

PALAEONTOLOGICAL ASSESSMENT FOR THE PROPOSED
DEVELOPMENT OF ERF 7005 PORTION OF ERF 1935,
WALMER

Prepared for:
Digital Soils Africa



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General Declaration

I, Ryan Nel, declare that –

- I act as the independent Specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.

I Ryan Nel, was appointed as a registered (SACNASP, registration no 132881) Geologist/Palaeontologist to conduct a Palaeontological Impact Assessment of the area with no other intentions. This report is reviewed by Dr. R.W. Gess.



Ryan Nel

SACNASP Reg. No. 132881(Geological Science)

Ryan Nel has an Honours and Master's degree in Geology from the University of the Free State, Bloemfontein, South Africa. He is currently enrolled for his PhD in Palaeontology at Rhodes University, Eastern Cape, Makhanda. He has been employed at the University of the Free State as an academic facilitator and as a student assistant for the mineralogy second-year course for three years. Ryan also holds a PGCE (Post Graduate Certificate in Education) from the University of South Africa, he taught geography, mathematics and science for two years in Queenstown in the Eastern Cape province of South Africa. He focused on Precambrian rocks for his master's degree and is currently researching early Devonian placoderm fossils from the Cape Supergroup under the supervision of Dr. R.W. Gess.

He is also part-time employed as a research assistant for Dr. R.W. Gess. Since 2021 Ryan has been assisting Dr. R.W. Gess with palaeontological impact assessments for developments in the Eastern Cape. He has been doing independent palaeontological impact assessments, under the supervision of Dr. R.W. Gess since January 2022. Ryan is also a member of the PSSA, GSSA and registered at SACNASP as a candidate natural scientist.

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1. INTRODUCTION

The applicant, K2015102466 (South Africa) (Pty) Ltd wishes to prepare 19.5Ha of Erf 7005 Portion of Erf 1935, Walmer, formally known as the Walmer Country Club with the necessary infrastructure such as roads, sewage lines, and stormwater drainage in accordance to engineering and local Municipality guidelines, to allow for subdivision of the area.

Currently, Erf 7005, Walmer, measuring about 114, 9168 Ha in extent, is zoned for Special Purposes 316 and an application at the NMBM is underway for subdivision and rezoning of first, the proposed Portion 1 (measuring 19.5Ha) to Business 1 purposes (and applicable area under this environmental application), and then secondly, the subsequent subdivision of Portion 1 into 79 portions (reason for this environmental application).

The 79 portions of properties will range in size from 1 101m² to 5 189m² to be developed for mixed-use purposes such as warehousing, storage, shops, residential units, etc, as is allowed under Business 1 purposes rezoning. Each land portion is likely to have a floor area of about 50% of the portion size of the plot to accommodate the necessary parking, loading and vehicle circulation requirements.

The 19.5 Ha site is situated within a Critical Biodiversity Area according to the Nelson Mandela Bay CBA map, and is on the northwestern portion of the former Walmer Country Club golf course and is south of the non-functioning railway track (previously known as the Apple Express railway) and bordered by the residential suburbs of Greenshields Park to the north across Buffelsfontein Road (MR422), Walmer Heights to the south and west, the Walmer Link housing development to the east.



Figure 1: Google Earth Satellite image of the Walmer Country Club development site (red polygon).

1.1. LEGISLATIVE CONTEXT FOR PALAEOLOGICAL ASSESSMENT

All heritage resources are protected by the National Heritage Act (Act 25 of 1999). The current palaeontological report forms part of the Heritage Impact Assessment under Section 35 and Section 38 of this Act.

According to Section 35 of the National Heritage Resources Act, dealing with archaeology, palaeontology and meteorites (In reference to Palaeontological, archaeological and meteorite resources found in South Africa):

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

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

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

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

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

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

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

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

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

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

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

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

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

(6) The responsible heritage resources authority may, after consultation with the owner of the land on which an archaeological or palaeontological site or a meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.

