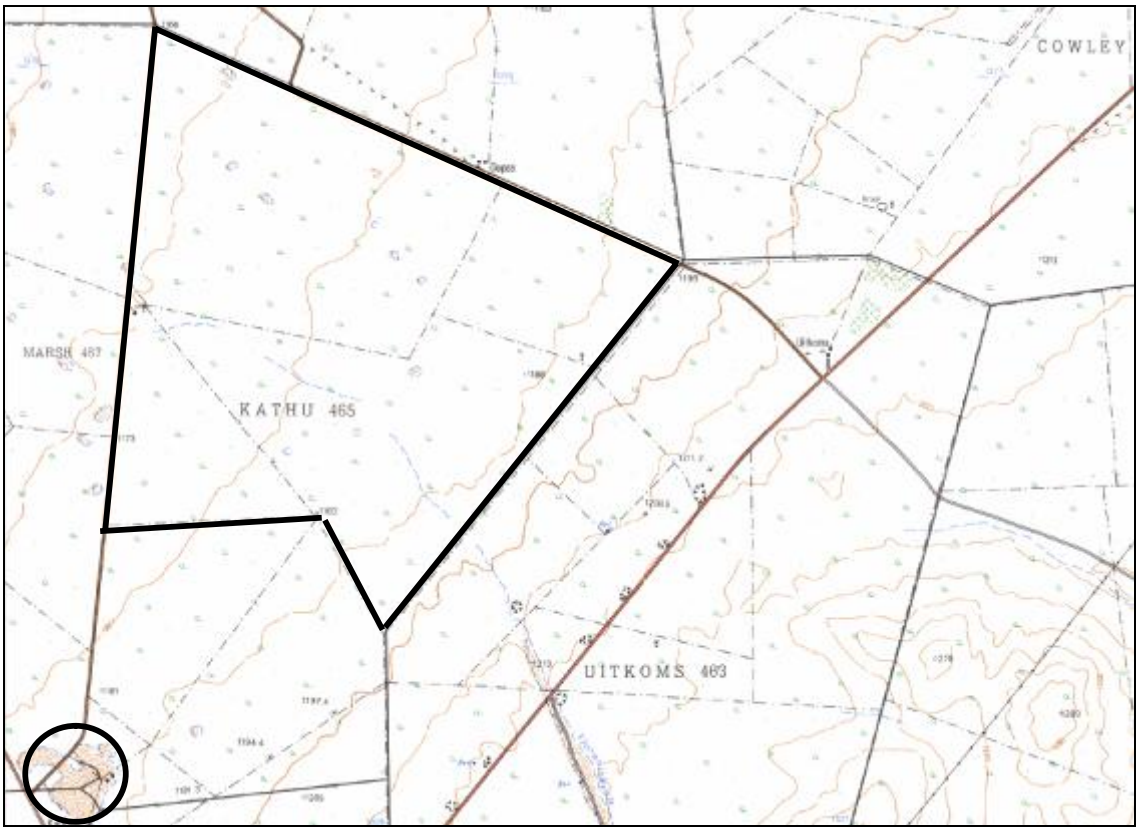

FIGURE 16: Portion of 2723 CA (Kathu), 1972, indicating the KSP site boundaries. The new N 14 alignment post-dates this map. The circle indicates the Kathu Pan site.

APPENDIX 2: INFORMATION SOURCES USED IN THIS REPORT

Databases

Environmental Potential Atlas, Department of Environmental Affairs and Tourism.
Heritage Sites Database, Pretoria
SAHRA database of archaeological impact assessment reports (2009)

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Maps

2723 CA Kathu (1972, 2001)
Cadastral farm diagrams of Kathu 465
Maps provided by client

Aerial photos

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Internet sources

http://www.flagsol-gmbh.com/flagsol/cms/

APPENDIX 3: GLOSSARY OF TERMS

Cultural significance (Burra Charter)

Aesthetic, historic, scientific, social or spiritual importance, meaning or noteworthiness for past, present or future generations

Cultural significance is embodied in the place itself (intrinsic significance), its fabric, setting, use, associations, meanings, records, related places and related objects.

Cultural significance is assessed in terms of the following criteria, some of which are embodied in the NHRA:

- Historic value: Material or intangible evidence resulting from changing social, political and environmental circumstances or conditions
- Rarity: Unique or unusual features also possess rarity value, apart from their age. Section 34 of the NHRA provided general protection for all structures older than 60 years. This does not imply that recently erected structures cannot possess rarity, or for that matter cultural value.
- Scientific value: Indicates research potential (the capacity to yield more knowledge)
- Typical: Indicates that the feature is a good example of a certain class or type of heritage resource
- Aesthetic: Other than artistic or architectural expression, aesthetic value can also be evident in craftsmanship, technique, visual cohesion (harmony), visual evidence of permanence and stability, setting etc.
- Technological: Indicates value in terms of a technological achievement
- Personal/Community: Indicates value in terms of association with a certain person, community, organisation or cultural group
- Landmark: A sense of place or belonging involves the physical and visual relationship between a feature and its environment.
- Condition (material integrity): Indicates substantial evidence of authentic fabric with minor degree of lost or obliterated fabric; also refers to a structure's restoration potential
- Sustainability: The potential for lasting economic viability (use) and the perpetuation of the original use or part thereof.

