

- 19 March 2015 -

Attention:

Sello Mokhanya (Eastern Cape Provincial Heritage Resources Authority – EC PHRA)

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RE : Basic Heritage Impact Assessment (HIA) - The Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality, Eastern Cape

The basic Heritage Impact Assessment (HIA) for the proposed Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality, Eastern Cape, was commissioned by Indwe Environmental Consulting to meet the Eastern Cape Provincial Heritage Resources Authority's (EC PHRA) HIA requirements as per Section 38 – Heritage Resources Management, of the National Heritage Resources Act, No 25 of 1999 (NHRA 1999).

The basic HIA for the above mentioned development comprises a:

- o Phase 1 Archaeological Impact Assessment (AIA) – Karen van Ryneveld [MSc Archaeology], ArchaeoMaps cc;
- o Desktop Palaeontological Assessment (PIA) – John Almond [PhD Palaeontology], Natura Viva cc; and a
- o Heritage Protocol for Incidental Finds during the Construction Phase.

Yours faithfully,



Karen van Ryneveld

ArchaeoMaps

(E-mail: kvanryneveld@gmail.com / Cell: 084 871 1064)

Archaeology

**The Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925,
Cove Ridge, East London, Buffalo City Metropolitan Municipality, Eastern Cape**

- 2 March 2015 -

Report to:

Sello Mokhanya (Eastern Cape Provincial Heritage Resources Authority – EC PHRA)

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Prepared by:

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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 –

- 2 March 2015 -

The Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality, Eastern Cape

Executive Summary

Terms of Reference -

Indwe have been appointed as independent EAP by the project proponent, Groot Bokpost (Pty) Ltd, to apply for EA, including a SR, EIA and EMPr reports, to the EC DEDEAT for the proposed *Cove Ridge Estate Mixed-Use Development*, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, Eastern Cape. The study site is situated at general development co-ordinate S33°03'07.3"; E27°48'17.8" and comprises an approximate 22ha area. Development is planned in 3 phases and entails the development of a truck stop, service station, warehousing, commercial and storage space and open space areas.

ArchaeoMaps was appointed by Indwe to coordinate the basic HIA for the *Cove Ridge Estate Mixed-Use Development*. The basic HIA comprises a Phase 1 AIA and a Desktop PIA, including a protocol for heritage finds for the ECO / ELO / construction phase of the development. This report represents the Phase 1 AIA only, with findings and recommendations thereof to be included in the EIA and EMPr.

The Phase 1 Archaeological Impact Assessment -

Project Area: *Cove Ridge Estate Mixed-Use Development*, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, EC; Study site – app. 22ha [1:50,000 Map Ref – 3327BB].

Coverage & Gap Analysis: Pre-feasibility and field assessment.

Field Methodology: One day field assessment; GPS co-ordinates – Garmin GPSmap 62s; Photographic documentation – Pentax K20D. Site significance assessment – SAHRA 2007 system.

Summary:

- No archaeological or cultural heritage developmental 'fatal flaws' identified;
- One (1) archaeological and cultural heritage resource [Site CR2], as defined and protected by the NHRA 1999, is located at the study site;
- [Should any incidental archaeological or cultural heritage resources, as defined and protected by the NHRA 1999, be encountered during the course of development the process described in the 'Heritage Protocol for Incidental Finds during the Construction Phase' should be followed.]

Map Code	Site	Co-ordinates	Recommendations
<i>Cove Ridge Estate Mixed-Use Development, East London</i>			
CR1	Cont. Period – Rocket Stores & Feeds Complex	S33°03'12.8"; E27°48'18.2"	N/A
CR2	Colonial Period – Farmstead	S33°03'12.7"; E27°48'10.9"	Conservation within development layout / design. <ul style="list-style-type: none"> • Current conservation measures comply with EC PHRA minimum site conservation standards; • Additional conservation measures are not recommended
CR3	Cont. Period – Farmstead	S33°03'02.3"; E27°48'17.7"	N/A

Recommendations –

With reference to archaeological and cultural heritage compliance, as per the requirements of the NHRA 1999, it is recommended that the proposed *Cove Ridge Estate Mixed-Use Development*, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, Eastern Cape, proceeds as applied for provided the developer comply with the above listed recommendations.

The EC PHRA 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 - Terms of Reference

Indwe Environmental Consulting cc (Indwe) have been appointed as independent Environmental Assessment Practitioner (EAP) by the project proponent, Groot Bokpost (Pty) Ltd (Groot Bokpost), to apply for Environmental Authorization (EA), including a Scoping (SR), Environmental Impact Assessment (EIA) and Environmental Management Plan (EMPr) reports, to the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (EC DEDEAT) for the proposed *Cove Ridge Estate Mixed-Use Development*, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality (BCMM), Eastern Cape. The study site is situated at general development co-ordinate S33°03'07.3"; E27°48'17.8" and comprises an approximate 22ha area. Development is planned in 3 phases and entails the development of a truck stop, service station, warehousing, commercial and storage space and open space areas.

ArchaeoMaps cc (ArchaeoMaps) was appointed by Indwe to coordinate the basic Heritage Impact Assessment (HIA) for the *Cove Ridge Estate Mixed-Use Development*. The basic HIA comprises a Phase 1 Archaeological Impact Assessment (AIA) and a Desktop Palaeontological Assessment (PIA), including a protocol for heritage finds for the Environmental Control / Liaison (ECO / ELO) / construction phase of the development.

This report represents the Phase 1 AIA only, with findings and recommendations thereof to be included in the EIA and EMPr. Terms of Reference (ToR) for the Phase 1 AIA, with specific reference to archaeological and basic cultural heritage compliance requirements are summarized as:

- Undertake a desktop study and field assessment to identify important archaeological and cultural heritage resources in the area. In particular identify:
 - Potential sites of archaeological and cultural heritage significance (GPS co-ordinates to be provided for planning purposes);
- Identify any potential 'fatal flaws' linked to the proposed development;
- Describe the findings of the study and their potential implications for the proposed project. This should include a description and assessment of the significance of the impacts of the proposed activities on the heritage resources; and
- Provide detailed guideline measures to manage any impacts, particularly during the construction phase but including the implementation phase, and an assessment of their likely effectiveness.

1.1.1) Development Location, Details and Impact

The proposed *Cove Ridge Estate Mixed-Use Development* is situated at general development co-ordinate S33°03'07.3"; E27°48'17.8", with the study site comprising an approximate 22ha area, described as Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, Eastern Cape [1:50,000 Map Ref – 3327BB] (Indwe 2015).

The study site is located within the West Bank Zone of the BCMM, approximately 1.2km west of the East London Airport, bounded by the R346, the Mount Coke Road, to the east, the DR02106 and the Cove Ridge informal settlement to the north-west and by smallholdings and the R72 to the south. The West Bank Local Spatial Development Framework (2004) identifies the area between the R72 and Mount Coke Road / Buffalo Pass Road as a potential second order node, defined as areas where mixed-use developments, including high intensity activities involving retail, office, industrial and residential development can take place specifically considering locality at transport interchanges to provide maximum access and act as catalysts for new growth and development (Indwe 2015).

The properties in question, Portions 21, 22 and 23 of Farm 925, is owned by Creditsmith Capital Partners (Pty) Ltd (Creditsmith). All 3 properties are zoned for Agricultural Use, with the land at present used for small scale agricultural purposes and private residence. The development proposal will include all necessary consolidation and rezoning applications. The change in the use of the properties from Agricultural to Mixed-Use will ensure investment and improvement to the property in accordance with municipal development plans. The proposed Mixed-Use development

supports development principles of spatial sustainability and spatial efficiency by optimizing the use of land and resources, limiting urban sprawl and protecting environmentally sensitive areas (Indwe 2015).

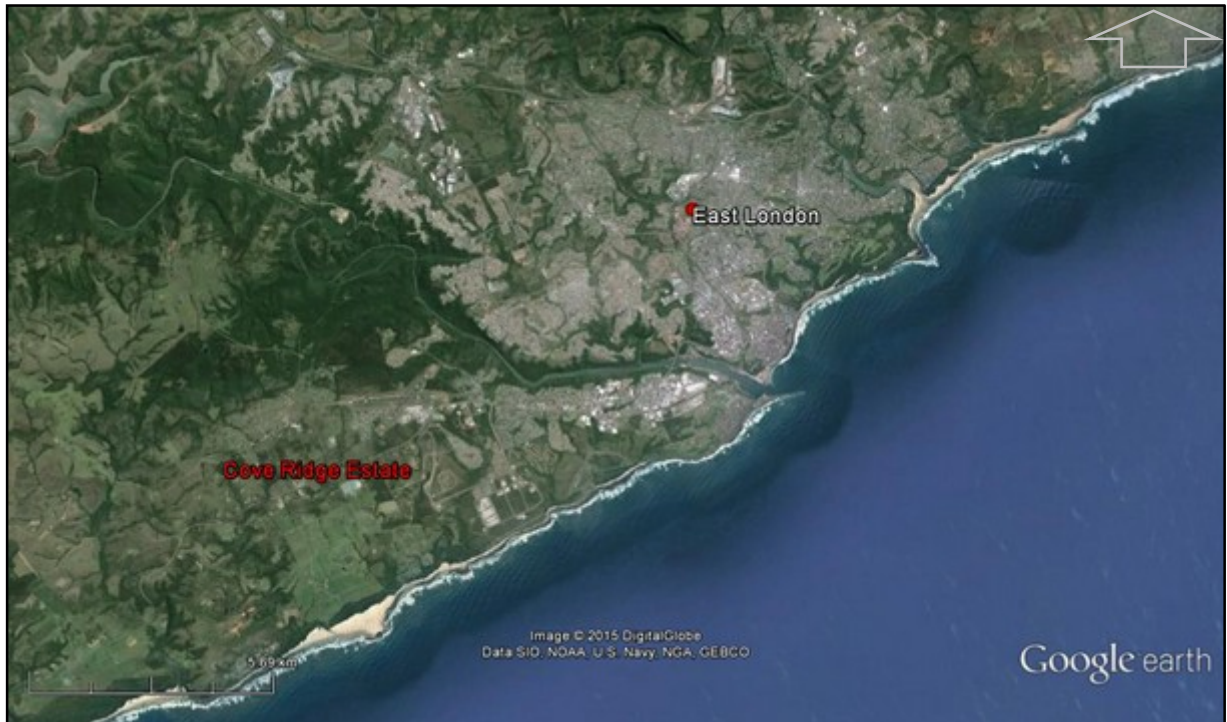
Further with reference to the West Bank Local Spatial Development Framework (2004), the proposed *Cove Ridge Estate Mixed-Use Development* supports proposals for Mixed-Use development in the West Bank Zone, primarily with reference to industrial uses to the east of the study site, the nearby Industrial Development Zone (IDZ) and the high density residential areas proposed around the airport and the Nordev restitution project. Mixed-Uses specified include shops, offices and service industries, but would not include conflicting uses like panel beating shops / enterprises, tyre fitment centres etc. (Indwe 2015).

The proposed *Cove Ridge Estate Mixed-Use Development* will be implemented in 3 phases (Indwe 2015):

- **Portion 21 of Farm 925:**
Development will comprise the construction of 7 warehouses.
- **Portion 22 of Farm 925:**
Development will comprise the construction of a service station, truck stop and a number of commercial building premises. (Development of the service station and truck stop is in accordance with the BCMM's Freight Transport Plan which indicates that no filling stations with truck stops are located on the main routes into the city or existent on the outskirts or the urban edge of East London).
- **Portion 23 of Farm 925:**
Development will comprise the construction of business storage units and commercial building premises.

Development will include the provision of bulk services (water supply, electricity and stormwater). The study site falls outside the current reticulated areas of the BCMM – no municipal services are in place. Water supply will most likely be serviced by the Fort Grey Reservoir Supply Zone. An inceptor sewer from the existing Zamnyama inceptor or a privately operated pump station and rising main which will connect to the Willowpark inceptor will provide sewerage services. Solid waste will be collected on a weekly basis by the BCMM for disposal at the nearest waste disposal site. Existing electrical infrastructure will need to be upgraded and the single access point off Buffalo Pass may in future need to be upgraded to accommodate anticipated traffic growth (Indwe 2015).

Phase 1 AIA – The Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, Eastern Cape



Map 1: General locality of the proposed Cove Ridge Estate Mixed-Use Development, Cove Ridge, East London, BCMM, Eastern Cape [1]



Map 2: General locality of the proposed Cove Ridge Estate Mixed-Use Development, Cove Ridge, East London, BCMM, Eastern Cape [2]



Map 3: Locality of the proposed Cove Ridge Estate Mixed-Use Development study site, Cove Ridge, East London, BCMM, Eastern Cape [1:50,000 Map Ref – 3327BB]

2 - The Phase 1 Archaeological Impact Assessment

2.1.1) Archaeological Legislative Compliance

The Phase 1 Archaeological Impact Assessment (AIA) for the proposed *Cove Ridge Estate Mixed-Use Development*, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, Eastern Cape, was requested to meet the Eastern Cape Provincial Heritage Resources Authority's (EC PHRA) requirements with reference to archaeological and basic cultural heritage resources in terms of the National Heritage Resources Act, No 25 of 1999 (NHRA 1999), with specific reference to Section 38(1)(a), 38(1)(c)(i), 38(1)(c)(ii) and 38(1)(d).

