

HWC Case No: 21051106SB0525E

PALAEONTOLOGICAL IMPACT ASSESSMENT

**PROPOSED LIGHT INDUSTRIAL DEVELOPMENT ON PORTION A OF ERF 21277
AALWYNDAL, MOSSEL BAY MUNICIPALITY, WESTERN CAPE**

By

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CLIENT

Dream Supreme Properties 14 CC

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SUMMARY

Site Name

The Applicant, Sernick (Pty) Ltd., proposes to construct a Light Industrial Facility on Part A of Erf 21277 in the Aalwyndal Development Precinct, Mossel Bay (Figure 1).

Location

The smallholding Erf 21277, Aalwyndal, is located inland of Mossel Bay and is approached from the N2 via Aalwyn Way and is situated on Nagtegaal Street (Figure 2).

Proposed Development

The proposed development involves the subdivision of Erf 21277 (7.775 ha) and the rezoning of an approximately 1.44 ha portion to Industrial Zone 1 (light industry). The development on the rezoned portion includes Self-storage Units, Administration Office, roads and parking and perimeter protection.

Palaeontological Resources Identified

The subsurface impact of the construction of the proposed storage facilities, workshops and offices will be limited to the **Skurweberg Formation** bedrock, its weathered zone and soil, and possibly grey windblown coversands in places. The Skurweberg Fm. (Nardouw Subgroup, Table Mountain Group) is of early Silurian age (~430 million years ago) and is mainly comprised of fluvial (riverine) braid-plain sandstones, with lesser muddier beds attributed to shallow marine or estuarine settings. The fossil content is sparse and only trace fossils have been recorded, mainly from the muddier interbeds (e.g. trilobite tracks, worm burrows). The palaeontological sensitivity of the Skurweberg Fm. is rated as LOW (Almond & Pether, 2008, 2009; Almond *et al.*, 2009). In this southern zone of the Cape Fold Belt the low sensitivity is further exacerbated by folding and deformation where the fossil potential is further reduced, and by the development of the weathering soil profile.

Anticipated Impacts

The relatively shallow excavations for foundations, water pipelines and septic tanks will mainly affect the soil profile formed on the deformed, weathered Skurweberg Formation bedrock. Consequently, the probability of well-preserved Silurian trace fossils being discovered in the Project Area is unlikely and the palaeontological sensitivity of the Erf 21277 Project Area may be considered MARGINAL (Appendix 1). Furthermore, there is no lack of minimally-deformed Skurweberg Fm. strata in the wider region of the Cape Fold Belt available for ongoing scrutiny for fossil content.

Recommendations

Impacts on fossil heritage resources due to disturbance of the soil profile formed on the weathered Skurweberg Formation underlying the Erf 21277 Project Area are not anticipated.

However, in case of the unexpected uncovering of fossil bones in the surficial coversands and soil, or buried archaeological material, or unmarked graves, it is recommended that a protocol for finds of potential fossil material (and buried artefacts), the Fossil Finds Procedure (FFP), is included in the Environmental Management Plan (EMP) for the Construction Phase of the project

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1 INTRODUCTION

The Applicant, Sernick (Pty) Ltd., proposes to construct a Light Industrial Facility on Part A of Erf 21277 in the Aalwyndal Development Precinct, Mossel Bay (Figure 1). A Notification of Intent to Develop (NID) has been submitted to Heritage Western Cape (HWC) by Kapp Environmental Consultants and a Heritage Impact Assessment (HIA) inclusive of a Palaeontological Impact Assessment (PIA) has been requested. This PIA is to inform about the palaeontological sensitivities of the Project Area and the probability of fossils being uncovered in the subsurface and being disturbed or destroyed during the Construction Phase of the proposed development.

