

Baseline Heritage Study:

**Proposed Richards Bay Port Expansion,
uMhlatuze Local Municipality,
uThungulu District,
KwaZulu-Natal**

Prepared for

AECOM

2 Fort Street, Central, Port Elizabeth 6000
Telephone Lucille Behrens 041 585 2514; 082 922 1645
Fax 041 585 8478
lucille.behrens@aecom.com

Prepared by



**ETHEMBENI
CULTURAL
HERITAGE**

Elizabeth Wahl and Len van Schalkwyk
Box 20057 Ashburton 3213 Pietermaritzburg
Telephone 033 326 1136 / 082 655 9077 / 082 529 3656
Facsimile 086 672 8557 thembeni@iafrica.com

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1 INTRODUCTION

eThembeni Cultural Heritage was appointed by AECOM to undertake a Baseline Heritage Study as a prelude to a full Phase 1 Heritage Impact Assessment (HIA) of the proposed Richards Bay Port expansion, as required by the National Environmental Management Act 107 of 1998 as amended (NEMA), in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA) (refer to Appendix A).

South Africa's heritage resources are both rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representivity of a particular time period; their rarity; and their sphere of influence.

The integrity and significance of heritage resources can be jeopardized by natural (e.g. erosion) and human (e.g. development) activities. In the case of human activities, a range of legislation exists to ensure the timeous identification and effective management of heritage resources for present and future generations.

This report is a baseline study in anticipation of a full Phase 1 HIA (including a specialist palaeontological study) for the proposed development.

2 TERMS OF REFERENCE

The purpose of this Baseline Heritage Study is to identify potential heritage resources / issues in the area proposed for development, based on desktop studies and literature reviews. This will allow the developers to evaluate the viability of the project in terms of potential impacts on heritage resources.

This report includes the details, qualifications and expertise of the person who prepared the report; and a statement of independence.

3 PROJECT DESCRIPTION¹

The Port of Richards Bay has been identified as the preferred location for a sustainable and competitive open access coal export terminal eventually providing capacity for about 32 mega tonnes to unlock coal exports for emergent miners looking for export solutions. The current Richards Bay Port expansion programme consists of two sections, namely the General Freight Bulk expansion (inclusive of rail, road and harbour bound industries) and the Coal Terminal. The FEL-2 study is currently looking at three options within the General Freight Bulk (GFB or port) expansion, and the options for the new Coal Terminal considers the development of the 500 series, with a further sub-option being the Swaziland Rail Link.

4 PROJECT LOCATION AND ENVIRONMENTAL DESCRIPTION

The proposed project is situated in Umhlatuze Local Municipality (KZN282), uThungulu District around the approximately central coordinate of 28°47'23" S 32°01'55" E. The areas in question are indicated on Figure 1, as follows:

1. GFB Port expansion (orange area)
2. Coal Swazi Link (yellow area)
3. Coal 500 Series (white area)
4. South Dunes (green area)
5. Marine Study (blue area)

The relevant Surveyor General 1:50 000 map sheets are 2831DB Empangeni, 2831DD Felixton, 2832CA KwaMbonambi and 2832CC Richards Bay.



FIGURE 1 PROPOSED RICHARDS BAY PORT EXPANSION AREAS.

¹ Information obtained from the client.

5 HISTORICAL SUMMARY²

Richards Bay is located on the north coast of KwaZulu-Natal about 180 kilometres north of Durban, on a 30km² lagoon of the Mhlatuze River³. The town began as a makeshift harbour that was set up by the Commodore of the Cape, Sir Frederick Richards during the Anglo-Zulu War of 1879. In 1935 the Richards Bay Game Sanctuary was created to protect the ecology around the lagoon and later by 1943 it expanded into the Richards Bay Park. The town was laid out on the shores of the lagoon in 1954 and proclaimed a town in 1969.

By the early 1950s, in the wake of burgeoning South African industrial expansion, the need for new port facilities had become ever more pressing⁴. The need for major expansion of export facilities was further emphasised by the Chamber of Mines that claimed there was a vast potential for South Africa's raw materials, provided adequate rail and port facilities capable of accommodating large vessels were available.

The South African Government decided in 1965 to build a deepsea harbour at Richards Bay. Construction work began in 1972 and four years later, on 1 April 1976, the new harbour was opened. The residential area of Richards Bay developed north of the harbour. Meerensee, started in 1970, was the first suburb. It was followed by Arboretum in 1975 and VeldenVlei in 1980. All three suburbs catered exclusively for Whites in accordance with the existing laws of apartheid. A township for Blacks was developed at Esikhaweni, fifteen kilometres south of Richards Bay. Residential areas for Indians and people of mixed blood were opened after 1985 west of VeldenVlei.

Richards Bay is South Africa's premier bulk port and the most modern. Although originally built for the export of coal, it has since expanded into other bulk and breakbulk cargoes. The multi-purpose terminal is the product of the merging of two separate terminals, namely the Bulk Metal and Combi Terminals. The resultant integration of infrastructure and facilities has enhanced the terminal's ability to logistically manage a variety of cargo types, namely break bulk, neo-bulk and containers.

In 2011 the port handled 89.232 million tonnes of cargo, a far cry from the unimpressed view expressed by Commissioner Henry Cloete in 1843, when he surveyed the Mhlatuze estuary and declared it to have little or no potential as a future harbour.

A dedicated railway line connects the port with Mpumalanga Province and Gauteng and was designed specifically to handle the majority of South Africa's coal exports. Other rail links connect Richards Bay with Durban in the south and Swaziland and Mpumalanga to the north.



The port occupies 2157 ha of land area and 1495 ha of water area at present, but has the potential of expanding when required, making Richards Bay potentially one of the largest ports worldwide. Richards Bay serves the coalfields of KwaZulu-Natal and Mpumalanga Provinces as well as timber and granite exporters from as far away as the East Cape and Northern Cape Provinces. Much of the general cargo has migrated away from Durban in recent years. Exports remain the main activity of the port. The port has become a popular call for international cruise ships because of the close proximity to game parks and the iSimangaliso Lucia World Heritage Site. Water sports and recreational facilities are available in the harbour at reserved places.

² A summary of the archaeological context of the study area is provided in Appendix B.

