Phase 1 Archaeological & Cultural Heritage Impact Assessment –

Metsimatala 150MW CSP Solar Energy Facility, Groenwater No 453, (near Postmasburg), Siyanda District Minicipality, Northern Cape

- 20 March 2016 -

Client / Compiled on behalf of:

Rikus Lamprecht (Enviroworks)

E-mail: rikus@enviroworks.co.za; Tel: 086 198 8895; Postal Address: Suite 116, Private Bag X01, Brandhof, 9324

Compiled by:

Karen van Ryneveld (ArchaeoMaps)

E-mail: karen@archaeomaps.co.za; Tel: 084 871 1064; Postal Address: Postnet Suite 239, Private Bag X3, Beacon Bay, 5205

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 – - 20 March 2016 -

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 SR, EIA and EMPr, to the DEA for the proposed *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, near Postmasburg, Siyanda District Municipality, Northern Cape. The proposed development is situated at general development co-ordinate S28°17'06.0"; E23°17'51.3" and comprises an approximate 500ha study site. Development will encompass the establishment of a 150MW CSP energy facility, including an on-site substation, wiring between the CSP mirror panels, internal access roads, security infrastructure and a storage area. An approximate 2-3 year construction phase is envisaged, with a 20-25 year operational phase. The development aims to generate clean, renewable electricity into the national Eskom grid as part of the DoE REIPPPP.

The original Metsimatala proposal centred on a 50MW CSP development. A full SR and EIA process was conducted in terms of the 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. The *Metsimatala CSP 150MW Solar Energy Facility* EA application will comprise of 2 components:

- A BAR for the construction of the 132kV powerline; and
- A full SR and EIA process for the construction and operation of the *Metsimatala 150MW SCP Solar Energy Facility.*

ArchaeoMaps was appointed by Enviroworks to compile the Phase 1 AIA for the full SR and EIA process for the construction and operation of the *Metsimatala 150MW SCP Solar Energy Facility* development.

The Phase 1 Archaeological & Cultural Heritage Impact Assessment –

Project Name & Locality: *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, near Postmasburg, Siyanda District Municipality, Northern Cape [1:50,000 Map Ref – 2823AD].

- **Summary of Findings:**

- Development layout poses no 'fatal flaws' – Consideration of a 'No-Go' option is irrelevant.
- All recorded archaeological and cultural heritage resources comprise known sites. No new archaeological or cultural heritage resources were recorded during the 2016 field assessment.
- Site MVIA3, a Later Iron Age (LIA) / contemporary cemetery, situated immediately adjacent to the Metsimatala study site should be formally conserved (permanent fence with access gate).
- Little to no negative cumulative impact will result from the proposed *Metsimatala CSP 150MW Solar Energy Facility* development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA 1999. The proposed development will in fact be contributory to living heritage, ensuring the sustainability of the Thlaping on their land; tribal, by virtue of their recorded history on the property, but with the prospect of a green, economically sustainable future.
- [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.]

Heritage Compliance Summary			
Map Code	**Site**	**Co-ordinates**	**Recommendations**
Metsimatala CSP 150MW Solar Energy Facility (S28°17'06.0"; E23°17'51.3")			
MVIA3	Later Iron Age (LIA) / contemporary – Cemetery	S28°16'45.3"; E23°18'26.0"	**Permanent conservation (permanent fence with access gate)**

Recommendations –

With reference to archaeological and cultural heritage compliance, as per the requirements of the NHRA 1999, it is recommended that the proposed *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, 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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1 – Project Description & Terms of Reference

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 Scoping Report (SR), an Environmental Impact Assessment (EIA) and Environmental Management Program report (EMPr), to the Department of Environmental Affairs (DEA) for the proposed *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, near Postmasburg, Siyanda District Municipality, Northern Cape. The proposed development 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, owned collectively by the Groenwater-Metsimatala Communal Property Association (CPA) and the Metsimatala CPA. Development will encompass the establishment of a 150MW Concentrated Solar Power (CSP) energy facility, including an on-site substation, wiring between the CSP mirror panels, internal access roads, security infrastructure and a storage area. The study site is situated approximately 22km north-east of Postmasburg and 17km north-west of Lime Acres, with access to the study site directly via the R385 Danielskuil-Postmasburg road. An approximate 2-3 year construction phase is envisaged, with a 20-25 year operational phase (followed by either retrofitting and upgrading or decommissioning). The 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. The *Metsimatala CSP 150MW Solar Energy Facility* EA application will comprise of 2 components:

- A Basic Assessment (BAR) for the construction of the 132kV powerline linking the *Metsimatala 150MW SCP Solar Energy Facility* to the national Eskom grid; and
- A full Scoping and EIA process for the construction and operation of the *Metsimatala 150MW SCP Solar Energy Facility*.

ArchaeoMaps was appointed by Enviroworks to compile the Phase 1 Archaeological & Cultural Heritage Impact Assessment (AIA) for the full Scoping and EIA process for the construction and operation of the *Metsimatala 150MW SCP 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 SR, EIA and EMPr. 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;
- 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.

[The Phase 1 AIA for the associated Metsimatala 132kV powerline development will be submitted separately as component part of the BAR documentation.]

Map 1: General locality of the proposed *Metsimatala 150MW CSP Solar Energy Facility*, Groenwater No 453, near Postmasburg, Northern Cape

Map 2: Close-up of the proposed *Metsimatala 150MW CSP Solar Energy Facility* study site, Groenwater No 453, near Postmasburg, Northern Cape

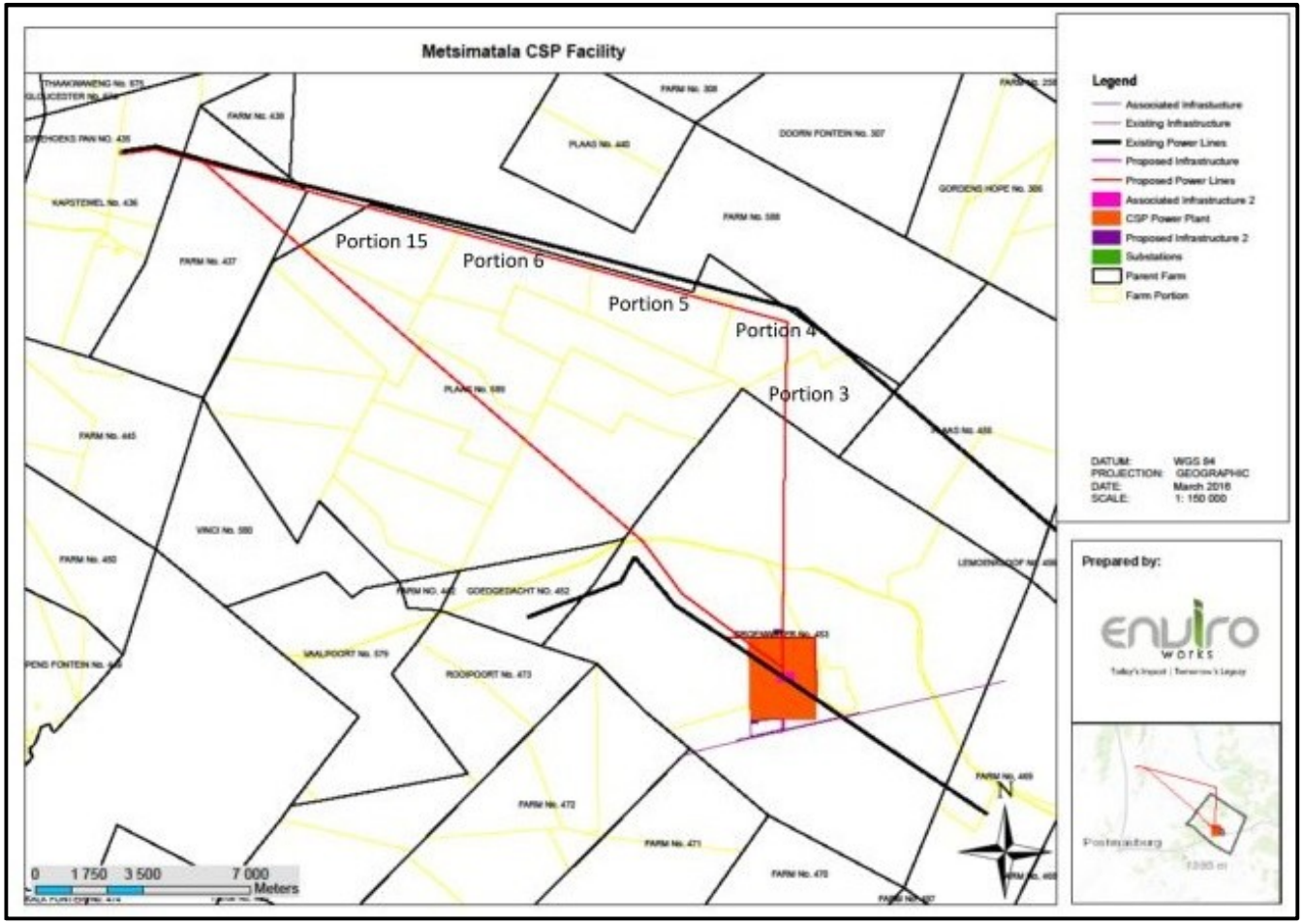
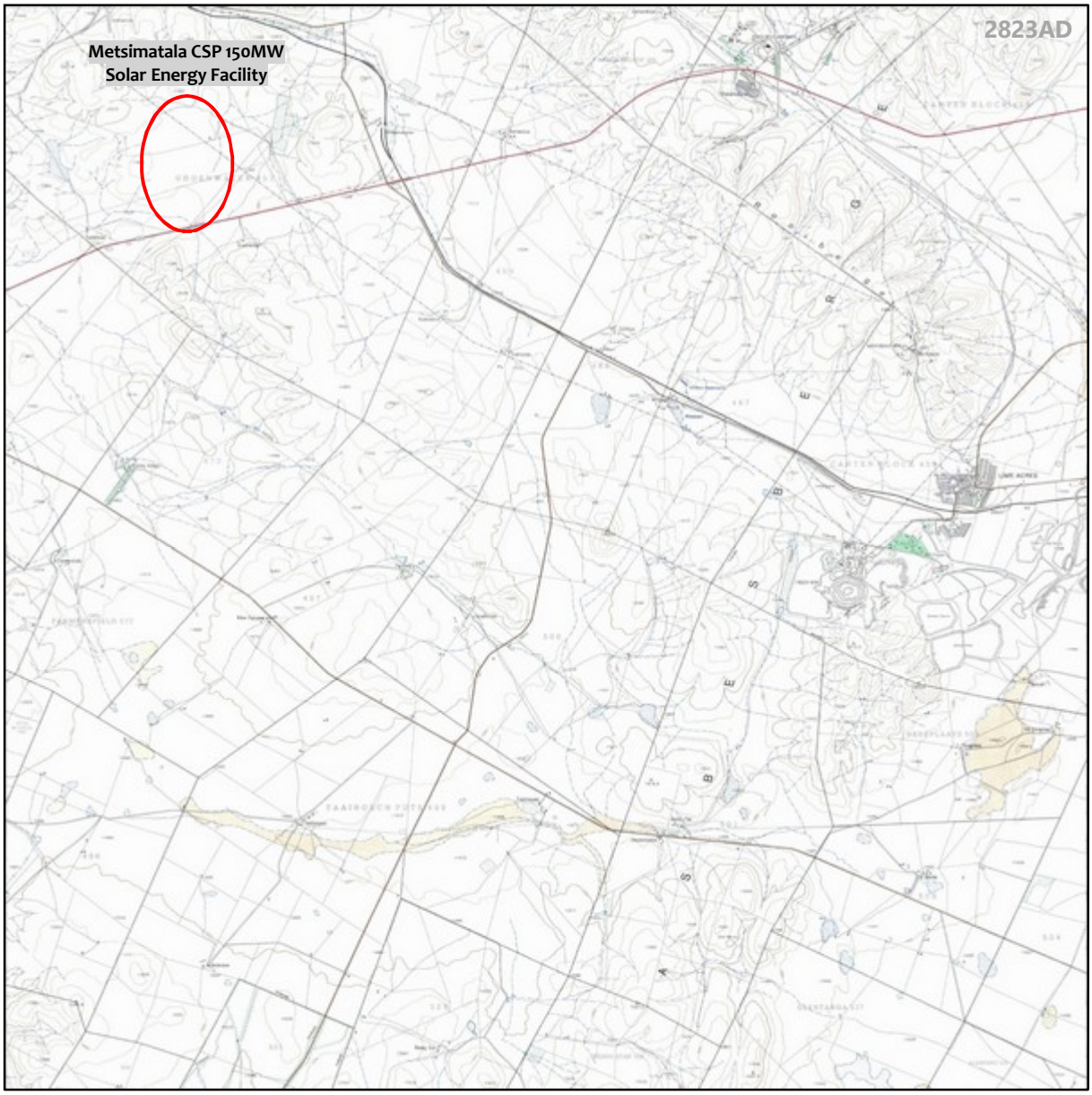