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 cultural heritage resources, inclusive of archaeological deposits / sites, built structures older than 60 years, burial grounds and graves, graves of victims of conflict and basic cultural landscapes or views as defined and protected by the NHRA 1999, that may be affected by the development.

This report comprises a Phase 1 AIA, including a basic pre-feasibility study and field assessment only.

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

- o 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:

- o The pre-feasibility assessment is based on the Appendices A and B introductory archaeological literature. In addition the SAHRA 2009 Mapping Project Database (MPD), SAHRIS and the SAHRA Database on declared Provincial Heritage Sites (PHS) – Eastern Cape, were consulted. The study excludes consultation of museum and university databases.
- o The field assessment was done over a 1 day period (2015-02-23) 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 GPSmap 62s (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.

Archaeological and cultural heritage site significance assessment and associated mitigation recommendations were done according to the system prescribed by SAHRA (2007).

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

2.1.3) Assessor Qualification & Accreditation

Karen van Ryneveld (ArchaeoMaps):

- Qualification: MSc Archaeology (2003) WITS University, Johannesburg / Certificate GIS (2007) NMMU University, Port Elizabeth.
- Accreditation: Association of Southern African Professional Archaeologists (ASAPA) accredited Cultural Resources Management (CRM) practitioner [member nr – 163]
 1. 2004 – Association of Southern African Professional Archaeologists (ASAPA) – Professional Member.
 2. 2005 – ASAPA CRM Section: Accreditation – Field Director (Stone Age, Iron Age, Colonial Period).
 3. 2010 – ASAPA CRM Section: Accreditation – Principle Investigator (Stone Age).

Karen van Ryneveld is a SAHRA / AMAFA / EC PHRA / HWC listed CRM archaeologist.

Karen has been involved in CRM archaeology since 2003 and has been the author (including selected co-authored reports) of more than 300 Phase 1 AIA studies. Phase 1 AIA work is centered 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 and heritage 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).

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 sites situated within or in direct proximity to the Cove Ridge Estate Mixed-Use Development study site can briefly be described as:

Archaeological and Basic Cultural Probability Assessment – Cove Ridge Estate Mixed-Use Development, East London, BCMM, Eastern Cape			
Primary Type / Period	Sub-Period	Sub-Period Type Site	Probability
EARLY HOMININ / HOMINID	-	-	Low
	Graves / Human remains: High scientific significance		
STONE AGE	Earlier Stone Age (ESA)		Low
	Middle Stone Age (MSA)		Low-Medium
	Later Stone Age (LSA)		Low-Medium
		Rock Art	None
		Shell Middens	Low-Medium
	Graves / Human remains: ESA & MSA – High scientific significance; LSA – High scientific & social significance		
IRON AGE	Early Iron Age (EIA)		Low-Medium
	Middle Iron Age (MIA)		None
	Later Iron Age (LIA)		Medium-High
	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	None
		Apartheid & Struggle	None-Low
	Graves / Human Remains: Medium-high scientific & high social significance		

Table 3: Archaeological and basic cultural probability assessment

2.2.2) The SAHRA 2009 MPD & SAHRIS

A number of archaeological Cultural Resources Management (CRM) reports are recorded in the SAHRA 2009 Mapping Project Database (MPD), situated within an approximate 30km radius from the Cove Ridge Estate Mixed-Use Development study site, listed as:

- Binneman, J. (Albany Museum). 2005. *Archaeological Heritage Impact Assessment for the proposed Gqunubie Valley Golf Estate*.
- Binneman, J. & Webley, L.E. (Albany Museum). 1996. *Proposed Eastern Cape Zinc and Phosphoric Acid Project: Baseline Report: Sensitivity of Cultural Sites*.
- Coetzee, F.P. (UNISA). 2008. *Cultural Heritage Survey for Nungu Trading 672 (Pty) Ltd Prospecting Application, East London, Eastern Cape*.
- Van Ryneveld, K. (ArchaeoMaps). 2007. *Phase 1 Archaeological Impact Assessment: Mnt. Coke Eco-residential and Golf Estate, East London, Eastern Cape, South Africa*.
- Van Ryneveld, K. (ArchaeoMaps). 2008a. *Phase 1 Archaeological Impact Assessment: Proposed Pipeline, Portion of Farm 1008, Winterstrand, East London, Eastern Cape, South Africa*.
- Van Ryneveld, K. (ArchaeoMaps). 2008b. *Phase 1 Archaeological Impact Assessment: Hotel and Conference Center Development, Portion 2 of Farm 992, Cove Rock, East London, Eastern Cape, South Africa*.
- Van Ryneveld, K. (ArchaeoMaps). 2008c. *Phase 1 Archaeological Impact Assessment: Cove Rock Golf Estate, Cove Rock, East London, Eastern Cape, South Africa*.

- Van Ryneveld, K. (ArchaeoMaps). 2008d. *Letter of Recommendation: Exemption from a Phase 1 Archaeological Impact Assessment (AIA) for the Beachfront adjoining the Cove Rock Golf Estate and Hotel and Conference Center Development, Cove Rock, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008e. *Phase 1 Archaeological Impact Assessment: Residential Development, Portions 1 & 4 of Farm 1245, Cove Rock, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008f. *Phase 1 Archaeological Impact Assessment: Residential Development, Farm 960, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008g. *Phase 1 Archaeological Impact Assessment: Rezoning and Subdivision for Mixed-use Development, Farm 939, Cove Rock, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008h. *Phase 1 Archaeological Impact Assessment: Warehousing and Light Industrial Development, Farm 922, Cove Rock, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008i. *Phase 1 Archaeological Impact Assessment: Development of a Shopping Mall and Commercial Offices, Portions 21, 22, 23 of Farm 925, Cove Rock, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008j. *Phase 1 Archaeological Impact Assessment: Warehouse and Related Infrastructure, Portion 19 of Farm 925, Cove Rock, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008k. *Phase 1 Archaeological Impact Assessment: Industrial Development, Erven 17532 & 49336, Orange Grove, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008l. *Phase 1 Archaeological Impact Assessment: Retail and Residential Development, Portions 3 & 5 of Farm 1234, Gonubie, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008m. *Phase 1 Archaeological Impact Assessment: Riverleigh Township Development, Farm 817/3, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2008n. *Phase 1 Archaeological Impact Assessment: Residential Development, Portions 3, 4 & 18 of Farm 807, Quenera, East London, Eastern Cape, South Africa.*
- Van Schalkwyk, L.O. (eThembeni). 2008. *Heritage Impact Assessment of the proposed N2 Wild Coast Toll Highway, Eastern Cape and KwaZulu-Natal, South Africa.*
- Webley, L.E. & Vernon, G. (Albany Museum). 2008. *Phase 1 Heritage Impact Assessment. The Construction of a Dual Carriageway linking Fitzpatrick Road and Currie Street on the 'Sleeper Site', Erf 15835, Buffalo City, Eastern Cape.*

Five (5) cases are recorded on SAHRIS, situated within an approximate 10km radius from the Cove Ridge Estate Mixed-Use Development. Of the recorded 5 cases 2 are mining / prospecting right applications for which no archaeological CRM studies have been submitted to date, including SAHRIS CaseID 2594 and SAHRIS CaseID 2434. SAHRIS CaseID 1725, the Coral Beach Residential Estate, Winterstrand, is still in process, again with no archaeological CRM study submitted to date. SAHRIS CaseID 3851 addresses Fort Glamorgan, with both an archaeological CRM study and the subsequent exhumation of historical graves from the area, but archaeological reports are not available on SAHRIS. SAHRIS CaseID 1042 refers to the Oxford Harbour View development, with the relevant archaeological CRM report referenced as:

- Van Ryneveld, K. (ArchaeoMaps). 2012. *Phase 1 Archaeological Impact Assessment – Oxford Harbour View Development, Erven 15833, 15834, 15835 and 33367, East London, Eastern Cape, South Africa.*

Additional archaeological CRM reports available on SAHRIS with study sites situated within the approximate 30km radius from the Cove Ridge Estate Mixed-Use Development study site are listed as:

- Anderson, G. (Umlando). 2009. *Heritage Survey of the Marine Aquaculture Zone, East London Industrial Development Zone;*
- Anderson, G. (Umlando). 2010. *Comment on the East London Foreshore Reclamation Project.*
- Anderson, G. (Umlando). 2011a. *Heritage Survey of the Proposed Ikwezi 10MW PV Solar Energy Facility;*
- Anderson, G. (Umlando). 2011b. *Heritage Survey of the Reinstatement of the East London Port Foreshore;*
- Binneman, J. (EHC). 2011. *A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Establishment of 12 Holiday Homes on Portion 3 of Farm 695, (Clippety Clop), adjacent to the Kwelera River, Great Kei Municipality, Eastern Cape Province.*
- Binneman, J. & Webley, L.E. (Albany Museum). 1996. *Proposed Eastern Cape Zinc and Phosphoric Acid Project: Baseline Report: Sensitivity of Cultural Sites.*

- Minkley, G. (University of Fort Hare). 2008. *Heritage Survey: Phase 1 Heritage Impact Assessment for the Proposed Atterbury Mixed-Use Development, Gonubie.*
- Van Ryneveld, K. (ArchaeoMaps). 2009a. *Phase 1 Archaeological Impact Assessment – Subdivision and Residential Developments, Farm 724/7, Kwelera, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2009b. *Phase 1 Archaeological Impact Assessment – Queenspark Substation and Power Line, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2010a. *Phase 1 Archaeological Impact Assessment – Consolidation and Rezoning of Farm 640/01 and Farm 640/29, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2010b. *Addendum to the Phase 1 Archaeological Impact Assessment: Queenstown Substation and Powerline, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2014a. *Phase 1 Archaeological Impact Assessment – Final Report. Buffalo Bridge Replacement, East London, Eastern Cape, South Africa.*
- Van Ryneveld, K. (ArchaeoMaps). 2014b. *Phase 1 Archaeological Impact Assessment – Upgrade and Expansion of the Cefane Mouth Holiday Resort, Portion of Farm RE/458 East London (near Chintsa), Eastern Cape, South Africa.*

One previous archaeological CRM study is directly applicable to the proposed Cove Ridge Estate Mixed-Use Development study site, being the referenced report:

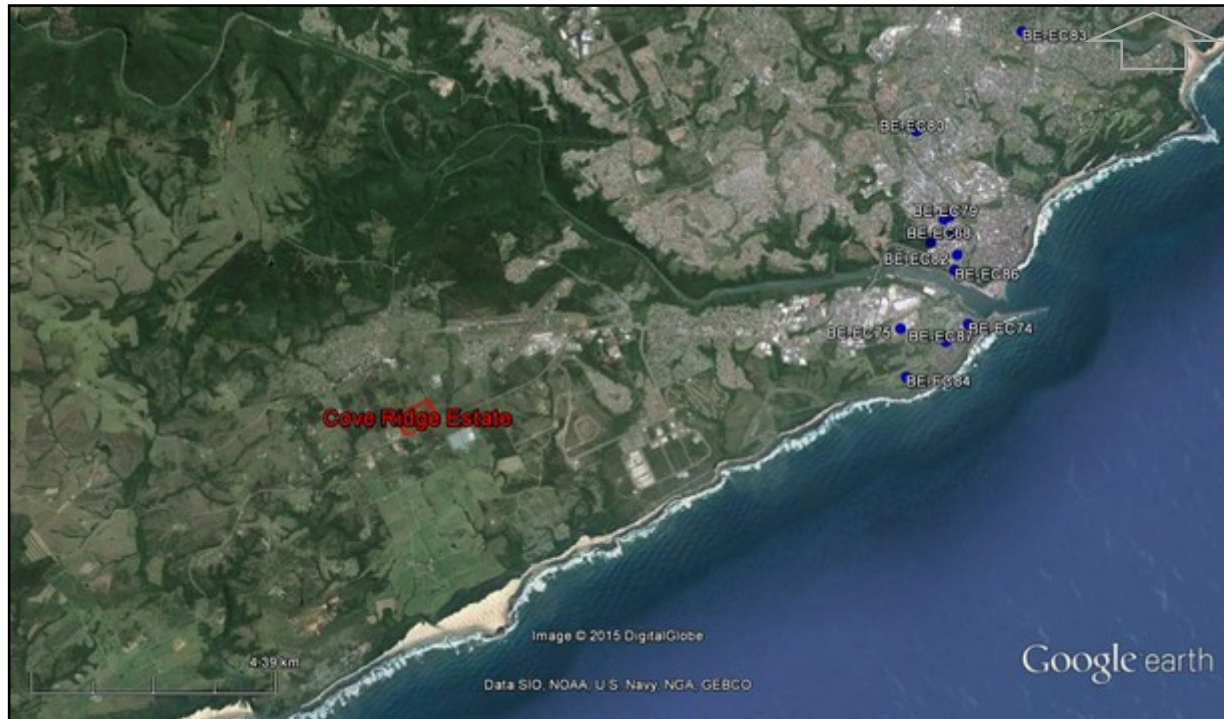
- Van Ryneveld, K. (ArchaeoMaps). 2008i. *Phase 1 Archaeological Impact Assessment – Development of a Shopping Mall and Commercial Offices, Portions 21, 22 and 23 of Farm 925, Cove Rock, East London, Eastern Cape.*

2.2.3) SAHRA Provincial Heritage Site Database – Eastern Cape

Georeferenced declared Provincial Heritage Sites (PHS) recorded in the SAHRA – Eastern Cape database situated within an approximate 10km radius from the Cove Ridge Estate Mixed-Use Development study site and limited to PHS's situated south of the Buffalo River are listed as (en.wikipedia.org/wiki/List_of_heritage_sites_in_Eastern_Cape).