³ http://en.wikipedia.org/wiki/Richards_Bay

⁴ <http://ports.co.za/richards-bay.php>

6 POTENTIAL HERITAGE RESOURCES AND DEVELOPMENT IMPLICATIONS

Various factors mitigate against the presence of significant heritage resources in the proposed development area:

- The historical environment, comprising a near-coastal lagoon, would have been unattractive as a place of human settlement prior to European occupation, given the presence of diseases deleterious to the health of people and domestic animals.
- The relatively recent establishment of the town and the port largely precludes the presence of structures or buildings with historical value.
- The nature of the construction of the port, involving massive environmental disturbance, would have destroyed any traces of archaeological, palaeontological or geological sites.
- Much of the greenfield area proposed for development has already been transformed by intensive and extensive land uses, including timber and sugarcane plantations

The potential occurrence of various heritage resource types is described below, along with the implications for the proposed development.

FORMALLY PROTECTED HERITAGE RESOURCES

No heritage resources with Grade I or Grade II status are present within the study area (refer to Appendix C).

BUILDINGS AND STRUCTURES

All buildings and structures older than sixty years are afforded general protection in terms of Section 33 of the KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA; also see Appendix A). Accordingly, no such structure may be demolished, altered or added to without the prior written approval of the Amafa aKwaZulu-Natali Council having been obtained on written application to the Council.

Given the recent history of the establishment of the town of Richards Bay and its harbour it is unlikely that buildings or structures older than sixty years are present within the proposed development area. However, should such resources be present, their rarity may afford them a heritage significance that precludes their alteration or demolition, and they would have to be included within the proposed development.

PLACES ASSOCIATED WITH ORAL TRADITIONS OR LIVING HERITAGE

Living heritage is defined in the National Heritage Council Act 11 of 1999 as cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships.

Given the nature of the historical environment and modern land uses it is unlikely that places associated with oral traditions or living heritage are present within the proposed development area. However, should such resources be present, their social, cultural and/or spiritual values may afford them a heritage significance that precludes their alteration or demolition, and they would have to be included within the proposed development.

LANDSCAPES AND NATURAL FEATURES

This heritage resource category includes sites, areas or reserves protected in terms of environmental legislation, including conservancies and nature reserves.

— Richards Bay Nature Reserve

The formally protected landscape of Richards Bay Nature Reserve is located on the northern banks of the Mhlatuze River Estuary, immediately south of the proposed development. It is a proclaimed Nature Reserve managed by Ezemvelo KZN Wildlife (Figures 2 and 3).



FIGURE 2 THE LOCATION OF RICHARDS BAY NATURE RESERVE (SOURCE EZEMVELO).



FIGURE 3 THE EXTENT OF RICHARDS BAY NATURE RESERVE AND SUPPORT AREAS (SOURCE EZEMVELO).

Ms J Longmore, Principal Conservation Planner in the Planning Division: IEM Section of Ezemvelo provided eThembeni with the following statement (email communication dated 29 November 2011), as well as various documents pertaining to the reserve and adjacent land:

'The Richards Bay Nature Reserve is of extremely high conservation significance. The estuary is identified in the Estuarine Systematic Conservation Plan for the Province as being 'totally irreplaceable' and a mandatory reserve, meaning that it is critical to the Province achieving its conservation goals and targets. Estuarine specialists that I have consulted recently are of the opinion that the Mhlatuze Estuary, or 'sanctuary' as it is commonly referred to, is presently probably the most important estuary in the Province in maintaining the fisheries and prawn industry (Kosi is over fished and St Lucia mouth closed).

'The incorporation of the 310ha forest on the south bank of the Sanctuary has long been identified as a conservation priority to get incorporated into the Richards Bay Nature Reserve. Plans to expand the Richards Bay Nature Reserve to incorporate the forest area under consideration date back to 1983. A standing agreement was eventually entered into between Ezemvelo and the uMhlatuze Municipality to have the surrounding Council Owned land proclaimed. The proclamation of the area in question was supported by the uMhlatuze Council (Resolution 4045 of 5 September 2006). The area in question is identified in the uMhlatuze Spatial Development Framework as "conservation" and indicated that Nature Reserve Planning is presently underway'.

In a report to the Regional Mining Development Environment Committee⁵ Ezemvelo states that the estuary is ranked the sixth most important estuary in terms of ecosystem services in the country. The sanctuary is an International Birding Area and a candidate area for RAMSAR.

Richards Bay Nature Reserve evidently constitutes a conservation area of local, regional, national and international ecosystem significance. It is therefore clear that the reserve and adjacent forest on the south bank of the Mhlatuze Estuary comprise a resource that has high heritage significance at all levels for its

⁵ Ezemvelo's Response to Specific Questions & Requests made by the RMDEC and the DMR. Objection to Richards Bay Minerals Prospecting Rights Application, Zulti South Extension. KZN30/5/1/1/3/2/1/856EM

scientific, economic, social and cultural values. This significance, coupled with its rarity and endangered status, merits the site's declaration as a Grade I, or National Heritage Site in terms of the National Heritage Resources Act 25 of 1999 (NHRA).

No development activity that could negatively affect the heritage significance of Richards Bay Nature Reserve may be countenanced.

TRADITIONAL BURIAL PLACES

As far as we could ascertain no cemeteries administered by the local municipality are present within the proposed development area. Given the history and nature of the environment it is unlikely that traditional burial places occur in any number. However, the client has indicated that there may be graves in the vicinity of 28°46'22.4" S 31°59'40.6" E, within the proposed Swazi Link area.

All human remains have high heritage significance at all levels for their spiritual, social and cultural values and may not be altered in any way without the permission of Amafa and the next-of-kin (see Appendix A).

The aforementioned site will be inspected during the field inspection as part of the Phase 1 HIA.

ECOFACTS, GEOLOGICAL AND ARCHAEOLOGICAL SITES AND PUBLIC MONUMENTS AND MEMORIALS

Given the history and nature of the environment it is unlikely that such heritage resources are present within the proposed development area. If present they are likely to have low heritage significance at all levels and will require little, if any, further mitigation prior to destruction.

PALAEONTOLOGICAL SITES⁶

In general, the KwaMbonambi, Kosi Bay and Isipingo formations are not highly fossiliferous. However, Kosi Bay Fm. contains lignite, rhizolites and is important for understanding pedogenesis in the region and dune development over time. The Isipingo Fm. contains various marine molluscs, although reported from much further south of the study area. The Port Durnford Fm. contains rich mammalian fauna. Palynological complexes from the Port Durnford Fm. provide a valuable source of information for reconstruction of the Pleistocene vegetation on the east coast of KwaZulu-Natal. The overall importance of the Port Durnford deposits for palaeoenvironmental reconstructions is recognised.

