

COEGA TO DEDISA POWERLINE CONSTRUCTION

FOR

Jonathan Kaplan

acrm

5 Stuart Road

Rondebosch

7700

acrm@waccess.co.za

by

Dr Alan Smith

Alan Smith Consulting

29 Browns Grove, Sherwood, Durban, 4091, South Africa

Telephone: 031 208 6896

asconsulting@telkomsa.net

01 October 2020

EXECUTIVE SUMMARY

Marine and estuarine shell fossils are likely to be encountered. Although **Significant Palaeontological** material could be found this material is not common. If encountered, fossil material is likely to be broken and fragmented. Should intact shells be encountered these should be archived and a competent Palaeontologist consulted. A “*Chance Find Protocol*” has been inserted.

1. BACKGROUND AND PROPOSED PROJECT

The following information is taken from the BID. The proposed power line is part of an overall power project. This project is of National Strategic Importance as it forms part of National Government's intent to address the energy crisis in South Africa. The Coega SEZ and Ngqura Port was identified as a preferred location as it meets the specifications for the proposed powership project and occurs within a designated Strategic Economic Zone (Triple04, 2020).

The overall project entails the generation of electricity from a floating mobile Powership, moored in the Port of Ngqura. It proposes three ships berthing during the project lifespan, a Floating Storage Regasification Unit "FSRU and two Powerships. A Liquefied Natural Gas Carrier (LNGC) carrier is to supply LNG to the FSRU on a short-term basis (1-2 days) in a 20-day cycle. The natural gas is pumped from the FSRU to the Powership via gas pipeline. The proposed design capacity for the Ngqura Powership is 540MW, which comprises of 27 gas engines having a heat output of 18.32 MW each. The 3 steam turbines have a heat out of 15.45 MW each. The fuel used by the Powership will be natural gas will be imported. The gas pipeline connecting the FSRU to the Powership will be routed along the edge of the existing eastern breakwater and will connect to the vessels via a flexible marine hose. The gas pipeline will likely be mounted on small footings requiring minor civil works to construct and install. The proposed technology for the production of electricity through natural gas-fired reciprocating engines and steam engines will improve efficiency of energy generation (Tripl04, 2020).

From the ship, electricity will be evacuated via a 132kV transmission line over a distance of approximately 6.8 km to the Dedisa substation. Construction is limited to transmission and gas supply lines as the ships are built internationally and arrive fully equipped in the port ready for operation (Tripl04, 2020).

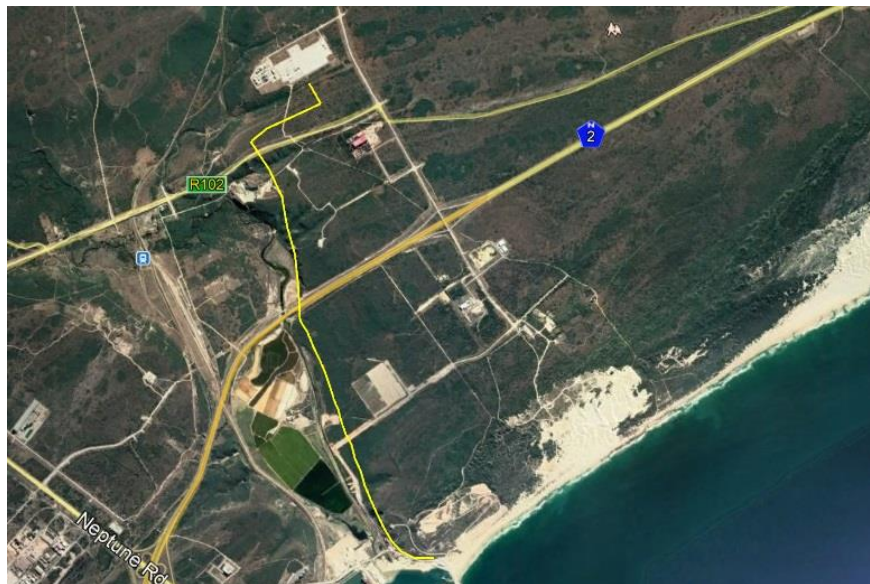


Figure 1: Location of the proposed Powerline. Source map GoogleEarth.

