Specialist Declaration of Interest

I, Karen van Ryneveld (Company – ArchaeoMaps; Qualification – MSc Archaeology), declare that:

- I am suitably qualified and accredited to act as independent specialist in this application;
- I do not have any financial or personal interest in the application, its' proponent or any subsidiaries, aside from fair remuneration for specialist services rendered; and
- That work conducted has been done in an objective manner – and that any circumstances that may have compromised objectivity have been reported on transparently.

Signature – 18 April 2016 -
Phase 1 Archaeological & Cultural Heritage Impact Assessment –
Metsimatala 150MW CSP Solar Energy Facility – Power Lines,
(near Postmasburg), Siyanda District Municipality, Northern Cape

Executive Summary

Project Description –
Enviroworks have been appointed as independent EAP by the project proponent, Metsimatala CSP Solar Energy (Pty) Ltd, to apply for EA, including a BAR and EMP, to the DEA for the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development, near Postmasburg, Siyanda District Municipality, Northern Cape. The Metsimatala 150MW CSP Solar Energy Facility is situated at general development co-ordinate S28°17'06.0"; E23°17'51.3" and comprises an approximate 500ha study site on the property Groenwater No 453.
The associated proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development is twofold in nature:
1. Realignment (app. 5km) of the power line running through the Metsimatala 150MW CSP Solar Energy Facility study site, with 2 options investigated for realignment; and
2. Construction of a new power line (app. 25-30km) from the Metsimatala 150MW CSP Solar Energy Facility to the Manganoor Substation near Postmasburg, with 2 options investigated for construction.
The Metsimatala 150MW CSP Solar Energy Facility development aims to generate clean, renewable electricity into the national Eskom grid as part of the DoE’s REIPPPP.

ArchaeoMaps was appointed by Enviroworks to compile the Phase 1 AIA for the BAR process for the realignment and construction of power lines for the Metsimatala 150MW SCP Solar Energy Facility development, as specialist component to the application’s HIA. [A separate Phase 1 AIA study has been commissioned for construction of the Metsimatala 150MW CSP Solar Energy Facility].

The Phase 1 Archaeological & Cultural Heritage Impact Assessment –
Project Name & Locality: Metsimatala 150MW CSP Solar Energy Facility – Power Lines, near Postmasburg, Siyanda District Municipality, Northern Cape [1:50,000 Map Ref – 2823AA, 2823AB, 2823AC & 2823AD].

- Summary of Findings:
  o Development layout poses no ‘fatal flaws’ – Consideration of a ‘No-Go’ option is irrelevant.
  o Realignment: Site MVIA3 is situated along proposed Realignment Option A. Recommended conservation measures should suffice for purposes of development. However, from an archaeological and cultural heritage perspective it is recommended that development follows Realignment Option B, with no heritage resources identified along the alignment.
  o Power Line: Site MPL3 is situated along Power Line Option A. Permanent conservation measures, complying with SAHRA Minimum Standards for site conservation are already in place, inferred to be the result of heritage compliance relating to development of the existing power line. From an archaeological and cultural heritage perspective neither of the power line options, Power Line Option A or Power Line Option B, poses a threat to identified sites.
  o Little to no negative cumulative impact will result from the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA 1999.
  o [In the event of any incidental archaeological or cultural heritage resources, as defined and protected by the NHRA 1999, being encountered during the course of development the process described in Appendix C: ‘Heritage Protocol for Incidental Finds during the Construction Phase’ should be followed.]

<table>
<thead>
<tr>
<th>Map Code</th>
<th>Site</th>
<th>Co-ordinates</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metsimatala 150MW CSP Solar Energy Facility – Power Lines</td>
<td>General (Sites that may be encountered during the course of development)</td>
<td>Stone Age (Low density MSA &amp; LSA lithic scatters typifying the general terrain)</td>
<td>N/A</td>
</tr>
<tr>
<td>-</td>
<td>Rock Art Engravings / Petroglyphs</td>
<td>-</td>
<td>o Temporary conservation (temporary fence and signage); o Archaeological site inspection; and o No development within 10m from the identified site</td>
</tr>
<tr>
<td>-</td>
<td>Graves</td>
<td>-</td>
<td>o Temporary conservation (temporary fence and signage); o Archaeological site inspection; and o No development within 15m from the identified site</td>
</tr>
</tbody>
</table>
### Identified heritage sites

| MVIA3 | LIA / Cont. – Cemetery | S28°16′45.3″; E23°18′26.0″ | o Formal conservation (permanent fence & access gate)  
o No pylon construction impact within 15m from the conservation fence |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MPL1</td>
<td>LIA / Colonial Period – Cemetery</td>
<td>S28°16′26.1″; E23°16′03.1″</td>
<td>N/A (based on distance from the study site)</td>
</tr>
<tr>
<td>MPL2</td>
<td>Colonial Period – Farmstead</td>
<td>S28°09′34.1″; E23°12′52.6″</td>
<td>N/A (based on distance from the study site)</td>
</tr>
</tbody>
</table>
| MPL3 | Colonial Period – Cemetery | S28°09′13.4″; E23°12′40.3″ | Formal conservation measures in place  
o No pylon construction impact within 15m from the conservation fence |
| HHPL1 | Colonial Period – Farmstead | S28°09′18.0″; E23°09′10.8″ | N/A (based on distance from the study site) |
| HHPL2 | Colonial Period – Farmstead | S28°09′37.2″; E23°09′12.5″ | N/A (based on distance from the study site) |
| G-St | Colonial Period / Cont. – Mining Complex | S28°07′57.6″; E23°07′06.7″ | N/A (based on distance from the study site) |

### Recommendations

With reference to archaeological and cultural heritage compliance, as per the requirements of the NHRA 1999, it is recommended that the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development, near Postmasburg, Siyanda District Municipality, Northern Cape, proceed as applied for provided the developer comply with the above listed heritage recommendations.

The SAHRA (APM Unit) HIA Comment will state legal requirements for development to proceed, or reasons why, from a heritage perspective, development may not be further considered.
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Enviroworks have been appointed as independent Environmental Assessment Practitioner (EAP) by the project proponent, Metsimatala CSP Solar Energy (Pty) Ltd, to apply for Environmental Authorization (EA), including a Basic Assessment Report (BAR) and Environmental Management Program report (EMP), to the Department of Environmental Affairs (DEA) for the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development, near Postmasburg, Siyanda District Municipality, Northern Cape. The Metsimatala 150MW CSP Solar Energy Facility is situated at general development co-ordinate S28°17'06.0"; E23°17'51.3" and comprises an approximate 500ha study site on the property Groenwater No 453. The associated proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development is twofold in nature:

1. Realignment (app. 5km) of the power line running through the Metsimatala 150MW CSP Solar Energy Facility study site, with 2 options investigated for realignment; and
2. Construction of a new power line (app. 25-30km) from the Metsimatala 150MW CSP Solar Energy Facility to the Manganoor Substation near Postmasburg, with 2 options investigated for construction.

The Metsimatala 150MW CSP Solar Energy Facility development aims to generate clean, renewable electricity into the national Eskom grid as part of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement Program (REIPPPP).

The original Metsimatala proposal centred on a 50MW CSP development. A full Scoping and EIA process was conducted in terms of the National Environmental Management Act, No 107 of 1998 (NEMA 1998), EIA Regulations 2010 and an EA issued in 2012. An amendment request to the EA was submitted and approved in 2013. In the interim the magnitude of the project scope increased to 150MW and a new EA process was initiated in terms of NEMA 1998, EIA Regulations 2014 for both the Metsimatala 150MW CSP Solar Energy Facility and the associated power lines.

ArchaeoMaps was appointed by Enviroworks to compile the Phase 1 Archaeological & Cultural Heritage Impact Assessment (AIA) for the BAR process for the realignment and construction of power lines for the Metsimatala 150MW CSP Solar Energy Facility development, as specialist component to the application's Heritage Impact Assessment (HIA), with findings and recommendations thereof to be included in the BAR and EMP. Terms of Reference (ToR) for the Phase 1 AIA are summarized as:

- Describe the existing area to be directly affected by the proposal in terms of its current cultural, historical and archaeological characteristics and the general sensitivity of these components to change;
- Describe the likely scope, scale and significance of impacts (positive and negative) on the cultural, historical and archaeological components of the area associated with the 1) construction and 2) operation or use phases of the proposal;
- Make recommendations on the scope of any mitigation measures that may be applied during 1) construction and 2) operation or use phases to avoid / reduce the significance of the identified related impacts. Mitigation measures could also be design recommendations as well as operational controls, monitoring programmes, Phase 2 mitigation, management procedures and the like;
- Broadly describe the implications of a 'No-Go' option;
- Broadly comment on the cumulative cultural, historical and archaeological impacts (positive or negative) associated with the 1) construction and 2) operation and use phases of the proposal; and
- Confirm if there are any outright ‘fatal flaws’ to the establishment of the proposal at its current location from a cultural, historical and archaeological perspective.

[A separate Phase 1 AIA study has been commissioned for construction of the Metsimatala 150MW CSP Solar Energy Facility].
Map 1: General locality of the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site, near Postmasburg, Northern Cape, indicating the positions of Power Line Option A (Lime) and Power Line Option B (Magenta) from the proposed Metsimatala Substation to the Manganoor Substation.
Map 2: Close-up of the proposed Metsimatala 150MW CSP Solar Energy Facility study site, indicating the locality of power line Realignment Option A (Red) and Realignment Option B (White) in relation to the existing power line (Blue) running through the study site.
Phase 1 Archaeological & Cultural Heritage Impact Assessment – Metsimatala 150MW CSP Solar Energy Facility – Power Lines, near Postmasburg, Siyanda District Municipality, Northern Cape

2 – The Phase 1 Archaeological & Cultural Heritage Impact Assessment

2.1.1) Archaeological & Cultural Heritage Legislative Compliance

The Phase 1 Archaeological & Cultural Heritage Impact Assessment (AIA) for the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines, near Postmasburg, Siyanda District Municipality, Northern Cape, was requested to meet the South African Heritage Resources Agency’s (SAHRA) requirements with reference to archaeological and basic cultural heritage resources in terms of the National Heritage Resources Act, No 25 of 1999 (NHRA 1999), with specific reference to Section 38(1)(a), 38(1)(c)(ii) and 38(1)(d). This report is submitted in (partial) fulfillment of the NHRA 1999, Section 38(3) requirements, for purposes of a NHRA 1999, Section 38(4) / Section 38(8) Heritage Impact Assessment (HIA) Comment by SAHRA.

Table 1: Extracts from the NHRA 1999, Section 38

<table>
<thead>
<tr>
<th>NHRA 1999, Section 38</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Subject to the provisions of subsections 7), 8) and 9), any person who intends to undertake a development categorized as –</td>
</tr>
<tr>
<td>a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;</td>
</tr>
<tr>
<td>b) the construction of a bridge or similar structure exceeding 50 m in length;</td>
</tr>
<tr>
<td>c) any development or other activity which will change the character of a site –</td>
</tr>
<tr>
<td>i. exceeding 5 000 m² in extent; or</td>
</tr>
<tr>
<td>ii. involving three or more existing erven or subdivisions thereof; or</td>
</tr>
<tr>
<td>iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or</td>
</tr>
<tr>
<td>iv. the costs which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;</td>
</tr>
<tr>
<td>d) the rezoning of a site exceeding 10 000 m² in extent; or</td>
</tr>
<tr>
<td>e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,</td>
</tr>
<tr>
<td>must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.</td>
</tr>
</tbody>
</table>

The Phase 1 AIA aimed to locate, identify and assess the significance of archaeological and cultural heritage resources, inclusive of archaeological deposits / sites (Stone Age, Iron Age and Colonial Period), rock art and shipwreck sites, built structures older than 60 years, sites of military history older than 75 years, certain categories of burial grounds and graves, graves of victims of conflict and basic cultural landscapes or viewscapes as defined and protected by the NHRA 1999, Section 2, that may be affected by the development.

This report comprises a Phase 1 AIA, including a basic pre-feasibility study and field assessment only. The report was prepared in accordance with Minimum Standard requirements for Phase 1 AIA reports as stipulated by SAHRA (2007).