The Uloa Formation is very rich in various marine fossils, including bivalve and gastropod molluscs, brachiopods, echinoids, corals etc. The Eocene deposits in north-eastern KwaZulu-Natal are thought to be correlative to the fossil-rich Eocene Salamanga Fm. in southern Mozambique. The Upper Maastrichtian and Palaeocene deposits from Richards Bay yielded rich cephalopod fauna.

The significance of the palaeontological content of the study area has been highlighted recently. The St Lucia Fm. is known to be exceptionally rich in high-quality fossils, and the study area is located in the region where unique fossils like mammalian or cephalopod remains were found, or can be found once development starts. Activities associated with development may lead to complete destruction of the fossil material and/or restrict access to fossiliferous beds in the future. Since any piece of palaeontological evidence is crucially important for our understanding the past biodiversity and modelling future environmental changes, all effort should be made to save palaeontological objects for subsequent studies.

⁶ Ovechkina (2012).

The study area is therefore considered as potentially very sensitive in terms of its palaeontological significance and a full Phase 1 Palaeontological Impact Assessment (PIA) must be undertaken prior to commencement of development.

BATTLEFIELDS

No battlefields are known to occur within the proposed development area.

SHIPWRECKS

Shipwrecks are known to occur along most of the KwaZulu-Natal coastline, but none will be affected by the proposed development.

7 CONCLUSION

We recommend that full HIA and PIA reports are prepared by accredited subject specialists for submission to Amafa in fulfilment of the requirements of the NHRA. According to Section 38(4) of the Act the reports shall be considered timeously by the Council which shall, after consultation with the person proposing the development, decide—

- whether or not the development may proceed;
- any limitations or conditions are to be applied to the development;
- what general protections in terms of the NHRA apply, and what formal protections may be applied to such heritage resources;
- whether compensatory action shall be required in respect of any heritage resources damaged or destroyed as a result of the development; and
- whether the appointment of specialists is required as a condition of approval of the proposal.

8 BIBLIOGRAPHY

- Ovechkina, M. N 2012. Palaeontological Impact Assessment desktop study for the Richards Bay Port Expansion Programme. Unpublished report submitted to eThembeni Cultural Heritage.
- Maggs, T. 1989. The Iron Age farming communities. In Duminy, A. and Guest, B. (eds) *Natal and Zululand from earliest times to 1910. A new history* pp. 28-48. Pietermaritzburg: University of Natal Press.
- Whitelaw, G. 1991. Precolonial iron production around Durban and in southern Natal. *Natal Museum Journal of Humanities* 3: 29-39.
- Whitelaw, G. 1997. What Da Gama missed on his way to Sofala. *Natalia* 27: 30-41.
- Whitelaw, G. 2009. An Iron Age fishing tale. *Southern African Humanities* 21: 195-212.

APPENDIX A STATUTORY REQUIREMENTS

General

The Constitution of the Republic of South Africa Act 108 of 1996 is the source of all legislation. Within the Constitution the Bill of Rights is fundamental, with the principle that the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development. With regard to spatial planning and related legislation at national and provincial levels the following legislation may be relevant:

- Physical Planning Act 125 of 1991
- Municipal Structures Act 117 of 1998
- Municipal Systems Act 32 of 2000
- Development Facilitation Act 67 of 1995 (DFA)
- KwaZulu-Natal Planning and Development Act 6 of 2008.

The identification, evaluation and management of heritage resources in South Africa is required and governed by the following legislation:

- National Environmental Management Act 107 of 1998 (NEMA)
- KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA)
- National Heritage Resources Act 25 of 1999 (NHRA)
- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)

KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA)

This Act is implemented by Amafa aKwaZulu-Natali/Heritage KwaZulu-Natal, the provincial heritage resources authority charged to provide for the conservation, protection and administration of both the physical and the living or intangible heritage resources of the province; along with a statutory Council to administer heritage conservation in the Province.

National Heritage Resources Act 25 of 1999 (NHRA)

The NHRA established the South African Heritage Resources Agency (SAHRA) together with its Council to fulfill the following functions:

- co-ordinate and promote the management of heritage resources at national level;
- set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; and
- provide for the protection and management of conservation-worthy places and areas by local authorities.

Heritage Impact Assessments

Section 38(1) of the NHRA may require a Heritage Impact Assessment in case of:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity which will change the character of a site—

- (i) exceeding 5 000m² in extent; or
- (ii) involving three or more existing erven or subdivisions thereof; or
- (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the re-zoning of a site exceeding 10 000m² in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

Reports in fulfilment of NHRA Section 38(3) must include the following information:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of the heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on such heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

It is incumbent upon the developer or Environmental Practitioner to approach the South African Heritage Resources Agency (SAHRA) or Amafa to ascertain whether an HIA is required for a project; what categories of heritage resource must be assessed; and request a detailed motivation for such a study in terms of both the nature of the development and the nature of the environment. In this regard we draw your attention to Section 38(2) of the NHRA which states specifically that 'The responsible heritage resources authority must ... if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report'. In other words, the heritage authority must be able to justify a request for an Archaeological, Palaeontological or Heritage Impact Assessment. The Environmental Practitioner may also submit information to the heritage authority in substantiation of exemption from a specific assessment due to existing environmental disturbance, for example.

Definitions of heritage resources

The Act defines a heritage resource as any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes, but is not limited to, the following wide range of places and objects:

- living heritage as defined in the National Heritage Council Act 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);
- ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity; definition used in KwaZulu-Natal Heritage Act 2008);
- places, buildings, structures and equipment;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features;

- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds;
- public monuments and memorials;
- sites of significance relating to the history of slavery in South Africa;
- movable objects, but excluding any object made by a living person; and
- battlefields.

Furthermore, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

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

Archaeological means –

- material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act 15 of 1994, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

Palaeontological means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

A **place** is defined as:

- a site, area or region;
- a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
- a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
- an open space, including a public square, street or park; and
- in relation to the management of a place, includes the immediate surroundings of a place.

Public monuments and memorials means all monuments and memorials:

- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
- which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.

Structures means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Management of Graves and Burial Grounds

– Definitions

Grave

The NHRA defines a grave as a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such a place.