Declared Provincial Heritage Sites – Eastern Cape					
Map Ref	Identifier	Site Name	Town	NHRA status	Coordinates
BE-EC74	9/2/026/0009	West Bank Post Office, Bank Street, East London	East London	Provincial Heritage Site	S33°01'53"; E27°54'36"
BE-EC75	9/2/026/0010	Old Powder Magazine, Fort Glamorgan, East London [NB use during the 7 th Xhosa War, also known as the War of the Axe, broke out in 1846.]	East London	Provincial Heritage Site	S33°01'58"; E27°53'49"
BE-EC84	9/2/026/0031	Hood Point Lighthouse, East London [Type site: Lighthouse.]	East London	Provincial Heritage Site	S33°02'26"; E27°53'55"
BE-EC87	9/2/026/0035	West Bank High School, Hood Street, East London	East London	Register	S33°02'04"; E27°54'21"

Table 4: Declared Provincial Heritage Sites in relation to the study site



Map 4: Spatial distribution of geo-referenced PHS in the Eastern Cape in relation to the Cove Ridge Estate Mixed-Use Development study site

2.2.4) General Discussion

Selected of the above listed reports and additional literature resources were consulted for purposes of a basic integrated background discussion on the more immediate receiving cultural environment of the Cove Ridge Estate Mixed-use Development study site:

Hominin / Human Evolution and the Stone Age: No Earlier Stone Age (ESA) sites were identified in any of the consulted CRM reports, aside from a single handaxe reported on by Van Ryneveld (2010a). Anderson (2011a) documented both MSA and LSA artefact scatters within the Ikwezi Solar Energy study site. Anderson's discovery of MSA artefact occurrences are in accordance with MSA hominin evidence: The Nahoon footprints site, where hominin / human footprints dating to 200,000BP have been discovered, is situated approximately 15km east north-east of the study site (www.eastlondon.org.za/nahoon_footprints.html), while of the earliest *Homo Sapien Sapien*, or modern human remains, dating to 125,000BP, are known from Klasies River Mouth along the south coast of the Eastern Cape (www.modernhumanorigins.net/klasies.html). Evidence of LSA (including pastoralist) occupation of the East London area seems fairly ample: The presence of deflated coastal shell middens were reported on by Binneman & Webley (1996). Anderson (2009) identified no less than 7 LSA shell midden sites during his East London IDZ survey. In addition an ephemeral shell scatter situated approximately 2.5-3km inland, on the banks of the Buffalo River, was reported on (Van Ryneveld 2010ab). The proposed Cove Ridge Estate Mixed-Use Development study site is situated within the approximate 5km 'sensitive' zone where shell middens may be expected to occur. Binneman & Webley (1996) reported on, amongst others, 3 shell middens at Cove Rock, recorded in the Albany Museum's database. Although these middens have not been re-reported on – they may well have weathered away in totality, midden material including LSA, but also Later Iron Age (LIA), are periodically observed in the Cove Rock area, eroding from the sand and vegetated dunes.

The Iron Age: Canasta Place, situated approximately 15-20km west of East London still constitutes the southern-most known EIA site in South Africa (Nongwasa 1994). From the late 1500's / early 1600's increasing numbers of LIA Nguni people moved south, into the Eastern Cape, as a result of Zulu tribal warfare and the resultant Mfecane. These people,

today collectively referred to as the Xhosa, largely displaced resident KhoiSan groups (Mitchell 2002), though instances of incorporation, either forced or by choice are also recorded. 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). Anderson (2011a) reported on 3 stone cairns or 'izivivane'. However, he is of the opinion that these may perhaps represent graves. In his pre-feasibility assessment of the Ikwezi Solar Energy project he consulted 1959 topographic maps, indicating that settlements were then recorded in the area. The most prominent CRM reported on LIA site remains the Cove Rock intangible heritage site, situated south of the Buffalo River (Coetzee 2008, Van Ryneveld 2008b, 2008c, 2008e, 2008g, 2008h, 2008i, 2008j). The site is closely tied with the history of Nongqawuse, the young Xhosa prophetess who in 1856 prophesized the 'Cattle Killing' (1856-1857) to ensure expulsion of the white man from Xhosa territory. The 'Cattle Killing' resulted in the deaths of more than 40,000 Xhosa and over 400,000 of their cattle. It is believed that the Cove Rock site was an important place where cattle were ordered to be chased off the cliffs by Xhosa 'seers' to meet the demands of the ancestors. The 'Cattle Killing' is believed by many to have been the major event that resulted in the Xhosa becoming a 'wage-paid labor nation' to the Colony (Milton 1983). Following the 'Cattle Killing' various African locations and reserves were established to accommodate, on their return, the 'loyal natives' – African 'followers' who had 'sought work in the Colony', under Sir George Grey's (Governor and High Commissioner of the Cape Colony) instructions. Grey's idea was that these 'loyal natives' would provide a 'buffer zone' alongside European settlers between the independent African chiefdoms and the Settler Colony, with the House of Phalo (Gqaleka and Rharhabe) representing the major independent African groups in the vicinity west of the Kei (Peires 1981). Reports specify the Bomlambo people as having lived in the more immediate Cove Rock (including the general Cove Ridge) vicinity during early Colonial Period times. Today the Cove Rock site comprises a living heritage site and is still used for spiritual / religious purposes, including amongst others usage by the Zionist Church.

The Colonial Period: British military need for a reliable harbor along the eastern frontier was evident as early as the 1830's, but became more pressing in 1835 after Governor Sir Benjamin D'Urban proclaimed the area between the Keiskamma and the Buffalo Rivers as the Province of Queen Adelaide. In 1836 a favorable survey of the Buffalo River mouth was made and the area immediately named Port Rex – but the Province was never annexed to the Cape and plans to develop the harbor abandoned. During the 7th Frontier War (War of the Axe, 1846-1847) a 2nd favorable report on the Buffalo River mouth was made; this time plans for its use were implemented. In 1847 a post, known as Fort Buffalo, was built on the West Bank of the river and in 1848 the new Governor, Sir Harry Smith, annexed the port and surrounding territory to the Cape Colony, naming it East London. Smith also established a 2nd more substantial fort, Fort Glamorgan, named after Col. Henry Somerset, eldest son of Lord Charles Somerset and commander of the British troops on the eastern frontier from 1819-1852. A stone jetty was built in 1848 and by 1849 at least 4 streets were laid out. By the mid 1850's the village had a population of 124 European settlers and 300 troops. From 1857 onwards many of the members of the British German Legion, settled in British Kaffraria, took up residence in East London. 1873 saw the 3 villages clustered around the Buffalo River mouth, East London West Bank, East London East Bank and Panmure (after Lord Panmure) merged into a single municipality. Construction on the main harbor began in 1872 and in 1873 work started on the breakwater (<http://www.sahistory.org.za/places/east-london>).

Minkley (2008) briefly sketches the Colonial Period cultural environment of the greater East London area stating that from the 1850's onwards German and other European settlers increasingly settled on farms of various allotments, from the Fish to the Buffalo and beyond the Kei River; a period commonly referred to as the 'grantee settlements'. Larger allotments approximated 1,500 acres, set aside for grazing and dairy farming. From 1876 allotments were broken up in smaller pieces, often used as orchards and for vegetable and timber farming. By the 1890's when another spate of further land apportionment occurred, most of the land-use and settlement patterns including un-alienated coastal forest strips, such as the zone between the Buffalo and the Kei Rivers, had been consolidated on what had largely been unoccupied or non-permanently settled African land.

Known Colonial Period resources are ample, primarily clustered in the vicinity of the East London harbour, and reported on by Van Ryneveld (2007, 2009b, 2010a, 2012, 2014a, 2014b) and Webley & Vernon (2008).

Grave and Cemetery Sites: Van Ryneveld (2008b) reported on a contemporary known grave, but of unknown locality – a cautionary note to developers that unmarked graves may be encountered during the course of development and supplementing the current record of identified grave sites (Anderson 2011a; Van Ryneveld 2007). SAHRIS CaseID 3851 reiterates the heritage process for the relocation of graves older than 60 years of age.

Shipwrecks: The following shipwrecks are recorded along the East London coastline, roughly from the Kei River mouth in the north to Kaysers' Beach in the south (<http://sashipwrecks.com>):

Agnes (1948), Albert Edward Prince of Wales (1882), Albert Juhl (1876), Alfred (1866), Alma (1878), Amatola (1852), Andreas (1928), Ann Staniland (1876), Ann Hutchinson (1942), Annie S (1875), Antonie (1864), Asphodel (1878), Atbara (1902), Aurora (1902), Bierstadt (1877), Blesbok (1971), Bonanza (1894), Brighton (1881), Caledonian (1905), Campyne (1874), Cape St. Francis (1963), Carl Zu Den Drei Greiffen (1875), Carrie Wyman (1886), Castor (1851), Cichina (1873), City of Johannesburg (1942), Clansman (1882), Clymping (1881), Colombia (1942), Columbia (1880), Campage (1874), Constantia (1868), Coquette (- Campage) (1874), Countess of Dudley (1877), Crixia (1872), Crusader (1868), Danashe (1945), Dauntless (1883), Die Heimath (1881), Early Morn (1863), Eda (1904), Elaine (1872), Elise (1878), Elise Linck (1902), Eliza (1880), Elizabeth (1839), Elizabeth Mary (1861), Ellen Browne (1877), Elmira (1876), Elphida (1893), Elsie May (1883), Emile Marie (1874), Emma (1872), Emma (1880), Euterpe (1876), Excello (1942), Fingoe (1874), Flora (- Florie) (1874), Foam (1851), Francisca (1882), Frontier III (1957), General Nott (1876), Ham 79 (1924), Ham 81 (1924), Hampton Court (1881), Helene (1905), Henry Douse (1867), Herma (1855), Hohenzallern (1876), Hope (1880), Huma (1855), Imogen (1867), Jacaranda (1971), James Gibson (1874), Jane Davies (1872), Johan (1882), Kaffir (1890), Kaffir Chief (1876), Kathleen Anderson (1903), Kensington (1900), Khedive (1910), King Cadwallon (1929), Koodoo (1960), K.G. Meldahl (1942), La Serena (1876), Lady Kennaway (1857), Leif (1896), Lily of Cape Town (1894), Lizzie (1885), Llannashe (1943), Lockett (1884), Lockett (1884), Lord of the Isles (1873), Louise (1891), Lucy (1895), Lunaria (1861), Madagascar (1858), Maid of Arron Marengo (1876), Margaret A (1972), Maron Neil (1885), Martha (1872), Mary (1960), Mary Anne (1966), Medusa (1863), Memento (1876), Memento (1875), M.M. Jones (1876), Nant-y-glo (1872), Natal Star (1874), New Blessing (1905), Nossa Senhora de Atalaia do Pinheiro (1647), Nova Bella (- Nuovo Abele) (1874), Nundeepe (1868), Olive (1900), Olive (1878), Ondes (1901), Orient (1907), Orient (1970), Palatina (1911), Papa Risetto (1888), Philippine Leader (1973), Pioneer (1902), Plettenberg (1948), Pondo (1902), Quanza (1872), Queen of Mary (1872), Queen of Nations (1889), Queen of the Deep (1867), Refuge (1872), Rosehall (1876), Rubicon (1989), Sandvik (1888), Sao Joao Baptista (1622), Sarah Phillips (1871), Schermbrucker (1964), Schmayl (1883), Sea Rover (1868), Sea Wave (1879), Seafield (1882), Shantung (1868), Sharp (1872), Shrimp (1861), Sierra Palma (1883), South Easter (1872), St. Agnes (1955), Star Beam (1880), Star of the East (1905), Stralenburg (1970), Stuart Star (1937), Success (1970), S.A. Oranjeland (1974), Therese (1861), Thode Fagelund (1941), TMP Sagattarius (2002), Triton (1905), Valdivia (1908), Verulam (1874), Vigilant (1853), Waratah (1909), Western Star (1874) and Wild Rose (1872).