The Phase 1 AIA was done with cognizance to preceding heritage documentation pertaining to the original Metsimatala proposal and subsequent amendments thereto, also associated with a change in development layout, with relevant archaeological Cultural Resources Management (CRM) reports referenced as:


Additional relevant legislation pertaining to the Phase 1 AIA is listed as:

2.1.2) Methodology & Gap Analysis

The Phase 1 AIA includes a basic pre-feasibility study and field assessment:

- The pre-feasibility assessment is based on the Appendices A and B introductory archaeological literature as well as general literature available and relevant to the study site. Databases consulted include the SAHRA 2009 Mapping Project Database (MPD), the South African Heritage Resources Information System (SAHRIS) and the SAHRA database on declared Provincial Heritage Sites (PHS) – Northern Cape. The study excludes consultation of museum and university databases.

- The field assessment was done over a 3 day period (2016-04-09, 10 & 12) with fieldwork conducted by the author. The assessment was done by foot and off-road vehicle and limited to a Phase 1 surface survey. GPS co-ordinates were taken with a Garmin Montana 650 (Datum: WGS84). Photographic documentation was done with a Pentax K20D camera. A combination of Garmap and Google Earth software was used in the display of spatial information.

- The field assessment was conducted across the Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site by means of line route alignment and regular spot assessment where access was restricted, focusing on an estimated 150m development corridor. The field assessment excluded assessment on the restricted property Kapstewel No 436 and portions of Plaas No 437, including the locality of the existing Manganoor Substation (Kapstewel No 436). Surface visibility proved to be in general very good. Hilly terrain associated with steep slopes and thicker vegetation did hamper surface assessment, for ex. across the foothills of the Ghaap Plateau. Exposed sub-surface interpretation are based on exposed road section cuttings throughout the general area covered and roads travelled during the course of the fieldwork, including large scale on-going roadworks.

The Phase 1 AIA was done according to the system and Minimum Standards prescribed for the 3-tiered Phase 1-3 Heritage Impact Assessment (HIA) process (SAHRA 2007):

- **Phase 1 HIA** – A Phase 1 HIA is compulsory for development types as stipulated in the NHRA 1999, Section 38(1) and Section 38(8), including any other development type or study site as required by the South African Heritage Resources Agency (SAHRA) or relevant Provincial Heritage Resources Authority (PHRA). A Phase 1 HIA comprises at minimum of an archaeological (AIA) and palaeontological (PIA) study, but aims to address all heritage types protected by the NHRA 1999 and to alert developers to additional heritage specialist study requirements, if and where relevant to a development. Phase 1 HIA studies focus on pre-feasibility or desktop studies, routinely coined with field assessments in order to locate, describe and assign a heritage site significance rating to identified resources that may be impacted by development. The aim of a Phase 1 HIA is to make site specific and general development recommendations regarding identified heritage resources for development planning and implementation purposes and may include recommendations for conservation, monitoring, mitigation (Phase 2 HIA), destruction or heritage declaration.

- **Phase 2 HIA** – Phase 2 HIAs are as a norm required where heritage resources of such significance has been identified during the Phase 1 HIA that mitigation (excavation) thereof is necessary for development purposes. Aside from large scale Phase 2 mitigation (routinely to precede development impact), lower keyed Phase 2 requirements may well include sampling, testing and monitoring during the construction or implementation phase of a development. Phase 2 HIA work is as a norm done under a compulsory heritage permit.

- **Phase 3 HIA** – As an extension to Phase 2 HIA work or cases where recommendations for heritage declaration formed part of a development’s heritage compliance requirements, heritage resources of such scientific or heritage tourism significance, that their long term conservation and continued research would be necessary within a development framework, is proposed as a Phase 3 HIA.

Archaeological and cultural heritage site significance assessment and associated mitigation recommendations were done according to the combined NHRA 1999, Section 7(1) and SAHRA (2007) system.
### Sahra Archaeological and Cultural Heritage Site Significance Assessment

<table>
<thead>
<tr>
<th>Site Significance</th>
<th>Field Rating</th>
<th>Grade</th>
<th>Recommended Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Significance</td>
<td>National Significance</td>
<td>Grade I</td>
<td>Site conservation / Site development</td>
</tr>
<tr>
<td>High Significance</td>
<td>Provincial Significance</td>
<td>Grade II</td>
<td>Site conservation / Site development</td>
</tr>
<tr>
<td>High Significance</td>
<td>Local Significance</td>
<td>Grade III-A</td>
<td>Site conservation or extensive mitigation prior to development / destruction</td>
</tr>
<tr>
<td>High Significance</td>
<td>Local Significance</td>
<td>Grade III-B</td>
<td>Site conservation or extensive mitigation prior to development / destruction</td>
</tr>
<tr>
<td>High / Medium</td>
<td>Generally Protected A</td>
<td>Grade IV-A</td>
<td>Site conservation or mitigation prior to development / destruction</td>
</tr>
<tr>
<td>Significance</td>
<td>Generally Protected B</td>
<td>Grade IV-B</td>
<td>Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction</td>
</tr>
<tr>
<td>Low Significance</td>
<td>Generally Protected C</td>
<td>Grade IV-C</td>
<td>On-site sampling, monitoring or no archaeological mitigation required prior to or during development / destruction</td>
</tr>
</tbody>
</table>

*Table 2: Sahra archaeological and cultural heritage site significance assessment ratings and associated mitigation recommendations*
2.2.1) Pre-feasibility Summary

Based on a basic introductory literature assessment of South African archaeology (See Appendices A and B) and background heritage database research, the probability of archaeological and cultural heritage resources situated on or in direct proximity to the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site can briefly be described as:

<table>
<thead>
<tr>
<th>Primary Type / Period</th>
<th>Sub-Period</th>
<th>Sub-Period Type Site</th>
<th>Probability</th>
</tr>
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<tbody>
<tr>
<td>EARLY HOMININ / HOMINID</td>
<td></td>
<td></td>
<td>None-Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graves / Human remains: High scientific significance</td>
<td></td>
</tr>
<tr>
<td>STONE AGE</td>
<td>Earlier Stone Age (ESA)</td>
<td></td>
<td>Medium</td>
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<tr>
<td></td>
<td>Middle Stone Age (MSA)</td>
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<td>Medium-High</td>
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<td>Later Stone Age (LSA)</td>
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</tr>
<tr>
<td></td>
<td>Rock Art</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Iron Age</td>
<td>Early Iron Age (EIA)</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Middle Iron Age (MIA)</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Later Iron Age (LIA)</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Graves &amp; Human remains: EIA – High scientific &amp; medium social significance; MIA &amp; LIA: High scientific &amp; social significance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLONIAL PERIOD</td>
<td>Colonial Period</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>LSA – Colonial Period Contact</td>
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<td>Low</td>
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<td>LIA – Colonial Period Contact</td>
<td></td>
<td>Medium</td>
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<td></td>
<td>Industrial Revolution</td>
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<td>Low</td>
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<td></td>
<td>Apartheid &amp; Struggle</td>
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<td>Low-Medium</td>
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Graves / Human remains: Medium-high scientific & high social significance

Table 3: Archaeological and basic cultural heritage probability assessment

2.2.2) The SAHRA 2009 MPD & SAHRIS

Eleven archaeological Cultural Resources Management (CRM) reports are recorded in the SAHRA 2009 Mapping Project Database (MPD), situated within an approximate 25km radius from the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site, listed as:

- Dreyer, C. 2007. (Private). *Archaeological and Historical Investigation of the Proposed Mining Activities at the Farm Rosslyn, Lime Acres, Northern Cape*.
Post compilation of the SAHRA 2009 MPD an array of SAHRIS cases have been submitted with study sites situated within the rough 25km radius from the Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site, selected of which are associated with archaeological CRM reports, listed non-inclusively (and excluding former Metsimatala archaeological CRM studies) as:

2.2.3) **SAHRA Provincial Heritage Site Database – Northern Cape**

![Map 4: Spatial distribution of geo-referenced PHS in the SAHRA – Northern Cape database in relation to the Metsimatala CSP 150MW Solar Energy Facility study site, Groenwater No 453, near Postmasburg, Northern Cape](image)

Georeferenced declared Provincial Heritage Sites (PHS) recorded in the SAHRA – Northern Cape database (https://en.wikipedia.org/wiki/List_of_Heritage_Sites_in_Northern_Cape) are scattered mainly to the east of the Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site, with the closest declared PHS situated in Danielskuil, more than 20km to the east, north-east of the Metsimatala study site.

2.2.4) **General Discussion**

The Stone Age record is well documented in consulted archaeological CRM reports, including records of the Earlier (ESA), Middle (MSA) and Later Stone Age (LSA) (Beaumont 2007a, Becker 2012; Birkholtz 2014, Fourie 2011, 2012b; Henderson 2005; Hutton & Hutton 2013; Hutton 2014; Morris 2001, 2005a, 2005b, 2008, 2012; Nel 2008, Van Rynheld 2005; Webley 2010). Documented Stone Age records indicate a predominance of MSA occurrences, often recorded as low density surface scatters, seemingly with little inferred sub-surface stratigraphic depth. In cases the MSA is found with an admixture of ESA Acheulean artefacts, in other cases associated with what seems to be primarily a macrolithic LSA, but not excluding the possibility of a microlithic LSA presence on the landscape, with occurrences more often present in pan depressions or ‘playa’ (palaeolake) landscapes and on hilly terrain. Despite the widespread presence of Stone Age lithics across the landscape, few significant lithic sites have been documented: Morris (2005b) however reported on mitigatory worthy MSA deposits from Leeufontein and LSA deposits from Wolhaarkop. The LSA record is supplemented by rock art, primarily engravings (petroglyphs): Morris & Beaumont (1994) identified no less than 119 petroglyphs spread across approximately 22 outcrops, with engravings yielding distinctive Western subject matter; men on horseback and with broad rim hats, women with long dresses and sub-rectangular structure plans amongst typical geometrics, animal and stick human figurines. Morris (2012) reported on a LSA shelter site, but without rock art, while Becker (2012) makes brief comment on a number of LSA engraving sites.
Research records of the greater terrain serves as testimony to the actual significance of the general area with reference to the Stone Age, including the declared National Heritage Site (NHS) of Wonderwerk Cave, near Kuruman, with its significant ESA, MSA and LSA (including rock art) stratigraphic sequence (Beaumont 1990a; Thackaray et. al 1981), dating to approximately 2Mya, with the site also associated with a Colonial Period component. Also further north of the Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site is the declared Provincial Heritage Site (PHS) of Kathu Townlands, for its ESA and MSA deposits (Beaumont 1990b). Closer to Pastmasburg are the LSA specularite and haematite mines of Blinkklipkop and Doornfontein, dated to roughly AD1,200; making these of the oldest known mining sites in South Africa (Beaumont 1973). In addition, various research studies on the Ghaap Plateau have yielded significant information on the ESA, MSA and LSA (Curnoe et. al. 2006a, 2006b; Herries et. al. 2007).

Of significance is reference by Fourie (2011, 2012a, 2012b) and van Vollenhoven (2014a, 2014b) on the Griqua, a LSA pastoralist Khoe group who lost sovereignty of their tribal land after 1880 to Cape rule, but still present on the landscape in contemporary times.

Iron Age sites are poorly represented in the archaeological CRM record; aside from a significant Later Iron Age (LIA) site, Old Metsimatala Village, recorded on Groenwater No 453 (Van Ryneveld 2012) and the Gamogara deposits recorded by Morris (2005a), the LIA is mainly represented by small farmworkers villages, residences and selected livestock enclosure remains (Fourie 2012b; Gaigher 2014; Hutton & Hutton 2013, Morris 2005a, Van Vollenhoven 2014b), with the primary LIA groups present in the general area being the Thlaping and Thlako, both being Tswana tribes, who have settled in the greater Northern Cape area from the late 1600s onwards (Fourie 2012a).

Colonial Period sites are amply reported on in consulted archaeological CRM reports. Old farmsteads and related farming infrastructure being the most common type Colonial Period site reported on, with these in varying stages of conservation / decay; some well conserved and still in use, whilst others are represented by ruined foundation remains only (Fourie 2012b; Henderson 2005; Hutton & Hutton 2013; Hutton 2014; Webley 2010). Becker (2012) also reported on the Magersfontein Battlefield site and a number of fortifications relating to the Anglo-Boer War, while the Industrial Period is represented by a historical railway bridge. In general the Industrial Period of the greater area started around the 1850s with the large scale discovery of minerals in the area, including copper, with a narrow gauge railway in operation from 1876 carrying copper to Port Nolloth (http://en.wikipedia.org/wiki/Okiep), followed by the 1866 discovery of diamonds (near Hopetown), which in the years to follow changed the cultural landscape from a low keyed Colonial Period farming and missionary landscape to a full-fledged developing industrial hub (http://en.wikipedia.org/wiki/Diamond_Fields). In 1922 manganese and soon thereafter rich iron ore deposits were discovered near Sishen; an electrified railway was built in 1930 to convey ore to the main line north of Kimberley and another built in 1974 to link the mines directly to Saldanha Bay (http://www.eisha.co.za). Remains of the Industrial Period is well represented in archaeological CRM documentation, including documented mining complexes and records of old mines, associated mining camps and cemeteries (Birkholtz 2014; Gaigher 2014; Pelser & Van Vollenhoven 2009; Van Vollenhoven 2014a).

