

RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

PUBLIC ACCESS TO SARDINIA BAY BEACH, PORT ELIZABETH, NELSON MANDELA BAY MUNICIPALITY, EASTERN CAPE

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1. OUTLINE OF THE PROPOSED DEVELOPMENT

The Nelson Mandela Bay Metropolitan Municipality (NMBM) has submitted an application to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) for Environmental Authorisation (EA) for a proposed parking bay and associated facilities and infrastructures within the Sardinia Bay Local Authority Nature Reserve, Sardinia Bay, situated along the south coast c. 14 km SE of central Port Elizabeth (Fig. 1). The following project description has been abstracted from the Background Information Document prepared by CEN, Port Elizabeth (15 July 2015).

In response to the moving sand dunes, the NMBM is proposing to establish a new car park and toilet block at Sardinia Bay. The parking bay is proposed to be c. 2500 m² in area. An area of c. 100 m² will be allocated to the toilet block and an area of c. 100 m² will be made available to the Sardinia Bay Lifesavers Club to develop a new clubhouse facility. This will leave c. 2300 m² for parking space which should be sufficient for around 130 vehicles. The existing upper parking bay will be closed and demolished. Existing infrastructure (toilets) will be removed. The construction rubble from the demolished parking bay will be used as fill material at the proposed parking bay site. A locked gate will be erected and placed across the road which extends to the existing upper parking bay to prevent vehicular access to this area. This gate will however still allow for emergency vehicles to have access to the beach.

Two sites have been proposed for the development of the proposed parking bay and associated infrastructures and structure (See Figure 2). Alternative sites 1 and 2 will be assessed in order to determine the preferred site for the development of the proposed parking bay.

The present palaeontological heritage comment is contributed to the Basic Assessment for the proposed development that is being conducted by CEN, Port Elizabeth (Contact details: Dr Mike Cohen. CEN IEM UNIT, 36 River Road, Walmer, Port Elizabeth 6070. Tel 041 581 2983. Fax 086 504 2549. Email steenbok@aerosat.co.za)

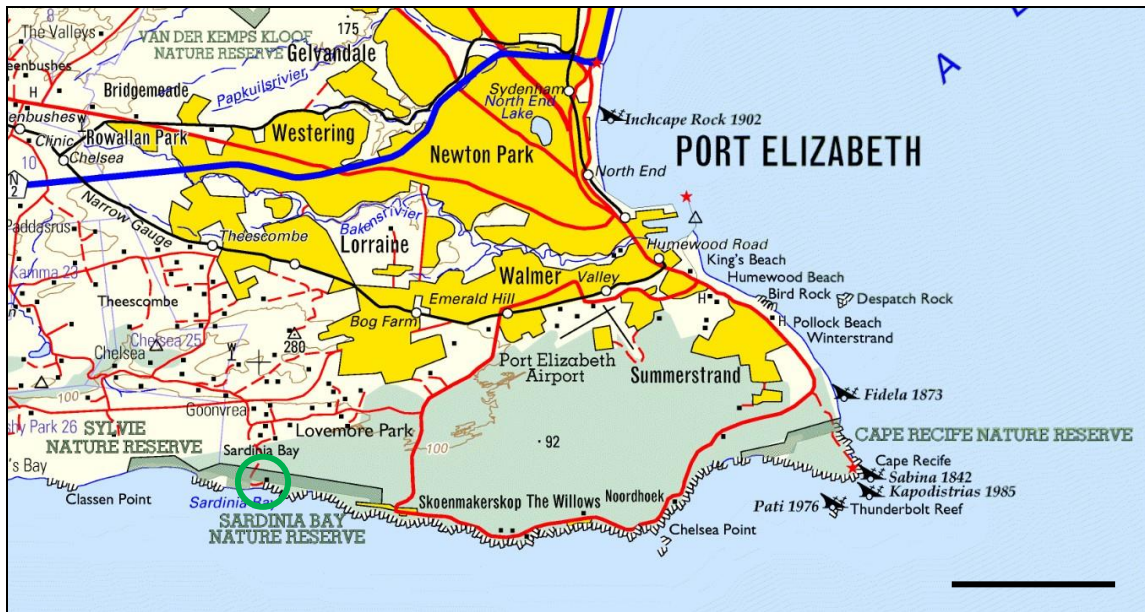


Figure 1. Extract from 1: 250 000 topographical map 3324 Port Elizabeth (Courtesy of The Chief Directorate: National Geospatial Information, Mowbray) showing the location of the proposed public access developments within the Sardinia Bay Nature Reserve near Port Elizabeth. Scale bar = 5 km.