2. GEOLOGY

The proposed Powerline may cross a variety of lithotypes (Fig. 2). These are:

- Table Mountain Sandstone Group
- Alexandria Formation
- Nanaga Formation
- Salnova Formation
- Bluewater Bay Formation.
- Alluvium

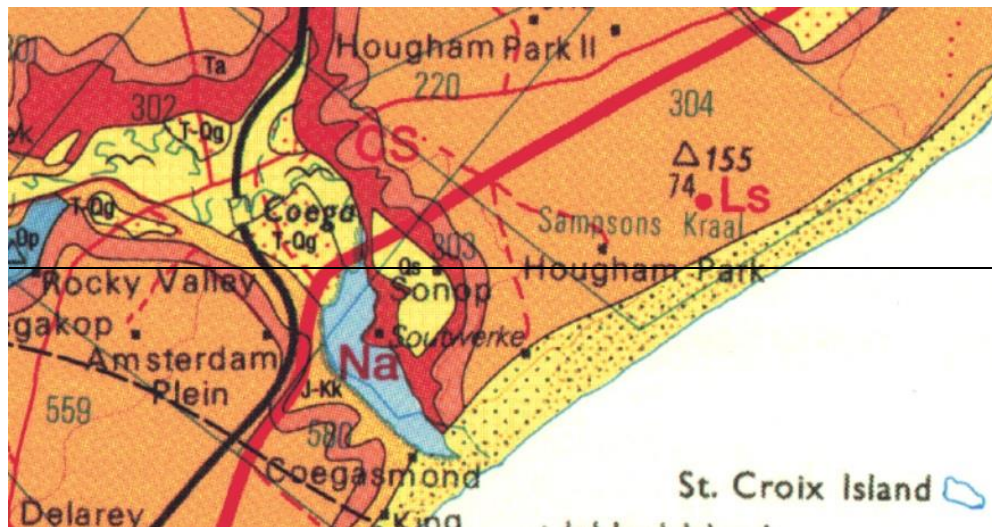


Figure 2: Extract from the PE 3324 1:250 000 Geological Map.

Table Mountain Group: This quartzite is 470 Ma (million years) in age (Fig. 2).

Alexandria Formation: This limestone-rich unit has an average thickness of 7-10m. It is of Tertiary age and composed of carbonaceous sandstone, shelly limestone, and conglomerate. Sandstones are found in the upper section. These are horizontal-, planar-, or trough- crossbedded. This unit was deposited in shoreface, foreshore or estuarine environments (Almond, 2010).

Nanaga Formation: This Quaternary aeolianite comprises semi-consolidated, cross-bedded sandstones. Calcrete layers containing roots, and reddish, clay-rich soils are also found. These were deposited in coastal dune cordon. In some areas this formation is known to unconformably overlies the Bathurst Formation instead of the Alexandria Formation (Almond, 2010).

The Salnova Formation: This Quaternary unit is composed of aeolian sand and marine-estuarine sand and gravel. These sandstones are overlain by poorly sorted pebbly to

bouldery conglomerates. It is similar to the Alexandria Formation although the calcareous sandstone are only semi-consolidated and are found in its lower sections. The opposite is true in the Alexandria Formation where sandstone dominates its upper sections (Almond, 2010). This formation was likely deposited in an intertidal setting where several marine transgressions took place over several million years (Le Roux, 1988; McMillan, 1990).

Bluewater Bay Formation: This is an alluvial sheet gravel and sand.

Alluvium: This is a contemporary river sand deposit.

3. PALAEONTOLOGY

Some of the lithotypes are rated high in palaeosensitivity (Fig. 3).



Figure 3: Palaeosensitivity of rocks in the proposed Residue Storage Extension area.

Table Mountain Sandstone: This unit contains trace fossils which are not **Palaeontologically Significant**.