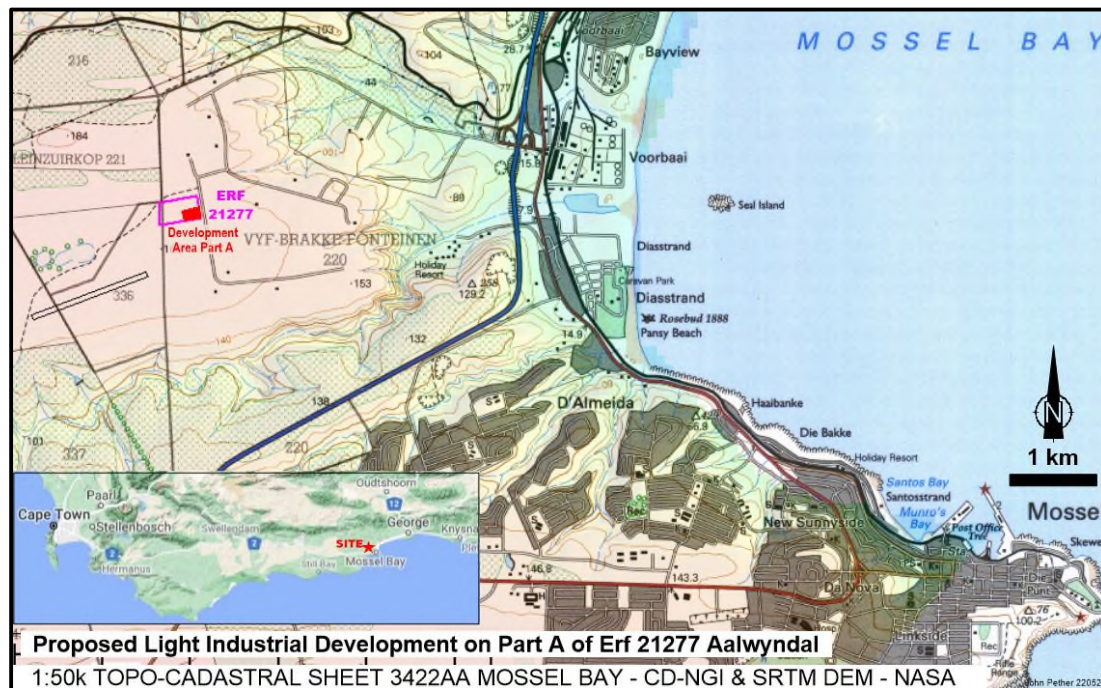


Figure 1. Location of the proposed development on Erf 21277.

2 LOCATION

The smallholding Erf 21277 Aalwyndal, previously known as Portion 242 of the farm Vyf-Brakke-Fontein, is approached from the N2 via Aalwyn Way and is situated on Nagtegaal Street (Figure 2).

Centre co-ordinates Part A: -34.151960°S / 22.066280°E.

3 PROPOSED ACTIVITY

The proposed development involves the subdivision of Erf 21277 (7.775 ha), as well as the rezoning of an approximately 1.44 ha portion of the subdivided property from Single Residential Zone 1 to Industrial Zone 1 (light industry). The development on the rezoned portion includes the following components:

- 176 small Self-storage Units in two blocks of 1796.45 m² each.
- 40 larger units in one block of 3540 m².
- Administration Office and toilet facility (the latter connected to a septic tank). The existing water line along Nagtegaal Street will supply water.
- Parking Bays – 7 bays.

The development will also include access roadways, stormwater run-off drainage and perimeter security fencing and lighting and access control.