The KwaZulu-Natal Cemeteries and Crematoria Act 12 of 1996 defines a grave as an excavation in which human remains have been intentionally placed for the purposes of burial, but excludes any such excavation where all human remains have been removed.

Burial ground

The term 'burial ground' does not appear to have a legal definition. In common usage the term is used for management purposes to describe two or more graves that are grouped closely enough to be managed as a single entity.

Cemetery

The KwaZulu-Natal Cemeteries and Crematoria Act 1996 defines a cemetery as any place

- (a) where human remains are buried in an orderly, systematic and pre-planned manner in identifiable burial plots;
- (b) which is intended to be permanently set aside for and used only for the purposes of the burial of human remains.

– Protection of graves and cemeteries

No person may damage, alter, exhume, or remove from its original position any grave, as defined above, without permission from the relevant authority, as detailed in the following table.

Grave type	Relevant legislation	Administrative authority – disinterment	Administrative authority – reburial
Graves located within a formal cemetery administered by a local authority	KwaZulu-Natal Cemeteries and Crematoria Act 12 of 1996	National and / or Provincial Departments of Health	If relocated to formal cemetery – relevant local authority.
Graves younger than 100 years located outside a formal cemetery administered by a local authority and the graves of victims of conflict	KwaZulu-Natal Heritage Act 4 of 2008 KwaZulu-Natal Cemeteries and Crematoria Amendment Act 2 of 2005	Amafa aKwaZulu-Natali, the provincial heritage resources authority	If relocated to private or communal property – Amafa. If relocated to formal cemetery – Amafa and relevant local authority.

– **Procedures required for permission to disinter and rebury graves**

The procedure for consultation regarding burial grounds and graves (Section 36 of the NHRA) is applicable to all graves located outside a formal cemetery administered by a local authority. The following extract from this legislation is applicable to this policy document:

SAHRA or Amafa may not issue a permit for any alteration to or disinterment or reburial of a grave unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

- (a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and
- (b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

Any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Services and in accordance with regulations of the responsible heritage resources authority—

- (a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and
- (b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

The Vermillion Accord on Human Remains⁷

Adopted in 1989 at WAC Inter-Congress, South Dakota, USA

1. Respect for the mortal remains of the dead shall be accorded to all, irrespective of origin, race, religion, nationality, custom and tradition.
2. Respect for the wishes of the dead concerning disposition shall be accorded whenever possible, reasonable and lawful, when they are known or can be reasonably inferred.
3. Respect for the wishes of the local community and of relatives or guardians of the dead shall be accorded whenever possible, reasonable and lawful.
4. Respect for the scientific research value of skeletal, mummified and other human remains (including fossil hominids) shall be accorded when such value is demonstrated to exist.
5. Agreement on the disposition of fossil, skeletal, mummified and other remains shall be reached by negotiation on the basis of mutual respect for the legitimate concerns of communities for the proper disposition of their ancestors, as well as the legitimate concerns of science and education.
6. The express recognition that the concerns of various ethnic groups, as well as those of science are legitimate and to be respected, will permit acceptable agreements to be reached and honoured.

⁷ <http://www.worldarchaeologicalcongress.org/>

APPENDIX B ARCHAEOLOGICAL CONTEXT OF THE STUDY AREA

The Stone Age⁸

No systematic Early and Middle Stone Age research has been undertaken in the proposed development area, hence the general nature of this section. Open air scatters of stone artefacts, probably with low heritage significance, could be expected in areas with minimal environmental disturbance.

South Africa's prehistory has been divided into a series of phases based on broad patterns of technology. The primary distinction is between a reliance on chipped and flaked stone implements (the Stone Age) and the ability to work iron (the Iron Age). Spanning a large proportion of human history, the Stone Age in Southern Africa is further divided into the Early Stone Age, or Paleolithic Period (about 2 500 000–150 000 years ago), the Middle Stone Age, or Mesolithic Period (about 150 000–30 000 years ago), and the Late Stone Age, or Neolithic Period (about 30 000–2 000 years ago). The simple stone tools found with australopithecine fossil bones fall into the earliest part of the Early Stone Age.

○ The Early Stone Age

Most Early Stone Age sites in South Africa can probably be connected with the hominin species known as *Homo erectus*. Simply modified stones, hand axes, scraping tools, and other bifacial artifacts had a wide variety of purposes, including butchering animal carcasses, scraping hides, and digging for plant foods. Most South African archaeological sites from this period are the remains of open camps, often by the sides of rivers and lakes, although some are rock shelters, such as Montagu Cave in the Cape region.

○ The Middle Stone Age

The long episode of cultural and physical evolution gave way to a period of more rapid change about 200 000 years ago. Hand axes and large bifacial stone tools were replaced by stone flakes and blades that were fashioned into scrapers, spear points, and parts for hafted, composite implements. This technological stage, now known as the Middle Stone Age, is represented by numerous sites in South Africa.

Open camps and rock overhangs were used for shelter. Day-to-day debris has survived to provide some evidence of early ways of life, although plant foods have rarely been preserved. Middle Stone Age bands hunted medium-sized and large prey, including antelope and zebra, although they tended to avoid the largest and most dangerous animals, such as the elephant and the rhinoceros. They also ate seabirds and marine mammals that could be found along the shore and sometimes collected tortoises and ostrich eggs in large quantities.

○ The Late Stone Age

Basic toolmaking techniques began to undergo additional change about 40 000 years ago. Small finely worked stone implements known as microliths became more common, while the heavier scrapers and points of the Middle Stone Age appeared less frequently. Archaeologists refer to this technological stage as the Late Stone Age. The numerous collections of stone tools from South African archaeological sites show a great degree of variation through time and across the subcontinent.

The remains of plant foods have been well preserved at such sites as Melkhoutboom Cave, De Hangen, and Diepkloof in the Cape region. Animals were trapped and hunted with spears and arrows on which were mounted well-crafted stone blades. Bands moved with the seasons as they followed game into higher lands in the spring and early summer months, when plant foods could also be found. When available, rock overhangs became shelters; otherwise, windbreaks were built. Shellfish, crayfish, seals, and seabirds were also important sources of food, as were fish caught on lines, with spears, in traps, and possibly with nets.

⁸ <http://www.britannica.com>; article authored by Colin J. Bundy, Julian R. D. Cobbing, Martin Hall and Leonard Monteath Thompson.