Grave and cemetery sites dominate archaeological CRM reports, also with reference to recommendations for development: Dreyer (2007) recorded 2 previously unknown cemeteries. Fourie (2011, 2012a, 2012b) recorded a number of cemeteries with additional stone cairn records interpreted as possible graves. Henderson (2005) recorded the Five Mission graveyard and an additional grave at Lime Acres. Hutton & Hutton (2013) documented 2 cemeteries and 3 possible graves with Hutton (2014) reporting on cemeteries associated with Colonial Period farmsteads as well as informal cemeteries most probably ascribable to the LIA. Van Vollenhoven (2014b) reported on a cemetery from the Ulco area and 3 stone cairns are interpreted as graves by Webley (2010).
2.3.1) Field Assessment Results

The proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development is twofold in nature:
1. Realignment (app. 5km) of the power line running through the Metsimatala 150MW CSP Solar Energy Facility study site, with 2 options investigated for realignment:
   o Realignment Option A, the preferred option runs north-east around the approximate 500ha Metsimatala 150MW CSP Solar Energy Facility study site, from S28°16’21.9”; E23°16’45.4” in the north-west to S28°17’27.1”; E23°18’23.5” in the south-east, on the property Groenwater No 453.
   o Realignment Option B, the alternative option runs south-west around the Metsimatala site, from S28°16’39.8”; E23°17’11.2” in the north-west to S28°17’44.5”; E23°18’48.6” in the south-east, on the property Groenwater No 453.
2. Construction of a new power line (app. 25-30km) from the Metsimatala 150MW CSP Solar Energy Facility to the Manganoor Substation near Postmasburg, with 2 options investigated for construction:
   o Power Line Option A, the preferred option and northern proposed power line alignment, runs from the Metsimatala substation, Groenwater No 453 (S28°17’00.6”; E23°17’47.5”) to the Manganoor substation, Kapstewel No 436 (S28°07’51.7”; E23°06’12.4”), traversing various portions of the properties Groenwater No 453, Plaas No 589, Plaas No 588, Plaas No 437 and Kapstewel No 436.
   o Power Line Option B, the alternative option and southern proposed power line alignment again runs from the Metsimatala substation on Groenwater No 453 to the Manganoor substation on Kapstewel No 436 and traversing portions of the properties Groenwater No 453, Plaas No 589, Plaas No 588, Plaas No 437 and Kapstewel No 436.

2.3.1.1) Stone Age:

The general terrain of the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development area is typified by a low density of Middle (MSA) and Later Stone Age (LSA) surface lithic artefacts. Artefacts were found widespread across the terrain, but artefact ratios (artefacts: m²) remained notably low, with densities in general too low to be recorded and averaging ≤1-5:1 across the total of the study site, but varying densities, including areas with higher and lower ratios were present. No significant, mitigatory worthy clusters, occurrences or site areas were identified. Artefacts are produced from a wide array of raw material sources, including amongst others hornfels (baked shale), granite, dolerite, jasperlite, banded ironstone and various siliceous materials. Road sections and large scale on-going road works in the general area provided the primary exposed sections for subsurface interpretation: It is evident that low densities of surface artefacts are (at least in cases) associated with significant sub-surface archaeological components. Road section inspection yielded lithic anthropogenic sub-surface components of up to 70cm in depth, generally associated with gravel members present in the Hutton sands, while fairly significant numbers of artefacts were identified in earth works sections and dump mounds associated with current road construction activities.

It can reasonably be concluded that construction of the proposed power lines, be it Power Line Option A or B or Realignment Option A or B, will impact on the identified low density MSA and LSA lithic deposits on the landscape. However, with reference to development impact (pylon construction and associated access roads), associated with the widespread Stone Age presence across the greater terrain and in absence of any identified significant cluster, occurrence or site area, it is recommended that development of the approved power lines proceed without the developer having to comply with additional heritage compliance requirements pertaining to lithic Stone Age deposits, such as Phase 2 mitigation, prior to construction impact.
2.3.1.2) **Rock Art:**

No LSA rock art engraving or petroglyph sites were encountered during the course of the field assessment. Petroglyphs may however well be present, more so in rocky and hilly terrain. Should any rock engravings be encountered during the course of development SAHRA should be immediately notified and an archaeological site inspection, including recording of the site be commissioned. The site should be temporarily conserved (construction netting with temporary signage indicating the area as a ‘No Entry – Heritage Site’ zone). The developer should ensure that pylon construction or access road development do not impact within 10m from the site.

[Early research by Gerhard Focke, McGregor Museum, identified a number of rock art engraving sites, primarily to the east of the Ghaap Plateau, with the area immediately east of Postmasburg largely devoid of recorded sites. However, early research recording did not accommodate georeferenced site records to be integrated with current standards of site recording.]

*Map 5: Rock art engraving sites mapped by Gideon and Dora Focke (Hutton & Hutton 2013, after Parkington et. al. 2008)*
Plate 1: Examples of Stone Age lithic artefacts from the Metsimatala power lines terrain [1]

Plate 2: Examples of Stone Age lithic artefacts from the Metsimatala power lines terrain [2]

Plate 3: An exposed gravel component containing lithic artefacts in the Hutton sand section of a road cutting

Plate 4: Stone Age lithic artefacts present in scraped dumps of ongoing road works
Plate 5: Close-up of gravel containing artefacts in scraped dumps of ongoing road works

Plate 6: In-situ Stone Age lithic artefacts from the Metsimatala power lines terrain [1]

Plate 7: In-situ Stone Age lithic artefacts from the Metsimatala power lines terrain [2]

Plate 8: Example of a Rock Art petroglyph from the Wildebeest Kuit site, near Kimberley
2.3.1.3) Identified Heritage Sites:

Three new archaeological and cultural heritage resources, as defined and protected by the NHRA 1999, were identified during the field assessment for the Metsimatala 150MW CSP Solar Energy Facility – Power Lines development, namely Sites MPL1, MPL2 and MPL3. In addition four archaeological and cultural heritage resources reported on in former survey reports are situated in proximity to the proposed line routes (Sites MVIA3, HH-PL1, HH-PL2 and G-S1). None of sites will be directly impacted by development. Relevant recommendations are made where development would need to meet additional conservation requirements during the construction phase.

- Van Ryneveld (2012) recorded thirty-two archaeological and cultural heritage resources situated on the property Groenwater No 453, including sites previously reported on by Becker (2011). Of the identified resources only one site, Site MVIA3, is situated in direct proximity to the proposed Realignment Option A alignment, and within the 150m assessment corridor.
- Twenty-three archaeological and cultural heritage resources were identified by Hutton & Hutton (2013) on the Department of Defence (DoD) owned, now mining restricted areas Farm 1/438 and Farm RE/588, with the study site primarily demarcating the northern boundary to the Power Line Option A alignment (with the power line aligned parallel to an existing power line route for the major part thereof). Identified sites were labelled Sites HH-PL1 to HH-PL26. Assessment results included the recording and description of a number of farming infrastructure such as wind pumps and dams. Stone Age artefacts and artefact clusters were also reported on independently. Of the identified sites the old Swartmodder farmsteads (Sites HH-PL1 and HH-PL2) are situated in proximity to the 150m assessment corridor of the proposed Power Line Option B line route. The close-by recorded Site HH-PL3 comprises a calcrete quarry and not a heritage site.
- The mining restricted property Kapstewel No 436 was not accessible; four heritage reports have been done on the property including the systematic surveys by Pelser & Van Vollenhoven (2009) and Gaigher (2014), with more limited assessments done by Rossouw (undated) and Van Vollenhoven (2014b). Gaigher (2014) includes a summary of sites identified by Pelser & Van Vollenhoven (2009) on Kapstewel No 436, and including his 2014 assessment results totalling 8 identified and reported on sites on the property. Sites reported on by Gaigher (2014) are labelled Sites G-S1 to G-S8, with site G-S1 being the only site of indirect relevance to the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development. No sites were identified by Rossouw (undated) for the Sebideng Mine power line, restricted to the property Kapstewel No 436. Van Vollenhoven (2014b) identified 3 sites on the property Kapstewel No 436, labelled Sites VV-S1 to VV-S3, with Site VV-S1 corresponding to Site G-S6&7 and Site VV-S2 to Site G-S8. None of the Van Vollenhoven (2014b) recorded sites are situated in proximity to the approximate 150m assessment corridor for the Metsimatala power lines.

2.3.1.3.1) Site MVIA3: Later Iron Age / Contemporary – Cemetery: S28°16’45.3’’; E23°18’26.0’’

Site MVIA3 was first identified and described by Van Ryneveld (2012, 2016) and comprises a Later Iron Age / contemporary cemetery situated at the northern extremity of Metsimatala Village, adjacent to the proposed Metsimatala 150MW CSP Solar Energy Facility study site and along the Realignment Option A route. Graves at the site are stylistically divided, with primarily traditional style stone cairn graves characterising the northern part of the cemetery and modern style graves mixed with traditional stone cairn graves characterising the southern part thereof. The older, more traditional part of the cemetery is associated with burial relating to Old Metsimatala Village (Site MVIA2). After reoccupation of Groenwater by the community in the 1990s it was decided to continue use of the cemetery rather than to establish a new cemetery (Pers. Comm. Obemang Kgoronyane – CPA member, 2012): The cemetery contains a 150+ graves and is an operational cemetery, serving the Metsimatala community. The cemetery is fenced on 3 sides; east, south and west, but without a fence to its northern side.

- Site Significance & Recommendations: Site MVIA3 is ascribed a SAHRA High / Medium Significance and a Generally Protected IV-A Field Rating. The site will not be impacted by development, but is situated within the approximate 150m assessment corridor. It is recommended that the developer ensures formal conservation of the site prior to any impact, including that the site be formally fenced (including upgrading of the existing fence where necessary).
on all sides with an access gate allowing vehicular access thereto (as recommended by Van Ryneveld 2016). In addition the developer should ensure that pylon construction do not impact within 15m from the site conservation fence.

2.3.1.3.2) Site MPL1: Later Iron Age / Colonial Period – Cemetery: S28°11'26.1"; E23°16'03.1"

Site MPL1 comprises a Later Iron Age / Colonial Period informal cemetery of approximately 40-50 stone cairn graves. The site is quite overgrown, with vegetation having negatively impacted on many of the graves. The site is believed to be an old mining camp cemetery, dating back to the years when asbestos was mined on the Ghaap (late 1800's / early 1900s), but remains of an associated old camp have not been identified (Pers. Comm.: Hans Matthia). The cemetery is situated approximately 2km from the proposed Power Line Option A line route and reported on in this report because it is a newly recorded site. The site will not be impacted by development.

- **Site Significance & Recommendations:** Site MPL1 is ascribed a SAHRA High / Medium Significance and a Generally Protected IV-A Field Rating. The site is situated roughly 2km from the proposed Power Line Option A line route and will not be impacted by development. Additional conservation measures for purposes of development would not be necessary.

2.3.1.3.3) Site MPL2: Colonial Period – Farmstead: S28°09'34.1"; E23°12'52.6"

The Colonial Period Moedhou farmstead, comprising the old farmhouse, associated outbuildings and related farming infrastructure, is older than 60 years of age and formerly protected by the NHRA 19999. The farmstead is situated adjacent to the existing power line and approximately 200m from proposed Power Line Option A. The farmstead will not be impacted by development.

- **Site Significance & Recommendations:** The Site MPL2 Colonial Period Moedhou farmstead comprises a number of structures pre-dating 60 years of age and is formerly protected by the NHRA 1999. The site receives automatic SAHRA protection as a site of High Significance with a Provincial Grade II Field Rating. The site is situated approximately 200m from proposed Power Line Option A and outside the 150m assessment corridor. The site will not be impacted by development. No additional conservation measures for purposes of development would be necessary.