According to Section 38 (1), a Heritage Impact Assessment is necessary to assess any potential impacts on palaeontological heritage within the development footprint where:

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) the construction of a bridge or similar structure exceeding 50 m in length;
- (c) any development or other activity which will change the character of a site—
 - i. exceeding 5 000 m² in extent; or
 - ii. involving three or more existing erven or subdivisions thereof; or
 - iii. involving three or more erven or 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
 - v. the re-zoning of a site exceeding 10 000 m² in extent;
 - vi. or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

2. PURPOSE AND GENERAL APPROACH OF STUDY

The purpose of the PIA is to identify the potential disturbance of the palaeontology at the development site. This is conducted on the basis of SAHRA APM Guidelines: Minimum Standards for the palaeontological component of Heritage Assessment Reports (SAHRA, 2013).

The compilation of the report is based on (i) a literature review of all possible published material related to palaeontology as well as a review of previous palaeontological impact assessments, (ii) using published geological maps collectively with Google Earth Satellite imagery, (iii) a non-intrusive walkover palaeontological site assessment.

A preliminary methodology study is carried out to identify key fossiliferous strata in the study area, providing insight to the fossil heritage at the site. The information is collected from published scientific materials, palaeontological impact assessment as well as consultation with other specialists in palaeontology. The information is used to study the palaeontological heritage of the rocks at the development site. On the basis of the literature collected, a general consensus can be made to determine the palaeontological sensitivity of the strata. During the non-intrusive site walkover, various GPS coordinates are recorded and photographs are taken to accompany the position on the GPS points.

It should be noted that not all assessed localities provide fossils, the majority of the fossils are generally embedded in the subsurface strata and more often covered by surface deposits like soil, and vegetation. A palaeontologist can thus make an observation of the subsurface strata by examining bedrock exposures elsewhere, preferably in the vicinity of the study area. Data from exposures further from the site may also provide clues about the underlying strata.

2.1. ASSUMPTIONS AND LIMITATIONS

According (Almond , 2014), the accuracy and reliability of PIA's are limited by the following:

1. Insufficient database of fossils in South Africa,
2. Variation in the accuracy of geological maps,
3. Insufficient explanation for the geological maps,
4. Unpublished material on palaeontology, and
5. Lack of a comprehensive database of fossil collections at institutions in South Africa.

3. GEOLOGY

3.1. LOCATION AND BRIEF DESCRIPTION OF SITE

The site is 19.5 Ha, situated within a Critical Biodiversity Area on the Nelson Mandela Bay CBA map, and is on the north western portion of the former Walmer Country Club golf course. It is located south of the non-functioning railway track (previously known as the Apple Express railway) and bordered by the residential suburbs of Greenshields Park to the north across Buffelsfontein Road (MR422), Walmer Heights to the south and west, the Walmer Link housing development to the east (Fig. 1). The geology of the area is delineated on the 1:250 000 scale geological map, Port Elizabeth, sheet 3324 (Council for Geoscience, Pretoria; Toerien & Hill, 1989) (Fig. 2). The area is largely underlain by the Algoa Group sediments which comprise ancient semi-consolidated coastal aeolianites of the late Pliocene-Pleistocene Nanaga Formation (Le Roux, 1990; Roberts, et al., 2006; Hassan, et al., 2022), and modern aeolian sediments of the Holocene age Schelm Hoek Formation (Le Roux, 1990; Illenberger, 1992)(Fig. 2).

3.1.1. ALGOA GROUP

The Algoa Group is one of several onshore coastal units that were deposited during recurring marine transgression and regression events along the South African coastline during the late Cenozoic (Roberts, et al., 2006; Hassan, et al., 2022). It comprises six calcareous, Eocene to the Holocene, formations, the Bathurst, Alexandria, Nanaga, Salnova, Nahoon, and Schelm Hoek Formations (Le Roux, 1990). The nature of the deposits was induced by glacio-eustatic sea-level changes, subcontinental tilting, and uplift. The Algoa Group overlies the tectonised metasedimentary rocks of the Cape Supergroup and parts of the Karoo Supergroup.