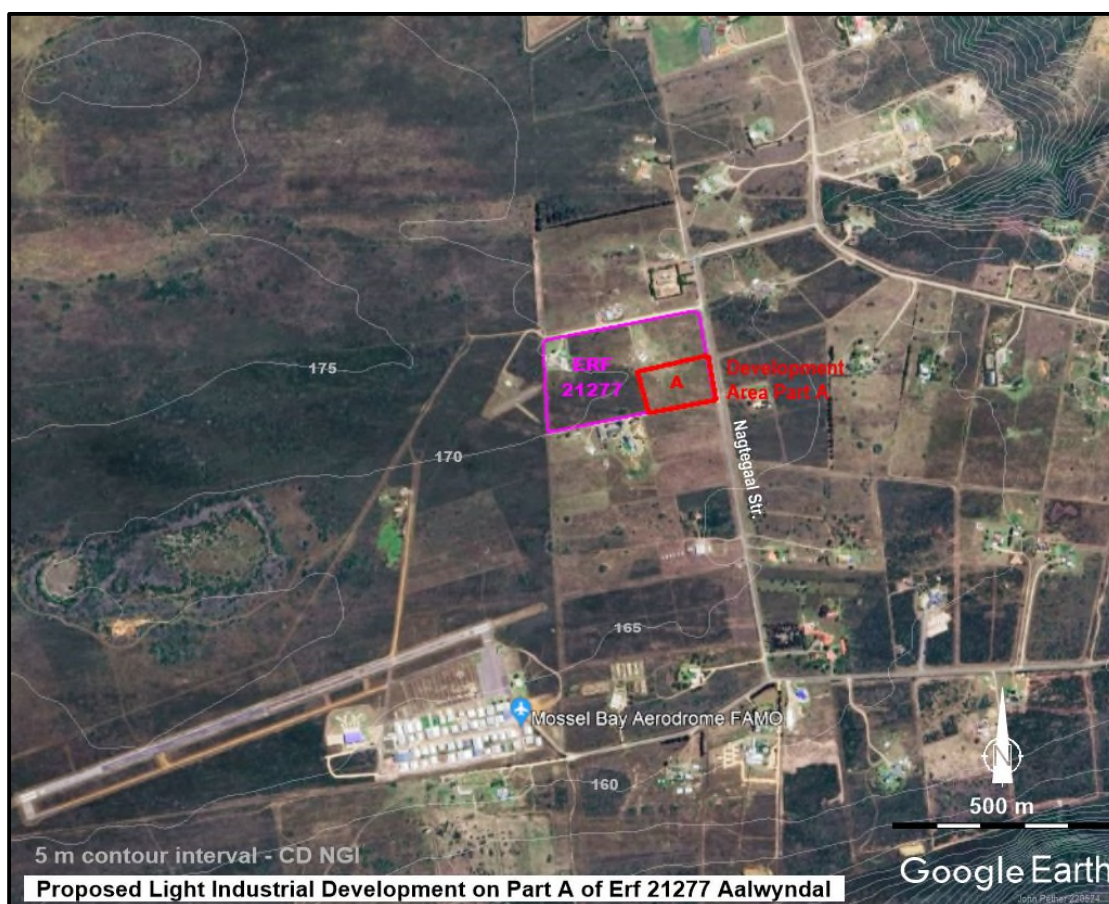


Figure 2. Aerial view of the surrounding development context of Erf 21277.

4 GEOLOGICAL SETTING

Erf 21277 is situated on bedrock of the **Skurweberg Formation** (Figure 3) of the Nardouw Subgroup of the upper Table Mountain Group of the **Cape Supergroup**. Thamm & Johnson (2006) provide a useful general summary of the Cape Supergroup. The essential palaeontology is summarised in Almond & Pether (2008) and Almond *et al.* (2009) who provide guidelines for the palaeontological sensitivity of the various stratigraphic units.

The deposition of the Cape Supergroup begins about 520 million years ago (~520 Ma) when the supercontinent Gondwana had been assembled by continental drift and its bedrock of “Pre-Cape” shales and granites had been weathered and eroded to form a gently undulating landscape. A rifted margin formed across the tip of future Africa which then subsided to form a depositional basin in which the ~8 km thickness of Cape Supergroup sediments accumulated, comprising the Table Mountain, Bokkeveld and Witteberg Groups. This was the “Agulhas Sea” and the Cape Supergroup is a great wedge of sediment derived from the north and thickening southwards, from wide fluvial braid-plains through shallow marine environments to deeper-water deposits further out in the Agulhas Sea (Thamm & Johnson 2006). Subsequently, around 250 Ma, the Agulhas Sea underwent compression from the south, squeezing the Cape Supergroup upwards in a series of stacked thrusts and folds to form the giant contortions of the Cape Fold Belt, while to the north the crust sagged downwards to form the Karoo Basin.