2.3.1.3.4) Site MPL3: Colonial Period – Cemetery: S28°09'23.4"; E23°12'40.3"

The Site MPL3 cemetery constitutes the Moedhou farmstead cemetery, containing both old and more contemporary graves. The cemetery is formally fenced with an access gate, with current site conservation measures meeting SAHRA Minimum Standards for site conservation, and inferred to be the result of heritage compliance for the existing power line. Proposed Power Line Option A pass approximately 20m from the conservation fence.

- **Site Significance & Recommendations:** Site MPL3 is ascribed a SAHRA High / Medium Significance and a Generally Protected IV-A Field Rating. Current site conservation measures, a permanent fence with access gate, meet SAHRA Minimum Standards for site conservation. The site is situated within the approximate 150m assessment corridor with proposed Power Line Option A passing roughly 20m from the conservation fence. No additional conservation measures are necessary prior to development impact, but the developer should ensure that pylon construction do not impact within 15m from the site conservation fence.
2.3.1.3.5) Site HH-PL1: Colonial Period – Farmstead: S28°09’28.0”; E23°09’10.8”

Site HH-PL1, the first of the Colonial Period Swartmodder farmsteads was first identified and reported on by Hutton & Hutton (2013) and described as: ‘The dilapidated remains of a farmhouse and its associated outbuildings were identified at this location. The house and outbuildings were constructed using unbaked clay bricks with corrugated iron roof covering. The current state of the house and outbuildings are severely dilapidated beyond repair and consist of various rooms, a kitchen and a large stoep. The house and some outbuildings are currently occupied by an unknown number of people. A large dilapidated round cement dam and associated wind pump is situated in close proximity to the house. The occupants of the house wished not to have photographs of the house taken from close range.’ The Site HH-PL1 Colonial Period Swartmodder farmstead, comprising the farmhouse, outbuildings and associated farming infrastructure, is older than 60 years and formally protected by the NHRA 1999. The site is as described by Hutton & Hutton (2013) in a fairly poor state of conservation, but currently still in use. Farmworkers reported that no graves are known from the area, associated with the farmstead or immediate surrounds. The farmstead is situated approximately 150m from the proposed Power Line Option B alignment.

- **Site Significance & Recommendations:** The Site HH-PL1 Colonial Period Swartmodder farmstead comprises a number of structures pre-dating 60 years of age; the site is by implication formally protected by the NHRA 1999. The site receives automatic SAHRA protection as a site of High Significance with a Provincial Grade II Field Rating. The site is situated roughly 150m from proposed Power Line Option B. The site, an operational farmstead, is deemed situated at a safe distance from the alignment. No additional conservation measures for purposes of development would be necessary.

2.3.1.3.6) Site HH-PL2: Colonial Period – Farmstead: S28°09’37.2”; E23°09’12.5”

Site HH-PL2, the second of the Colonial Period Swartmodder farmsteads, first identified and reported on by Hutton & Hutton (2013) was described as: ‘The dilapidated remains of a farmhouse and its associated outbuildings were identified at this location. The house and outbuildings were constructed using unbaked clay bricks. The roof covering and all window and door frames are removed. No flooring or other features belonging to the structure remained. The current state of the house and outbuildings are severely dilapidated beyond repair and consist of various rooms and a large stoep. A large dilapidated round cement dam and associated wind pump is situated in close proximity to the house.’ The Site HH-PL2 Swartmodder farmstead, comprising the remains of the old farmhouse, outbuildings and associated farming infrastructure is inferred to represent the first, or earliest of the Swartmodder farmsteads, with the unbaked clay brick structures beyond repair or restoration potential as reported on. The site is situated more than 300m from the proposed Power Line Option B alignment and will not be impacted by development.

- **Site Significance & Recommendations:** The Site HH-PL2 Colonial Period Swartmodder farmstead comprises a number of structures pre-dating 60 years of age and is formally protected by the NHRA 1999. The site receives automatic SAHRA protection as a site of High Significance with a Provincial Grade II Field Rating. The site is situated more than 300m from proposed Power Line Option B. The site will not be impacted by development. No additional conservation measures for purposes of development would be necessary.

2.3.1.3.7) Site G-S1: Colonial Period / Contemporary – Mining Complex: S28°07’57.6”; E23°07’06.7”

Site G-S1 is reported on as described by Gaigher (2014) as having first been identified by Pelser & Van Vollenhoven (2009) and described as: ‘This site contains the remains of an old Mining Complex. There are various prospecting trenches, mine buildings and an ore crushing facility. Scrap metals, building rubble and old vehicle parts scatter the area. The site is probably less than 60 years of age and is deemed of low significance. The documentation (recording and photographs taken) done during the survey is seen as sufficient mitigation measures...’
Site G-S1, situated on the mining restricted property Kapstewel No 436, was not revisit during the field assessment for the Metsimatala 150MW CSP Solar Energy Facility – Power Lines development.

- **Site Significance & Recommendations**: Site G-S1 is ascribed a SAHRA Low Significance and a Generally Protected IV-C Field Rating (after Gaigher 2014 and Pelser & Van Vollenhoven 2009). The site is situated approximately 180m to the south of the proposed Power Line Option A and Option B alignments and will not be impacted by development. It is recommended that either of the proposed power line alignments be implemented without the developer having to comply with additional heritage compliance requirements relating to Site G-S1.

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**Map 6**: Map of all recorded archaeological and cultural heritage sites (Gaigher 2014; Hutton & Hutton 2013; Pelser & van Vollenhoven 2009, Van Ryneveld 2012; Van Vollenhoven 2014b) including results of the field assessment in relation to the proposed Metsimatala realignment and power line options.
Map 7: Results of the field assessment indicating the localities of the 7 archaeological and cultural heritage resources in proximity to the proposed Metsimatala realignment and power line options.
Phase 1 Archaeological & Cultural Heritage Impact Assessment –
Metsimatala 150MW CSP Solar Energy Facility – Power Lines, (near Postmasburg), Siyanda District Municipality, Northern Cape

Plate 9: View of Site MVIA3 (van Ryneveld 2016)

Plate 10: View of Site MVIA3 (van Ryneveld 2016)

Plate 11: Selected graves from Site MPL1[1]

Plate 12: Selected graves from Site MPL1[2]
Plate 13: Selected graves from Site MPL1

Plate 14: General view of Site MPL2

Plate 15: View of the formally conserved Site MPL3 cemetery

Plate 16: General view of Site HH-PL1
Plate 17: General view of Site HH-PL2

Plate 18: View of the Site HH-PL2 old farmhouse

Plate 19: Interior of the Site HH-PL2 old farmhouse (Hutton & Hutton 2013)

Plate 20: View of Site G-S1 (Gaigher 2014)
2.3.2) Conclusion

Seven archaeological and cultural heritage sites are situated within, or in proximity to the approximate 150m assessment corridor of the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines study site. Of the identified sites three constitute cemetery sites, two of which, Site MVIA3 and MPL3, are located within the assessment corridor. Site MPL1, a newly identified cemetery is situated more than 2km from the proposed Power Line Option A alignment. Three sites are classed as Colonial Period farmstead sites, namely Sites MPL2, HH-PL1 and HH-PL2. All identified Colonial Period farmsteads are situated in proximity to the assessment corridor only; none of the sites will be impacted by development. Site G-S1, a Colonial Period / contemporary mining complex, is also situated in proximity to the assessment corridor only and will not be impacted by development.

The two cemetery sites situated within the assessment corridor (Sites MVIA3 and MPL3) need to be conserved: Formal conservation of Site MVIA3 is recommended, while formal conservation measures are already in place at Site MPL3 – inferred to be the result of heritage compliance relating to construction of the exiting power line. [The identification of three cemetery sites during the field assessment, cautions against the possibility that poorly demarcated or unmarked graves may be discovered during the course of construction.]

- **Realignment**: Site MVIA3 is situated along proposed Realignment Option A. Recommended conservation measures should suffice for purposes of development. However, from an archaeological and cultural heritage perspective it is recommended that development follows Realignment Option B, with no heritage resources identified along the alignment.

- **Power Line**: Site MPL3 is situated along Power Line Option A. Permanent conservation measures, complying with SAHRA Minimum Standards for site conservation are already in place, inferred to be the result of heritage compliance relating to development of the existing power line. From an archaeological and cultural heritage perspective neither of the power line options, Power Line Option A or Power Line Option B, poses a threat to identified sites.
Plate 21: Realignment Option A: General view of the line route [1]

Plate 22: Realignment Option A: General view of the line route [2]

Plate 23: Realignment Option B: General view of the line route [1]

Plate 24: Realignment Option B: General view of the line route [2]
Phase 1 Archaeological & Cultural Heritage Impact Assessment – Metsimatala 150MW CSP Solar Energy Facility – Power Lines, (near Postmasburg), Siyanda District Municipality, Northern Cape

Plate 25: Power Line Option A: view from Groenwater towards the Ghaap plateau

Plate 26: Power Line Option A: General view along portions of Plaas 589

Plate 27: Power Line Option A: General view across the portion of Plaas 588

Plate 28: Power Line Option A: General view towards the restricted Kapstewel property
Plate 29: Power Line Option B: View of the line route in the vicinity of the Groenwater crossing station

Plate 30: Power Line Option B: View of the line route near the Jenn Haven settlement

Plate 31: Power Line Option B: General view along portions of Plaas 589

Plate 32: Power Line Option B: View from Plaas 588 across to Plaas 437
Identified archaeological and cultural heritage sites are ascribed an Environmental Impact Assessment (EIA) rating (in accordance with NEMA 1998, Regulations 2014), based on the extent or spatial scale of the impact \( E \) (0 = None, 1 = Site specific, 2 = Local, 3 = Regional, 4 = National and 5 = International), the magnitude of the impact, positive or negative \( M+ \) / \( M- \) (0 = Zero, 2 = Very low, 4 = Low, 8 = High and 10 = Very high), the duration of the impact \( D \) (1 = Immediate, 2 = Short term, 3 = Medium term, 4 = Long term and 5 = Permanent), the probability of the occurrence \( P \) (1 = Improbable, 2 = Low probability, 3 = Medium probability, 4 = High probability and 5 = Definite), the irrereplaceable loss of resources \( I \) (0 = None; 1 = Very low, 2 = Low, 3 = Moderate, 4 = High, 5 = Definite), the reversibility of potential impacts \( R \) (0 = No impact, 1 = Impact will be reversible; 2 = High potential for reversibility; 3 = Moderate potential for reversibility; 4 = Low potential for reversibility; 5 = Impact cannot be reversed) and cumulative impact (None, Low, Medium and High). A site significance point \([SP]\) is assigned as follows:

- \( SP = (M + D + E + I + R) \times P \).

A maximum of 150 SP can be assigned to an impact. Environmental Significance \([S]\) is assigned based on the SP as follows:

- \( S \geq 40 \) = Low \([L]\);
- \( 40-74 \) = Medium \([M]\);
- \( 75-99 \) = Medium-High \([MH]\);
- \( 100-124 \) = High \([H]\); and
- \( 125-150 \) = Very High \([H+]\).

The significance can be either positive \([+]\) or negative \([-\). An impact of low \([L]\) is likely to contribute to either + or decisions about whether or not to proceed with the development, with little real effect and is unlikely to have an influence on project design or alternative motivation. An impact of M implies that if unmanaged could influence a decision on whether or not to proceed with development. An impact of MH is similar to M, with caution to mitigation options and alternative mitigation options should be investigated where possible. An impact of H could influence a decision about whether or not to proceed with development, regardless of available mitigation options and an impact of VH implies that a project cannot proceed and that impacts are irreversible, regardless of available mitigation options.