The entire study site is underlain by the ancient coastal aeolianites of the Pliocene to Early Pleistocene **Nanaga Formation** (Fig. 2). The Nanaga Formation encompass large-scale high-angle cross-bedded calcareous sandstone and sandy limestone, reaching a thickness of approximately 150m (Maud & Botha, 2000). These deposits are visible along road cuttings on the N10 and R72 (Norman & Whitfield, 2006). The deposits occur as semi-to well-consolidated sands with the upper surface weathered to calcrete and red clay rich soil (Almond, 2010). The ancient dunes of the Nanaga Formation are typically preserved as rounded hills which tend to be parallel to the modern shoreline. A decrease in age typically observed towards the modern coastline, indicate a marine regression during the time of deposition. The majority of the Nanaga Formation deposits are covered with indigenous vegetation (Almond, 2010). Although the Nanaga Formation is underlined by the Alexandria Formation, the current study site contains no evidence of the Alexandria Formation. According to the 1:250 000 geological map the area is underlain by the Ordovician-aged Peninsula Formation.

3.1.2. TABLE MOUNTAIN GROUP

The Cape Supergroup comprise the Table Mountain Group, Bokkeveld Group and Witteberg Group. The sediments of these groups were deposited along a passive continental margin over a period of approximately 190 Ma (Booth, et al., 1999), from 500 to 330 Ma (Ordovician to Carboniferous). Deposition of the Table Mountain Group took place in shallow marine and terrestrial environments (with minor glaciation), whereas sedimentation of the Bokkeveld and Witteberg Groups took place in deltaic and shallow marine shelf settings respectively (Rust, 1973). The Table Mountain Group comprises six formations, the Sardinia Bay, Peninsula, Cederberg, Goudini, Skurweberg, and Baviaanskloof (Booth, et al., 1999).

The oldest strata within the Algoa Bay area, and within the vicinity of the study site, comprise quartzitic sandstone of the **Peninsula Formation** (Table Mountain Group, Cape Supergroup). The Peninsula Formation extends from the north western to south eastern side of the geological map and is often

overlay by the Nanaga Formation (Fig. 2). The Peninsula Formation formed approximately 500 million years ago (Ordovician) as a predominantly fluvial succession in shallow marine beach environments (Thamm & Johnson, 2006). Sediments were deposited by braided rivers and the formation is characterised by sandstones, quartzites, mudstone as well as pebbly conglomerate (Thamm & Johnson, 2006). The sedimentary rocks of the Peninsula Formation are extremely weather resistant and is often exposed by the overlying Nanaga Formation. There was no evidence of the Peninsula Formation sediments at the study area.