Alexandria Formation: This has a basal conglomerate comprising an oyster shell *hash*. Marine invertebrate fossils and trace fossils are common throughout this Formation (King, 1972). Locally it can contain a rich diversity (including over two hundred taxa) of Miocene / Pliocene marine fauna. These are mainly bivalves and gastropods, but there is also a wide range of rarer groups such as flat sea urchins (*pansy shells*), corals, brachiopods (*lamp shells*), barnacles, crabs and sharks' teeth.(Almond, 2010) Despite its unusually rich fossil record, in practice the **Palaeontological Sensitivity** of the Alexandria Formation is very variable, ranging from high to low (Almond, 2010).

Nanaga Formation: The overall **Palaeontological Sensitivity** is low (Almond, 2010)

Salnova Formation: Gastropod, bivalve, echinoid, and crustacean fossils are frequently found. The overall **Palaeontological Sensitivity** of the Salnova Formation is rated high, however most of it is not especially rich in shells, and often the shells are fragmentary remains (Almond, 2010).

Bluewater Bay Formation: This is unlikely to be fossiliferous.

Alluvium: This could contain reworked fossils, but these are likely to be damaged.

4. CHANCE FIND PROTOCOL

As this site includes areas flagged red on the SAHRIS PalaeoSensitivity Map (Fig. 3), a **“Chance Find Protocol”** is **Recommended**.

In the case of any unusual finds, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.
- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labeled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

Functional responsibilities of the Developer

1. At full cost to the project, and guided by the appointed Palaeontological Specialist, ensure that a representative archive of palaeontological samples and other records is assembled to characterize the palaeontological occurrences affected by the excavation operation.

2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas.
3. Facilitate systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by described and measured geological sections, and by providing aid in the surveying of positions where significant fossils are found.
4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as “normal” fossil finds.
5. Provide covered, dry storage for samples and facilities for a work area for sorting, labeling, and boxing/bagging samples.
6. Costs of basic curation and storage until collected. Documentary record of palaeontological occurrences must be done.
7. The contractor will, in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which appropriate information regarding plans for excavations and work schedules must be indicated on the plan of the excavation sites. This must be done in conjunction with the appointed specialist.
8. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period.
9. Locations of samples and measured sections are to be pegged, and routinely and accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any “significant fossils” are recorded during the time of excavation.

5. CONCLUSIONS & RECOMMENDATIONS

Fossils are likely to be encountered. Although **Significant Palaeontological** material could be found on this site, it is likely to be broken and highly fragmented. Should intact shells be encountered these should be archived and a competent Palaeontologist consulted. A “*Chance Find Protocol*” has been inserted.

6. REFERENCES

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Port Elizabeth 3324 1: 250 000 Geological Map. Council for Geosciences, Pretoria.

King, L. (1972). "[Pliocene marine fossils from the Alexandria Formation in the Paterson District, Eastern Cape Province, and their geomorphic significance](#)". South African Journal of Geology. **75** (2). [ISSN 1012-0750](#).

Le Roux, F.G., 1988. The Alexandria, Nanaga and Salnova Formations redefined and their stratigraphic positions in the Algoa Group. Geocongress' 88. Ext. Abstr. 22nd Earth Science Congress, Geo/. Soc. S. Afr, pp.363-366

McMillan, I. K. (1990-08-01). [A foraminiferal biostratigraphy and chronostratigraphy for the Pliocene to Pleistocene Upper Algoa Group, eastern Cape, South Africa](#). South African Journal of Geology. **93** (4). [ISSN 1012-0750](#).

Palaeosensitivity Map <https://sahris.sahra.org.za/map/palaeo>

Triple04: Sustainable Solutions (2020: September 21). ID for the Powership at Port of Ngqura within Coega SEZ at Nelson Mandela Bay Municipality, Eastern Cape.

7. DETAILS OF SPECIALIST

Dr Alan Smith

Private Consultant: Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban, 4091

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Honorary Research Fellow: Discipline of Geology, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Durban.

Role: Specialist Palaeontological Report production

Expertise of the specialist:

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published more than 50 journal articles with 360 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhekuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropro.
- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.
- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Rooilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.