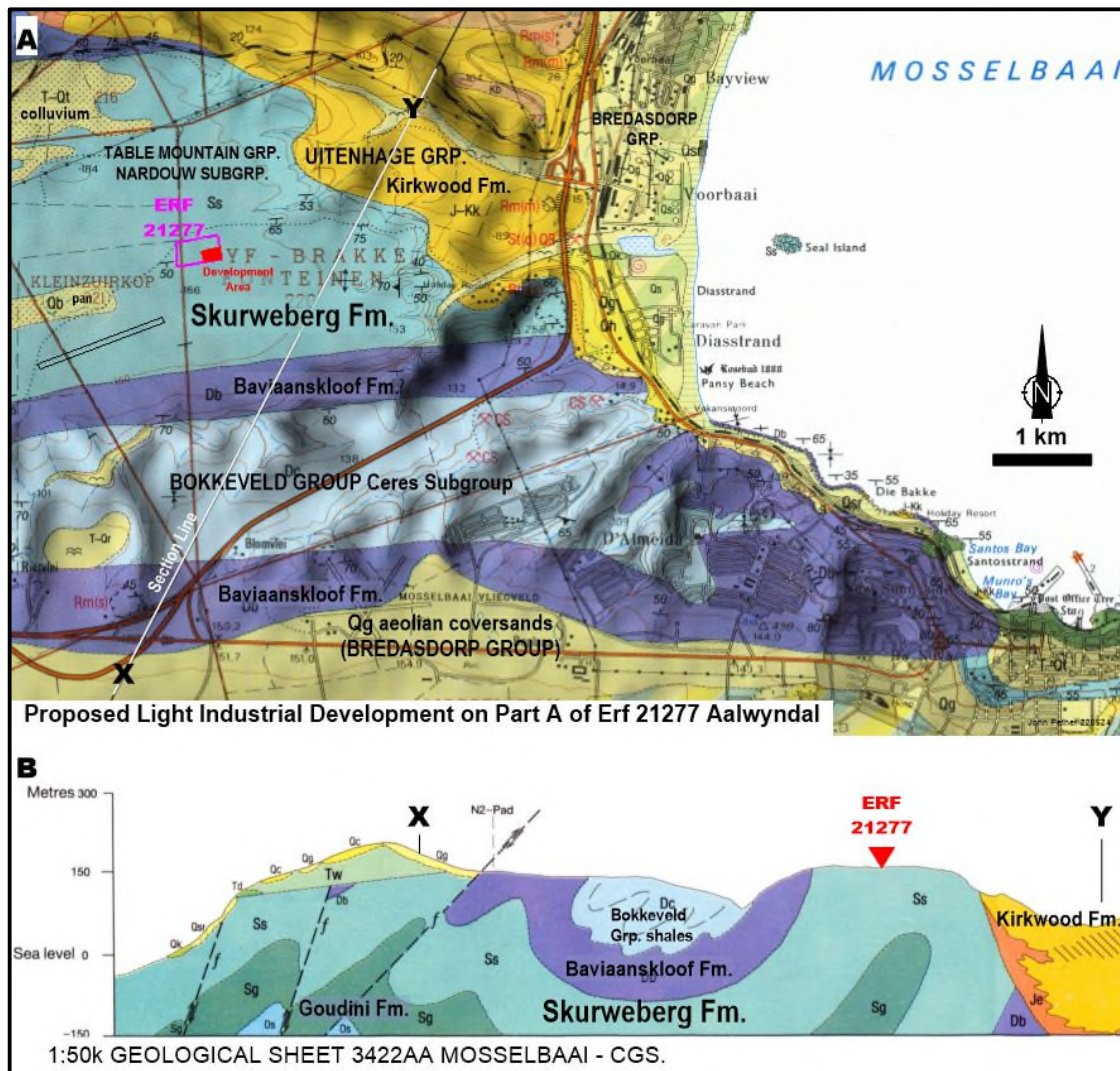


Figure 3. Geological context of Erf 21277. A – Surface geology. B – Section showing the folding and faulting of the Goudini, Skurweberg and Baviaanskloof formations comprising the Nardouw Subgroup, upper Table Mountain Group.

The **Skurweberg Formation** (Ss) is of early Silurian age (~430 Ma) and is comprised of white quartzitic sandstones, mainly in thick cross-bedded units with occasional interbedded quartz-pebble conglomerate lenses and thin mudrock intercalations. The palaeoenvironment is interpreted as sandy alluvial braid-plains deposited by numerous river courses that, unrestricted by any vegetation along river banks, crossed wide fluvial plains down to the sea. Intervals of marine influence are represented by thin, muddier deposits with rare trace fossils.

The Cape Supergroup rocks were extensively disrupted by faulting during the breakup of supercontinent Gondwana and a “fresh” suite of sediments filled the new basins so created. These late Jurassic and early Cretaceous sediments, deposited between about 155 Ma and 130 Ma, are called the **UITENHAGE GROUP** (Figure 3) and comprise conglomerates eroded from the high ground above fault scarps (Enon Fm.), the sandy and muddy deposits of river flood plains (Kirkwood Fm.), and the deposits of deltas, estuaries and marine embayments at the coast (Sundays River Fm.).