Heritage resources/features (NHRA)

Any place or object of cultural significance, including:
(*a)* places, buildings, structures and equipment of cultural significance;
(b) places to which oral traditions are attached or which are associated with living heritage;
(c) historical settlements and townscapes;
(d) landscapes and natural features of cultural significance;
(e) geological sites of scientific or cultural importance;
(f) archaeological and palaeontological sites;
(g) graves and burial grounds, including—
(i) ancestral graves;
(ii) royal graves and graves of traditional leaders;
(iii) graves of victims of conflict;
(iv) graves of individuals designated by the Minister by notice in the *Gazette*;
(v) historical graves and cemeteries; and
(vi) other human remains, which are not covered in terms of the Human Tissue Act, 1983 Act No. 65 of 1983);
(h) sites of significance relating to the history of slavery in South Africa;
(i) movable objects, including—

(i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
(ii) objects to which oral traditions are attached or which are associated with living heritage;
(iii) ethnographic art and objects;
(iv) military objects;

(v) objects of decorative or fine art;
(vi) objects of scientific or technological interest; and
(vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

Heritage significance (NHRA)

(a) its importance in the community, or pattern of South Africa's history;
(b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
(c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
(d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
(e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
(f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
(g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
(h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
(i) sites of significance relating to the history of slavery in South Africa.

Historic period

Since the arrival of the white settlers - c. AD 1840 in this part of the country

Impact

A description of the effect of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space

Impact assessment

Issues that cannot be resolved during screening (Level 1) and scoping (Level 2) and thus require further investigation

Intangible heritage

Defined in terms of the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003) as:

- Oral traditions and expressions, including language as a vehicle of the intangible cultural heritage;
- Performing arts;
- Social practices, rituals and festive events;
- Knowledge and practices concerning nature and the universe;
- Traditional craftsmanship.

The "intangible cultural heritage" means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity.

Visual and social impact assessments as part of an HIA are directly associated with intangible cultural heritage.

Iron Age

Early Iron Age (EIA)	AD 200 - AD 1000
Late Iron Age (LIA)	AD 1000 - AD 1830

Issue

A question that asks what the impact of the proposed development will be on some element of the environment

Maintenance

Keeping something in good health or repair

Management actions

Actions that enhance benefits associated with a proposed development or avoid, mitigate, restore, rehabilitate or compensate for the negative impacts

Preservation

Conservation activities that consolidate and maintain the existing form, material and integrity of a cultural resource

Reconstruction

Re-erecting a structure on its original site using original components

Rehabilitation

Re-using an original building or structure for its historic purpose or placing it in a new use that requires minimal change to the building or structure characteristics and its site and environment.

Restoration

Returning the existing fabric of a place to a known earlier state by removing additions or by reassembling existing components

SAHRA - South African Heritage Resources Agency

Stone Age

Early Stone Age (ESA)	2 000 000 - 150 000 Before Present
Middle Stone Age (MSA)	150 000 - 30 000 BP
Late Stone Age (LSA)	30 000 - until c. AD 200

Value

Worth, conservation utility, desirability to conserve etc in terms of physical condition, level of significance (importance), economy (feasibility), possible new uses and associations/comparisons with similar features elsewhere

APPENDIX 4: RUBIDGE PALAEONTOLOGICAL DESKTOP STUDY FOR SESHENG

BPI for Palaeontological Research

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15 June 2010

Dr Robert De Jong
Cultmatrix
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Queenswood 0121
Pretoria

E-Mail cultmat@iafrica.com

Dear Robert,

Sesheng Development – Palaeontological Impact Assessment

I have undertaken a desk top palaeontological impact analysis for the area which will be affected by the proposed development at Sesheng, west of Kathu.

The entire area is underlain by Precambrian rocks which are not exposed. These in turn are covered by Tertiary surface limestones. The Precambrian rocks are not known to contain any fossils. There is a slight, but unlikely, possibility of Tertiary fossils being present in the limestone deposits. It is unlikely that the proposed development will have an impact on palaeontological heritage, but it is essential that if fossils are uncovered in the process of development activities that a professional palaeontologist be bought in to access the situation.

Yours sincerely

Bruce Rubidge PhD, FGSSA, Pr Sci Nat

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