Figure 2. Satellite image showing alternative sites for the proposed public access and associated infrastructure developments in the Sardinia Bay Nature Reserve (Figure abstracted from the Background Information Document prepared by CEN, Port Elizabeth).

2. GEOLOGICAL BACKGROUND

The geology of the Sardinia Nature Reserve near Port Elizabeth is shown on 1: 50 000 sheets 3425AB & 3525BA (Council for Geoscience, Pretoria) (Toerien & Hill 1989, Le Roux 2000) (Figure 3). The present study area along the south coast is underlain by deformed metasediments – conglomerates, sandstones and phyllites – of the **Sardinia Bay Formation** (Table Mountain Group, Cape Supergroup) that were possibly deposited in a tidal shelf setting (Shone 1983, 1987, 1994, Johnson *et al.* 2006). These Early Palaeozoic (Cambrian / Ordovician) bedrocks are mantled with thick coastal aeolianites (wind-blown dune sands) of the **Schelm Hoek Formation (Algoa Group)** of Holocene age. Modern aeolian calcareous sands of the Schelm Hoek Formation build still-active dune sands of Holocene age along the South Coast (Illenberger 1992, Le Roux 2000). Deposition probably started during regression from the Mid Holocene transgressive maximum (*i.e.* the Flandrian transgression of 2-3 m amsl at 4000-3000 BP). The dune sands may be up to 140 m thick with an average of 30 m, and extend up to 6 km from the coast. Active sand dunes near the coast are unvegetated while those further inland are stabilized by dense dune thicket. In addition to unconsolidated, well-sorted, calcareous aeolian sands the Schelm Hoek Formation contains abundant shell middens of the Late Stone Age (Roberts *et al.*, 2006, Webley & Hall, 1998). Palaeosols (ancient soil horizons) and peats are absent according to Le Roux (2000, his Table 3) whereas Illenberger (1992) as well as Goedhart and Hattingh (1997) record the presence of fossil soils. These Holocene dune deposits may be semi-consolidated at depth, and difficult to distinguish from the older, generally better cemented Nahoon Formation aeolianites.