The subsequent geological history of the region involves coastal-plain marine platform development and the deposition of coastal-plain shallow-marine formations that relate to periods of high sea level during the Cenozoic Era (since 66 Ma) and the aeolian (dune)

formations that cover them. The higher part of the coastal plain, 160-200 m asl., on which Erf 21277 is situated, is the old “High Coastal Platform” bevel which was formed as a marine wave-cut platform dating back to earlier Cenozoic times (Palaeogene Period). It is likely that the “High Coastal Platform” was occupied by the sea during Eocene periods of global warming about 52, 42 and 35 Ma, but definite Eocene marine deposits have not been preserved on it in the southern Cape and have evidently been eroded away. Due to interim coastal uplift the “High Coastal Platform” was beyond the limit of subsequent high sea levels during the Neogene Period after 23 Ma, when the marine and aeolian (dune) formations of the **Bredasdorp Group** were deposited at lower elevations.

5 ANTICIPATED PALAEOONTOLOGICAL IMPACT

The subsurface impact of the construction of the proposed storage facilities, workshops and offices will be limited to the Skurweberg Formation bedrock, its weathered zone and soil, and possibly grey windblown coversands in places. The trenches for foundations for the buildings are expected to be conventional and 0.6 to 0.8 m in depth. The Solar PV facility similarly involves shallow post holes and cable trenches. The post holes for fencing are expected to be of similar depth, while footings for tall lamp poles are larger and deeper. The deepest excavations are for the septic tanks and are not expected to exceed ~2 m depth.

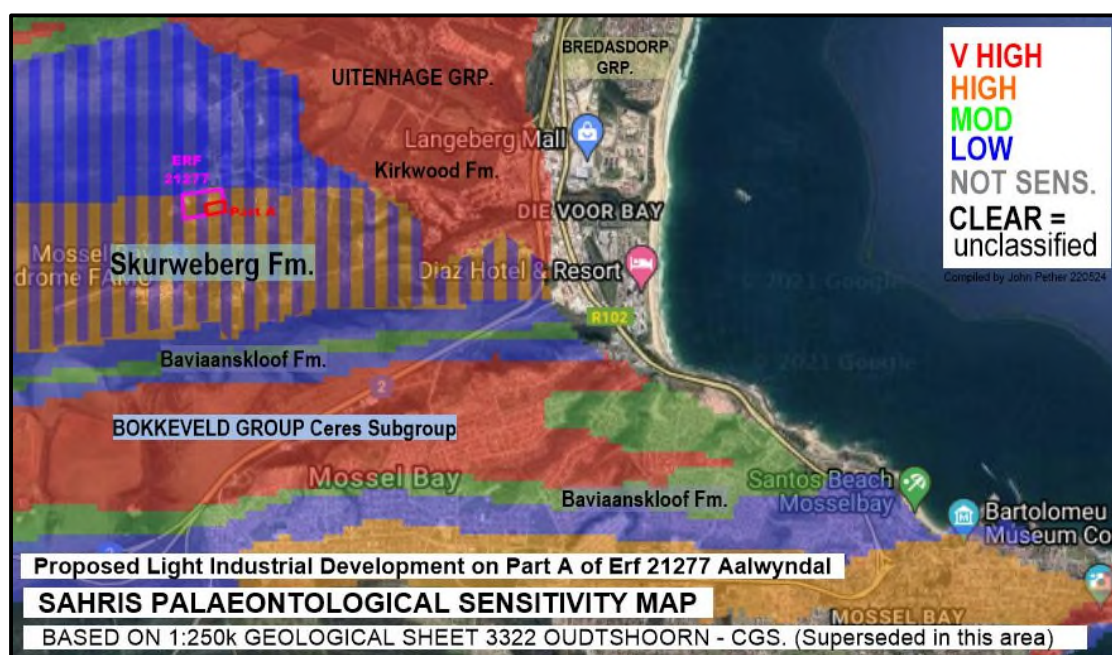


Figure 4. Palaeontological Sensitivity Map, annotated to show revised extent of the Skurweberg Formation as vertical blue bars (cf. Figure 3).

The SAHRIS Palaeosensitivity Map (Figure 4) is based on the 1:250 000 Oudtshoorn geological map which in this area has been revised (Figure 3). Previously the area depicted by vertical bars in Figure 4 was thought to be the Peninsula Fm. (orange/high) and the Nardouw Subgroup (blue/low), but is now revised to only involve the overfolded Skurweberg Fm. (Figure 3B). Consequently, the Screening Tool Report based on the old map is innocently erroneous as the sensitivity of the Skurweberg Fm. is rated as LOW (Almond & Pether, 2008, 2009; Almond *et al.*, 2009).