2.3.1) Field Assessment Results

One (1) archaeological and cultural heritage resource (Site CR2), as defined and protected by the NHRA 1999, was identified during the archaeological field assessment of the *Cove Ridge Estate Mixed-Use Development* study site. Three (3) anthropogenic resources (Sites CR1, CR2 and CR3) are situated at the study site, all comprising Built Environment resources. Sites CR1 and CR3 post-dates 60 years of age and are by implication not protected by the NHRA 1999. Site CR2 may well comprise the original Farm 925 residence. The vernacular residence pre-dates 60 years of age and is formally protected by the NHRA 1999.

[The findings of the assessment reiterate locales recorded during field assessment of a former Phase 1 AIA at Portions 21, 22 and 23 of Farm 925, referenced as:

- o Van Ryneveld, K. (ArchaeoMaps). 2008i. *Phase 1 Archaeological Impact Assessment – Development of a Shopping Mall and Commercial Offices, Portions 21, 22 and 23 of Farm 925, Cove Rock, East London, Eastern Cape.*]

2.3.1.1) CR1 – Contemporary Period – Rocket Stores & Feeds Complex (S33°03'12.8"; E27°48'18.2"):

The Rocket Stores & Feeds Complex dates to the 1970's / 1980's and comprises the still in use Rocket Stores & Feeds stores and outlets, to the north-west of which is a series of outbuildings and ruined structure remains, architecturally and temporally dating to the same period as the store buildings. To the immediate north-east of the Rocket Stores & Feeds Complex is a contemporary farmstead residence, post-dating construction of the store outlet. The CR1 structures, including derelict and ruined structures are all younger than 60 years of age and thus not formally protected by the NHRA 1999. The developer need not apply for an EC PHRA Built Environment permit prior to impact or destruction of these structures.

2.3.1.2) CR2 – Colonial Period – Farmstead (S33°03'12.7"; E27°48'10.9"):

Site CR2 comprises a Colonial Period farmstead residence. The vernacular structure is, based primarily on architectural style, inferred to date to the late 1800's / early 1900's, coinciding temporally with the 2nd set of farms (allotments) having been laid out in the East London area. The residence is well maintained and still in use. Site CR2 is at present formally fenced with an access gate; current conservation measures comply with EC PHRA minimum site conservation standards. The Site CR2 Colonial Period farmstead residence is conserved within the proposed development layout, being in accordance with development plans situated immediately north of the internal access road separating the business storage and commercial building premises from the agricultural land area on Portion 23 of Farm 925.

Despite the fact that Site CR2 will be conserved within the framework of the development proposal, the developer is reminded that the residence, pre-dating 60 years of age, is formally protected by the NHRA 1999 (Section 34). Any impact on the structure, including alteration thereto is subject to the EC PHRA Built Environment permit application process.

- o Site Significance Assignment and Recommendations: Site CR2 receives automatic SAHRA / EC PHRA protection as a site of *High Significance* with a *Provincial Grade II Field Rating*. The site will be conserved within the proposed development layout. Current conservation measures comply with EC PHRA minimum site conservation standards. No additional conservation measures are recommended.

2.3.1.3) CR3 – Contemporary Period – Farmstead (S33°03'02.3"; E27°48'17.7"):

The Site CR3 contemporary farmstead dates to the 1970's / 1980's. Structures at the site are younger than 60 years and not formally protected by the NHRA 1999. The developer need not apply for an EC PHRA Built Environment permit prior to impact or destruction of these structures.

Thick vegetation characterized the study site, obscuring surface visibility across the majority of the *Cove Ridge Estate Mixed-Use Development* terrain. Surface visibility was more than often restricted to access pathways and animal tracks. Mole heaps characterized the surface of the study site; but not yielding any anthropogenic material. Dam scrapings / sections were heavily vegetated and not informative with reference to subsurface interpretation. Shallow subsurface exposures, primarily natural erosion sections, of up to approximately 20cm in depth and with the internal road cutting measuring more or less 70cm in height provided the primary proxy for subsurface interpretation. Subsurface sections proved to be unanimously anthropogenically sterile, displaying a single stratigraphic dune member. Vegetated dunes, despite surface anthropogenic sterility, may well be regarded as potentially sensitive with reference to specifically LSA, but also LIA buried sites or occurrences and with the study site situated within the approximate 5km 'sensitive zone' from the coastline caution should be taken during the course of construction to ensure that incidental exposures are adequately recorded and managed. Based on limited recorded and mitigated, specifically LSA and LIA archaeological sites within the greater Cove Rock, including the Cove Ridge area any subsurface site or occurrence encountered during the course of construction should be regarded as 'highly sensitive'. Investigation and conservation / mitigation of such resources can be regarded as having a 'positive' impact on our archaeological and cultural heritage.

- [Based on the findings of the Phase 1 AIA it can reasonably be inferred that there is a moderate likelihood that archaeological or cultural heritage resources may be encountered during the course of construction. In the event of such resources being identified, sound protocol regarding their discovery would be imperative to ensure proper management, be it either the conservation or mitigation thereof.]



Map 5: Results of the Cove Ridge Estate Mixed-Use Development archaeological field assessment (tracklog – white)



Plate 1: General view of the Cove Ridge Estate Mixed-Use Development study site [1]



Plate 3: General view of the Cove Ridge Estate Mixed-Use Development study site [3]



Plate 2: General view of the Cove Ridge Estate Mixed-Use Development study site [2]



Plate 4: General view of the Cove Ridge Estate Mixed-Use Development study site [4]



Plate 5: Anthropogenic sterile sections of approximately 70cm high at the study site



Plate 7: Disused and ruined contemporary outbuildings at CR1 [1]



Plate 6: View of the CR1 Rocket Stores & Feeds building complex



Plate 8: Disused and ruined contemporary outbuildings at CR1 [2]



Plate 9: Disused and ruined contemporary outbuildings at CR1 [3]



Plate 11: The Colonial Period CR2 farmstead



Plate 10: The contemporary CR1 residence



Plate 12: Part of the contemporary CR3 farmstead

3 - Environmental Impact Assessment Rating

Identified archaeological and cultural heritage sites are ascribed an Environmental Impact Assessment (EIA) rating, 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:

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

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
Site Conservation	Sites: CR2	-4	5	1	3	3	3	-48	-M	-M	+8	5	1	0	0	4	+72	+M	+M

Comment: Colonial period sites that will be conserved by the proposed development layout / design

Summary of mitigation points: Site CR2 – Conservation within current development layout. Existing conservation measures comply with EC PHRA minimum site conservation standards. No additional conservation measures are recommended

Table 5: Environmental significance assessment of identified Colonial Period resources that will be conserved by the Cove Ridge Estate Mixed-Use Development proposal

4 - Recommendations

With reference to archaeological and cultural heritage compliance, as per the requirements of the NHRA 1999, it is recommended that the proposed *Cove Ridge Estate Mixed-Use Development*, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, BCMM, Eastern Cape, proceeds as applied for provided the developer comply with the below listed recommendations.

- No archaeological or cultural heritage developmental ‘fatal flaws’ identified;
- One (1) archaeological and cultural heritage resource [Site CR2], as defined and protected by the NHRA 1999, is located at the study site;
- [Should any incidental archaeological or cultural heritage resources, as defined and protected by the NHRA 1999, be encountered during the course of development the process described in the ‘Heritage Protocol for Incidental Finds during the Construction Phase’ should be followed.]

The EC PHRA HIA Comment will state legal requirements for development to proceed, or reasons why, from a heritage perspective, development may not be further considered.

Archaeological and Basic Cultural Heritage Compliance Summary – <i>Cove Ridge Estate Mixed-Use Development, East London, BCMM, Eastern Cape</i>			
Map Code	Site	Co-ordinates	Recommendations
<i>Cove Ridge Estate Mixed-Use Development, East London</i>			
CR1	Cont. Period – Rocket Stores & Feeds Complex	S33°03'12.8"; E27°48'18.2"	N/A
CR2	Colonial Period – Farmstead	S33°03'12.7"; E27°48'10.9"	Conservation within development layout / design. <ul style="list-style-type: none"> • Current conservation measures comply with EC PHRA minimum site conservation standards; • Additional conservation measures are not recommended
CR3	Cont. Period – Farmstead	S33°03'02.3"; E27°48'17.7"	N/A

Table 6: Archaeological and cultural heritage compliance summary for the proposed *Cove Ridge Estate Mixed-Use Development*, East London, BCMM, Eastern Cape

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 and Abbreviations

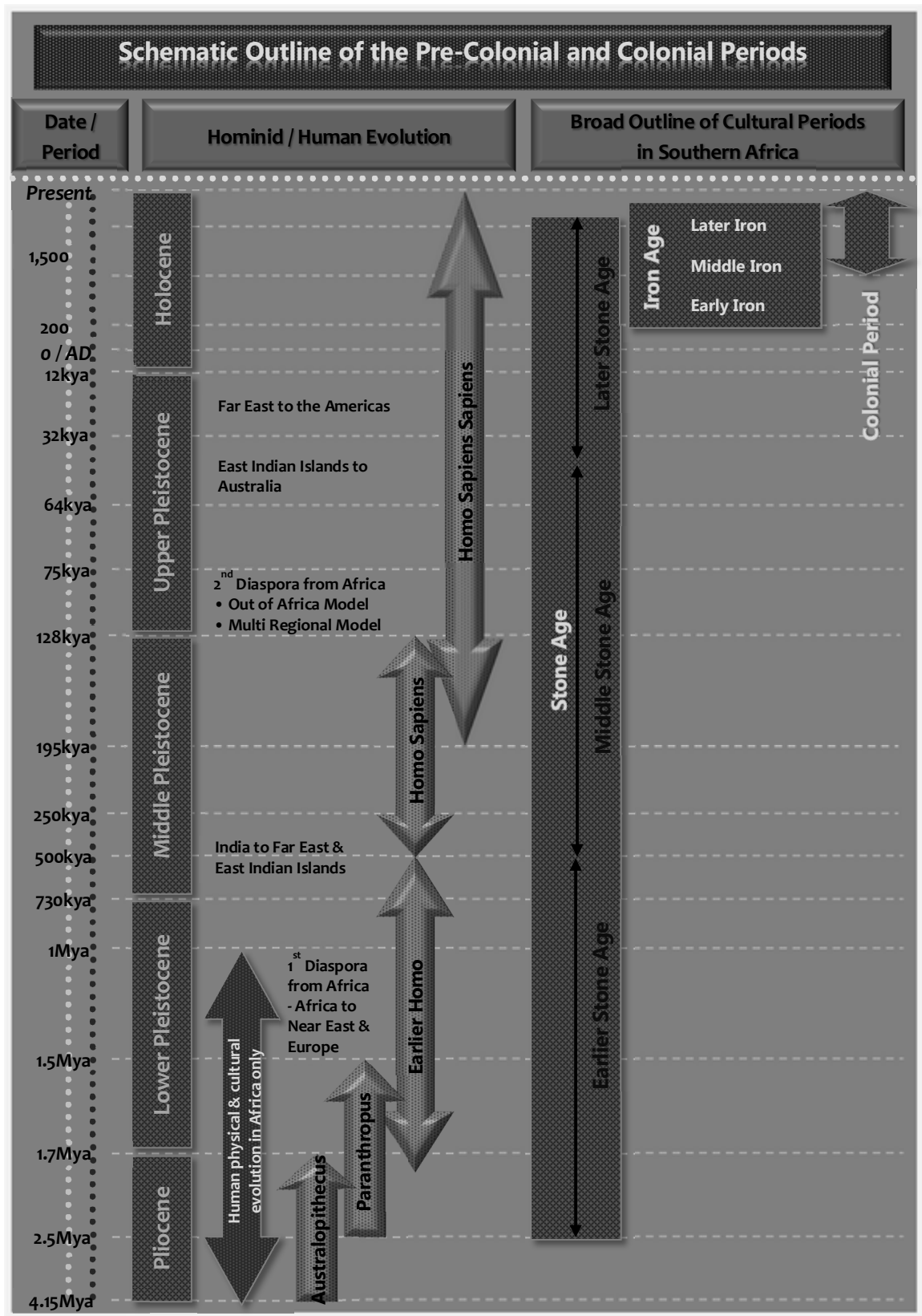
AD	: Anno Domini (the year o.)
AIA	: Archaeological Impact Assessment
AMAFa	: Amafa aKwaZulu-Natali
ASAPA	: Association of Southern African Professional Archaeologists
BAR	: Basic Assessment Report
BC	: Before the Birth of Christ (the year o.)
BCE	: Before the Common Era (the year o.)
BIA	: Basic Impact Assessment
BID	: Background Information Document
BP	: Before the Present (the year 1950.)
cm	: Centimeter
CRM	: Cultural Resources Management
DAC	: Department of Arts and Culture
DEAT	: Department of Environmental Affairs and Tourism
DEDEAT	: Department of Economic Development, Environmental Affairs and Tourism
DME	: Department of Minerals and Energy
DSACR	: Department of Sport, Arts, Culture and Recreation
ECO	: Environmental Control Officer
EAP	: Environmental Assessment Practitioner
EC PHRA	: Eastern Cape Provincial Heritage Resources Authority
EIA	: Environmental Impact Assessment
EIA ₁	: Early Iron Age
EMPr	: Environmental Management Plan report
ESA	: Earlier Stone Age
ha	: Hectare
HIA	: Heritage Impact Assessment
HWC	: Heritage Western Cape
HCMP	: Heritage Conservation Management Plan
ICOMOS	: International Council on Monuments and Sites
IEM	: Integrated Environmental Management
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
MPRDA (2002)	: Mineral and Petroleum Resources Development Act, No 28 of 2002
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
PIA	: Palaeontological Impact Assessment
PHRA	: Provincial Heritage Resources Authority
PSSA	: Palaeontological Society of South Africa
PPP	: Public Participation Process
SAHRA	: South African Heritage Resources Agency
SAHRIS	: South African Heritage Resources Information System
ScIA	: Socio-cultural Impact Assessment
SIA	: Social Impact Assessment

6 - References

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Appendix A:



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. Kingdoms and civilizations associated with the Iron Age are indicative of a complex social hierarchy. The Colonial Period is marked by the advent of writing, in southern Africa primarily associated with the first European travelers (Mitchell 2002).