Environmental impact assessment ratings are grouped per sites with the same basic recommendation per site type or type of impact, with cognizance to the fact that impacts on heritage sites are as a norm irreversible (heritage sites are non-renewable resources) and with reference to the SAHRA (2007) prescribed mitigation options per site significance rating, weighed against development / possible natural impact.
### Conservation of Cemetery Site(s)

**Sites:** MVIA3, MPL3

<table>
<thead>
<tr>
<th>Environmental Impact</th>
<th>Site Number</th>
<th>Before Mitigation</th>
<th>After mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MD E IR P</td>
<td>M D E IR P</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-4 2 1 3 4 3</td>
<td>-2 1 1 0 2 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SP S C</td>
<td>L S C</td>
</tr>
</tbody>
</table>

**Comment:** Cemetery sites situated within the 150m assessment corridor which will be conserved

**Summary of mitigation points:**
- Site MVIA3: Permanent conservation (permanent fence with access gate); No pylon construction impact within 15m from the conservation fence
- Site MPL3: Permanent conservation measures in place; No pylon construction impact within 15m from the conservation fence

*Table 4: Environmental Impact Assessment Rating – Metsimatala 150MW CSP Solar Energy Facility – Power Lines*
With reference to archaeological and cultural heritage compliance, as per the requirements of the NHRA 1999, it is recommended that the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development, near Postmasburg, Siyanda District Municipality, Northern Cape, proceed as applied for provided the developer comply with the below listed heritage recommendations.

- **Development layout poses no ‘fatal flaws’ –** Consideration of a ‘No-Go’ option is irrelevant.
- **Realignment:** Site MVIA3 is situated along proposed Realignment Option A. Recommended conservation measures should suffice for purposes of development. However, from an archaeological and cultural heritage perspective it is recommended that development follows Realignment Option B, with no heritage resources identified along the alignment.
- **Power Line:** Site MPL3 is situated along Power Line Option A. Permanent conservation measures, complying with SAHRA Minimum Standards for site conservation are already in place, inferred to be the result of heritage compliance relating to development of the existing power line. From an archaeological and cultural heritage perspective neither of the power line options, Power Line Option A or Power Line Option B, poses a threat to identified sites.
- Little to no negative cumulative impact will result from the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA 1999.
- [In the event of any incidental archaeological or cultural heritage resources, as defined and protected by the NHRA 1999, being encountered during the course of development the process described in Appendix C: 'Heritage Protocol for Incidental Finds during the Construction Phase' should be followed.]

### Table 5: Summarized heritage compliance requirements for the proposed Metsimatala 150MW CSP Solar Energy Facility – Power Lines development, near Postmasburg, Siyanda District Municipality, Northern Cape

<table>
<thead>
<tr>
<th>Map Code</th>
<th>Site</th>
<th>Co-ordinates</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S28°06'45.3&quot;; E23°18'26.0&quot;</td>
<td>- Temporary conservation (temporary fence and signage); o No development within 10m from the identified site</td>
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<td></td>
<td></td>
<td>S28°11'26.1&quot;; E23°16'03.1&quot;</td>
<td>N/A (based on distance from the study site)</td>
</tr>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>S28°09'23.4&quot;; E23°12'40.3&quot;</td>
<td>Formal conservation measures in place o No pylon construction impact within 15m from the conservation fence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S28°09'28.0&quot;; E23°09'10.8&quot;</td>
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<tr>
<td></td>
<td></td>
<td>S28°09'37.2&quot;; E23°09'12.5&quot;</td>
<td>N/A (based on distance from the study site)</td>
</tr>
</tbody>
</table>

The SAHRA (APM Unit) HIA Comment will state legal requirements for development to proceed, or reasons why, from a heritage perspective, development may not be further considered.
**Notes:**

- Should any registered Interested & Affected Party (I&AP) wish to be consulted in terms of Section 38(3)(e) of the NHRA 1999 (Socio-cultural consultation / SAHRA SIA) it is recommended that the developer / EAP ensures that the consultation be prioritized within the timeframe of the environmental assessment process.

**Simplified guide to the identification of archaeological sites:**

- **Stone Age** – Knapped stone display flakes that appear unnatural and may result in similar type ‘shaped’ stones often concentrated in clusters or forming a distinct layer in the geological stratigraphy. ESA shapes may represent ‘pear’ or oval shaped stones, often in the region of 10cm in length or larger. Typical MSA types include blade-like or triangular shaped stones often associated with randomly shaped stones that display use or edge-wear around the rim of the artefact. LSA types may well be small, informally shaped stones, often associated with bone, pieces of charcoal and in cases ceramic shards.
  - **Rock Art** – Includes both painted and engraves images.
  - **Shell Middens** – Include compact shell lenses that may be quite extensive in size or small ephemeral scatters of shell food remains, often associated with LSA artefact remains, but may also be of MSA and Iron Age cultural association.

- **Iron Age** – Iron Age sites are often characterized by stone features, i.e. the remains of former livestock enclosures or typical household remains, huts are often identified by either mound or depression hollows. Typical artefacts include ceramic remains, farming equipment, beads and trade goods, metal artefacts (including jewelry) etc. Remains of the ‘Struggle’ – events, histories and landmarks associated therewith are often, based on cultural association, classed as part of the Iron Age heritage of South Africa.

- **Colonial Period** – Built environment remains, either urban or rural, are of a western cultural affiliation with typical artefacts representing early western culture, including typical household remains, trade and manufactured goods, such as old bottles, porcelain and metal artefacts. War memorial remains including the vast array of associated graves and the history of the Industrial Revolution form important parts of South Africa’s Colonial Period heritage.
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>Anno Domini (the year 0.)</td>
</tr>
<tr>
<td>AIA</td>
<td>Archaeological Impact Assessment</td>
</tr>
<tr>
<td>BAR</td>
<td>Basic Assessment Report</td>
</tr>
<tr>
<td>BC</td>
<td>Before the Birth of Christ (the year 0.)</td>
</tr>
<tr>
<td>BCE</td>
<td>Before the Common Era (the year 0.)</td>
</tr>
<tr>
<td>BID</td>
<td>Background Information Document</td>
</tr>
<tr>
<td>BP</td>
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</tr>
<tr>
<td>cm</td>
<td>Centimeter</td>
</tr>
<tr>
<td>CRM</td>
<td>Cultural Resources Management</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
</tr>
<tr>
<td>ECO</td>
<td>Environmental Control Officer</td>
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<tr>
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<td>Environmental Assessment Practitioner</td>
</tr>
<tr>
<td>EIA</td>
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<tr>
<td>EIA₁</td>
<td>Early Iron Age</td>
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<tr>
<td>EMPr</td>
<td>Environmental Management Plan/Program report</td>
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<td>Heritage Impact Assessment</td>
</tr>
<tr>
<td>km</td>
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<tr>
<td>Kya</td>
<td>Thousands of years ago</td>
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<td>LIA</td>
<td>Later Iron Age</td>
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<tr>
<td>m</td>
<td>Meter</td>
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<tr>
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<tr>
<td>mm</td>
<td>Millimeter</td>
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<tr>
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<td>Provincial Heritage Resources Authority</td>
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<td>PPP</td>
<td>Public Participation Process</td>
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<td>SAHRA</td>
<td>South African Heritage Resources Agency</td>
</tr>
<tr>
<td>SAHRIS</td>
<td>South African Heritage Resources Information System</td>
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</table>


Appendix A:

Schematic Outline of the Pre-Colonial and Colonial Periods

<table>
<thead>
<tr>
<th>Date / Period</th>
<th>Hominid / Human Evolution</th>
<th>Broad Outline of Cultural Periods in Southern Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
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<td>Later Iron</td>
</tr>
<tr>
<td>1,500</td>
<td>Holocene</td>
<td>Middle Iron</td>
</tr>
<tr>
<td>200</td>
<td></td>
<td>Early Iron</td>
</tr>
<tr>
<td>0 / AD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12kya</td>
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<td>32kya</td>
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<tr>
<td>193kya</td>
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<td>250kya</td>
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</tr>
<tr>
<td>500kya</td>
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</tr>
<tr>
<td>730kya</td>
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</tr>
<tr>
<td>1Mya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5Mya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7Mya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5Mya</td>
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</tr>
<tr>
<td>4.15Mya</td>
<td></td>
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</tr>
</tbody>
</table>

Far East to the Americas
East Indian Islands to Australia

Pliocene
Lower Pleistocene
Middle Pleistocene
Upper Pleistocene

Far East to the Americas
East Indian Islands to Australia

Human physical & cultural evolution in Africa only
Out of Africa Model
Multi Regional Model

Earlier Stone Age
Middle Stone Age
Later Stone Age

Human *in situ* evolution in Africa

India to Far East & East Indian Islands

1st Diaspora from Africa
• Africa to Near East & Europe

2nd Diaspora from Africa
• Out of Africa Model
• Multi Regional Model

Later Iron Age
Middle Iron Age
Early Iron Age

Colonial Period

Far East to the Americas
East Indian Islands to Australia

1st Diaspora from Africa
• Africa to Near East & Europe

2nd Diaspora from Africa
• Out of Africa Model
• Multi Regional Model

India to Far East & East Indian Islands

Human physical & cultural evolution in Africa only

Australopithecus
Paranthropus

ArchaeoMaps
Introduction to the Archaeology of South Africa

Archaeologically the southern African cultural environment is roughly divided into the Stone Age, the Iron Age and the Colonial Period, including its subsequent Industrial component. This cultural division has a rough temporal association beginning with the Stone Age, followed by the Iron Age and the Colonial Period. The division is based on the identified primary technology used. The hunter-gatherer lifestyle of the Stone Age is identified in the archaeological record through stone being the primary raw material used to produce tools. Iron Age people, known for their skill to work iron and other metal, also practiced agriculture and animal husbandry. Kingdoms and civilizations associated with the Iron Age are indicative of a complex social hierarchy. The Colonial Period is marked by the advent of writing, in southern Africa primarily associated with the first European travelers (Mitchell 2002).

During the latter part of the Later Stone Age (LSA) hunter-gatherers shared their cultural landscape with both pastoralists and Iron Age people, while the advent of the Colonial Period in South Africa is marked by a complex cultural mosaic of people; including LSA hunter-gatherers, pastoralists, Later Iron Age farming communities and Colonial occupation.

1) Early Hominin Evolution

DNA studies indicate that humans and chimpanzees shared a common ancestor between 6-8Mya (Sibley & Ahlquist 1984). By 4Mya, based on fossil evidence from Ethiopia and Kenya, hominins (humans and their immediate fossil ancestors and relatives) had already evolved. The earliest fossils are ascribed to Ardipithecus ramidus (4.4Mya), succeeded by Australopithecus anamensis (4.2-3.9Mya). These fossils are inferred to lie at the base from which all other hominins evolved (Leakey et al. 1995; White et al. 1996).

In South Africa the later hominins are classed into 3 groups or distinct genera; Australopithecus (gracile australopithecines), Paranthropus (robust australopithecines) and Homo. South Africa has 3 major hominin sites: Taung in the North-West Province, where Raymond Dart identified the first Australopithecus fossil in 1924 (Dart 1925); The Cradle of Humankind (Sterkfontein Valley) sites in Gauteng, the most prolific hominin locality in the world for the period dating 3-5-1.5Mya which have yielded numerous Australopithecus, Paranthropus and limited Homo fossils (Keyser et al. 2000; Tobias 2000); and Makapansgat in the Limpopo Province, where several more specimens believed to be older than most of the Cradle specimens were discovered (Klein 1999).

A. africanaus, represented at all 3 sites are believed to have been present on the South African landscape from about 3Mya. From approximately 2.8Mya they shared, at least in the Cradle area, the landscape with P. robustus and from roughly 1.3Mya with early forms of Homo (Clarke 1999). Global climatic cooling around 2.5Mya may have stimulated a burst of species turnover amongst hominins (Vrba 1992); the approximate contemporary appearance of the first stone tools suggests that this was a critical stage in human evolution. But exactly which early hominin population is to be accredited as the ancestor of Homo remains elusive.

H. erectus is present in the African palaeo-anthropological record from around 1.8Mya and shortly thereafter the first exodus from Africa is evidenced by H. erectus specimens from China, Indonesia and even Europe (Klein 1999).

2) The Stone Age

2.1) The Earlier Stone Age

In South Africa the only Earlier Stone Age (ESA) Oldowan lithic assemblage comes from Sterkfontein Cave. The predominant quartz assemblage is technologically very simple, highly informal and inferred to comprise exclusively of multi-purpose tools (Kuman et al. 1997). The latter part of the ESA is characterized by the Acheulean Industrial Complex, present in the archaeological record from at least 1.5Mya. Both H. erectus and P. robustus may be accredited with the production of these tools. The association between stone tools and increased access to meat and marrow supporting the greater dietary breath of Homo may have been vital to Homo’s evolutionary success; and the eventual extinction of the robust australopithecines (Klein 1999).