Figure 1: Layout – *Metsimatala 150MW CSP Solar Energy Facility* study site and 132kV powerline routes, Groenwater No 453, near Postmasburg, Northern Cape (courtesy Enviroworks)



Map 3: Locality of the *Metsimatala 150MW CSP Solar Energy Facility*, Groenwater No 453, near Postmasburg, Northern Cape [1: 50,000 Map Ref – 2823AD]

2.1.1) Archaeological & Cultural Heritage Legislative Compliance

The Phase 1 Archaeological & Cultural Heritage Impact Assessment (AIA) for the proposed *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, 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)(c)(i), 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.

NHRA 1999, Section 38

1) Subject to the provisions of subsections 7), 8) and 9), any person who intends to undertake a development categorized as –
   - a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
   - b) the construction of a bridge or similar structure exceeding 50 m in length;
   - **c) any development or other activity which will change the character of a site –**
     - i. **exceeding 5 000 m² in extent;** or
     - ii. **involving three or more existing erven or subdivisions thereof;** or
     - iii. involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
     - iv. the costs which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
   - d) **the rezoning of a site exceeding 10 000 m² in extent;** or
   - e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

   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.

Table 1: Extracts from the NHRA 1999, Section 38

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:

- Becker, E. 2011. (Envass Environmental). *Archaeological Impact Assessment. Technical Report prepared for Metsimatala Village, Portion 3, 4 and 5 of the Farm Groenwater 453, Postmasburg, Northern Cape*.
- Van Ryneveld, K. 2012. (ArchaeoMaps). *Phase 1 Archaeological Impact Assessment – Metsimatala Solar Project, Groenwater 453, Siyanda District Municipality, Northern Cape, South Africa*.

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

- National Environmental Management Act, No 107 of 1998 (NEMA 1998) and associated Regulations (2014).

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 1 day period (2016-03-14) 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 total of the Metsimatala CSP 150MW study site. Surface visibility proved to be very good. Exposed sub-surface sections were limited to a few animal burrows and a borrow pit situated to the immediate south of study site.

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 focusses 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, heritage declaration, monitoring, mitigation (Phase 2 HIA), or destruction.

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

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 CSP 150MW Solar Energy Facility* study site can briefly be described as:

Archaeological and Basic Cultural Heritage Probability Assessment – Metsimatala CSP 150MW Solar Energy Facility, Groenwater No 453, (near Postmasburg), Siyanda District Municipality, Northern Cape			
Primary Type / Period	**Sub-Period**	**Sub-Period Type Site**	**Probability**
EARLY HOMININ / HOMINID	-	-	None-Low
	Graves / Human remains: High scientific significance		
STONE AGE	Earlier Stone Age (ESA)		Low-Medium
	Middle Stone Age (MSA)		Medium-High
	Later Stone Age (LSA)		Low-Medium
		Rock Art	Medium
		Shell Middens	None
	Graves / Human remains: ESA & MSA – High scientific significance; LSA – High scientific & social significance		
IRON AGE	Early Iron Age (EIA)		None
	Middle Iron Age (MIA)		None
	Later Iron Age (LIA)		Medium
	Graves & Human remains: EIA – High scientific & medium social significance; MIA & LIA: High scientific & social significance		
COLONIAL PERIOD	Colonial Period		High
		LSA – Colonial Period Contact	Low
		LIA – Colonial Period Contact	Medium
		Industrial Revolution	Low
		Apartheid & Struggle	Low-Medium
	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

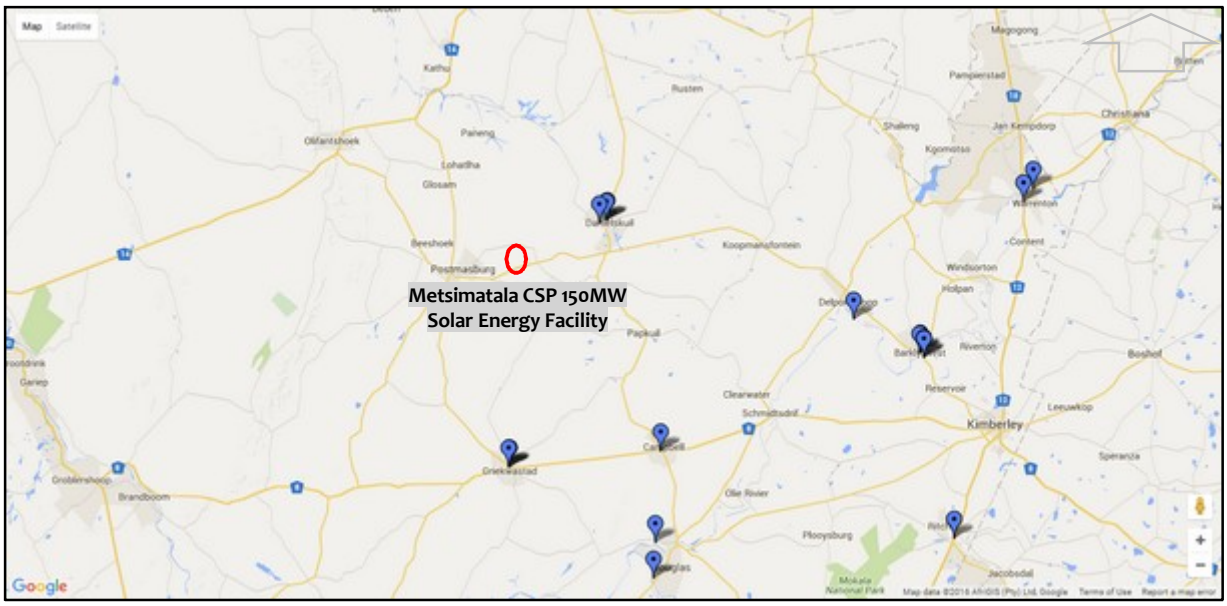
Five archaeological Cultural Resources Management (CRM) reports are recorded in the SAHRA 2009 Mapping Project Database (MPD), situated within an approximate 25km radius from the proposed *Metsimatala CSP 150MW Solar Energy Facility* study site, listed as:

- Dreyer, C. 2007. (Private). *Archaeological and Historical Investigation of the Proposed Mining Activities at the Farm Rosslyn, Lime Acres, Northern Cape*.
- Henderson, Z.L. 2005. (National Museum Bloemfontein). *Cultural Heritage Assessment for Finsch Mine*.
- Morris, D. 2008. (McGregor Museum, KBY). *Archaeological and Heritage Impact Assessment on Remainder of Carter Block 458, near Lime Acres, Northern Cape*.
- Morris, D. & Beaumont, P.B. 1994. (McGregor Museum, KBY). *Ouplaas 2 Rock Engravings, Danielskuil.*
- Van Ryneveld, K. 2005. (McGregor Museum, KBY). *Cultural Heritage Site Inspection Report for the purpose of a Prospecting Right EMP – (Portion of) Skeyfontein 536, Postmasburg District, Northern Cape, South Africa.*

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 CSP 150MW Solar Energy Facility* study site, selected of which are associated with archaeological CRM reports, listed non-inclusively (and excluding former Metsimatala archaeological CRM studies) as:

- Becker, E. 2012. (Hatch). *Transnet Capital Projects: Ngqura 16Mtpa Manganese Rail. Phase 1 Heritage Impact Assessment Kimberley to De Aar.*
- Fourie, W. 2011. (PGS). *Solar Reserve SA (Pty) Ltd. Hermansrus Solar Thermal Energy Power Plant, Postmasburg – Heritage Impact Report.*
- Fourie, W. 2012a. (PGS). *Solar Reserve SA (Pty) Ltd. 132kV Power Line Connection to the Hermansrus Solar Thermal Energy Power Plant, Postmasburg, Northern Cape Province – Heritage Impact Report.*
- Fourie, W. 2012b. (PGS). *Solar Reserve SA (Pty) Ltd. Proposed Construction of 132kV Power Line on Switchyard Associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province – Heritage Impact Assessment.*
- Hutton, L. & Hutton, M. 2013. (Private). *Heritage Impact Assessment Report for the Farms Plaas 438 Portion 1 and Plaas 588 RE.*
- Hutton, M. 2014. (PGS). *Solar Reserve SA (Pty) Ltd – Proposed Construction of Two 132kV Power Lines and Switchyards to Connect the Redstone Solar Thermal Energy Plant to the Olien Substation in the Z.F. Ngcawu District Municipality in the Northern Cape Province – Option 1: Redstone Solar Thermal Energy Plant to Olien Substation.*
- Morris, D. 2012. (McGregor Museum, KBY). *Archaeological Impact Assessment, Phase 1: Proposed Development of PV Power Station at Welcome Wood (Extended Area), near Owendale, Northern Cape.*
- Van Vollenhoven, A.C. 2014. (Archaetnos). *A report on a Heritage Impact Assessment for the proposed Eskom Kimberley Strengthening Phase 4 Project between the Ulco, Olien and Mangalore Substations in the Northern Cape Province.*
- Webley, L.E. 2010. (ACO). *Heritage Impact Assessment of proposed Groenwater Solar Array, Northern Cape Province.*

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

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 CSP 150MW Solar Energy Facility* 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) (Becker 2012; Fourie 2011, 2012b; Henderson 2005; Hutton & Hutton 2013; Hutton 2014; Morris 2012; Van Ryneveld 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. Despite the widespread presence of Stone Age lithics across the landscape, no significant lithic sites have been reported on. The LSA record is supplemented by petroglyphs or rock art engravings: 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. Of significance is reference by Fourie (2011, 2012a, 2012b) 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 453 (Van Ryneveld 2012), the LIA is mainly represented by small farmworkers villages, residences and selected livestock enclosure remains (Fourie 2012b; Hutton & Hutton 2013), with the primary LIA groups present in the general area being the Thlaping and Thlako, both being Tswana tribes (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://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).

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 (2014) reported on a cemetery from the Ulco area and 3 stone cairns are interpreted as graves by Webley (2010).

2.3.1.1) Cultural Heritage and Known Heritage Resources from Groenwater No 453

The Thlaping is a lesser Tswana polity, also known as the '*Fish People*' or '*People of the Goat*' and subdivided into 5 primary clans; the baThlaping, the Bagaphuduhudu, the BaThlaping Bagaphudutswane, the BaThlaping Ba Ga Maidi and the baThlaping Ba Ga Mothidi (http://en.wikipedia.org/wiki/Tswana_people), with the Tswana generally believed to have been settled in their tribal areas by AD1600.

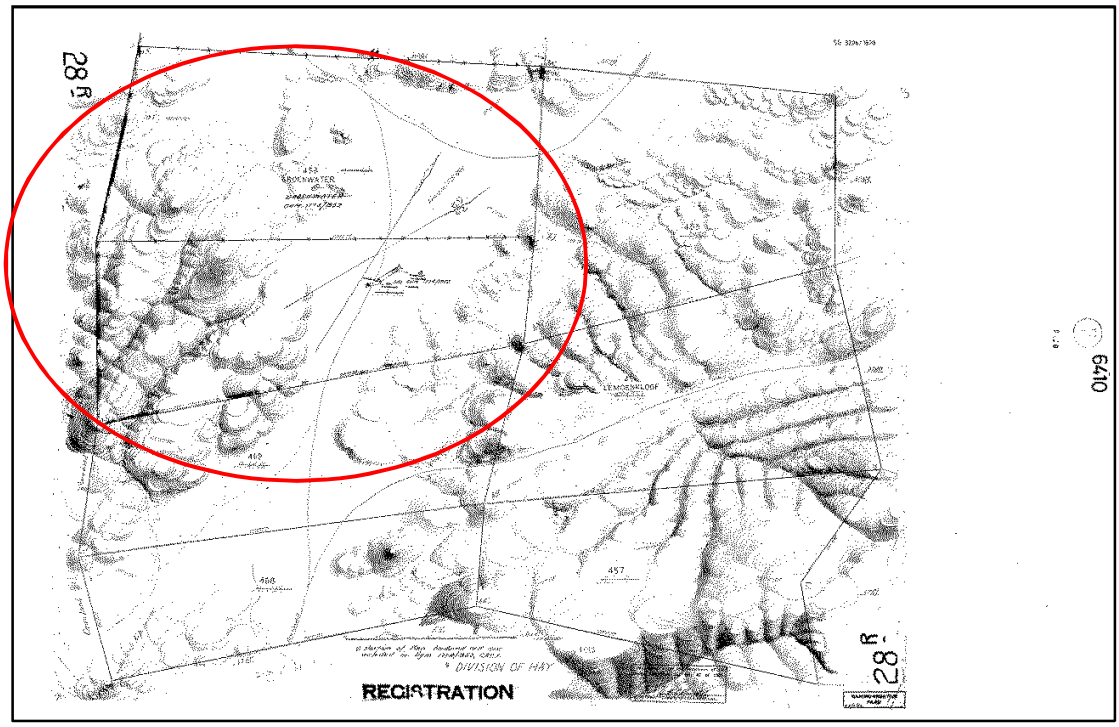


Figure 2: Groenwater 453, 1st known survey by J.H. Ford in 1881 and registered as Crown Title [CSG Record Number F3296/1878]