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

1) Early Hominin Evolution

DNA studies indicate that humans and chimpanzees shared a common ancestor between 6-8Mya (Sibley & Ahlquist 1984). By 4Mya, based on fossil evidence from Ethiopia and Kenya, hominins (humans and their immediate fossil ancestors and relatives) had already evolved. The earliest fossils are ascribed to *Ardipithecus ramidus* (4.4Mya), succeeded by *Australopithecus anamensis* (4.2-3.9Mya). These fossils are inferred to lie at the base from which all other hominins evolved (Leakey *et al.* 1995; White *et al.* 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 breadth 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 *folies directeurs* (signature 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 microlithic 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 to 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 Kwaile branch (extending along the coast from Kenya to KwaZulu-Natal);
2. The Nkope branch (located inland and reaching from southern Tanzania through Malawi and eastern Zambia into Zimbabwe); and
3. The Kalundu branch (stretching from Angola through western Zambia, Botswana and Zimbabwe into South Africa).

In southern Africa, recent work distinguishes two phases of the Kwaile 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 as well as along the KwaZulu-Natal coastal belt (Huffman 1998). Since the Silver Leaves facies is only slightly younger than the Kwaile 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 Maunatana 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 continent's western half by aridity and confined in the south during the 1st millennium to bushveld areas of the old Transvaal. Declining summer rainfall restricted occupation to a diminishing belt close to the East Coast and north of 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 30,000km². By the 1st millennium ivory and skins were already exported overseas, with sites like Sofala and Chibueni, Mozambique, 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 Bambandanyalo 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 dolomite 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 India Company (VOC) established a permanent base, with the intent to provide fresh food and water to VOC ships. In an attempt to improve the food supply a few settlers (free burghers) were allowed to establish farms. The establishment of an intensive mixed farming economy failed due to 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'.

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Palaeontology

Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality, Eastern Cape

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1. SUMMARY

It is proposed to establish a Mixed Used Development on the adjoining Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality (DEDEAT Ref: EC/7/A/LN1, LN2, LN3/M/14-11). The study area is approximately 22 hectares in extent and is zoned for Agricultural Use. It is located c. 1.2 km southwest of East London Airport and c. 10 km WSW of the East London CBD.

The proposed development footprint overlies potentially fossiliferous sedimentary rocks of the Middleton Formation (Lower Beaufort Group / Adelaide Subgroup, Karoo Supergroup) of Late Permian age. Elsewhere in the Main Karoo Basin these ancient fluvial sediments are known to contain a range of Late Permian vertebrate fossils (reptiles, therapsids, amphibians and fish), trace fossils, non-marine bivalves and plant remains (e.g. petrified wood), with several historical records in the East London area. However, the impact significance of the proposed Cove Ridge Estate Mixed-Use Development as far as fossil heritage is concerned is rated as LOW because:

- The potentially fossiliferous bedrocks here are probably mantled in thick soils and are highly weathered. Substantial excavation of potentially fossiliferous fresh (unweathered) bedrock is therefore not anticipated;
- Baking of sediments during nearby dolerite intrusion may have compromised their fossil content;
- Fossil abundance within the Lower Beaufort Group in the Eastern Cape might be lower than that of equivalent beds in the western Karoo (This is still to be established, however).

It is noted that petrified wood material that has weathered out of the underlying Beaufort Group bedrocks to accumulate in downwashed and alluvial gravels at or near to the ground surface has been widely recorded to the southwest and northeast of East London (Almond 2011c and unpublished field data). Such reworked fossil wood might therefore be present within superficial sediments in the present study area (e.g. around dams), but this remains unconfirmed.

In view of the overall low impact significance of the proposed development on palaeontological heritage resources, it is concluded that no further specialist palaeontological heritage studies or mitigation are recommended for the Cove Ridge Estate Mixed Use Development project near East London, pending the exposure of any substantial fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood, vertebrate trackways) during the construction phase. In this case, negative impacts on local fossil heritage can be effectively mitigated by appropriate ECO monitoring and – where necessary – by professional palaeontological mitigation.

Fresh exposures of Beaufort Group sediments created during the construction phase of the development should be inspected at intervals by the responsible Environmental Control Officer (ECO). It is also recommended that the ECO for this development visit a Karoo palaeontological display (e.g. at the Albany Museum, Grahamstown, or the East London Museum) before the start of operations so that they acquire some familiarity with the appearance of typical Beaufort Group

and younger fossil material. Well-illustrated and accessible accounts of Karoo fossils that may help in the recognition of Beaufort Group fossils have been published by Cluver (1978), MacRae (1999) and McCarthy and Rubidge (2005).

Should *loose* fossils be encountered during excavations, they should be carefully collected, with adherent matrix where necessary, given a provisional reference number (e.g. marked on masking tape) and carefully wrapped in newspaper. It is *essential* that the locality where the fossil is found be accurately marked on a 1: 50 000 map or recorded by GPS. Specimens without locality information are of limited scientific value. The fossils should be submitted for inspection by a professional palaeontologist at the earliest opportunity. Some of this material may be of scientific interest - in which case it should be deposited ultimately in an approved repository (e.g. Albany Museum, Grahamstown or East London Museum) – while other specimens may be of educational value and might be donated for display purposes.

If *in situ*, articulated skeletons or other substantial fossil remains are encountered during excavation, they should *NOT* be informally excavated since this will almost invariably lead to damage and loss of useful contextual information (e.g. taphonomy – data on mode of death and burial of animals). If feasible, they should be photographed (with scale), covered with a protective layer of loose sediment, and the site marked and carefully recorded (GPS / 1: 50 000 map / aerial photograph). The Environmental Control Officer should immediately inform ECPHRA, the Eastern Cape Provincial Heritage Resources Authority (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za) so that specimens can be examined, recorded and, if necessary, professionally excavated at the developers expense.

These recommendations should be included in the Environmental Management Plan for the proposed Cove Ridge Estate Mixed Use Development project near East London.

2. INTRODUCTION & BRIEF

It is proposed to establish a Mixed Used Development on the adjoining Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality (DEDEAT Ref: (EC/7/A/LN1, LN2, LN3/M/14-11). The study area is approximately 22 hectares in extent and is zoned for Agricultural Use. It is located c. 1.2 km southwest of the East London Airport and c. 10 km WSW of the East London CBD (Figs. 1, 2).

The main infrastructural developments proposed for each land parcel have been summarized as follows in the Background Information Document produced by Indwe Environmental Consulting, East London:

1. Portion 21 of Farm 925

Proposed development within this land parcel will comprise the construction of 7 warehouses with a total development footprint of 8622 m².

2. Portion 22 of Farm 925

Proposed development within this land parcel will comprise:

- The construction of a service station with a total development footprint of 13137 m²;
- The construction of a truck stop with a total development footprint of 18490 m²;
- The construction of commercial building premises with a total development footprint of 15834 m².

3. Portion 23 of Farm 925

Proposed development within this land parcel will comprise:

- The construction of business storage units with a total development footprint of 7159 m² to 7739 m²;
- The construction of commercial building premises with a total development footprint of 4162 m² and 18265 m²;
- Agricultural land with a total development footprint of 8409 m².

In addition to the above, the project will involve the provision of bulk services such as water supply, electricity and stormwater. A single access point off the Buffalo Pass Road on the adjacent Portion 21 is proposed to service the whole development area.

Indwe Environmental Consulting, East London, has been appointed as independent Environmental Assessment Practitioners to undertake a full Scoping and Environmental Impact Assessment (EIA) for the Cove Ridge Estate Mixed-Use Development. The proposed development footprint overlies potentially fossiliferous sedimentary rocks of the Lower Beaufort Group (Adelaide Subgroup, Karoo Supergroup) of Late Permian age. A desktop study of the potential impact on palaeontological heritage has therefore been commissioned on behalf of the developer and Indwe Environmental Consulting by Ms Karen van Ryneveld of ArchaeoMaps - Archaeological and Heritage Consultancy (Contact details: Postnet Suite 239, Private Bag X3, Beacon Bay, 5205. Cell: 084 871 1064. E-mail: kvanryneveld@gmail.com) as part of a broader-ranging HIA, in accordance with the requirements of the National Heritage Resources Act, 1999.

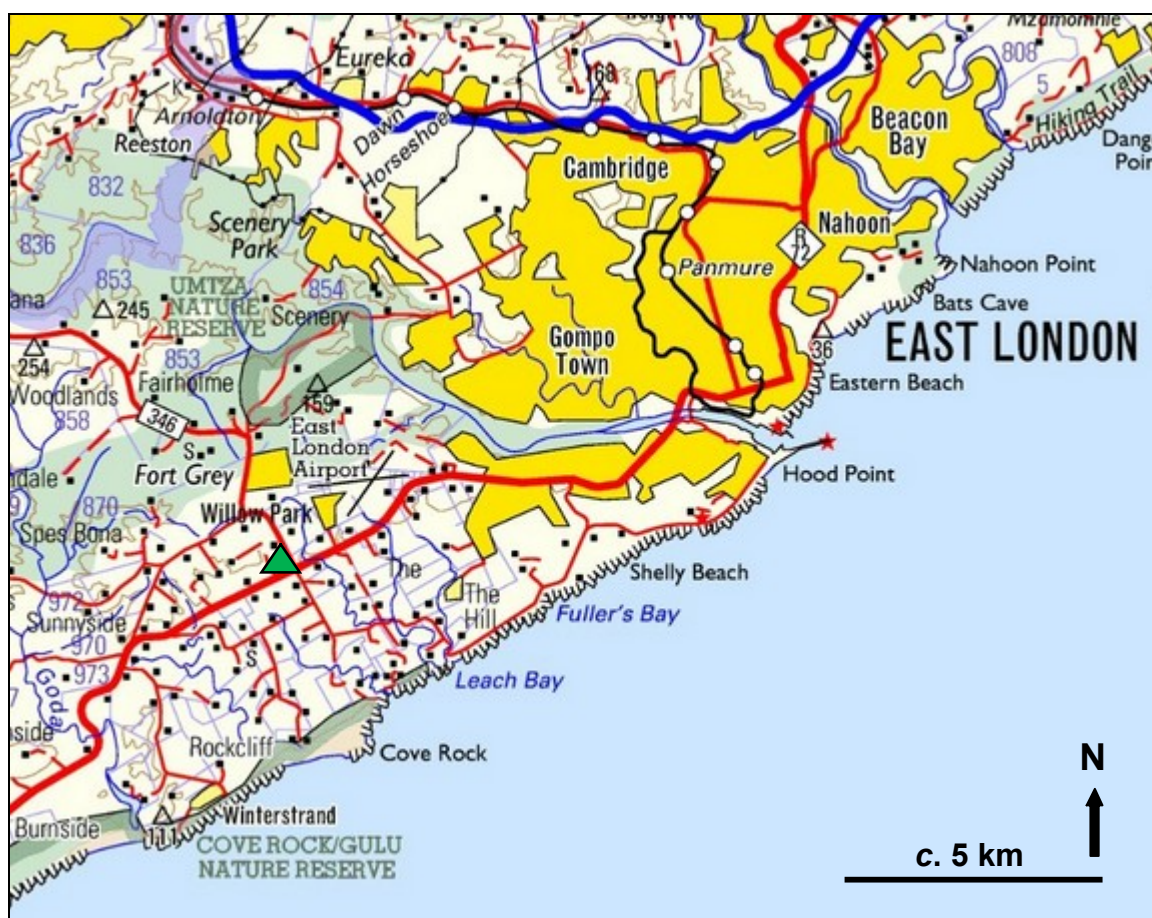


Fig. 1. Extract from 1: 250 000 topographic sheet 3326 Grahamstown (Courtesy of the Chief Directorate: National Geo-spatial Information, Mowbray) showing the location (green triangle) of the study area for the proposed Cove Ridge Estate Mixed-Use Development, near East London Airport and some 10 km WSW of East London.