Probably the longest lasting artefact tradition ever created by hominins, the Acheulean is found from Cape Town to north-western Europe and India, occurring widely in South Africa. Despite the many sites it is still considered a ‘prehistoric dark age’ by many archaeologists, encompassing one of the most critical periods in human evolution; the transition from H. erectus to archaic forms of H. sapiens (Klein 1999).

The Acheulean industry is characterized by handaxes and cleavers as fosilles directeurs (signatory artefact types), in association with cores and flakes. Handaxes and cleavers were multi-purpose tools used to work both meat and plant matter (Binneman & Beaumont 1992). Later Acheulean flaking techniques involved a degree of core preparation that allowed a single large flake of predetermined shape and size to be produced. This Victoria West technique indicates an origin within the Acheulean for the Levallois technique of the Middle Stone Age (Noble & Davidson 1966). The lithic artefact component was supplemented by wood and other organic material (Deacon 1970).

2.2) The Middle Stone Age

The Middle Stone Age (MSA), dating from approximately 500kya to 40-22/23kya is interpreted as an intermediate technology between the Acheulean and the Later Stone Age (LSA) (Goodwin & van Riet Lowe 1929). The MSA is typologically characterized by the absence of handaxes and cleavers, the use of prepared core techniques and the production of blades, triangular and convergent flakes, with convergent dorsal scars and faceted striking platforms, often produced by means of the Levallois technique (Volman 1984). The widespread occurrence of MSA technology across Africa and its spread into much of Eurasia...
in Oxygen Isotope Stage (OIS) 7 is viewed as part of a process of population dispersal associated with both the ancestors of the later Neanderthals in Europe and anatomically modern humans in Africa (Foley & Lahr 1997).

After the riches offered by the Cradle sites and Makapansgat, southern Africa’s Middle Pleistocene fossil record is comparatively poor. Early Middle Pleistocene fossil evidence suggests an archaic appearance and fossils are often assigned to H. heidelbergensis and H. sapiens rhodesiensis (Rightmire 1976). Modern looking remains, primarily from Border Cave (KwaZulu-Natal) and Klasies River Mouth (Eastern Cape) raised the possibility that anatomically modern humans had, by 120kya, originated south of the Sahara before spreading to other parts of the world (Brauer 1985; Stringer 1985). Subsequent studies of modern DNA indicated that African populations are genetically more diverse and probably older than those elsewhere (Cann et al. 1994). Combined, the fossil and genetic evidence underpins the so-called Out of Africa 2 model (arguing that gene flow and natural selection led regional hominin populations along distinct evolutionary trajectories after Homo’s expansion from Africa in the Lower Pleistocene Out of Africa 1 model) of modern human origins and the continuing debate as to whether it should be preferred to its Multiregional alternative (arguing that modern humans evolved more or less simultaneously right across the Old World) (Mellars & Stringer 1989; Aitken et al. 1999; Nitecki & Nitecki 1999).

Persuasive evidence of ritual activity or bodily decoration is evidenced by the widespread presence of red ochre at particularly MSA 2 sites (after Volman’s 1984 MSA 1-4 model; Henshilwood & Sealy 1997), while evidence from Lion Cave, Swaziland, indicates that specularite may have been mined as early as 100kya (Beaumont 1973). Evidence for symbolic behavioral activity is largely absent; no evidence for rock art or formal burial practices exists.

2.3) The Later Stone Age

Artifacts characteristic of the Later Stone Age (LSA) appear in the archaeological record from 40/27-23kya and incorporates microlithic as well as macro lithic assemblages. Artifacts were produced by the Later Stone Age hunter-gatherers and pastoralists, who subsisted on a hunter-gatherer way of life (Deacon 1984; Mitchell 2002).

According to Deacon (1984) the LSA can temporally be divided into 4 broad units directly associated with climatic, technological and subsistence changes:

1. Late Pleistocene microlithic assemblages (40-12kya);
2. Terminal Pleistocene / early Holocene non-microlithic assemblages (12-8kya);
3. Holocene microlithic assemblages (8kya to the Historic Period); and
4. Holocene assemblages with pottery (5kya to the Historic Period) closely associated with the influx of pastoralist communities into South Africa (Mitchell 2002).

Elements of material culture characteristic of the LSA reflect modern behavior. Deacon (1984) summarizes these as:

1. Symbolic and representational art (paintings and engravings);
2. Items of personal adornment such as decorated ostrich eggshell, decorated bone tools and beads, pendants and amulets of ostrich eggshell, marine and freshwater shells;
3. Specialized hunting and fishing equipment in the form of bows and arrows, fish hooks and sinkers;
4. A greater variety of specialized tools including bone needles and awls and bone skinning tools;
5. Specialized food gathering tools and containers such as bored stone digging stick weights, carrying bags of leather and netting, ostrich eggshell water containers, tortoise shell bowls and scoops and later pottery and stone bowls;
6. Formal burial of the dead in graves (sometimes covered with painted stones or grindstones and accompanied by grave goods);
7. The miniaturization of specialized tools linked to the practice of hafting for composite tools production;
8. A characteristic range of specialized tools designed for making some of the items listed above.

- **Rock Art**

Rock Art is one of the most visible and informative components of South Africa’s archaeological record. Research into LSA ethnography (as KhoiSan history) has revolutionized our understanding of both painted and engraved (petroglyph) images, resulting in a paradigm shift in Stone Age archaeology (Deacon & Dowson 2001). Paintings are concentrated in the Drakensberg / Maluti mountains, the eastern Free State, the Cape Fold Mountains, the Waterberg Plateau and the Soutpansberg mountains. Engravings on the other hand are found throughout the Karoo, the western Free State and North-West Province (Mitchell 2002). Both forms of LSA art drew upon a common stock of motifs, derived from widely shared beliefs and include a restricted range of naturalistically depicted animals, geometric imagery, human body postures and non-realistic combinations of human and animal figures (anthropomorphic figurines). LSA Rock Art is closely associated with spiritual or magical significance (Lewis-Williams & Dowson 1999).

Aside from LSA or KhoiSan Rock Art, thus art produced by both hunter-gatherer and pastoralist and agro-pastoralist groups, Rock Art produced by Iron Age populations are known be present towards the north of the country.

- **Shell Middens (‘Strandloper’ Cultures)**

South Africa’s nearly 3,000km coastline is dotted by thousands of shell middens, situated between the high water mark and approximately 5km inland, bearing witness to long-term exploitation of shellfish mainly over the past 12,000 years. These LSA shell middens are easily distinguishable from natural accumulations of shells and deposits can include bones of animals eaten such as shellfish, turtles and seabirds, crustaceans like crabs and crayfish and marine mammal remains of seals, dolphins and occasionally whales. Artefacts and hearth and cooking remains are often found in shell midden deposits. Evidence exist that fish were speared, collected by hand, reed baskets and by means of stone fish traps in tidal pools (Mitchell 2002).

Shell midden remains were in the past erroneously assigned to ‘Strandloper cultures’. Deacon & Deacon (1999) explain that “no biological or cultural group had exclusive rights to coastal resources.” Some LSA groups visited the coast periodically while others stayed year round and it is misleading to call them all by the same name. Two primary sources of archaeological enquiry serves to shed more light on the lifestyles of people who accumulated shell middens, one being the
analysis of food remains in the middens itself and the other being the analysis of LSA human skeletal remains of people buried either in shell middens or within reasonable proximity to the coast.

Shell middens vary in character ranging from large sites tens of meters in extent and with considerable depositional depth to fairly small ephemeral collections, easily exposed and destroyed by shifting dune action. Shell middens are also found inland, along rivers where fresh water mussels occur. These middens are often fairly small and less common in the Eastern Cape often dated to within the past 3,000 years (Deacon & Deacon 1999).

In addition shell middens are not exclusively assigned to LSA cultures; shellfish were exploited during the Last Interglacial, indicating that the practice was most probably continuous for the past 120,000 years (MSA shell middens). Along the coast of KwaZulu Natal evidence exist for the exploitation of marine food resources by Iron Age communities. These shell middens are easily distinguished from Stone Age middens by particularly rich, often decorated ceramic artefact content. Colonial Period shell middens are quite rare and extremely ephemeral in character; primarily the result of European shipwreck survivors and reported on along the coast of KwaZulu-Natal and the Transkei, Eastern Cape.

3) The Iron Age

For close to 2 millennia people combining cereal agriculture with stock keeping have occupied most of southern Africa’s summer rainfall zone. The rapid spread of farming, distinctive ceramics and metallurgy is understood as the expansion of a Bantu-speaking population, in archaeological terms referred to as the Iron Age.

3.1) The Early Iron Age

Ceramic typology is central to current discussions of the expansion of iron using farming communities. The most widely used approach is that of Huffman (1980), who employs a multidimensional analysis (vessel profile, decoration layout and motif) to reconstruct different ceramic types. Huffman (1998) argues that ceramics can be used to trace the movements of people, though not necessarily of specific social or political groupings. Huffman’s Urewe Tradition coincides largely with Phillipson’s (1977) Eastern Stream. A combined Urewe Tradition / Eastern Stream model for the Early Iron Age can be summarized as:

1. The Kivale branch (extending along the coast from Kenya to KwaZulu-Natal);
2. The Nkope branch (located inland and reaching from southern Tanzania through Malawi and eastern Zambia into Zimbabwe); and
3. The Kalundu branch (stretching from Angola through western Zambia, Botswana and Zimbabwe into South Africa).

In southern Africa, recent work distinguishes two phases of the Kivale branch: The earlier Silver Leaves facies (250-430AD) occurring as far south as the Northern Province. The later expression or Moziani facies (420-580AD) occurs in the Northern Province as well as along the KwaZulu-Natal coastal belt (Huffman 1998). Since the Silver Leaves facies is only slightly younger than the Kivale type site in Kenya, very rapid movement along the coast, perhaps partly by boat, is inferred (Klapwijk 1994). Subsequently (550-650AD) people making Moziani derived ceramics settled more widely in the interior of South Africa.

Assemblages attributable to the Nkope branch appear south of the Zambezi but north of South Africa from the 5th Century. Ziva represents an early facies, with Gokomere deriving jointly from Ziva and Bambata. A subsequent phase is represented by the Zhizo facies of the Shashe-Limpopo basin, and by Taulkome (Huffman 1994). Related sites occur in the Kruger National Park (Meyer 1988). Zhizo (7th – 10th Century) is ancestral to the Toutswe tradition which persisted in eastern Botswana into the 13th Century.

Kalundu origins need further investigation; its subsequent development is however better understood. A post-Bambata phase is represented by the 5th – 7th Century sites of Happy Rest, Klein Africa and Maunatlana in the Northern Province and M Kumalanga (Prinsloo 1974, 1989). Later phases are present at the Lydenburg Heads site (Whitelaw & Moon 1996) and by the succession of Azuluzi, Ndondowane and Ntshekane in KwaZulu-Natal (7th – 10th Centuries) (Prins & Grainger 1999). Later Kalundu facies include Klingbeil and Eiland in the northern part of the country (Evers 1980) with Kgopolwe being a lowveld variant in M Kumalanga (10th – 12th Century). Broadhurst and other sites indicate a still later survival in Botswana (Campbell 1991).

Despite the importance accorded to iron agricultural implements in expanding the spread of farming and frequent finds of production debris, metal objects are rare. Metal techniques were simple, with no particular sign of casting, wire drawing or hot working. Jewelry (bangles, beads, pendants etc.) constitute by far the largest number of finds but arrows, adzes, chisels, points and spatulae are known (Miller 1996).

Early Iron Age people were limited to the Miombo and Savannah biomes; excluded from much of the continent’s western half by aridity and confined in the south during the 1st millennium to bushveld areas of the old Transvaal. Declining summer rainfall restricted occupation to a diminishing belt close to the East Coast and north of 53º (Maggs 1994); sites such as Canasta Place (800AD), Eastern Cape, mark the southern-most limit of Early Iron Age settlement (Nogova 1994).

- The Central Cattle Pattern

The Central Cattle Pattern (CCP) was the main cognitive pattern since the Early Iron Age (Huffman 1986). The system can be summarized as opposition between male pastoralism and female agriculture; ancestors and descendants; rulers and subjects; and men and women. Cattle served as the primary means of transaction; they represented symbols exchanged for the fertility of wives, legitimacy of children and appeasement of ancestors. Cattle were also used as tribute to rulersconfirming sub-ordination and redistribution as loan cattle by the ruler to gain political support. Cattle represented healing and fertilizing qualities (Huffman 1988; Kuper 1980).