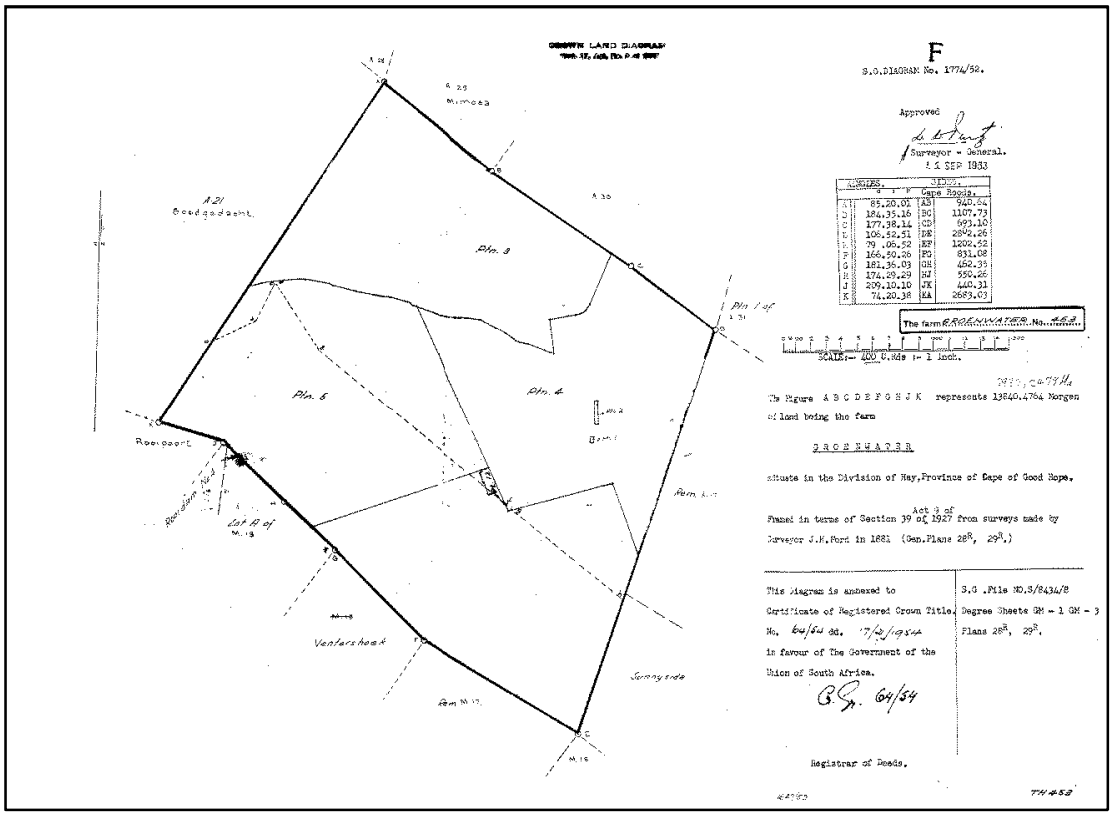


Figure 3: Groenwater 453, subdivided in 1952 with the southern portion leased for mining purposes (blue asbestos) in 1963 [CSG Record Number F1774/1952]

Not much is recorded on the early Thlaping settlement at Groenwater, but it is known that '*metsimatala*' means 'green water', in Afrikaans '*groen water*', referring to the spring situated on the adjacent property. Metsimatala is recorded to have been the original name of the settlement before the forced removal of the community in 1968 by the then Apartheid government, when the farm was 'renamed' Groenwater after the Tswana name of the original settlement (http://africanlanguages.com/south_africa/place_names_sagns.html). This piece of recorded history however in contradiction with records of the Chief Surveyor General, indicating the property name as Groenwater from as early as 1881, albeit not negating that the property could locally have been known as Metsimatala after the Thlaping village situated thereon.

Van Ryneveld (2012) recorded a number of heritage sites on Groenwater 453, and included former assessment results (Becker 2011) in the summary table of heritage resources on the property, summarized as:

Known Heritage Resources on Groenwater No 453					
Map Code	**Site**	**Type / Period**	**Description**	**Co-ordinates**	**Heritage Status Quo under Metsimatala CSP 150MW Proposal**
PLSA1	PLSA1	Stone Age	MSA (& LSA)	S28°14'46.3"; E23°20'02.8"	Conservation
PLSA2	PLSA2	Stone Age	MSA (& LSA)	S28°13'43.1"; E23°21'38.1"	Conservation
PLIA1	PLIA1	Iron Age	Farmstead	S28°15'08.8"; E23°19'40.1"	Conservation
PLCP1	PLCP1	Colonial Period	Farmstead	S28°14'09.5"; E23°20'27.7"	Conservation
PVSA1	PVSA1	Stone Age	MSA (& LSA)	S28°15'49.1"; E23°19'30.7"	Conservation
PVSA2	PVSA2	Stone Age	LSA	S28°15'55.3"; E23°19'34.5"	Conservation
PVSA3	PVSA3	Stone Age	MSA (& LSA)	S28°15'49.3"; E23°19'10.4"	Conservation
PVSA4	PVSA4	Stone Age	MSA (& LSA)	S28°15'48.2"; E23°18'48.2"	Conservation
PVIA1	PVIA1	Iron Age	Feature	S28°15'40.7"; E23°19'35.2"	Conservation
PVIA2	PVIA2	Iron Age	Feature	S28°15'42.1"; E23°19'31.1"	Conservation
PVIA3	PVIA3	Iron Age	Feature	S28°15'47.6"; E23°19'38.9"	Conservation
PVIA4	PVIA4	Iron Age	Farmstead	S28°15'52.4"; E23°19'38.8"	Conservation
PVIA5	PVIA5	Iron Age	Feature	S28°15'56.3"; E23°19'34.7"	Conservation
PVIA6	PVIA6	Iron Age	Feature	S28°16'00.2"; E23°19'34.0"	Conservation
PVIA7	PVIA7	Iron Age	Feature	S28°15'59.2"; E23°19'32.7"	Conservation
PVIA8	PVIA8	Iron Age	Feature	S28°15'56.2"; E23°19'18.7"	Conservation
PVIA9	PVIA9	Iron Age	Feature	S28°15'49.6"; E23°19'04.7"	Conservation
PVIA10	PVIA10	Iron Age	Feature	S28°15'46.0"; E23°19'09.4"	Conservation
PVIA11	PVIA11	Iron Age	Feature	S28°15'41.1"; E23°19'07.7"	Conservation
PVIA12	PVIA12	Iron Age	Feature	S28°15'41.2"; E23°19'05.2"	Conservation
PVIA13	PVIA13	Iron Age	Feature	S28°15'40.0"; E23°19'05.4"	Conservation
PVIA14	PVIA14	Iron Age	Feature	S28°15'41.3"; E23°19'04.0"	Conservation
PVIA15	PVIA15	Iron Age	Feature	S28°15'47.3"; E23°18'51.9"	Conservation
PVIA16	PVIA16	Iron Age	Feature	S28°15'43.4"; E23°18'49.2"	Conservation
PVIA17	PVIA17	Iron Age	Feature	S28°15'42.2"; E23°18'48.4"	Conservation
PVIA18	PVIA18	Iron Age	Farmstead	S28°15'41.4"; E23°18'48.6"	Conservation
MVIA1	MVIA1	Iron Age	Cemetery	S28°15'14.1"; E23°18'46.2"	Conservation
MVIA2	MVIA2	Iron Age	Village	S28°16'37.6"; E23°18'56.2"	Conservation
MVIA3	**MVIA3**	**Iron Age**	**Cemetery**	**S28°16'45.3"; E23°18'26.0"**	**Conservation**
MVIA4	MVIA4	Iron Age / Cont.	Cemetery	S28°16'56.7"; E23°19'45.4"	Conservation
MVIA5	MVIA5	Iron Age	Cemetery	S28°16'21.2"; E23°20'09.5"	Conservation
MVCP1	MVCP1	Colonial Period	Railway Station	S28°16'28.0"; E23°20'11.1"	Conservation

Table 4: Known heritage resources situated on Groenwater 453 and their associated heritage status quo under the proposed *Metsimatala CSP 150MW Solar Energy Facility* proposal (adapted from Van Ryneveld 2012)

2.3.1) Field Assessment Results

The proposed approximate 500ha *Metsimatala CSP 150MW Solar Energy Facility* study site overlaps the former proposed 50MW CSP study site (210ha). A single archaeological and cultural heritage site, as defined and protected by the NHRA 1999 and previously identified pertains (van Ryneveld 2012); Site MVIA3, a Later Iron Age (LIA) / contemporary cemetery is situated adjacent to the proposed study site at the northern perimeter of Metsimatala Village. The site will not be impacted by development.

Results of the 500ha study site field assessment are similar to that previously recorded for the area. The general terrain is characterized by a number of low rising dolerite outcrops, with the geological substrate, also the inferred anthropogenic basal member, a combined dolerite and banded iron stone 'pebble' member surfacing at intervals. A low density of Stone Age artefacts are present on the surface of the site, mainly found within the surfacing 'pebble' member. Artefact densities are too low to ascribe an artefact ratio (artefacts: m²) to the occurrence. Artefacts are primarily ascribed to the later Middle Stone Age (MSA) and the macrolithic Later Stone Age (LSA) based on typology and artefact size. Artefacts are produced from mixed raw material sources, including medium to fine grained dolerite, banded iron stone, jasperlite, baked shale, quartzitic material and including a few siliceous pieces. A borrow pit (BP – S28°18'01.0"; E23°17'43.1") towards the south of the study site indicate that low densities of artefacts may well be encountered to a level of approximately 30-40cm in depth, following the sub-surface dip of the geological substrate. It is recommended that development proceed across the proposed 500ha *Metsimatala CSP 150MW Solar Energy Facility* study site without the developer having to apply for a SAHRA Site Destruction Permit for the low density Stone Age occurrence.

2.3.1.1) 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) and comprises a Later Iron Age / contemporary cemetery situated at the northern extremity of Metsimatala Village and adjacent to the proposed *Metsimatala CSP 150MW Solar Energy Facility* study site. 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 based on immediate proximity to the Metsimatala study site 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.