2.1. Legislative context of this palaeontological study

The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act (1999) include, among others:

- geological sites of scientific or cultural importance;
- palaeontological sites;
- palaeontological objects and material, meteorites and rare geological specimens.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites:

(1) The protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority.

(2) All archaeological objects, palaeontological material and meteorites are the property of the State.

(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

(4) No person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;

(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or

(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

(5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and no heritage resources management procedure in terms of section 38 has been followed, it may—

(a) serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;

(b) carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;

(c) if mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and

(d) recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

Minimum standards for the palaeontological component of heritage impact assessment reports have been developed by SAHRA (2013).

2.2. Approach to this desktop palaeontological assessment (PIA)

This desktop PIA report provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations for specialist palaeontological mitigation where this is considered necessary. The report is based on (1) a review of the relevant scientific literature, including earlier palaeontological impact assessments for the East London – King William's Town region (e.g. Almond 2011a, 2011b, 2011c, 2012a, 2012b); (2) published geological maps and accompanying sheet explanations, (3) Google earth® satellite images, as well as (4) the author's field experience with the formations concerned and their palaeontological heritage.

When preparing a palaeontological desktop assessment the potentially fossiliferous rock units (groups, formations *etc*) represented within the study area are determined from geological maps and examination of satellite images. The currently recorded fossil heritage within each unit is determined from the published scientific literature and the author's field experience. This data is then used to assess the palaeontological sensitivity of each rock unit to development (*N.B.* A tabulation of palaeontological sensitivity of all formations in the Eastern Cape has already been compiled by Almond *et al.*, 2008).

The likely impact of the proposed development on local fossil heritage is then determined on the basis of (1) the rock units concerned and (2) the nature of the development itself, most notably the extent of fresh bedrock excavation envisaged. Adverse palaeontological impacts normally occur during the construction rather than operational phase. Mitigation by a professional palaeontologist – normally involving the recording and sampling of fossil material and associated geological information (*e.g.* sedimentological data) – is usually most effective during the construction phase when fresh fossiliferous bedrock has been exposed by excavations. To carry out mitigation, the palaeontologist involved will need to apply for a palaeontological collection permit from the relevant heritage management authority, in this case ECPHRA, the Eastern Cape Provincial Heritage Resources Authority (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za). It should be emphasized that, *providing appropriate mitigation is carried out*, the majority of developments involving bedrock excavation can make a *positive* contribution to our understanding of local palaeontological heritage.

2.3. Assumptions made for the PIA desktop study

Note that while fossil localities recorded within the study area itself are obviously highly relevant, most fossil heritage is buried beneath the land surface or obscured by surface deposits (soil, alluvium *etc*) and vegetation cover. The hidden fossil resources therefore have to be inferred from palaeontological observations made within the same formations elsewhere in the region, or even further afield (*e.g.* an adjacent province). Here it is assumed that fossil heritage is fairly uniformly distributed throughout the outcrop area of a given formation. Experience shows that this assumption does not always hold. This is because the original depositional setting across a formation that may extend over hundreds of kilometres may vary significantly, with palaeoecological implications (*e.g.* from a shallow to deeper water environment), while fossils are often patchy in their occurrence. Furthermore, the levels of tectonic deformation (folding, cleavage development *etc*), as well as the intensity and nature of metamorphism and weathering experienced by a given formation may change markedly across its outcrop area. These factors may seriously compromise the preservation of fossil remains present within the original sedimentary rock.

The main limitation on this desktop study is our limited understanding of the palaeontology of the East London area in general (See Fig. 2), mainly due to lack of bedrock exposure and high levels of bedrock weathering in the region. Confidence levels for this analysis are therefore only moderate.



Fig. 2. Google Earth© satellite image of the coastal platform c. 10 km to the WSW of East London, Eastern Cape, showing the outline of the Cove Ridge Estate study area (red polygon). Note the lack of bedrock exposure within the study area.

3. GEOLOGICAL BACKGROUND

The Cove Ridge Estate Mixed-Use Development study area at the corner of the R72 (Settlers Way) and Prince George's Street, just SW of East London Airport, is situated some 3.6 km inland from the coast on a low-lying, flat to very gently-sloping coastal platform at about c. 100 m amsl. (Figs. 1, 2). The coastal platform to the southwest of East London is incised into Palaeozoic sedimentary bedrocks of the Karoo Supergroup. However, levels of bedrock exposure in the region are extremely low, mainly due to deep weathering, soils cover and grassy vegetation *plus* trees.

The geology of the study area to the southwest of East London is outlined on 1: 250 000 geology sheet 3326 Grahamstown (Fig. 3; Council for Geoscience, Pretoria). A short geological explanation for this sheet has been published by Johnson and Le Roux (1994), and there is a useful separate geology report by Mountain (1974) on the geology of the East London area.

The study area is underlain by Late Permian continental (fluvial) sediments of the Lower Beaufort Group (**Adelaide Subgroup, Pa**). Due to poor exposure, the Adelaide Subgroup outcrop area has often not been clearly subdivided at the formational level in the East London region (Mountain 1974, Johnson & Caston 1979). However, according to the 1: 250 000 geological map, only the **Middleton Formation (Pm)** is represented in the study area. The Beaufort Group beds here have a regional low dip to the south or south-southwest and lie on the north-eastern edge of a large, dish-shaped synclinal structure within the Karoo Supergroup rocks. This syncline is centred approximately near Christmas Rock, some 20 km down the coast to the southwest of Cove Rock, and has Triassic sediments of the Upper Beaufort Group (Katberg Formation) at its core. The Lower Beaufort Group bedrocks are displaced by a small NE-SW trending fault running shortly to

the northwest of the Cove Ridge study area (black line in Fig. 3). Superficial sediments (unmapped soils, regolith, possibly gravels) overlying the Beaufort Group bedrocks are exposed along the margins of several dams in the region, including a few small examples within the present study area, but fresh (unweathered) bedrock is unlikely to be encountered here.

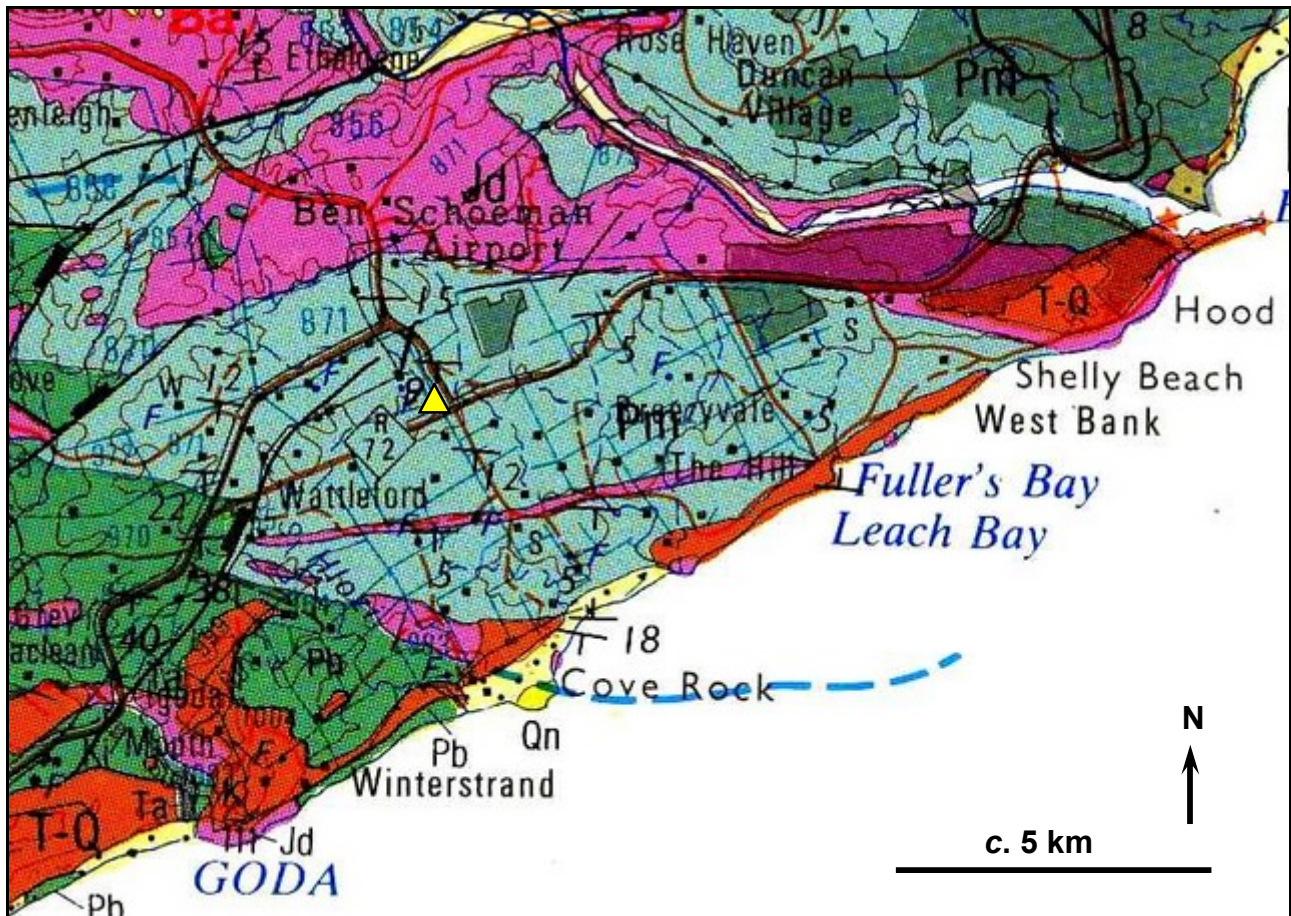


Fig. 3. Extract from 1: 250 000 geological map sheet 3326 Grahamstown (Council for Geoscience, Pretoria) showing approximate location (yellow triangle) of the Cove Ridge Estate study area, some 10 km WSW of East London. Key geological units shown here include:

Pink (Jd) = Jurassic Karoo Dolerite Suite

Pale blue-green (Pm) = Middleton Formation of the Lower Beaufort Group (Adelaide Subgroup, Karoo Supergroup)

Dark Green (Pb) = Balfour Formation of the Lower Beaufort Group

Orange-Brown (T-Q) = Nanaga Formation (Algoa Group)

A representative vertical section through the Beaufort Group in the East London region of the Eastern Cape is given by Johnson *et al.* (2006, Fig. 16 therein). Since dips of the Beaufort Group beds here are generally very shallow, low levels of tectonic deformation are expected. Brief descriptions of Adelaide Subgroup sediments in the Eastern Cape are given in sheet explanations for geology sheets King William's Town (printed on 1: 250 000 geology map), Kei Mouth (Johnson & Caston 1979) and Grahamstown (Johnson & Le Roux 1994). In this area of the Eastern Cape the contact between the Balfour and the underlying Middleton Formation is often difficult to map, given the scarcity of good outcrops and their broadly similar lithologies. Satellite images of the region show that in general relief is low and few natural exposures of the Beaufort Group bedrock are present. It is very likely that the Beaufort Group bedrock, especially the potentially fossil-bearing mudrock component, is deeply weathered here, probably to a depth of several meters locally. The common occurrence of ferricretes within the superficial cover in this region indicates deep weathering under humid, tropical climates. Excavations of less than several meters depth

made during construction are therefore unlikely to expose fresh (unweathered) Karoo Supergroup bedrock. Fresher, potentially fossiliferous bedrocks might be intersected by deeper excavations, however.

The **Middleton Formation (Pm)** forms the middle portion of the Adelaide Subgroup east of 24°E, including the peripheral portions of the large coastal synclinal structure on the Grahamstown sheet described earlier (Mountain 1974, Johnson & Le Roux 1994, Johnson *et al.* 2006). Since the contact with the overlying Balfour Formation is mapped just to the west (Fig. 3), it is inferred that the rocks beneath the study area belong to the uppermost portion of the Middleton succession. The fluvial Middleton succession comprises greenish-grey to reddish overbank mudrocks with subordinate resistant-weathering, fine-grained channel sandstones deposited by large meandering river systems. Because of the dominance of recessive-weathering mudrocks, the Middleton Formation erodes readily to form low-lying *vlaktes* and hilly terrain while extensive exposures of fresh (unweathered) bedrock are generally rare.