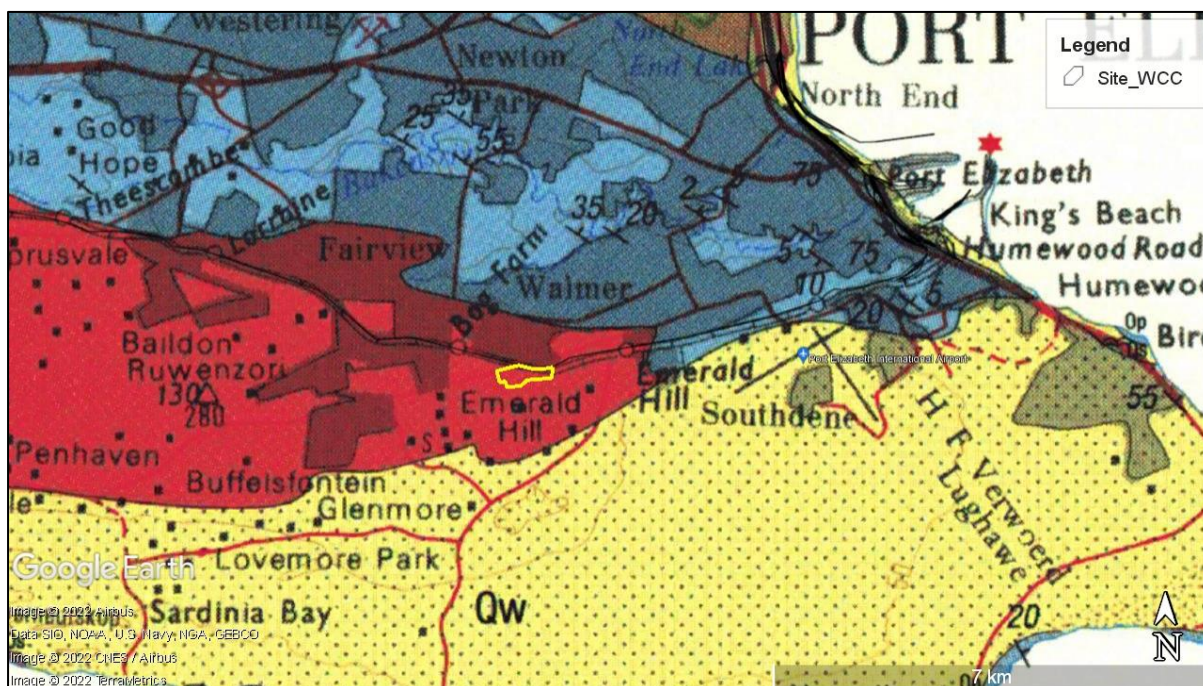
4. PALAEOLOGY

4.1. ALGOA GROUP

The **Nanaga Formation** has a sparse collection of fossils, these include calcretised rootlets (*rhizocretes*), fragmented marine shells, foraminifera, and land-dwelling gastropods (*Achatina*, *Tropidopora*, *Trigonephris*, and *Natalina*). Fossils of terrestrial vertebrates have also been recorded which include; rare vertebrate bones, teeth, and trackways (Almond, 2009).

4.2. TABLE MOUNTAIN GROUP

The Eastern Cape Province of South Africa provides a limited insight into the fossils from the **Peninsula Formation** as a result of the structural complexity and high levels of tectonic deformation. Fossils recorded from this province has been recognised as trace fossils in the form of trails, trackways (arthropod) and burrows (*Skolithos*) (Rust, 1973). The majority of the fossils recorded in this formation are from outcrops in the Western Cape Province (Rust, 1967; Potgieter & Oelofsen, 1983; Broquet, 1990; Thamm & Johnson, 2006).