This cognitive and conceptual structure underlies all cultural behavior, including the placement of features in a settlement. The oppositions of male and female, pastoralism and agriculture, ancestors and descendants, rulers and subjects, cool and hot are represented in spatial oppositions, either concentric or diametric (Huffman 1986).
A typical CCP village comprise of a central cattle enclosure (byre) where men are buried. The Kgotla (men’s meeting place / court) is situated adjacent to the cattle enclosure. Surrounding the enclosure is an arc of houses, occupied according to seniority. Around the outer perimeter of the houses is an arc of granaries where women keep their pots and grinding stones (Huffman 1986). The model varies per ethnic group which helps to distinguish ethnicity throughout the Iron Age, but more studies are required to recognize the patterns.

### 3.2 The Middle Iron Age

The hiatus of South African Middle Iron Age activity was centered in the Shashe-Limpopo Valley and characterized by the 5-tier hierarchical Mapungubwe State spanning some 30,000km². By the 1st millennium ivory and skins were already exported overseas, with sites like Sofala and Chibuene, Mosambique, interfacing between interior and transoceanic traders. Exotic glass beads, cloth and Middle Eastern ceramics present at southern African sites mark the beginning of the regions incorporation into the expanding economic system that, partly tied together with maritime trading links across the Indian Ocean, increasingly united Africa, Asia and Europe long before Da Gama or Columbus (Eloff & Meyer 1981; Meyer 1998).

Occupation was initially focused at Bambandanyalo and K2. The Bambananyalo main midden (1030-1220AD) stands out above the surrounding area, reaching more than 6m in places and covering more than 8ha the site may have housed as many as 2,000 people (Meyer 1998). The CCP was not strictly followed; whether this is ideologically significant or merely a reflection of local typology remains unclear. The midden, the size of which may reflect the status of the settlement’s ruler, engulfed the byre around 1060-1080AD, necessitating relocation of the cattle previously kept there. The re-organization of space and worldview implied suggests profound social changes even before the sites’ abandonment in the early 13th century, when the focus of occupation moved to Mapungubwe Hill, 1 km away (Huffman 1998).

Excavations at Mapungubwe Hill, though only occupied for a few decades (1220-1290AD), yielded a deep succession of gravel floors and house debris (Eloff & Meyer 1981). Huffman (1998) suggests that the suddenness with which Mapungubwe was occupied may imply a deliberate decision to give spatial expression to a new social order in which leaders physically removed themselves from ordinary people by moving onto more inaccessible, higher elevations behind the stone walls demarcating elite residential areas. Social and settlement changes speak of considerable centralization of power and perhaps the elaboration of new ways of linking leaders and subjects.

At Bambandanyalo and Mapungubwe elite burial grave goods include copper, bone, ivory and golden ornaments and beads. Social significance of cattle is reinforced by their importance among the many human and animal ceramic figurines and at least 6 ‘beast burials’ (Meyer 1998).

Today the drought prone Shashe-Limpopo Valley receives less than 350mm of rainfall per annum, making cereal cultivation virtually impossible. The shift to drier conditions in the late 12th to 13th centuries across the Shashe-Limpopo basin and the eastern Kalahari may have been pivotal in the break-up of the Mapungubwe polity, the collapse of Botswana’s Toutswe tradition and the emergence of Great Zimbabwe (1220-1550AD), southern Africa’s best known and largest (720ha) archaeological site (Meyer 1998).

South of the Limpopo and north of the Outpansberg, Mapungubwe derived communities survived into the 14th Century, contemporary with the establishment of Sotho-speaking makers of Maloko pottery.

### 3.3 The Later Iron Age

South African farming communities of the 2nd millennium experienced increased specialization of production and exchange, the development of more nucleated settlement patterns and growing political centralization, albeit not to the same extent as those participating in the political evolution of the Later Iron Age. However, together they form the background to the cataclysmic events of the late 18th / early 19th Century Mfecane (Mitchell 2003).

Archaeological evidence of settlement pattern, social organization and ritual practice often differ from those recorded ethnographically. The Moloko ceramic tradition seems to be ancestral to modern Sotho-Tswana speakers (Evers 1980) and from about 1,100AD a second tradition, the Blackburn tradition, appears along South Africa’s eastern coastline. Blackburn produced mostly undecorated pottery (Davies 1971), while Mpmambanyoni assemblages, reaching as far south as Transkei, includes examples of rim notching, incised lines and burnished ochre slip (Robey 1980). At present, no contemporary farming sites are known further inland in KwaZulu-Natal or the Eastern Cape.

Huffman (1998) argues that similarities between Blackburn and early Mapolo wares imply a related origin, presumably in the Chibemba of Zambia or the Ivuna of Tanzania, which contains a range of ceramic attributes important in the Blackburn as well as beehive grass huts similar to those made by the Nguni. This is one of the few suggestions of contact between Sotho-Tswana and Nguni speakers on the one hand and farming communities who, if Huffman is correct, were already long established south of the Limpopo. Both ethnographic and archaeological data demonstrate that Sotho-Tswana and Nguni are patrilineal and organize their settlements according to the CCP (Kuper 1980).

From 1,300AD there is increasing evidence for the beginning of agro-pastoralist expansion considerably beyond the area of previous occupation. It is also by this time that the genealogies of several contemporary Bantu speaking groups can be traced (Wilson & Thompson 1969). Associated with this expansion was the regular employment of stone, rather than wood, as building material, an adaptation that has greatly facilitated the discovery and identification of settlements. Maggs (1976) describes 4 basic settlement types all characterized by the use of semi weathered dolerite to produce hard binding wall building tradition employing larger more regular stones for the inner and outer faces and smaller rubble for the infill. As with the more dispersed homesteads of KwaZulu-Natal and the Eastern Cape, sites tend to be in locally elevated situations, reflecting a deep seated Sotho and Nguni preference for higher places rather than supernaturally dangerous riverside localities; another important contrast to both 1st millennium (Maggs 1976) and later Zulu Kingdom settlement patterns (Hall & Maggs 1973).
The lack of evidence for iron production in the interior and eastern part of South Africa emphasize exchange relationships between various groups and associated more centralized polities. By the 19th Century iron production in KwaZulu-Natal was concentrated in particular clans and lineages and associated with a range of social and religious taboos (Maggs 1992). South of Durban comparatively few smelting sites are known (Whitelaw 1991), a trend even more apparent in Transkei (Peele 1987). However, metal remained the most important and archaeologically evident item traded between later farming communities. (Other recorded trade items include glass and ostrich eggshell beads; Indian Ocean seashells; siltstone pipes; dagga, and later on tobacco; pigments including ochre, graphite and specularite; hides and salt.)

Rising polity settlements are particularly evident in the north of the country and dated to the 17th Century, including Molokwane, capital of the Bakwena chiefdom (Pistorius 1994) and Kaditshwene, capital of a major section of the Hurutsho, whose population of 20,000 in 1820 almost equals contemporary Cape Town in size (Boeyens 2000). The agglomeration of Tsawana settlements in the north of the country was fuelled by both population growth and conflict over access to elephant hides for ivory and long distance trade with the East Coast. During this period ceramic decoration became blander and more standardized than the earlier elaborate decoration that included red ochre and graphite coloring.

The Mfecane refers to the wars and population movements of the early 19th Century which culminated in the establishment of the Zulu Kingdom and came to affect much of the interior, even beyond the Zambesi: The late 18th Century was marked by increasing demands for ivory (and slaves) on the part of European traders at Delagoa Bay, as many as 50 tons of ivory were exported annually from 1750-1790. As elephant populations declined, competition increased both for them and for the post 1790 supply of food to European and American whalers calling at Delagoa Bay (Smith 1970). Cattle raiding, conflict over land and changes in climatic and subsistence strategies characterized much of the cultural landscape of the time.

In the 15th Century Admiral Zheng He and his subordinates impressed the power of the Ming Dynasty rulers in a series of voyages as far afield as Java, Sri Lanka, southern Arabia and along the East African coast, collecting exotic animals en route. But nothing more came of his expeditions and China never pursued opportunities for trade or colonization (Mote 1995).

Portuguese maritime expansion began around the time of Cheng He's voyages; motivated by a desire to establish a sea route to the riches of the Far East. By 1585 Diogo Cao had reached Cape Cross, 3 years later Bartolomeu Dias rounded the Cape of Good Hope and less than a decade later Vasco da Gama called at several places along South Africa's coast, trading with Khoekhoen (Khoi) at Mossel Bay before reaching Mozambique and crossing the ocean to India. His voyage initiated subsequent Portuguese bases from China to Iraq. In Africa interest was focused on seizing important coastal trading towns such as Sofala and gaining access to the gold of Zimbabwe. Following the 1510 Portuguese-Khoekhoen battle at Table Bay, in which the viceroy of India was killed, Portuguese ships ceased to call along the South African coast (Elphick 1985).

A number of shipwrecks, primarily along the eastern coast attest to Portuguese activity including the Sao Joao, wrecked in 1552 near Port Edward and the Sao Bento, destroyed in 1554 off the Transkei coast. Survivors' accounts provided the 1st detailed information on Africa's inhabitants (Auret & Maggs 1982).

By the late 1500's Portuguese supremacy of the Indian Ocean was threatened. From 1591 numerous Dutch and English ships called at Table Bay and in 1652 the Dutch East India Company (VOC) established a permanent base, with the intent to provide fresh food and water to VOC ships. In an attempt to improve the food supply a few settlers (free burghers) were allowed to establish farms. The establishment of an intensive mixed farming economy failed due to competition for access to overseas trade encouraged some leaders to replace locally organized circumcision schools and age-sets with more permanently maintained military regimes. These were now used to gain access through warfare to land, cattle and stored food. By 1810 three groups, the Mthethwa, Ndawenwe and Ngwane dominated northern KwaZulu-Natal (Wright 1993). The Mthethwa paramountcy was undermined by the killing of its leader Dingiswayo in circa 1848, which led to a brief period of Ndawenwe dominance. In consequence one of Dingiswayo's former tributaries, Shaka, established often forceful alliances with chiefdoms further south. Shaka's Zulu dominated coalition resisted the Ndawenwe who in return fled to Mozambique. As the Zulu polity expanded it consolidated its control over large areas, incorporating many communities into it. Others sought refuge from political instability by moving south of the Thukela River, precipitating a further domino effect as far as the Cape Colony's eastern border (Wright 1995).

4) The Colonial Period

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From the 1700's many settlers expanded inland over the Cape Fold Mountain Belt. The high cost of overland transport constrained the ability to sell their produce while settlement of the interior was increasingly made difficult by resident KhoSan groups, contributing due to a lack of VOC military support to growing Company opposition in the years before British control of the Cape (1795 / 1806) (Davenport & Saunders 2000).

In 1820 a major British settlement was implanted on the eastern frontier of the Cape Colony, resulting in large numbers of the community moving into the interior, initially to KwaZulu-Natal, and then after Britain annexed Natal (1843), further into the interior to beyond the Vaal River. Disruptions of the Mfecane eased their takeover of African lands and the Boers (farmers) established several Republics. A few years later the 2nd South African War saw both the South African and Orange Free State Republics annexed by Britain, a move largely motivated by British desire to control the goldfields of the Witwatersrand. With adjacent regions of the sub-continent also falling, directly or indirectly, under British rule and German colonization of Namibia, European control of the whole of southern Africa was firmly established before the 1st World War (Davenport & Saunders 2000).

- **Xhosa Iron Age Cultures meets Colonists in the Eastern Cape**

From the late 1600's conflict between migrants from the Cape (predominantly Boers) and Xhosa people in the region of the Fish River were strife, ultimately resulting in a series of 9 Frontier Wars (1702-1878) (Milton 1983). Both cultures were heavily based and reliant on agriculture and cattle farming. As more Cape
migrants, and later settlers from Britain (1820) and elsewhere arrived, population pressures and competition over land, cattle and good grazing became intense. Cattle raiding became endemic on all sides, with retaliatory raids launched in response. As missionaries arrived with evangelical messages, confrontations with hostile chiefs who saw them as undermining traditional Xhosa ways of life resulted in conflicts which flared into wars.