Dating from this period are numerous engravings on rock surfaces, mostly on the interior plateau, and paintings on the walls of rock shelters in the mountainous regions, such as the Drakensberg and Cederberg ranges. The images were made over a period of at least 25 000 years. Although scholars originally saw the South African rock art as the work of exotic foreigners such as Minoans or Phoenicians or as the product of primitive minds, they now believe that the paintings were closely associated with the work of medicine men, shamans who were involved in the well-being of the band and often worked in a state of trance. Specific representations include depictions of trance dances, metaphors for trance such as death and flight, rainmaking, and control of the movement of antelope herds.

Iron Age⁹

Archaeological evidence shows that Bantu-speaking agriculturists first settled in southern Africa around AD 300. Bantu-speakers originated in the vicinity of modern Cameroon from where they began to move eastwards and southwards, some time after 400 BC, skirting around the equatorial forest. An extremely rapid spread throughout much of sub-equatorial Africa followed: dating shows that the earliest communities in Tanzania and South Africa are separated in time by only 200 years, despite the 3 000 km distance between the two regions. It seems likely that the speed of the spread was a consequence of agriculturists deliberately seeking iron ore sources and particular combinations of soil and climate suitable for the cultivation of their crops.

The earliest agricultural sites in KwaZulu-Natal date to between AD 400 and 550. All are situated close to sources of iron ore, and within 15 km of the coast. Current evidence suggests it may have been too dry further inland at this time for successful cultivation. From 650 onwards, however, climatic conditions improved and agriculturists expanded into the valleys of KwaZulu-Natal, where they settled close to rivers in savanna or bushveld environments. There is a considerable body of information available about these early agriculturists.

Seed remains show that they cultivated finger millet, bulrush millet, sorghum and probably the African melon. It seems likely that they also planted African groundnuts and cowpeas, though direct evidence for these plants is lacking from the earlier periods. Faunal remains indicate that they kept sheep, cattle, goats, chickens and dogs, with cattle and sheep providing most of the meat. Men hunted, perhaps with dogs, but hunted animals made only a limited contribution to the diet in the region.

Metal production was a key activity since it provided the tools of cultivation and hunting. The evidence indicates that people who worked metal lived in almost every village, even those that were considerable distances from ore sources.

Large-scale excavations in recent years have provided data indicating that first-millennium agriculturist society was patrilineal and that men used cattle as bridewealth in exchange for wives. On a political level, society was organised into chiefdoms that, in our region, may have had up to three hierarchical levels. The villages of chiefs tended to be larger than others, with several livestock enclosures, and some were occupied continuously for lengthy periods. Social forces of the time resulted in the concentration of unusual items on these sites. These include artefacts that originated from great distances, ivory items (which as early as AD 700 appear to have been a symbol of chieftainship), and initiation paraphernalia.

This particular way of life came to an end around AD 1000, for reasons that we do not yet fully understand. There was a radical change in the decorative style of agriculturist ceramics at this time, while the preferred village locations of the last four centuries were abandoned in favour of sites along the coastal littoral. In general, sites dating to between 1050 and 1250 are smaller than most earlier agriculturist

⁹ Whitelaw (1997). See also Whitelaw (1991, 2009).

settlements. It is tempting to see in this change the origin of the Nguni settlement pattern. Indeed, some archaeologists have suggested that the changes were a result of the movement into the region of people who were directly ancestral to the Nguni-speakers of today. Others prefer to see the change as the product of social and cultural restructuring within resident agriculturist communities.

Whatever the case, it seems likely that this new pattern of settlement was in some way influenced by a changing climate, for there is evidence of increasing aridity from about AD 900. A new pattern of economic inter-dependence evolved that is substantially different from that of earlier centuries, and is one that continued into the colonial period nearly 500 years later.

Artefacts on Iron Age homestead sites include ceramic sherds, upper and lower grindstones and human and animal bones. Metalworking sites are often located in areas where iron ore is available and associated debris includes furnace remains, slag, bloom and ceramic sherds.

'The evidence or written sources [from shipwrecked Portuguese and other European mariners, who traversed lowland and coastal Natal on their way northwards to Mozambique] shows that, by the 1550s, while the coastal sourveld of Pondoland was thinly inhabited, coastal Natal from the Mtamvuna northwards was already well populated. A settlement of twenty hemispherical huts built of poles and thatch is described as being typical of the coast at that time. A later report confirms that such 'small villages' were the homes of kinship groups, each under the authority of a senior man. There can have been little difference between these homesteads and those of the nineteenth century in Natal and Zululand.

'The agro-pastoral economy of the Iron Age prevailed throughout the coastal regions, with cultivation typically a combination of grains, legumes and vegetables of the pumpkin-melon family. There were three types of grains, one being sorghum and another a smaller-seeded millet, specific identification being difficult to establish from the old Portuguese documents. Vegetables included beans, African groundnuts (both legumes), gourds, watermelons and pumpkins, while sorghum was cultivated for its sweet pith as well as for its seeds... There is evidence to show that tobacco was being cultivated and smoked by 1686. Cattle, sheep and goats were seen in quantities, as were chicken from southern Natal northwards' (Maggs 1989:39).

'In the nineteenth century, a significant linguistic and cultural boundary can be discerned separating Nguni and Tembe Thonga. Those parties of shipwreck survivors that walked northwards to Mozambique must have crossed this 'boundary' somewhere between the Thukela and the Thonga kingdom of Inhaca on the southern shores of Delagoa Bay. There are hints that this was the case. For example, the AD 1554 survivors gave the name Pescaria (fisheries) to an estuarine lake, which is almost certainly the Mhlatuze Lagoon, where they bought quantities of fish for the first time on their journey northwards.

'As organized fishing is associated with Tembe Thonga and not with Nguni, this suggests that the former extended as far south as the Mhlatuze in the sixteenth century. The 1593 account recorded a change in architectural style on the coastal plain from the St. Lucia area northwards, where the hemispherical huts of the Nguni gave way to what appears to have been a cone-on-cylinder style associated with the Tembe Thonga' (Maggs 1989:39-40).

Some groups of Tembe Tsonga were incorporated into the Zulu polity during the expansion of the Zulu kingdom. However, due to the area's low agricultural potential, settlement density during the Iron Age and historical periods was never high and therefore the archaeological visibility of these communities is low.