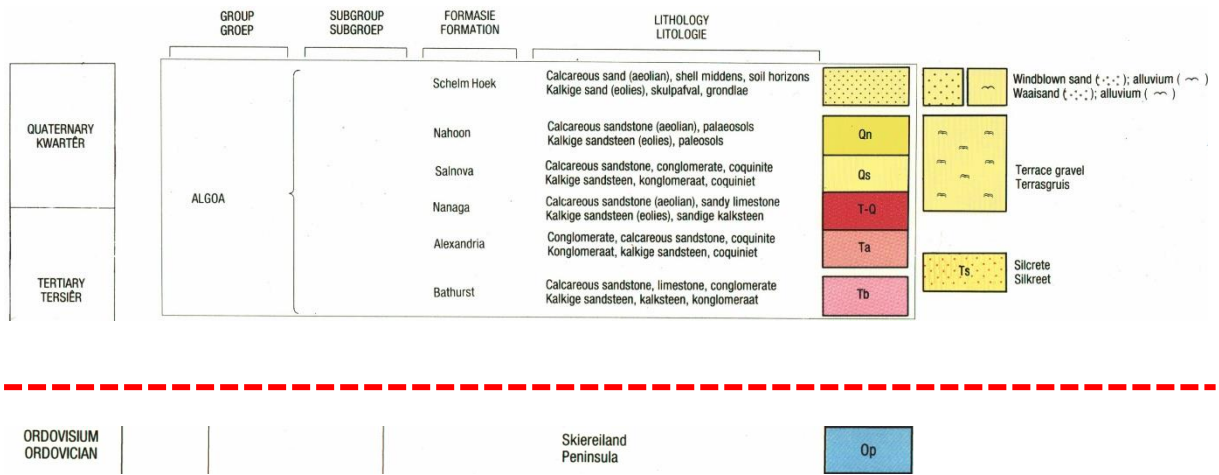


Figure 2: 1:250 000 geological map of Port Elizabeth 3324 (Council for Geoscience, Pretoria) indicating the surface area (yellow polygon) of the study area. A key to the geological units is given below the map. The red line indicates an unconformity and a resultant absence of strata between the Devonian (Cape Supergroup) and Tertiary/Quaternary (Algoa Group) deposits.

5. SITE ASSESSMENT

After conducting a preliminary desktop study of the site, a non-intrusive site walkover was done on the 08th of August 2022 by a qualified specialist, Mr. Ryan Nel. Assessment revealed that the area was largely covered with an overgrowth of vegetation with limited rock outcrop (Fig. 3 – Fig. 9), and is situated within the outcrop area of the calcareous sandstone and sandy limestone of the Nanaga Formation (T-Q), Algoa Group (Fig. 2). The southern part of the site was mainly utilised, historically, as a golf course (Fig. 4 and Fig. 9). Fine-grained unconsolidated sediments were visible along exposed trackways in the north western, northern and eastern part of the study area (Fig. 8 and Fig. 9). Investigation of these sediments revealed a quartz dominant composition (Fig. 6.). These sediments were carefully studied during the survey; however, no fossils material was identified.



Figure 3: Aerial map of Erf 7005 Portion of Erf 1935 showing the various GPS points (yellow pins) attained during the field investigation.



Figure 4: Photograph facing towards the east. Coordinates: 33°59'33.00"S 25°33'49.00"E (Point 1).



Figure 5: Dense vegetation cover. Coordinates: 33°59'27.00"S 25°33'45.00"E (Point 2).



Figure 6: Photograph of unconsolidated sediment. Coordinates: 33°59'25.00"S 25°33'60.00"E (Point 3).



Figure 7: Unconsolidated fine-grained sediments. Coordinates: 33°59'23.84"S 25°34'6.63"E (Point 4).



Figure 8: Dense vegetation overgrowth on the eastern side of the study area. Coordinates: 33°59'25.95"S 25°34'17.82"E (Point 5).



Figure 9: Photograph facing east. Coordinates: 33°59'28.22"S 25°34'26.19"E (Point 6).

6. CONCLUSION AND RECOMMENDATIONS

The potential of a palaeontological impact in the area is related to the degree of subsurface excavations (depths and volume), and the palaeontological sensitivities recorded from previous fossils recorded. During the site inspection it was found that the area is largely covered with weathered deposits of the Nanaga Formation aeolianites, possibly as well as blown in unconsolidated sand of the Schelmuhoek Formation which dominates the terrain to the south. These deposits were only partially exposed along gravel roads extending from the western part to the eastern part of the study area. Due to the weathering of the Nanaga Formation strata, the development of soil and the dense vegetation cover, outcrop was very sparse and no material of palaeontological importance was identified. The Nanaga Formation has previously been recorded to contain remains of plant rootlets, marine shells, land-dwelling gastropods as well as rare vertebrate bones, teeth and trackways. No evidence for the Peninsula Formation rocks were recorded at the study site.

It should however, be noted that any exposures encountered during the excavation must be inspected for fossil remains by a qualified palaeontologist. The remains of invertebrates, vertebrates and trace fossils are of palaeontological interest and any disturbed during excavations must immediately be reported to a palaeontologist to record and collect the materials.

7. REFERENCES

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Satellite image showing the various GPS readings