2.3.2) Conclusion

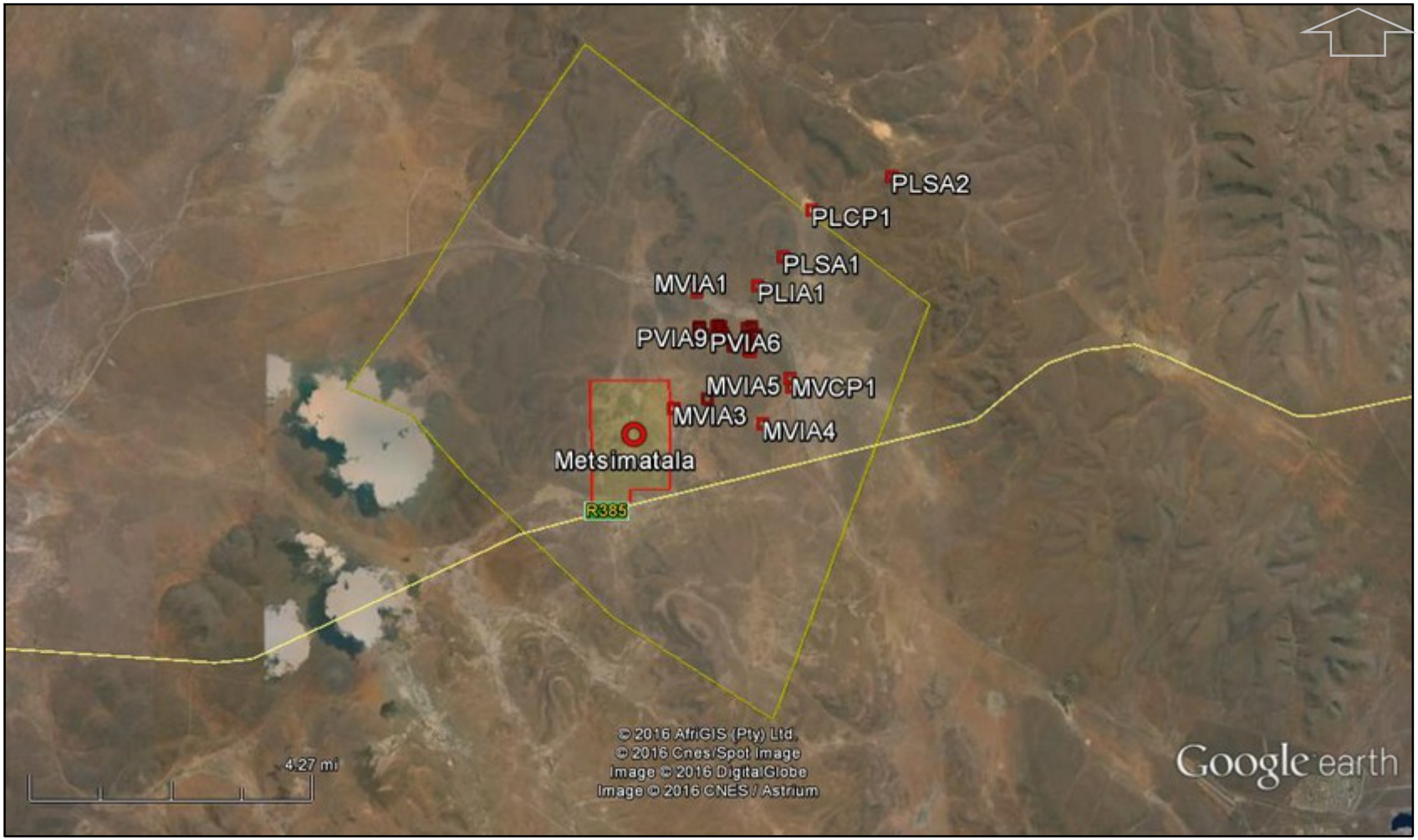
The *Metsimatala CSP 150MW Solar Energy Facility* can be described as a 'safe' development proposal with reference to archaeological and cultural heritage resources, as defined and protected by the NHRA 1999. Development will impact on a low density Stone Age occurrence, with artefact densities too low to ascribe an artefact ratio (artefacts: m²); accordingly a heritage site significance rating cannot be assigned thereto. One archaeological and cultural heritage resource, as defined and protected by the NHRA 1999, Site MVIA3, a LIA / contemporary cemetery, is situated adjacent to the study site towards

the northern extremity of Metsimatala Village. The site will not be impacted by development, but additional conservation measures, ensuring the formal conservation of the site are recommended. All other previously recorded heritage sites and features situated on Groenwater 453 will be conserved.

The proposed *Metsimatala CSP 150MW Solar Energy Facility* will have little to no impact on the recorded cultural landscape:

- The most significant Stone Age site recorded to date, Site PVSA 4 (S28°15'48.2"; E23°18'48.2"), a MSA and LSA site (fairly extensive artefact lense or member) characterised by a high density of lithic artefacts with mitigatory or further excavation and research potential is situated approximately 1.3km north, north-east of the northern extremity of the Metsimatala study site and within the dolerite hill outcrop band characterising the area north of the proposed study site; by virtue of location shielded by terrain and landscape gradient from visual impact from the development.
- The cultural landscape of Old Metsimalata Village, Site MVIA2 (S28°16'37.6"; E23°18'56.2"), and PVIA1-PVIA18, largely remains of farming small holdings on the outskirts of the former village, with Site MVIA2 being the most significant recorded LIA site to date, not only pertaining to heritage resources recorded on Groenwater 453, but within the approximate 25km radius from the Metsimatala study site, will be conserved; again by virtue of location, being situated at the foot of a large dolerite hill approximately 1km east of the Metsimatala study site. Contemporary Metsimatala village, located basically between the proposed *Metsimatala CSP 150MW Solar Energy Facility* and Old Metsimatala Village forms an interesting transition between the past, the very origins, heritage and 'sense of place' of the Thlaping of Old Metsimatala Village, with Site MVIA3 concrete testimony thereto, and the future green, economic sustainability of the people thereof, represented by the proposed *Metsimatala CSP 150MW Solar Energy Facility* itself. [No LIA / contemporary cemeteries will be directly impacted, despite proximity of the MVIA3 cemetery to the Metsimatala study site.]

In accordance with the above described development impact (or rather lack thereof) on the cultural landscape of Groenwater 453, it can reasonably be concluded that little to no negative cumulative impact will result from the proposed *Metsimatala CSP 150MW Solar Energy Facility* development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA 1999. The proposed development will in fact be contributory to living heritage, ensuring the sustainability of the Thlaping on their land; tribal, by virtue of their recorded history on the property, but with the prospect of a green, economically sustainable future.



Map 5: Spatial distribution of recorded archaeological and cultural heritage resources in relation to the *Metsimatala CSP 150MW Solar Energy Facility* study site

Map 6: Map of the proposed *Metsimatala CSP 150MW Solar Energy Facility* study site, indicating the locality of Site MVIA3 (and MVIA2) in relation thereto

Plate 1: General view of the *Metsimatala CSP 150MW Solar Energy Facility* study site [1]

Plate 2: General view of the *Metsimatala CSP 150MW Solar Energy Facility* study site [2]

Plate 3: General view of the *Metsimatala CSP 150MW Solar Energy Facility* study site [3]

Plate 4: General view of the *Metsimatala CSP 150MW Solar Energy Facility* study site [4]

Plate 5: Low density Stone Age lithics present on the surface of the Metsimatala study site

Plate 7: View over the historical portion of the MVIA3 cemetery

Plate 6: View over the contemporary portion of the MVIA3 cemetery

Plate 8: Close-up of the historical portion of the VMIA3 cemetery

3 – Environmental Impact Assessment Rating

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 irreplaceable 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) x P.

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

- <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.

Environmental Impact	Site Number	Environmental Significance																
		Before Mitigation									After mitigation							
		M	D	E	I	R	P	SP	S	C	M	D	E	I	R	P	SP	S	C
Conservation of cemetery site(s)	Sites: MVIA3	-4	2	1	3	4	3	-42	M	-M	+2	1	1	0	0	2	+8	L	+L
	Comment: Cemetery sites situated in proximity to the proposed development that will be conserved within the current proposed layout																		
	Summary of mitigation points: MVIA3: Permanent conservation (permanent fence with access gate)																		

Table 5: Environmental Impact Assessment Rating – *Metsimatala 150MW CSP Solar Energy Facility*

With reference to archaeological and cultural heritage compliance, as per the requirements of the NHRA 1999, it is recommended that the proposed *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, 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.
- All recorded archaeological and cultural heritage resources comprise known sites. No new archaeological or cultural heritage resources were recorded during the 2016 field assessment.
- Site MVIA3, a Later Iron Age (LIA) / contemporary cemetery, situated immediately adjacent to the Metsimatala study site should be formally conserved (permanent fence with access gate).
- Little to no negative cumulative impact will result from the proposed *Metsimatala CSP 150MW Solar Energy Facility* development on recorded archaeological and cultural heritage resources, as defined and protected by the NHRA 1999. The proposed development will in fact be contributory to living heritage, ensuring the sustainability of the Thlaping on their land; tribal, by virtue of their recorded history on the property, but with the prospect of a green, economically sustainable future.
- [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.]

Heritage Compliance Summary – Metsimatala CSP 150MW Solar Energy Facility, Groenwater No 453, (near Postmasburg), Siyanda District Municipality, Northern Cape			
Map Code	**Site**	**Co-ordinates**	**Recommendations**
Metsimatala CSP 150MW Solar Energy Facility (S28°17'06.0"; E23°17'51.3")			
MVIA3	Later Iron Age (LIA) / contemporary – Cemetery	S28°16'45.3"; E23°18'26.0"	**Permanent conservation (permanent fence with access gate)**

Table 6: Summarized heritage compliance requirements for the proposed *Metsimatala CSP 150MW Solar Energy Facility*, Groenwater No 453, near Postmasburg, Siyanda District Municipality, Northern Cape

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.