APPENDIX C METHODOLOGY

Database and literature review

No archaeological site data was available for the proposed development area from the SAHRIS national heritage database. A concise account of the archaeology of the broader study area was compiled from sources including those listed in the bibliography.

Assessment of heritage resource value and significance

Heritage resources are significant only to the extent that they have public value, as demonstrated by the following guidelines for determining site significance developed by Heritage Western Cape (HWC 2007) and utilised during this assessment.

Grade I Sites (National Heritage Sites)

Regulation 43 Government Gazette no 6820. 8 No. 24893 30 May 2003, Notice No. 694 states that: Grade I heritage resources are heritage resources with qualities so exceptional that they are of special national significance should be applied to any heritage resource which is

- a) Of outstanding significance in terms of one or more of the criteria set out in section 3(3) of the NHRA;
- b) Authentic in terms of design, materials, workmanship or setting; and is of such universal value and symbolic importance that it can promote human understanding and contribute to nation building, and its loss would significantly diminish the national heritage.

1. Is the site of outstanding national significance?
2. Is the site the best possible representative of a national issue, event or group or person of national historical importance?
3. Does it fall within the proposed themes that are to be represented by National Heritage Sites?
4. Does the site contribute to nation building and reconciliation?
5. Does the site illustrate an issue or theme, or the side of an issue already represented by an existing National Heritage Site – or would the issue be better represented by another site?
6. Is the site authentic and intact?
7. Should the declaration be part of a serial declaration?
8. Is it appropriate that this site be managed at a national level?
9. What are the implications of not managing the site at national level?

Grade II Sites (Provincial Heritage Sites)

Regulation 43 Government Gazette no 6820. 8 No. 24893 30 May 2003, Notice No. 694 states that: Grade II heritage resources are those with special qualities which make them significant in the context of a province or region and should be applied to any heritage resource which -

- a) is of great significance in terms of one or more of the criteria set out in section 3(3) of the NHRA; and
- (b) enriches the understanding of cultural, historical, social and scientific development in the province or region in which it is situated, but that does not fulfil the criteria for Grade 1 status.

Grade II sites may include, but are not limited to –

- (a) places, buildings, structures and immovable equipment of cultural significance;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and palaeontological sites; and
- (g) graves and burial grounds.

The cultural significance or other special value that Grade II sites may have, could include, but are not limited to –

- (a) its importance in the community or pattern of the history of the province;
- (b) the uncommon, rare or endangered aspects that it possess reflecting the province's natural or cultural heritage
- (c) the potential that the site may yield information that will contribute to an understanding of the province's natural or cultural heritage;
- (d) its importance in demonstrating the principal characteristics of a particular class of the province's natural or cultural places or objects;
- (e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group in the province;
- (f) its importance in demonstrating a high degree of creative or technical achievement at a particular period in the development or history of the province;
- (g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
- (h) its strong or special association with the life or work of a person, group or organization of importance in the history of the province.

Grade III (Local Heritage Resources)

Regulation 43 Government Gazette no 6820. 8 No. 24893 30 May 2003, Notice No. 694 states that: Grade III heritage status should be applied to any heritage resource which

- (a) fulfils one or more of the criteria set out in section 3(3) of the NHRA; or
- (b) in the case of a site contributes to the environmental quality or cultural significance of a larger area which fulfils one of the above criteria, but that does not fulfill the criteria for Grade 2 status.

Grade IIIA

This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant *any* alteration being regulated. The significances of these buildings and/or sites should include at least some of the following characteristics:

- Highly significant association with a
 - historic person
 - social grouping
 - historic events
 - historical activities or roles
 - public memory
- Historical and/or visual-spatial landmark within a place
- High architectural quality, well-constructed and of fine materials
- Historical fabric is mostly intact (this fabric may be layered historically and/or past damage should be easily reversible)
- Fabric dates to the early origins of a place
- Fabric clearly illustrates an historical period in the evolution of a place
- Fabric clearly illustrates the key uses and roles of a place over time
- Contributes significantly to the environmental quality of a Grade I or Grade II heritage resource or a conservation/heritage area

Such buildings and sites may be representative, being excellent examples of their kind, or may be rare: as such they should receive maximum protection at local level.

Grade IIIB

This grading is applied to buildings and/or sites of a marginally lesser significance than grade IIIA; and such marginally lesser significance argues against the regulation of internal alterations. Such buildings and

sites may have similar significances to those of a grade IIIA building or site, but to a lesser degree. Like grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than grade IIIA examples: as such they should receive less stringent protection than grade IIIA buildings and sites at local level and internal alterations should not be regulated (in this context).

Grade IIIC

This grading is applied to buildings and/or sites whose significance is, in large part, a significance that contributes to the character or significance of the environs. These buildings and sites should, as a consequence, only be protected and regulated *if the significance of the environs is sufficient to warrant protective measures*. In other words, these buildings and/or sites will only be protected if they are within declared conservation or heritage areas.

Assessment of development impacts

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, by minimising natural site erosion or facilitating non-destructive public use, for example. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the aforementioned examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on identified heritage resources:

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific, affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence (a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.
	Medium	Intensity is medium and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all of the other criteria being rated medium or higher.

Criteria	Rating Scales	Notes
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

APPENDIX D SPECIALIST COMPETENCY AND DECLARATION OF INDEPENDENCE

Specialist competency

Len van Schalkwyk is accredited by the Cultural Resources Management section of the Association of South African Professional Archaeologists (ASAPA) to undertake HIAs in South Africa. Mr van Schalkwyk has a master's degree in archaeology (specialising in the history of early farmers in southern Africa) from the University of Cape Town and 25 years' experience in heritage management. He has worked on projects as diverse as the establishment of the Ondini Cultural Museum in Ulundi, the cultural management of Chobe National Park in Botswana and various archaeological excavations and oral history recording projects. He was part of the writing team that produced the KwaZulu-Natal Heritage Act 1997. He has worked with many rural communities to establish integrated heritage and land use plans and speaks good Zulu.

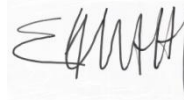
Mr van Schalkwyk left his position as assistant director of Amafa aKwaZulu-Natali, the provincial heritage management authority, to start eThembeni in partnership with Elizabeth Wahl, who was head of archaeology at Amafa at the time. Over the past decade they have undertaken almost 1000 HIAs throughout South Africa, as well as in Mozambique.