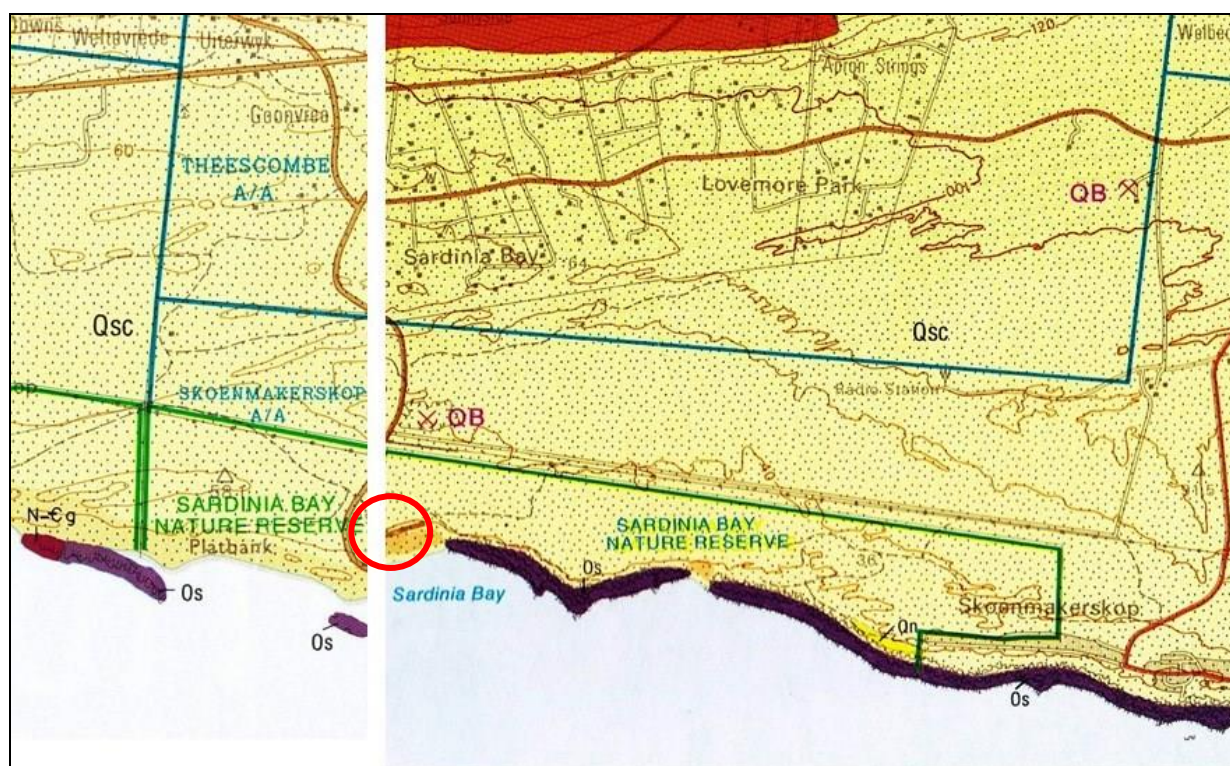


Figure 3. Extracts from 1: 50 000 geology sheets 3425AB & 3525BA (Council for Geoscience, Pretoria) showing the geology of the Sardinia Bay Nature Reserve area. The main rock units represented here include the Sardinia Bay Formation (Os, purple) of the Cape Supergroup as well as the Nahoon Formation (Qn, yellow) and Schelm Hoek Formation (Qsc, pale yellow with stipple) of the Algoa Group. QB refers to quarries for building sand. The present development area is underlain by unconsolidated sands of the Schelm Hoek Formation with siliclastic bedrocks of the Sardinia Bay Formation at depth.

3. PALAEOLOGICAL HERITAGE

The **Sardinia Bay Formation** bedrocks have yielded low diversity assemblages of acritarchs (organic-walled microfossils) from finer-grained horizons (Gaucher & Germs 2006) as well as questionable shallow marine trace fossils (*Cruziana*, *Skolithos* etc) (Shone 1991). The palaeontological sensitivity of this rock succession is considered to be LOW.

An authoritative review of the palaeontological potential of Quaternary coastal sands of the Cape region, including the **Schelm Hoek Formation**, is provided by Pether (2008); see also the short review by Almond (2010). Categories of scientifically valuable fossils mentioned by Pether (*ibid.*) and others that may be preserved in these sands include:

- rare fossil bones, teeth and other remains of mammals (e.g. rhino, elephant, bovids, moles), reptiles (e.g. tortoises, lizards), and ostriches (e.g. egg shells)
- terrestrial gastropods
- plant remains such as charcoal, decayed plant roots
- calcareous and siliceous microfossils (foraminiferans, ostracods, diatoms, shell fragments, calcareous algae, echinoid spines)
- organic-walled microfossils (pollen, spores) from mudrocks deposited in interdune ponds and vleis, which may also contain fossil frogs, fish, aquatic snails and plant macrofossils (reeds, leaves, seeds, roots etc)
- trace fossils (e.g. mole and arthropod burrows, vertebrate tracks)

Illenberger (1992) records fragmentary remains of molluscs, calcareous algae, and sea urchins as well as foraminiferans, terrestrial snails (e.g. *Achatina*, *Trigonephrus*) and root casts (rhizoliths) from the Schelm Hoek Formation in particular. Shell middens close to open beaches are dominated by white sand mussels (*Donax serra*) but also contain remains of marine and terrestrial mammals, stone artifacts, bone tools and occasionally pottery.

The overall palaeontological sensitivity of the Schelm Hoek Formation is assessed as LOW, although pockets of locally HIGH sensitivity may occur locally.

4. CONCLUSIONS & RECOMMENDATIONS

The bedrocks and superficial sediments underlying the alternative public access and associated development footprints are of low palaeontological sensitivity. It is concluded that the proposed infrastructure developments are unlikely to have significant impacts on local palaeontological heritage resources. There are no preferences on palaeontological grounds for any of the alternative development site options.

It is therefore recommended that, pending the discovery of significant new fossils remains before or during construction, exemption from further specialist palaeontological studies and mitigation is granted for the proposed public access and associated infrastructure developments within the Sardinia Bay Nature Reserve near Port Elizabeth, Eastern Cape.

Should any substantial fossil remains (e.g. vertebrate bones and teeth, petrified wood, plant fossil assemblages) be encountered during excavation, however, these should be safeguarded, preferably *in situ*, and reported by the ECO to ECPHRA (*i.e.* The Eastern Cape Provincial Heritage

Resources Authority. Contact details: Mr Sello Mokhanya, 74 Alexander Road, King Williams Town 5600; smokhanya@ecphra.org.za) and a suitably qualified palaeontologist so that specimens can be examined, recorded and, if necessary, professionally excavated at the developer's expense.

5. KEY REFERENCES

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6. 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, Limpopo, Free State, Mpumalanga and Northwest Provinces under the aegis of his Cape Town-based company *Natura Viva* cc. He has served as a 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 is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape 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.



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