5 – Acronyms & Abbreviations

AD	: Anno Domini (the year 0.)
AIA	: Archaeological Impact Assessment
BAR	: Basic Assessment Report
BC	: Before the Birth of Christ (the year 0.)
BCE	: Before the Common Era (the year 0.)
BID	: Background Information Document
BP	: Before the Present (the year 1950.)
cm	: Centimeter
CRM	: Cultural Resources Management
DEA	: Department of Environmental Affairs
ECO	: Environmental Control Officer
EAP	: Environmental Assessment Practitioner
EIA	: Environmental Impact Assessment
EIA_1	: Early Iron Age
EMPr	: Environmental Management Plan / Program report
ESA	: Earlier Stone Age
ha	: Hectare
HIA	: Heritage Impact Assessment
km	: Kilometer
Kya	: Thousands of years ago
LIA	: Later Iron Age
LSA	: Later Stone Age
m	: Meter
m^2	: Square Meter
MIA	: Middle Iron Age
mm	: Millimeter
MSA	: Middle Stone Age
Mya	: Millions of years ago
NEMA (1998)	: National Environmental Management Act, No 107 of 1998
NHRA (1999)	: National Heritage Resources Act, No 25 of 1999
PHRA	: Provincial Heritage Resources Authority
PPP	: Public Participation Process
SAHRA	: South African Heritage Resources Agency
SAHRIS	: South African Heritage Resources Information System

6 – References

1. Becker, E. 2011. (Envass Environmental). *Archaeological Impact Assessment. Technical Report prepared for Metsimatala Village, Portion 3, 4 and 5 of the Farm Groenwater 453, Postmasburg, Northern Cape.*

2. Becker, E. 2012. (Hatch). *Transnet Capital Projects: Ngqura 16Mtpa Manganese Rail. Phase 1 Heritage Impact Assessment Kimberley to De Aar*.

3. Dreyer, C. 2007. (Private). *Archaeological and Historical Investigation of the Proposed Mining Activities at the Farm Rosslyn, Lime Acres, Northern Cape*.

4. Fourie, W. 2011. (PGS). *Solar Reserve SA (Pty) Ltd. Hermansrus Solar Thermal Energy Power Plant, Postmasburg – Heritage Impact Report*.

5. Fourie, W. 2012a. (PGS). *Solar Reserve SA (Pty) Ltd. 132kV Power Line Connection to the Hermansrus Solar Thermal Energy Power Plant, Postmasburg, Northern Cape Province – Heritage Impact Report*.

6. Fourie, W. 2012b. (PGS). *Solar Reserve SA (Pty) Ltd. Proposed Construction of 132kV Power Line on Switchyard Associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province – Heritage Impact Assessment.*

7. Henderson, Z.L. 2005. (National Museum Bloemfontein). *Cultural Heritage Assessment for Finsch Mine.*

8. http://africanlanguages.com/south_africa/place_names_sagns.html [Accessed March 2016].

9. http://en.wikipedia.org/wiki/Tswana_people [Accessed March 2016].

10. http://en.wikipedia.org/wiki/Okiep [Accessed March 2016].

11. http://wikipedia.org/wiki/Diamond_Fields [Accessed March 2016].

12. http://www.eisha.co.za [Accessed March 2016].

13. https://en.wikipedia.org/wiki/List_of_Heritage_Sites_in_Northern_Cape [Accessed March 2016].

14. Hutton, L. & Hutton, M. 2013. (Private). *Heritage Impact Assessment Report for the Farms Plaas 438 Portion 1 and Plaas 588 RE.*

15. Hutton, M. 2014. (PGS). *Solar Reserve SA (Pty) Ltd – Proposed Construction of Two 132kV Power Lines and Switchyards to Connect the Redstone Solar Thermal Energy Plant to the Olien Substation in the Z.F. Ngcawu District Municipality in the Northern Cape Province – Option 1: Redstone Solar Thermal Energy Plant to Olien Substation*.

16. Morris, D. 2008. (McGregor Museum, KBY). *Archaeological and Heritage Impact Assessment on Remainder of Carter Block 458, near Lime Acres, Northern Cape.*

17. Morris, D. & Beaumont, P.B. 1994. (McGregor Museum, KBY). *Ouplaas 2 Rock Engravings, Danielskuil*.

18. South African Government. (No. 107 of) 1998. *National Environmental Management Act*.

19. South African Government. (No. 25 of) 1999. *National Heritage Resources Act*.

20. South African Heritage Resources Agency. 2007. *Minimum Standards for the Archaeological and Heritage Components of Impact Assessments.* (Unpublished guidelines.)

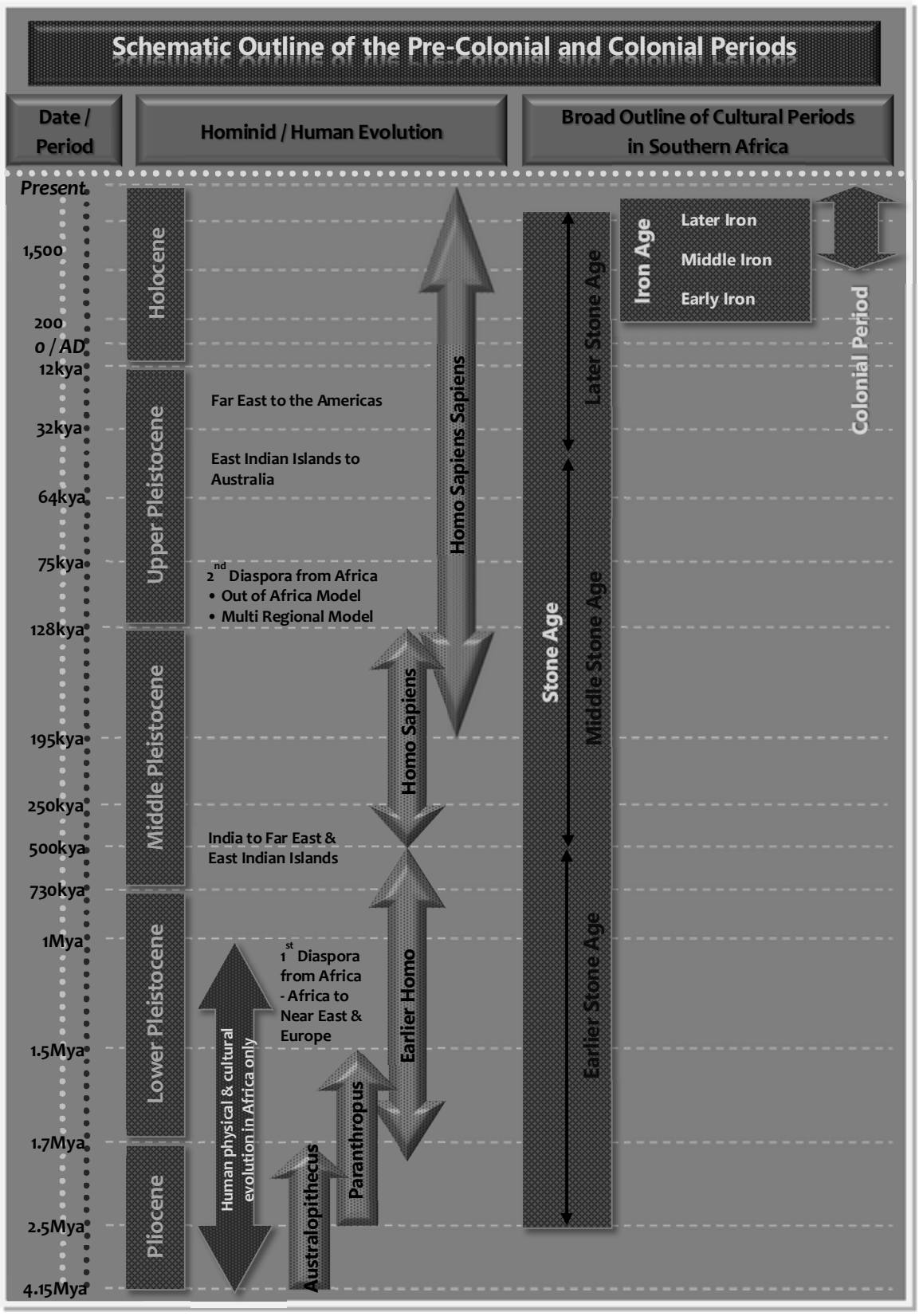
21. Van Ryneveld, K. 2005. (McGregor Museum, KBY). *Cultural Heritage Site Inspection Report for the purpose of a Prospecting Right EMP – (Portion of) Skeyfontein 536, Postmasburg District, Northern Cape, South Africa.*

22. Van Ryneveld, K. 2012. (ArchaeoMaps). *Phase 1 Archaeological Impact Assessment – Metsimatala Solar Project, Groenwater 453, Siyanda District Municipality, Northern Cape, South Africa.*

23. Van Vollenhoven, A.C. 2014. (Archaetnos). *A report on a Heritage Impact Assessment for the proposed Eskom Kimberley Strengthening Phase 4 Project between the Ulco, Olien and Mangalore Substations in the Northern Cape Province.*

24. Webley, L.E. 2010. (ACO). *Heritage Impact Assessment of proposed Groenwater Solar Array, Northern Cape Province.*

Appendix A:


Schematic Outline of the Pre-Colonial and Colonial Periods
Date / Period
Hominid / Human Evolution
Broad Outline of Cultural Periods in Southern Africa
Present
1,500
200
0 / AD
12kya
32kya
64kya
75kya
128kya
195kya
250kya
500kya
730kya
1Mya
1.5Mya
1.7Mya
2.5Mya
4.15Mya
Holocene
Upper Pleistocene
Middle Pleistocene
Lower Pleistocene
Pliocene
Far East to the Americas
East Indian Islands to Australia
2nd Diaspora from Africa
• Out of Africa Model
• Multi Regional Model
India to Far East & East Indian Islands
1st Diaspora from Africa - Africa to Near East & Europe
Human physical & cultural evolution in Africa only
Homo Sapiens Sapiens
Homo Sapiens
Earlier Homo
Paranthropus
Australopithecus
Stone Age
Later Stone Age
Middle Stone Age
Earlier Stone Age
Iron Age
Later Iron
Middle Iron
Early Iron
Colonial Period

Appendix B:

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. Kingships 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 indicates 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.* 1994).