The sedimentology of the meandering fluvial Middleton Formation succession in the Eastern Cape interior has been outlined by Hill (1993) as well as Catuneanu and Bowker (2001). The Lower Beaufort succession here is dominated by blue-grey to greenish-grey, hackly-weathering mudrocks. These are mainly silty but also muddy, variously massive (unbedded) to well-bedded, often showing clearly developed fining-upwards and thinning-upward cycles within the succession. Olive-grey, maroon to purple-brown and mottled maroon / grey mudrocks occur less frequently but are not uncommon. Arid climate palaeosol horizons characterised by abundant rusty to cream-coloured calcrete are variously rare to fairly common within different parts of the overbank mudrock succession and are an important focus for palaeontological fieldwork since vertebrate fossils are often concentrated at these levels. Rare stellate pseudomorphs after gypsum (“desert roses”) also point towards at least seasonally arid Late Permian palaeoclimates in the eastern Main Karoo Basin during some Late Permian time intervals.

In the East London region the Lower Beaufort Group sediments have been extensively intruded and baked by dolerite sills in the Early Jurassic (183 Ma) **Karoo Dolerite Suite (Jd)** (Duncan & Marsh 2006). A narrow, west-east trending dolerite dyke runs south of the study area towards Fuller’s Bay on the coast, while a more extensive sill underlies the airport area to the north (Fig. 3). Such major intrusions are likely to have thermally metamorphosed the country rock for a considerable distance on either side of their edges.

The outer edge of the coastal platform inland of Cove Rock at the coast is mantled by Pleistocene aeolianites (wind-blown dune sands) of the **Nanaga Formation (T-Qn)**, Fig. 3). These are not mapped in the study area itself, however, and are generally sparsely fossiliferous (Le Roux 1992), so they will not be considered further here.

4. PALAEONTOLOGICAL HERITAGE

The overall palaeontological sensitivity of the Beaufort Group sediments is high (Almond *et al.* 2008). These continental sediments have yielded one of the richest fossil records of land-dwelling plants and animals of Permo-Triassic age anywhere in the world (MacRae 1999, Rubidge 2005, McCarthy & Rubidge 2005). A chronological series of mappable fossil biozones or assemblage zones (AZ), defined mainly on their characteristic tetrapod faunas, has been established for the Main Karoo Basin of South Africa (Rubidge 1995). Maps showing the distribution of the Beaufort assemblage zones within the Main Karoo Basin have been provided by Kitching (1977), Keyser and Smith (1979) and Rubidge (1995, 2005). An updated version based on a comprehensive GIS fossil database has recently been published (Van der Walt *et al.* 2010).

Most maps showing the distribution of the Beaufort assemblage zones within the Main Karoo Basin show that their boundaries remain uncertain in the near-coastal region of the Eastern Cape (Rubidge 1995, 2005), although some of these ambiguities may be resolved by the latest map of Van der Walt *et al.* (2010). GIS databases show that the density of fossil sites recorded within the East London area remain very low (Nicolas 2007, Fig. 4 herein). This is probably due to factors such as low levels of outcrop, deep bedrock weathering, and extensive dolerite intrusion, although

palaeoenvironmental factors may also have played a significant role here. Without further fossil collecting, it is therefore not yet possible to positively identify the specific Beaufort fossil assemblage zone(s) involved at many development sites in this region, and therefore the particular fossil taxa (species, genera) that might be encountered there during construction. As explained earlier, it is inferred that the Cove Ridge study area lies within the uppermost Middleton Formation. Any fossil remains recovered from these pits are therefore likely to belong to the *Cistecephalus* Assemblage Zone (Rubidge 1995). Given the current paucity of palaeontological data from the East London region, any new well-localized, identifiable fossil finds here are of considerable scientific value.

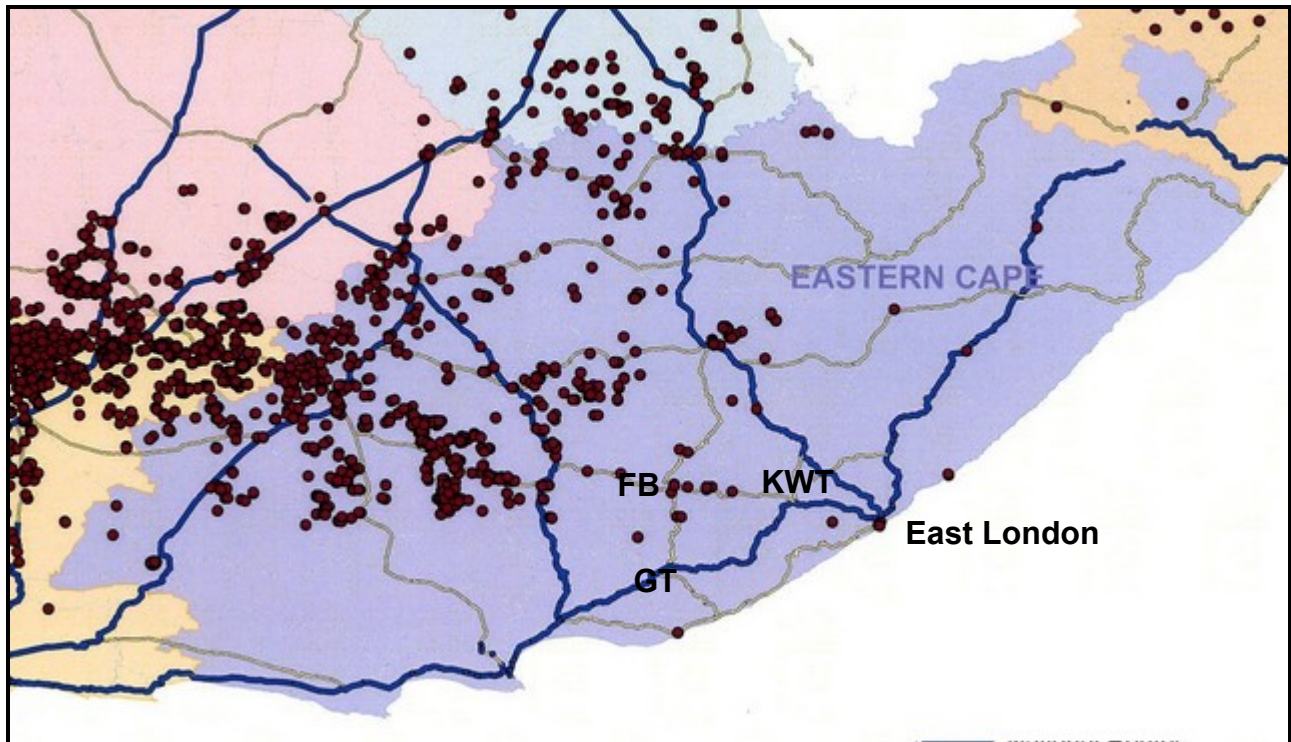


Fig. 4. Distribution of fossil sites in the Beaufort Group in the Eastern Cape (Modified from Nicolas 2007). Note the scarcity of sites recorded in the East London area and along the coast to the southwest. KWT = King William's Town. FB = Fort Beaufort. GT = Grahamstown.

4.1. Middleton Formation

The Middleton Formation comprises portions of three successive Beaufort Group fossil assemblage zones (AZ) that are largely based on the occurrence of specific genera and species of fossil therapsids. These are, in order of decreasing age, the *Pristerognathus*, *Tropidostoma* and *Cistecephalus* Assemblage Zones (Rubidge 1995). The three biozones have been assigned to the Wuchiapingian Stage of the Late Permian Period, with an approximate age range of 260-254 million years (Rubidge 2005 Smith *et al.* 2012). According to published maps showing the distribution of the Beaufort assemblage zones within the Main Karoo Basin (Keyser & Smith 1979, Hill 1993, Rubidge 1995, Van der Walt *et al.* 2010), the upper Middleton Formation succession lies within the ***Cistecephalus* Assemblage Zone** (= upper *Cistecephalus* Biozone or *Aulacephalodon-Cistecephalus* Assemblage Zone of earlier authors; see table 2.2 in Hill 1993).

The following major categories of fossils might be expected within *Cistecephalus* AZ sediments in the study area (Keyser & Smith 1979, Anderson & Anderson 1985, Hill 1993, Smith & Keyser *in* Rubidge 1995, MacRae 1999, Cole *et al.*, 2004, Almond *et al.* 2008, Nicolas & Rubidge 2010, Smith *et al.* 2012):

- isolated petrified bones as well as rare articulated skeletons of **terrestrial vertebrates** such as true **reptiles** (notably large herbivorous pareiasaurs, small insectivorous owenettids) and **therapsids** or “mammal-like reptiles” (eg diverse herbivorous dicynodonts, flesh-eating gorgonopsians, and insectivorous therocephalians) (Fig. 5)
- aquatic vertebrates such as large **temnospondyl amphibians** (*Rhinesuchus*, usually disarticulated), and **palaeoniscoid bony fish** (*Atherstonia*, *Namaichthys*, often represented by scattered scales rather than intact fish)
- freshwater **bivalves** (*Palaeomutela*)
- **trace fossils** such as worm, arthropod and tetrapod burrows and trackways, coprolites (fossil droppings)
- **vascular plant remains** including leaves, twigs, roots and petrified woods (“*Dadoxylon*”) of the *Glossopteris* Flora (usually sparse, fragmentary), especially glossopterid trees and arthropytes (horsetails).

As far as the biostratigraphically important tetrapod remains are concerned, the best fossil material is generally found within overbank mudrocks, whereas fossils preserved within channel sandstones tend to be fragmentary and water-worn (Rubidge 1995, Smith 1993). Many fossils are found in association with ancient soils (palaeosol horizons) that can usually be recognised by bedding-parallel concentrations of calcrete nodules.

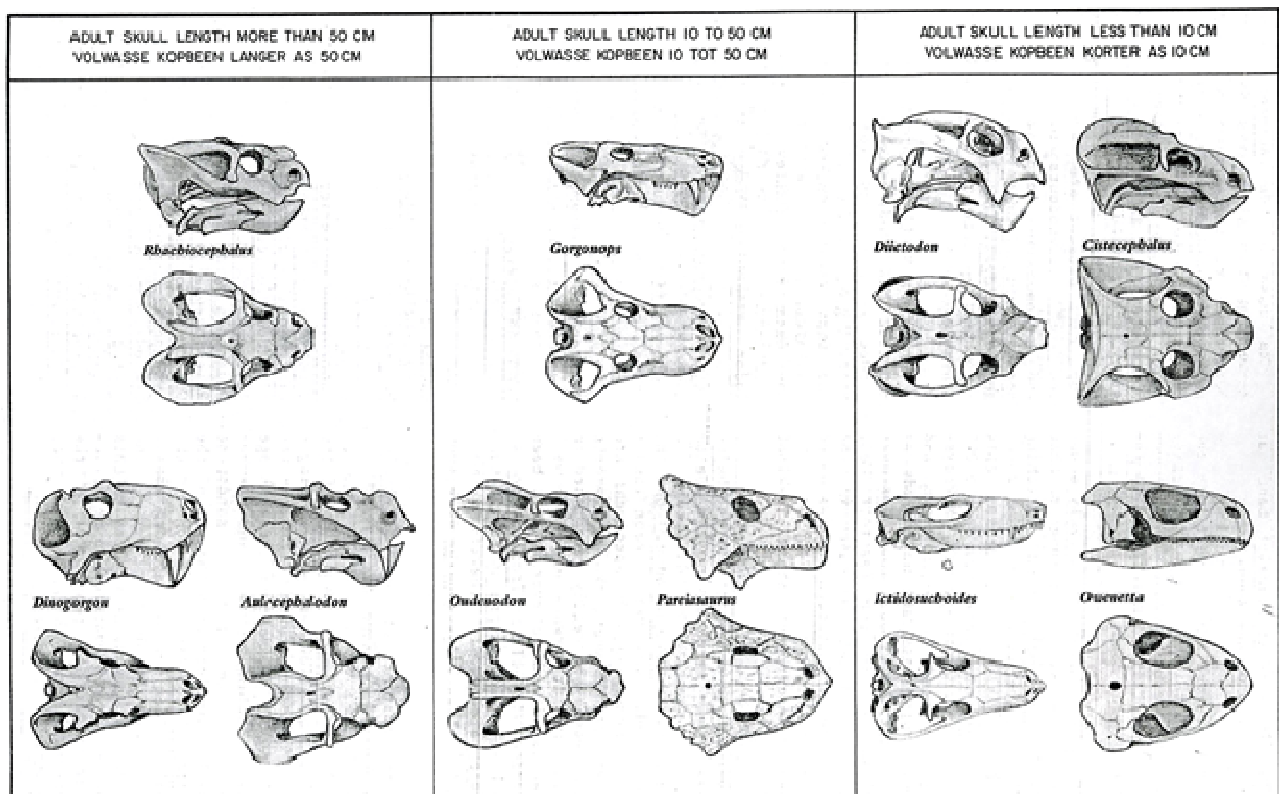


Fig. 5. Skulls of characteristic fossil vertebrates from the *Cistecephalus* Assemblage Zone (From Keyser & Smith 1979). *Pareiasaurus* a large herbivore, and *Owenetta*, a small insectivore, are true reptiles. The remainder are therapsids or “mammal-like reptiles”. Of these, *Gorgonops* and *Dinogorgon* are large flesh-eating gorgonopsians, *Ictidosuchoides* is an insectivorous therocephalian, while the remainder are small- to large-bodied herbivorous dicynodonts.