As pressures between the European settlers and the Xhosa grew, settlers organized themselves into local militia, counteracted by Xhosa warring skills. But both sides were limited by the demands of seasonal farming and the need for labor during harvest. Wars between the Boers and the Xhosa resulted in shifting borders, from the Fish to the Sundays River, but it was only after the British annexed the Cape in 1806 that authorities turned their attention to the Eastern regions and petitions by the settlers about Xhosa raids. British expeditions, in particular under Colonel John Graham in 1811 and later Harry Smith in 1834, were sent not only to secure the frontier against the Xhosa, but also to impose British authority on the settlers, with the aim to establish a permanent British presence. Military forts were built and permanently manned. Over time the British came to dominate the area both militarily and through occupation with the introduction of British settlers. The imposition of British authority led to confrontations not only with the Xhosa but also with disaffected Boers and other settlers, and other native groups such as the Khoikhoi, the Griqua and the Mpondoland. The frontier was continued over a period of about 150 years from the 1st arrival of the Cape settlers, and with the intervention of the British military ultimately ending in the subjugation of the Xhosa people. Fighting ended on the Eastern Cape frontier in June 1878 with the annexation of the western areas of the Transkei and administration under the authority of the Cape Colony (Milton 1983).

The Industrial Revolution

The Industrial Revolution refers roughly to the period between the 18th and 19th Centuries, typified by major changes in agriculture, manufacturing, mining, transport, and technology. Changing industry had a profound effect on socio-economic and socio-cultural conditions across the world. The Industrial Revolution marks a major turning point in human history; almost every aspect of daily life was eventually influenced in some way. Average income and population size began to exhibit unprecedented growth; in the two centuries following 1800 the world’s population increased over 6-fold, associated with increasing urbanization and demand of resources. Starting in the latter part of the 18th century, the transition from manual labor towards machine-based manufacturing changed the face of economic activity; including the mechanization of the textile industries, the development of iron-making techniques and the increased use of refined coal. Trade expansion was enabled by the introduction of canals, improved roads and railways. The introduction of steam power fuelled primarily by coal and powered machinery was underpinned by dramatic increases in production capacity. The development of all-metal machine tools in the first two decades of the 19th century facilitated the manufacture of more production machines in other industries (More 2000).

Effects of the Industrial Revolution were widespread across the world, with its enormous impact of change on society, a process that continues today as ‘industrialization’.

5) References Cited

Appendix C:

Heritage Impact Assessment (HIA) – Metsimatala 150MW CSP Solar Energy Facility – Power Lines, (near Postmasburg), Siyanda District Municipality, Northern Cape

Heritage Protocol for Incidental Finds during the Construction Phase

Should any palaeontological, archaeological or cultural heritage resources, including human remains / graves, as defined and protected by the NHRA 1999, be identified during the construction phase of development (including as a norm during vegetation clearing, surface scraping, trenching and excavation phases), it is recommended that the process described below be followed.

➢ On-site Reporting Process:

1. The identifier should immediately notify his / her supervisor of the find.

2. The identifier’s supervisor should immediately (and within 24 hours after reporting by the identifier) report the incident to the on-site SHE / SHEQ officer.

3. The on-site SHE / SHEQ officer should immediately (and within 24 hours after reporting by the relevant supervisor) report the incident to the appointed ECO / ELO officer. [Should the find relate to human remains the SHE / SHEQ officer should immediately notify the nearest SAPS station informing them of the find].

4. The ECO / ELO officer should ensure that the find is within 72 hours after the SHE / SHEQ officers report reported on SAHRIS and that a relevant heritage specialist is contacted to make arrangements for a heritage site inspection. [Should the find relate to human remains the ECO / ELO officer should ensure that the archaeological site inspection coincides with a SAPS site inspection, to verify if the find is of forensic, authentic (informal / older than 60 years), or archaeological (older than 100 years) origin].

5. The appointed heritage specialist should compile a ‘heritage site inspection’ report based on the site specific findings. The site inspection report should make recommendations for the destruction, conservation or mitigation of the find and prescribe a recommended way forward for development. The ‘heritage site inspection’ report should be submitted to the ECO / ELO, who should ensure submission thereof on SAHRIS.

6. SAHRA / the relevant PHRA will state legal requirements for development to proceed in the SAHRA / PHRA Comment on the ‘heritage site inspection’ report.

7. The developer should proceed with implementation of the SAHRA / PHRA Comment requirements. SAHRA / PHRA Comment requirements may well stipulate permit specifications for development to proceed.
   - Should permit specifications stipulate further Phase 2 archaeological investigation (including grave mitigation) a suitably accredited heritage specialist should be appointed to conduct the work according to the applicable SAHRA / PHRA process. The heritage specialist should apply for the permit. Upon issue of the SAHRA / PHRA permit the Phase 2 heritage mitigation program may commence.
   - Should permit specifications stipulate destruction of the find under a SAHRA / PHRA permit the developer should immediately proceed with the permit application. Upon the issue of the SAHRA / PHRA permit the developer may legally proceed with destruction of the palaeontological, archaeological or cultural heritage resource.
   - Upon completion of the Phase 2 heritage mitigation program the heritage specialist will submit a Phase 2 report to the ECO / ELO, who should in turn ensure submission thereof on SAHRIS. Report recommendations may include that the remainder of a heritage site be destroyed under a SAHRA / PHRA permit.
   - Should the find relate to human remains of forensic origin the matter will be directly addressed by the SAPS: A SAHRA / PHRA permit will not be applicable.
NOTE: Note that SAHRA / PHRA permit and process requirements relating to the mitigation of human remains requires suitable advertising of the find, a consultation, mitigation and re-interment / deposition process.

Duties of the Supervisor:
1. The supervisor should immediately upon reporting by the identifier ensure that all work in the vicinity of the find is ceased.
2. The supervisor should ensure that the location of the find is immediately secured (and within 12 hours of reporting by the identifier), by means of a temporary conservation fence (construction netting) allowing for a 5-10m heritage conservation buffer zone around the find. The temporary conserved area should be sign-posted as a ‘No Entry – Heritage Site’ zone.
3. Where development has impacted on the resource, no attempt should be made to remove artefacts / objects / remains further from their context, and artefacts / objects / remains that have been removed should be collected and placed within the conservation area or kept for safekeeping with the SHE / SHEQ officer. It is imperative that where development has impacted on palaeontological, archaeological and cultural heritage resources the context of the find be preserved as good as possible for interpretive and sample testing purposes.
4. The supervisor should record the name, company and capacity of the identifier and compile a brief report describing the events surrounding the find. The report should be submitted to the SHE / SHEQ officer at the time of the incident report.

Duties of the SHE / SHEQ Officer:
1. The SHE / SHEQ officer should ensure that the location of the find is recorded with a GPS. A photographic record of the find (including implementation of temporary conservation measures) should be compiled. Where relevant a scale bar or object that can indicate scale should be inserted in photographs for interpretive purposes.
2. The SHE / SHEQ officer should ensure that the supervisors report, GPS co-ordinate and photographic record of the find be submitted to the ECO / ELO officer. [Should the find relate to human remains the SHE / SHEQ officer should ensure that the mentioned reporting be made available to the SAPS at the time of the incident report].
3. Any retrieved artefacts / objects / remains should, in consultation with the ECO / ELO officer, be deposited in a safe place (preferably on-site) for safekeeping.

Duties of the ECO / ELO officer:
1. The ECO / ELO officer should ensure that the incident is reported on SAHRIS. (The ECO / ELO officer should ensure that he / she is registered on the relevant SAHRIS case with SAHRIS authorship to the case at the time of appointment to enable heritage reporting).
2. The ECO / ELO officer should ensure that the incident report is forwarded to the heritage specialist for interpretive purposes at his / her soonest opportunity and prior to the heritage site inspection.
3. The ECO / ELO officer should facilitate appointment of the heritage specialist by the developer / construction consultant for the heritage site inspection.
4. The ECO / ELO officer should facilitate access by the heritage specialist to any retrieved artefacts / objects / remains that have been kept in safekeeping.
5. The ECO / ELO officer should facilitate coordination of the heritage site inspection and the SAPS site inspection in the event of a human remains incident report.
6. The ECO / ELO officer should facilitate heritage reporting and heritage compliance requirements by SAHRA / the relevant PHRA, between the developer / construction consultant, the heritage specialist, the SHE / SHEQ officer (where relevant) and the SAPS (where relevant).

Duties of the Developer / Construction Consultant:
The developer / construction consultant should ensure that an adequate heritage contingency budget is accommodated within the project budget to facilitate and streamline the heritage compliance process in the event of identification of incidental palaeontological, archaeological and cultural heritage resources during the course of development, including as a norm during vegetation clearing, surface scraping, trenching and excavation phases, when resources not visible at the time of the surface assessment may well be exposed.
### Appendix D:

**Resumé:**

**Karen van Ryneveld**  
2016

<table>
<thead>
<tr>
<th>Name:</th>
<th>Karen van Ryneveld</th>
</tr>
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</table>
| Contact Details: | 1) Cell: 084 871 1064  
2) E-mail: karen@archaeomaps.co.za  
3) Website: www.archaeomaps.co.za  
4) Postal address: Postnet Suite 239, Private Bag X9, Beacon Bay, 5205 |
| Company: | ArchaeoMaps cc |
| Occupation: | Archaeologist |
| Qualification: | MSc Archaeology (WITS University – 2003) |
| Accreditation: | 1) Association of Southern African Professional Archaeologists (ASAPA) accredited Cultural Resources Management (CRM) practitioner [member nr – 163]  
   - 2010 – ASAPA CRM Section: Principle Investigator – Stone Age  
   - 2005 – ASAPA CRM Section: Field Director – Stone Age, Iron Age & Colonial Period  
2) SAHRA, AMAFA, EC PHRA and HWC listed ASAPA accredited CRM archaeologist |

#### Tertiary Education

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<td>University of Fort Hare, East London</td>
<td>MPhil Environmental Studies</td>
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<tr>
<td>2010</td>
<td>UNISA University, Pretoria</td>
<td>(Project Management 501)</td>
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<tr>
<td>2006-2007</td>
<td>Nelson Mandela Metropolitan University, Port Elizabeth</td>
<td>Undergraduate Certificate in Geographical Information Systems</td>
</tr>
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<td>2001-2003</td>
<td>WITS University, Johannesburg</td>
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#### Courses

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<td>SPA (Safety Passport Alliance) – Petrol Retail [SA Safety Management Services Training (Pty) Ltd – SMST, Sasolburg, Gauteng]</td>
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#### Employment – Professional Archaeology

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<td>ArchaeoMaps Archaeological Consultancy</td>
<td>Self-employed (Archaeologist – CRM)</td>
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<td>2006-2007/03</td>
<td>National Museum, Bloemfontein</td>
<td>Archaeologist – Dept. of Archaeology</td>
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<td>2005-2006/05</td>
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<td>Archaeologist – CRM, Dept. of Archaeology</td>
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<td>Amafa aKwaZulu Natali</td>
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#### Employment – Freelance: Ground Penetrating Radar

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<td>Terra Scan assistant (BCM area, EC) – GPR &amp; underground utilities focussing on the petrol retail (oil &amp; gas) industry</td>
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**Archaeology – Summary**

Karen has been involved in CRM archaeology since 2003 and has been the author (including selected co-authored reports) of approximately 400 Phase 1 AIA studies. Phase 1 AIA work is centred in South Africa, focusing on the Northern and Eastern Cape provinces and the Free State. She has also conducted Phase 1 work in Botswana (2006/2007). In 2007 she started ArchaeoMaps, an independent archaeological consultancy. In 2010 she was awarded ASAPA CRM Principle Investigator (PI) status based on large scale Phase 2 Stone Age mitigation work (De Beers Consolidated Mines – Rooipoort, Northern Cape – 2008/2009) and has also been involved in a number of other Phase 2 projects including Stone Age, Shell Middens, Grave / Cemetery projects and Iron Age sites.

In addition to CRM archaeology she has been involved in research, including the international collaborations at Maloney’s Kloof and Grootkloof, Chaap plateau, Northern Cape (2005/2006). Archaeological compliance experience includes her position as Head of the Archaeology, Palaeontology and Meteorites (APM) Unit at AMAFA aKwa-Zulu Natali (2004).

#### Company Profile

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<thead>
<tr>
<th>Company Name</th>
<th>ArchaeoMaps cc</th>
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<td>Registration number</td>
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<tr>
<td>Accountant</td>
<td>Azima Financial Services, Bloemfontein</td>
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<tr>
<td>Members / Shareholders</td>
<td>Karen van Ryneveld (100%)</td>
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<td>BBBEE status</td>
<td>Exempted Micro Enterprise (EME)</td>
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