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. africanus, 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 2.3Mya 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. ergaster 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. ergaster* 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. ergaster* 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 40-27/23kya 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 1982; 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.* 1993; Nitecki & Nitecki 1994).

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; Hensilwood & 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

Artefacts characteristic of the Later Stone Age (LSA) appear in the archaeological record from 40/27-23kya and incorporates micolithic as well as macrolithic assemblages. Artefacts were produced by modern *H. sapien* or *H. sapien sapien*, 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 (2kya 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 skin-working 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, tortoiseshell 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 selected stone tools linked to the practice of hafting for composite tools production; and
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 the 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 Kwale 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 (strething from Angola through western Zambia, Botswana and Zimbabwe into South Africa).

In southern Africa, recent work distinguishes two phases of the Kwale branch: The earlier Silver Leaves facies (250-430AD) occurring as far south as the Northern Province. The later expression or Mzonjani facies (420-580AD) occurs in the Northern Province a well as along the KwaZulu-Natal coastal belt (Huffman 1998). Since the Silver Leaves facies is only slightly younger than the Kwale type site in Kenya, very rapid movement along the coast, perhaps partly by boat, is inferred (Klapwijk 1974). Subsequently (550-650AD) people making Mzonjani 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. Ziwa represents an early facies, with Gokomere deriving jointly from Ziwa and Bambata. A subsequent phase is represented by the Zhizo facies of the Shashe-Limpopo basin, and by Taukome (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 Mpumalanga (Prinsloo 1974, 1989). Later phases are present at the Lydenburg Heads site (Whitelaw & Moon 1996) and by the succession of Mzuluzi, Ndondonwane and Ntshekane in KwaZulu-Natal (7th – 10th Centuries) (Prins & Grainger 1993). Later Kalundu facies include Klingbeil and Eiland in the northern part of the country (Evers 1980) with Kgopolwe being a lowveld variant in Mpumalanga (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 continents 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 S33° (Maggs 1994); sites such as Canasta Place (800AD), Eastern Cape, mark the southern-most limit of Early Iron Age settlement (Nogwaza 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 rulers confirming sub-ordination and redistribution as loan cattle by the ruler to gain political support. Cattle represented healing and fertilizing qualities (Huffman 1998; 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 30,000km^2. 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 typography 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 1200's 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 Soutpansberg, 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 Zimbabwe tradition. However, together they form the background to the cataclysmic events of the late 18th / early 19th Century *Mfecane* (Mitchell 2002).

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 Mpambanyoni 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 (1989) argues that similarities between Blackburn and early Maloko wares imply a related origin, presumably in the Chifumbaze 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 to 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 dolorite to produce hard binding *daga* for house floors and a 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 benign 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 1979).

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 (Feely 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 Hurutshe, whose population of 20,000 in 1820 almost equals contemporary Cape Town in size (Boeyens 2000). The agglomeration of Tswana settlements in the north of the country was fuelled by both population growth and conflict over access to elephant herds 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 Zambezi: 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.

Competition for access to overseas trade encouraged some leaders to replace locally organized circumcision schools and age-sets with more permanently maintained military regiments. These were now used to gain access through warfare to land, cattle and stored food. By 1810 three groups, the Mthethwa, Ndwandwe and Ngwane dominated northern KwaZulu-Natal (Wright 1995). The Mthethwa paramountcy was undermined by the killing of its leader Dingiswayo in *circa* 1818, which led to a brief period of Ndwandwe 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 Ndwandwe 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

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 1991).

Portuguese maritime expansion began around the time of Zheng He's voyages; motivated by a desire to establish a sea route to the riches of the Far East. By 1485 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 Indian 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 shortages of capital and labor, and free burghers turned to wheat cultivation and livestock farming. While the population grew slowly the area of settlement expanded rapidly with new administrative centers established at Stellenbosch (1676), Swellendam (1743) and Graaf-Reinet (1785). By the 1960's the Colony's frontier was too long to be effectively policed by VOC officials (Elphick 1985).

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 KhoiSan 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 Mpondo. The frontier wars 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 - 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

1. Aitken, M.J., Stringer, C.B. & Mellars, P.A. (eds). 1993. *The origin of modern humans and the impact of chronometric dating*. Princeton: Princeton University Press
2. Auret, C. & Maggs, T.M.O'C 1982. *The great ship São Bento: remains from a mid-sixteenth century Portuguese wreck on the Pondoland coast*. Annals of the Natal Museum 25:1-39
3. Beaumont, P.B. 1973. *The ancient pigment mines of South Africa.* South African Journal of Science 69: 41-46
4. Binneman, J.N.F. & Beaumont, P.B. 1992. *Use-wear analysis of two Acheulean handaxes from Wonderwerk Cave, Northern Cape.* South African Field Archaeology 1:92-97
5. Boeyens, J.C.A. 2000. *In search of Kadishwene.* South African Archaeological Bulletin 55:3-17
6. Brauer, G. 1982. *Early anatomically modern man in Africa and the replacement of the Mediterranean and European Neanderthals*. In De Lumley, H. (ed) L'Home erectus et la place de l'homme de tautavel parmi les hominids fossils. Nice: Centre National de la Recherche Scientifique
7. Cann, R.L., Rickards, O. & Lum, J.K. 1994. *Mitochondrial DNA and human evolution: our one lucky mother*. Nature 325: 31-36
8. Campbell, A.C. 1991. *The riddle of the stone walls.* Botswana Notes and Records 23:243-249
9. Clarke, R.J. 1999. *A discovery of complete arm and hand of the 3.3 million year old Australopithecus skeleton from Sterkfontein.* South African Journal of Science 95:447-480
10. Dart, R.A. 1925. *Australopithecus africanus: the man-ape of South Africa.* Nature 115:195-199
11. Davenport, T.R.H. & Saunders, C. 2000. *South Africa: A modern history*. London: Macmillan
12. Davies, O. 1971. *Excavations at Blackburn.* South African Archaeological Bulletin 26: 165-178
13. Deacon, H.J. 1970. *The Acheulian occupation at Amanzi Springs, Uitenhage District, Cape Province.* Annals of the Cape Provincial Museums 8:89-189
14. Deacon, J. 1984. *Later Stone Age people and their descendants in southern Africa*. In Klein, R.G. (ed). Southern Africa prehistory and paleoenvironments. Rotterdam: A.A. Balkema
15. Deacon, H.J. & Deacon., J. 1999. *Human Beginnings in South Africa. Uncovering the Secrets of the Stone Age.* Cape Town: David Phillip Publishers
16. Deacon, J. & Dowson, A.D. (eds.) 2001. *Voices from the past. /Xam Bushmen and the Bleek and Lloyd Collection.* Johannesburg: Witwatersrand University Press
17. Eloff, J.F. & Meyer, A. 1981. *The Greefswald sites*. In Voigt, E.A. (ed) Guide to archaeological sites in the northern and eastern Transvaal. Pretoria: South African Association of Archaeologists
18. Elphick, R. 1985. *Khoikhoi and the founding of white South Africa.* Johannesburg: Ravan Press
19. Evers, T.M. 1980. *Klingbeil Early Iron Age sites, Lydenburg, Eastern Transvaal, South Africa.* South African Archaeological Bulletin 35:46-57
20. Feeley, .M. 1987. *The early farmers of Transkei, southern Africa, before AD 1870.* Oxford: British Archaeology Reports
21. Foley, R.A & Lahr, M.M. 1997. *Mode 3 technologies and the evolution of modern humans*. Cambridge Archaeological Journal 7:3-36
22. Goodwin A.J.H. & van Riet Lowe, C. 1929. *The Stone Age cultures of South Africa*. Annals of the South African Museum 27:1-289
23. Hall, M. & Maggs, T.M.O'C. 1979. *Nqabeni: a later Iron Age site in Zululand*. South African Archaeological Society Goodwin Series 3:159-176
24. Hensilwood, C. & Sealy, J.C. 1997. *Bone artefacts from the Middle Stone Age at Blombos Cave, southern Cape, South Africa.* Current Anthropology 38:390-395
25. Huffman, T.N. 1980. *Ceramics, Classification and Iron Age Entities.* African Studies 39:123-174
26. Huffman, T.N. 1989. *Ceramics, Settlements and Late Iron Age Migrations*. African Archaeological Review 7: 155-182
27. Huffman, T.N. 1986. *Iron Age Settlement Patterns and the Origin of Class Distinction in Southern Africa.* Advances in World Archaeology 5:291-338
28. Huffman, T.N. 1994. Toteng Pottery and the Origins of Bambata. Southern African Field Archaeology 3:3-9
29. Huffman, T.N. 1998. *The Antiquity of Lobola.* South African Archaeological Bulletin 53:57-62
30. Keyser, A., Menter, C.G., Moggi-Cheggi, J., Pickering T.R, & Berger, L.R. 2000. *Drimolen: A New Hominid Bearing Site in Gauteng, South Africa.* South African Journal of Science 96:193-197
31. Klapwijk, M. 1974. *A Preliminary Report on Pottery from the North-Eastern Transvaal, South Africa*. South African Archaeological Bulletin 29:19-23
32. Klein, R.G. 1999. *The Human Career: Human Biological and Cultural Origins.* Chicago: University of Chicago Press
33. Kuman, K, Field, A.S. & Thackeray, J.F. 1997. *Discovery of New Artefacts at Kromdraai.* South African Journal of Science 93: 187-193
34. Kuper, A. 1980. *Symbolic Dimensions of the Southern Bantu Homestead.* Africa 1:8-23
35. Leakey, M.G., Feibel, C.S., McDougall, I & Walker, A.C. 1995. *New Four-Million-Year-Old Hominid Species from Kanopi and Allia Bay, Kenya*. Nature 376:565-57