The generally very low levels of exposure of Lower Beaufort Group seen in the East London area is due to deep post-Gondwana weathering as well as extensive soil development and high levels of vegetation cover in modern humid, pluvial climates. Roadcuts (e.g. along the N2 freeway) and steep-sided river valleys (e.g. in East London itself) mainly feature the more resistant dolerites and channel sandstones while the potentially more highly fossiliferous Beaufort Group mudrock

horizons are very poorly exposed (Almond 2011a, 2011b, 2014a). For these reasons alone, the Late Palaeozoic fossil record of the East London area is very poorly known, with most records coming from the better exposed coastal zone (e.g. Mountain 1974, Kitching 1977, Nicolas 2007).

Older data on Lower Beaufort Group fossil records in the East London area has been provided by Mountain (1974, p. 12) and Kitching (1977, pp. 53, 62). It is notable that many of these early records explicitly refer to badly preserved specimens. Poorly preserved therapsids, mostly dicynodonts referable to the *Cistecephalus* Assemblage Zone, as well as unidentified plant remains were collected near East London (on the left bank of the Buffalo River and on the shore) in the eighteenth century by George Gordon McKay. The dicynodont *Oudenodon*, which ranges through the *Cistecephalus* and *Dicynodon* Assemblage Zones, is recorded from close to the Qolora River Mouth, some 60 km north-east of East London (Rogers & Schwarz 1902, p. 54).

Unnamed tetrapod fossils were recorded from the Morgans Bay area (just southwest of the Kei Mouth) to the northeast of East London by Plumstead (Mountain 1974, p.12). A *Cistecephalus* Assemblage Zone fossil biota including the dicynodonts *Dicynodon* (this genus ranges down below the *Dicynodon* AZ itself; Rubidge 1995) and *Oudenodon* as well as other, unidentified small- and medium-sized dicynodonts, the gorgonopsian *Lycaenops* and plant fossils of the *Glossopteris* flora (*Glossopteris* spp., sphenophytes) was collected by Kitching from intertidal coastal exposures intruded by dolerite at “Morgans Bay, Komga” in 1954 (Mountain 1974, p. 12; Kitching 1977, p. 62). Kitching (1977, p. 53) records the following therapsid genera from “small, scanty exposures next to the Nahoon River towards Arnoldton and Kidd’s Beach”, i.e. along the coast to the southwest of East London: the dicynodonts *Aulacephalus* [= *Aulacephalodon*?], *Pristerodon* and *Oudenodon* as well as an indeterminate theriodont (“*Lycosuchus*”). Kitching referred this biota to “strata below the *Cistecephalus* band. The “*Cistecephalus* Band” is a potential acme zone that occurs high up within the *Cistecephalus* Assemblage Zone and so Kitching’s fauna may well belong to the latter assemblage zone. Petrified (silicified) wood material showing well-developed seasonal growth rings occurs fairly frequently in the Beaufort Group in the King William’s Town – East London region (Almond 2011a, 2011b, 2011c). It has been provisionally referred to the basket-genus *Dadoxylon* and is probably of gymnospermous affinities for the most part (cf Bamford 1999, 2004).

Much of the fossil material mentioned above is probably curated in the collections of the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand, Johannesburg. Small displays of local Beaufort Group and other fossils are also presented at the Amatole Museum (previously Kaffrarian Museum), King William’s Town, and the East London Museum.

4.2. Karoo Dolerite Suite

The dolerite outcrops in the Eastern Cape study region are in themselves of no palaeontological significance since these are high temperature igneous rocks emplaced at depth within the Earth’s crust. As a consequence of their proximity to large dolerite intrusions in the East London – King William’s Town area, the Beaufort Group sediments here often been thermally metamorphosed or “baked” (i.e. recrystallised, impregnated with secondary minerals). Embedded fossil material of phosphatic composition, such as bones and teeth, is frequently altered by baking - bones in the East London area are typically black, for example - and may be very difficult to extract from the hard matrix by mechanical preparation (Smith & Keyser, p. 23 in Rubidge 1995). Thermal metamorphism by dolerite intrusions therefore tends to *reduce* the palaeontological heritage potential of neighbouring Beaufort Group sediments.

4.3. Late Caenozoic superficial deposits

For the most part the Late Caenozoic superficial deposits (e.g. soil, alluvium, downwasted gravels) overlying the Beaufort Group bedrocks in the East London area are expected to be of low to very low palaeontological sensitivity, with very rare occurrences of Pleistocene to Recent mammalian remains (e.g. bones and teeth).

It should be noted, however, that there is an (unconfirmed) possibility that resistant-weathering silicified wood material may have been eroded out of the Lower Beaufort bedrocks (e.g. channel sandstones) in Late Caenozoic times and have become concentrated within downwasted surface gravels as well as alluvial gravels on the coastal plain. This palaeontologically important phenomenon has been noted within the Upper Beaufort Group (Katberg Formation) outcrop area by Almond (2011c) and confirmed by more recent fieldwork by the author to the NE and SW of East London.

5. CONCLUSIONS & RECOMMENDATIONS

The Late Permian continental sediments of the Middleton Formation (Lower Beaufort Group, Karoo Supergroup) that underlie the whole study area are generally considered to be of high palaeontological sensitivity due to their rich fossil record of terrestrial vertebrates (notably various “mammal-like reptiles”, trace fossils and plant remains). However, the impact significance of the proposed Cove Ridge Estate Mixed-Use Development as far as fossil heritage is concerned is rated as LOW because:

- The potentially fossiliferous Karoo bedrocks on the coastal platform here are probably mantled in thick soils and highly weathered. Substantial excavation of potentially fossiliferous fresh (unweathered) bedrock is therefore not anticipated;
- Baking of sediments as a consequence of nearby dolerite intrusions may have compromised their fossil content;
- Fossil abundance within the Lower Beaufort Group in the Eastern Cape might be lower than that of equivalent beds in the western Karoo (This is still to be established, however).

Petrified wood material that has weathered out of the underlying Beaufort Group bedrocks to accumulate in downwasted and alluvial gravels at or near the ground surface has been widely recorded to the southwest and northeast of East London (Almond 2011c and unpublished field data). Such reworked fossil wood might therefore be present within superficial sediments in the present study area (e.g. around dams), but this remains unconfirmed.

In view of the overall low impact significance of the proposed development on palaeontological heritage resources, it is concluded that no further specialist palaeontological heritage studies or mitigation are recommended for the Cove Ridge Estate Mixed Use Development project near East London, pending the exposure of any substantial fossil remains (e.g. vertebrate bones and teeth, large blocks of petrified wood, vertebrate trackways) during the construction phase. In this case, negative impacts on local fossil heritage can be effectively mitigated by appropriate ECO monitoring and – where necessary – by professional palaeontological mitigation.

Fresh exposures of Beaufort Group sediments created during the construction phase of the development should be inspected at intervals by the responsible Environmental Control Officer (ECO). It is also recommended that the ECO for this development visit a Karoo palaeontological display (e.g. at the Albany Museum, Grahamstown, or the East London Museum) before the start of operations so that they acquire some familiarity with the appearance of typical Beaufort Group and younger fossil material. Well-illustrated and accessible accounts of Karoo fossils that may help in the recognition of Beaufort Group fossils have been published by Cluver (1978), MacRae (1999) and McCarthy and Rubidge (2005).

Should loose fossils be encountered during excavations, they should be carefully collected, with adherent matrix where necessary, given a provisional reference number (e.g. marked on masking tape) and carefully wrapped in newspaper. It is *essential* that the locality where the fossil is found be accurately marked on a 1: 50 000 map or recorded by GPS. Specimens without locality information are of limited scientific value. The fossils should be submitted for inspection by a professional palaeontologist at the earliest opportunity. Some of this material may be of scientific interest - in which case it should be deposited ultimately in an approved repository (e.g. Albany

Museum, Grahamstown or East London Museum) – while other specimens may be of educational value and might be donated for display purposes.

If *in situ*, articulated skeletons or other substantial fossil remains are encountered during borrow pit excavation, they should *NOT* be informally excavated since this will almost invariably lead to damage and loss of useful contextual information (e.g. taphonomy – data on mode of death and burial of animals). If feasible, they should be photographed (with scale), covered with a protective layer of loose sediment, and the site marked and carefully recorded (GPS / 1: 50 000 map / aerial photograph). The Environmental Control Officer should immediately inform ECPHRA, the Eastern Cape Provincial Heritage Resources Authority (Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; Email: smokhanya@ecphra.org.za) and a suitably qualified palaeontologist so that specimens can be examined, recorded and, if necessary, professionally excavated at the developers expense.

These recommendations should be included in the Environmental Management Plan for the proposed Cove Ridge Estate Mixed Use Development project near East London.

It should be noted that provided appropriate mitigation measures are implemented, the professional recording and collection of new fossil material as part of the mitigation process represents a *positive* impact in terms of our understanding of Eastern Cape fossil heritage.

6. ACKNOWLEDGMENTS

Ms Karen van Ryneveld of ArchaeoMaps, Beacon Bay is thanked for commissioning this report and for providing the necessary background information.

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8. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company *Natura Viva* cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He has contributed to palaeotechnical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape, Limpopo, Gauteng and the Free State for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



Heritage Protocol for Finds

Heritage Impact Assessment (HIA) - The Cove Ridge Estate Mixed-Use Development, Portions 21, 22 and 23 of Farm 925, Cove Ridge, East London, Buffalo City Metropolitan Municipality, Eastern Cape

Heritage Protocol for Incidental Finds during the Construction Phase

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

➤ **On-site Reporting Process:**

1. The identifier should immediately notify his / her supervisor of the find.
2. The identifier's supervisor should immediately (and within 24 hours after reporting by the identifier) report the incident to the on-site SHE / SHEQ officer.
3. The on-site SHE / SHEQ officer should immediately (and within 24 hours after reporting by the relevant supervisor) report the incident to the appointed ECO / ELO officer. [Should the find relate to human remains the SHE / SHEQ officer should immediately notify the nearest SAPS station informing them of the find].
4. The ECO / ELO officer should ensure that the find is within 72 hours after the SHE / SHEQ officers report reported on SAHRIS and that a relevant heritage specialist is contacted to make arrangements for a heritage site inspection. [Should the find relate to human remains the ECO / ELO officer should ensure that the archaeological site inspection coincides with a SAPS site inspection, to verify if the find is of forensic, authentic (informal / older than 60 years), or archaeological (older than 100 years) origin].
5. The appointed heritage specialist should compile a 'heritage site inspection' report based on the site specific findings. The site inspection report should make recommendations for the destruction, conservation or mitigation of the find and prescribe a recommended way forward for development. The 'heritage site inspection' report should be submitted to the ECO / ELO, who should ensure submission thereof on SAHRIS.
6. SAHRA / the relevant PHRA will state legal requirements for development to proceed in the SAHRA / PHRA Comment on the 'heritage site inspection' report.
7. The developer should proceed with implementation of the SAHRA / PHRA Comment requirements. SAHRA / PHRA Comment requirements may well stipulate permit specifications for development to proceed.
 - Should permit specifications stipulate further Phase 2 archaeological investigation (including grave mitigation) a suitably accredited heritage specialist should be appointed to conduct the work according to the applicable SAHRA / PHRA process. The heritage specialist should apply for the permit. Upon issue of the SAHRA / PHRA permit the Phase 2 heritage mitigation program may commence.
 - Should permit specifications stipulate destruction of the find under a SAHRA / PHRA permit the developer should immediately proceed with the permit application. Upon the issue of the SAHRA / PHRA permit the developer may legally proceed with destruction of the palaeontological, archaeological or cultural heritage resource.
 - Upon completion of the Phase 2 heritage mitigation program the heritage specialist will submit a Phase 2 report to the ECO / ELO, who should in turn ensure submission thereof on SAHRIS. Report recommendations may include that the remainder of a heritage site be destroyed under a SAHRA / PHRA permit.
 - Should the find relate to human remains of forensic origin the matter will be directly addressed by the SAPS: A SAHRA / PHRA permit will not be applicable.

NOTE: Note that SAHRA / PHRA permit and process requirements relating to the mitigation of human remains requires suitable advertising of the find, a consultation, mitigation and re-interment / deposition process.

➤ **Duties of the Supervisor:**

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

➤ **Duties of the SHE / SHEQ Officer:**

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

➤ **Duties of the ECO / ELO officer:**

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

➤ **Duties of the Developer / Construction Consultant:**

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