Elizabeth Wahl has a BA Honours in African Studies from the University of Cape Town, majoring in archaeology, and has completed various Masters courses in Heritage and Tourism at the University of KwaZulu-Natal. She is currently studying for an MPhil in the Conservation of the Built Environment at the University of Cape Town. She is also a member of ASAPA.

Ms Wahl was an excavator and logistical coordinator for Glasgow University Archaeological Research Division's heritage programme at Isandlwana Battlefield; has undertaken numerous rock painting surveys in the uKhahlamba/Drakensberg Mountains, northern KwaZulu-Natal, the Cederberg and the Koue Bokkeveld in the Cape Province; and was the principal excavator of Scorpion Shelter in the Cape Province, and Lenjane and Crystal Shelters in KwaZulu-Natal. Ms Wahl compiled the first cultural landscape management plan for the Mnweni Valley, northern uKhahlamba/Drakensberg, and undertook an assessment of and made recommendations for cultural heritage databases and organisational capacity in parts of Lesotho and South Africa for the Global Environment Facility of the World Bank for the Maloti Drakensberg Transfrontier Conservation and Development Area. She developed the first cultural heritage management plan for the uKhahlamba Drakensberg Park World Heritage Site, following UNESCO recommendations for rock art management in southern Africa.

Declaration of independence

We declare that Len van Schalkwyk, Elizabeth Wahl and eThembeni Cultural Heritage have no financial or personal interest in the proposed development, nor its developers or any of its subsidiaries, apart from in the provision of HIA and management consulting services.



Palaeontological Impact Assessment

desktop study for the

Richards Bay Port Expansion Programme

by

Maria N. Ovechkina, PhD (Palaeontol. & Stratigr.)

(University of KwaZulu-Natal; saccamina@gmail.com)

5 December 2012

Study Area

The study area proposed for the Richards Bay Port Expansion Programme is situated around and inland of the Richards Bay harbour (Fig. 1) in north-eastern KwaZulu-Natal.



Fig. 1. Areas proposed for the Richards Bay Port Expansion Programme: General Freight Bulk Port expansion (orange), Coal Swazi Link (yellow), Coal 500 Series (white), South Dunes (green), and Marine Study (blue).

Geological Setting

The sedimentary sheath around Richards Bay is represented by the Neogene deposits of the Maputaland Group (Fig. 2; Roberts *et al.*, 2006; Porat & Botha, 2008) that rest on the Palaeocene (Roberts *et al.*, 2006) and Cretaceous deposits of the Zululand Group (Shone, 2006).

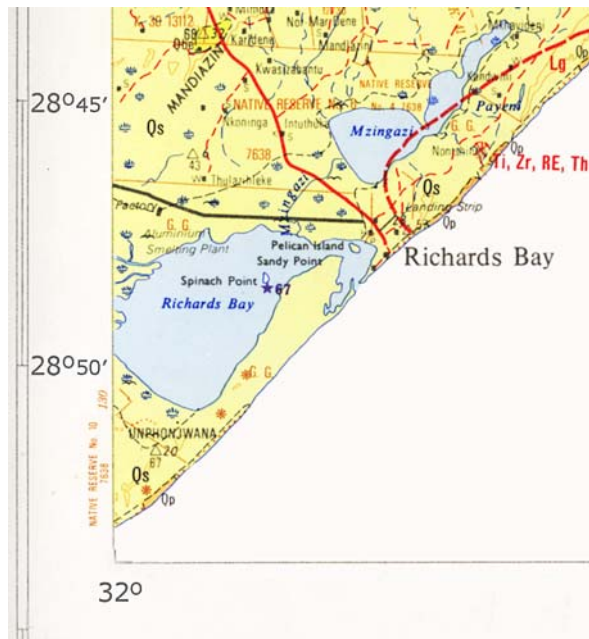


Fig. 2. Excerpt from geological map '27½32 St Lucia' depicting the area proposed for the Richards Bay Port Expansion Programme. Sediments along the coast: Qs – KwaMbonambi Fm., Qp – Port Durnford Fm. (Geological Survey 1985; Porat & Botha, 2008).

In the area around and south of Richards Bay, the Neogene sediments generally include (downwards) the Holocene KwaMbonambi Formation, Middle to Late Pleistocene Kosi Bay and Isipingo formations, Early–Middle Pleistocene Port Durnford Formation, Early Pliocene Umkwelane Formation and Miocene Uloa Formation (Fig. 3). The Uloa Fm. lies below the Richards Bay coastal plain (Roberts *et al.*, 2006). The deposits of the Port Durnford Formation are exposed in outcrops along the shoreline.

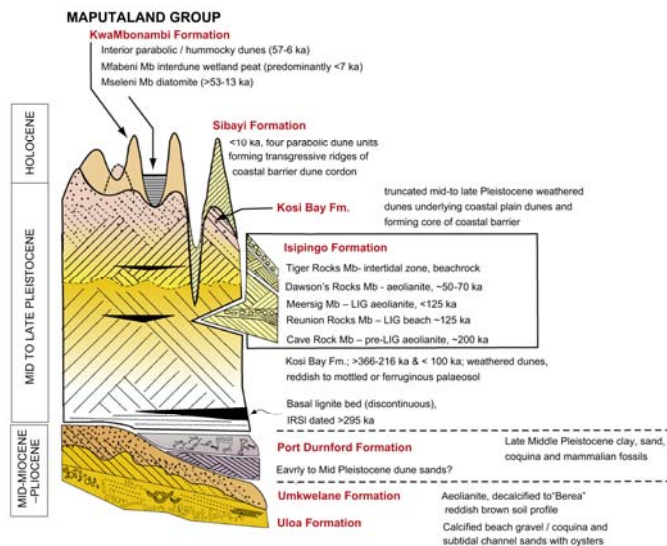


Fig. 3. Schematic representation of the Maputaland Group lithostratigraphic units. Not to scale. (Porat & Botha, 2008).

The Palaeogene sediments (Early Palaeocene–Early Oligocene) have been observed in onshore cores south of Richards Bay at depths around 35–55 m. The Upper Cretaceous St Lucia Formation deposits have been identified in some onshore cores below that level and at around 60 m below the sea floor in cores from Richards Bay harbour.