36. Lewis-Williams, D. & Dowson, T. 1999. *Images of Power. Understanding San Rock Art*. Halfway House: Southern Book Publishers
37. Maggs, T.M.O'C. 1976. *Iron Age communities of the Southern Highveld.* Pietermaritzburg: Natal Museum
38. Maggs, T.M.O'C. 1992. *'My Father's Hammer Never Ceased its' Song Day and Night': The Zulu Ferrous Metalworking Industry*. Natal Museum Journal of Humanities 4:65-87
39. Maggs, T.M.O'C. 1994. *The Early Iron Age in the Extreme South: Some Patterns and Problems*. Azania 29/30:171-178
40. Mellars, P.A. & Stringer, C.B. (eds). 1989. *The Human Revolution: Behavioural and Biological Perspectives on the Origins of Modern Humans.* Edinburgh: Edinburgh University Press
41. Miller, D.E. 1996. *The Tsodilo Jewellery: Metal Work from Northern Botswana*. Cape Town: University of Cape Town Press
42. Milton, J. 1983. *The Edges of War. A History of Frontier Wars (1702-1878)*. Kenwyn: Juta & Co.
43. Mitchell, P. 2002. *The Archaeology of Southern Africa*. Cambridge: Cambridge University Press
44. Meyer, A. 1988. *N Kultuurhistories Interpretasie van die Ystertydperk in die Nasionale Krugerwildtuin*. Phd thesis, University of Pretoria
45. Meyer, A. 1998. *The Archaeological Sites of Greefswald.* Pretoria: University of Pretoria Press
46. More, C. 2000. *Understanding the Industrial Revolution.* London: Routledge
47. Mote, F.W. 1991. *China in the Age of Columbus.* In Levenson, J.A. (ed) Circa 1492: Art in the Age of Exploration. New Haven: Yale University Press
48. Nitecki, M.H. & Nitecki, D.V. (eds). 1994. *Origins of Anatomically Modern Humans.* New York: Plenum
49. Noble, W & Davidson, I. 1996. *Human Evolution, Language and Mind: A Psychological and Archaeological Enquiry*. Cambridge: Cambridge University Press
50. Nogwaza, T. 1994. *Early Iron Age Pottery from Canasta Place, East London District.* South African Field Archaeology 3:103-106
51. Pakenham, T. 1993. *The Illustrated Boer War*. Parklands: Jonathan Ball Publishers.
52. Pistorius, J.C.C. 1992. *Molokwane an Iron Age Bakwena Village. Early Tswana Settlement in the Western Transvaal*. Johannesburg: Perskor Press.
53. Prins, F.E. & Graigner, J.E. 1993. *Early Farming Communities in Northern Transkei: The Evidence from Ntsitsana and Adjacent Areas*. Natal Museum Journal of Humanities 5:153-174
54. Phillipson, D.W. 1977. *The Later Prehistory of Eastern and Southern Africa.* London: Heineman
55. Prinsloo, H. P. 1974. *Early Iron Age Site at Klein Afrika near Wyliespoort, Soutpansberg Mountains, South Africa.* South African Journal of Science 70:27 1-273
56. Prinsloo, H.P. 1989. *Vroe Ystertydperk Terreine in die Soutpansberg.* M.A. Thesis, Universiy of Pretoria
57. Rightmire, G.P. 1976. *Relationships of Middle and Upper Pleistocene Hominids from Sub-Saharan Africa.* Nature 260:238-240
58. Robey, T.S. 1980. *Mpanbanyoni, A Late Iron Age Site on the Natal South Coast.* Annals of the Natal Museum 24:147-164
59. Sibley, C.G. & Ahlquist, J.E. 1884. *The Phylogeny of the Hominid Primates as Indicated by DNA-DNA Hybridization.* Journal of Molecular Evolution 20:2-15
60. Smith, A.K. 1970. *The struggle for the Control of Southern Mozambique* 1720-1835. Ossa 63-96
61. Stringer, C.B. 1985. *Middle Pleistocene Hominid Variability and the Origin of Late Pleistocene Humans.* In Delson, E. (ed) Ancestors: The Hard Evidence. New York: Alan Liss
62. Tobias, P.V. 2000. *The Fossil Hominids.* In Partridge, T.C. & Maud, R,R. The Cenozoic of Southern Africa. Oxford: Oxford University Press
63. Volman T.P. 1984. *Early Prehistory of Southern Africa*. In Klein, R.G. Southern Africa Prehistory and Palaeoenvironments. Rotterdam: A.A. Balkema
64. Vrba, E.S. 1992. *Mammals as a Key to Evolutionary Theory*. Journal of Mammology 73:1-28
65. White, T.D., Suwa, G. & Asfaw, B. 1994. *Australopithecus Ramidus: A New Species of Early Hominid from Aramis, Ethiopia.* Nature 371:306-312
66. Whitelaw, G. 1991. *Precolonial Iron Production around Durban and in Southern KwaZulu-Natal.* Natal Museum Journal of Humanities 3:29-39
67. Whitelaw, G. & Moon, M. 1996. *The Distribution and Ceramics of Pioneer Agriculturists in KwaZulu-Natal.* Natal Museum Journal of Humanities 8:53-79
68. Wilson, M. & Thompson, L. (eds). 1969. *Oxford History of South Africa.* Oxford: Oxford University Press
69. Wright, J.B. 1995. *Political Transformations in the Thukela-Mzimkhulu Region in the Late Eighteenth and Early Nineteenth Centuries*. In Hamilton, C. The *Mfecane* Aftermath: Reconstructive Debates in Southern African History. Johannesburg: Witwatersrand University Press

Appendix C:

Heritage Impact Assessment (HIA) – Metsimatala 150MW CSP Solar Energy Facility, Groenwater No 453, (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-internment / 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

Name:	Karen van Ryneveld	
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 X3, 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

2015-Present	**University of Fort Hare, East London** (*MPhil Environmental Studies*)
2010	**UNISA University, Pretoria** *(Project Management 501)*
2006-2007	**Nelson Mandela Metropolitan University, Port Elizabeth** *(Undergraduate Certificate in Geographical Information Systems)*
2001-2003	**WITS University, Johannesburg** *(MSc Archaeology)*
1999-2000	**University of Pretoria, Pretoria** *(BA Hons. Archaeology)*
1991-1993	**University of Pretoria, Pretoria** *(BA Archaeology & History of Art)*

Courses

2016/01	SPA (Safety Passport Alliance) – Petrol Retail [SA Safety Management Services Training (Pty) Ltd – SMST, Sasolburg, Gauteng]

Employment – Professional Archaeology

2007/04-Present	ArchaeoMaps Archaeological Consultancy [Self-employed] (Archaeologist – CRM)
2006/06-2007/03	National Museum, Bloemfontein (Archaeologist – CRM, Dept. of Archaeology)
2005/04-2006/05	McGregor Museum, Kimberley (Archaeologist – Researcher / CRM, Dept. of Archaeology)
2004/04-2005/01	Amafa aKwaZulu-Natali, Pietermaritzburg (HoD: Archaeology, Paleontology and Meteorites [APM] Unit)
2002/09-2004/03	McGregor Museum, Kimberley (Archaeologist – Researcher / CRM, Dept. of Archaeology)

Employment – Freelance: Ground Penetrating Radar

2015/10-Present	Terra Scan assistant (BCM area, EC) – GPR & underground utilities focussing on the petrol retail (oil & gas) industry [GPR in grave / cemetery sensitive heritage cases – MPhil dissertation research]

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, Ghaap 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

Company Name	: ArchaeoMaps cc
Registration number	: 2005/180719/23
VAT number	: Not VAT Registered
Accountant	: Azima Financial Services, Bloemfontein
Members / Shareholders	: Karen van Ryneveld (100%)
BBBEE status	: Exempted Micro Enterprise (EME)