Palaeontology of the Study Area

In general, the KwaMbonambi, Kosi Bay and Isipingo formations are not highly fossiliferous. However, Kosi Bay Fm. contains lignite, rhizolites and is important for understanding pedogenesis in the region and dune development over time (Porat & Botha, 2008). The Isipingo Fm. contain various marine molluscs, that were although reported much south of the study area (Cooper & Liu, 2006). The Port Durnford Fm. contains rich mammalian fauna, which was reviewed by McCarthy & Orr (1978). Palynological complexes from the Port Durnford Fm. provide a valuable source of information for reconstruction of the Pleistocene vegetation on the east coast of KwaZulu-Natal (Scott *et al.*, 1992; Oschadleus *et al.*, 1996). The overall importance of the Port Durnford deposits for palaeoenvironmental reconstructions was highlighted by Hobday & Orme (1974). The Uloa Formation is very rich in various marine fossils, including bivalve and gastropod molluscs, brachiopods, echinoids, corals etc. (Roberts *et al.*, 2006; pers. observ.).

The Eocene deposits in north-eastern KwaZulu-Natal are thought to be correlative to the fossil-rich Eocene Salamanga Fm. in southern Mozambique (Roberts *et al.*, 2006).

The Upper Maastrichtian and Palaeocene deposits from Richards Bay yielded rich cephalopod fauna (Klinger *et al.*, 2001; van Jaarsveld, 2006).

Sensitivity Analysis

The significance of the palaeontological content of the study area has been recently highlighted by Mol *et al.* (2012). The St Lucia Fm. is known to be exceptionally rich in high-

quality fossils, and the study area is located in the region where unique fossils like mammalian or cephalopod remains were found, or can be found once development starts. Activities associated with development may lead to complete destruction of the fossil material and/or restrict access to fossiliferous beds in the future. Since any piece of palaeontological evidence is crucially important for our understanding the past biodiversity and modelling future environmental changes, all effort should be made to save palaeontological objects for subsequent studies.

The study area is therefore considered as potentially very sensitive in terms of its palaeontological significance.

Actions and Risk Mitigation Measures

Under provisions of the National Heritage Resources Act (Office of the President, 1999) and KwaZulu-Natal Heritage Act (Office of the Premier, 2009), it is essential that Phase 1 Palaeontological Impact Assessment (PIA) be undertaken prior to commencement of development; however, the developer must obtain relevant permits from AMAFA/SAHRA prior to the commencement of activities and seek professional palaeontological consultation at that stage. Phase 1 PIA will provide information on field rating and statement of significance of individual sites. Detail analysis of geotechnical cores would be essential during Phase 1 PIA.

The developer must stop activities and inform AMAFA/SAHRA once the fossiliferous beds are reached. In this case, the developer should seek professional palaeontological consultation and a palaeontologist has to be contracted to assess the significance of relevant sediments and to arrange rescue of palaeontological material should it be deemed necessary.

REFERENCES

- COOPER, M.R. & LIU, K. 2006. The Cainozoic palaeontology and stratigraphy of KwaZulu-Natal. Part 4. The post-Karoo geology of the Durban area, with special reference to the Isipingo Formation. *Durban Museum Novitates* **31**: 1–23.
- GEOLOGICAL SURVEY. 1985. 27½32 St Lucia, 1:250 000 Geological Series. Pretoria: Department of Mineral and Energy Affairs.
- HOBDAY, D.K. & ORME, A.R. 1974. The Port Durnford Formation: a major Pleistocene barrier-lagoon complex along the Zululand coast. *Transactions of the Geological Society of South Africa* **77**: 141–149.
- KLINGER H.C., KENNEDY, W.J., LEES, J.A. & KITTO, S. 2001. Upper Maastrichtian ammonites and nannofossils and a Palaeocene nautiloid from Richards Bay, Kwa Zulu, South Africa. *Acta Geologica Polonica* **51** (3): 273–291.
- MCCARTHY, M.J. & ORR, W.N. 1978. A Rhynoceros tooth from the basal strata of the Port Durnford Formation, Zululand, South Africa: the relocation of the Anderson's mammalian fossil site. *Annals of the Natal Museum* **23**: 485–496.
- MOL, N., SMITHEN, C., VAN HUYSSTEEN, M., HALE, T. & DE BEER, E. 2012. *Draft Scoping Report: Richards Bay Mining: Zulti South Project – EMP Amendment, EIA, WULA, NNR Certification and Planning and Development Act*. Johannesburg: SRK Consulting (South Africa) (Pty) Ltd. http://www.srk.co.za/files/File/South-Africa/publicDocuments1/ZultiSouth/439550_rbmining_zulti_south_draft_scoping_reportfinal_2012_08_07_signed.pdf (accessed 4 Dec. 2012).
- OFFICE OF THE PREMIER. 2009. KwaZulu-Natal Heritage Act, № 4 of 2008. *Extraordinary Provincial Gazette of KwaZulu-Natal* **225**: 3–268.
- OFFICE OF THE PRESIDENT. 1999. National Heritage Resources Act, № 25 of 1999. *Government Gazette* **406** (19974): 2–88.
- OSCHADLEUS, H.D., VOGEL, J.C. & SCOTT, L. 1996. Radiometric date for the Port Durnford peat and development of yellow-wood forest along the South African east coast. *South African Journal of Science* **92**: 43–45.

- PORAT, N. & BOTHA, G. 2008. The luminescence chronology of dune development on the Maputaland coastal plain, southeast Africa. *Quaternary Science Reviews* **27**: 1024–1046.
- ROBERTS, D.L., BOTHA, G.A., MAUD, R.R. & PETHER, J. 2006. Coastal Cenozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds), *The Geology of South Africa*. Johannesburg: Geological Society of South Africa & Pretoria: The Council for Geoscience, pp. 605–628.
- SCOTT, L., COOREMANS, B. & MAUD, R.R. 1992. Preliminary palynological evaluation of the Port Durnford Formation at Port Durnford, Natal, South Africa. *South African Journal of Science* **88**: 470–474.
- SHONE, R.W. 2006. Onshore post-Karoo Mesozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds), *The Geology of South Africa*. Johannesburg: Geological Society of South Africa & Pretoria: The Council for Geoscience, pp. 541–552.
- VAN JAARVELD, A. 2006. *The construction of Berth 306 at the port of Richards Bay: Removal of ammonites from the Upper Maastrichtian (Cretaceous) layer.*
<http://www.sahra.org.za/content/aiaconstructionofberth306vanjaarsveldamar06> (accessed 4 Dec. 2012).

M. Ovechkina
Maria N. Ovechkina