The fossil content of the Silurian Skurweberg Fm. fluvial braid-plain sandstones is sparse. Trace fossils are recorded from the finer-grained, muddier beds attributed to shallow marine or

estuarine settings. A contemporary review of the palaeontology of the Goudini and Skurweberg formations has been provided by Almond (2011). Hitherto only trace fossils have been recorded, mainly from the muddier interbeds. The trace fossils include rare trilobite scratch burrows (*Cruziana*) and arthropod tracks, annulated sediment-feeder burrows (*Arthropycus*), and commoner sandstone horizons of “pipe rock” that are riddled with simple vertical tube burrows (*Skolithos*) of suspension feeding invertebrates (Figure 5).

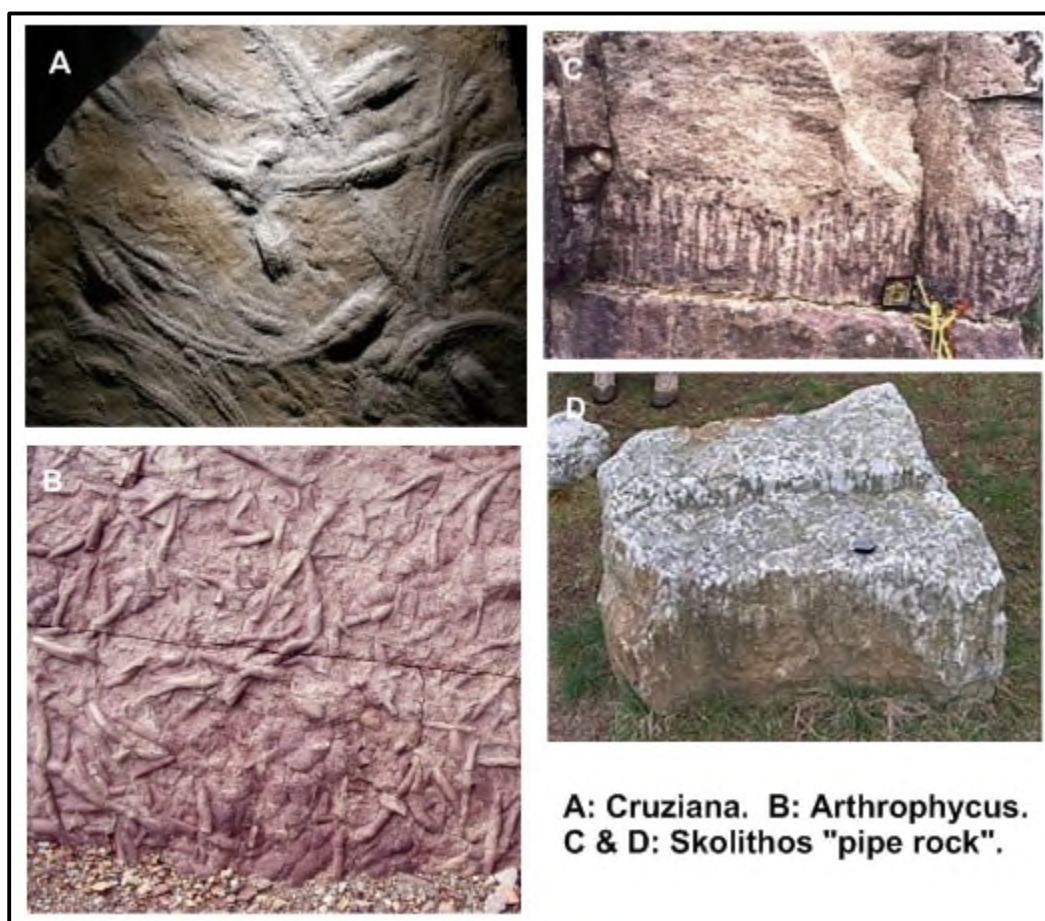


Figure 5. Trace fossil types found in the Table Mountain Group and in deposits of similar age globally. (Images from the internet).

The LOW palaeontological sensitivity of the Skurweberg Fm. is a general rating and not applicable everywhere. In this southern zone of the Cape Fold Belt the low sensitivity is further exacerbated by the strong folding and deformation where the fossil potential is further reduced (Figures 3B & 6). The fossils occur primarily in the fine-grained and muddy units. During strong folding these “incompetent” beds are sheared and pinched and develop cleavage at angles to the original bedding that obscures and smears out the fossils. The mudrock units are also more prone to subsequent alteration by weathering when in the near-surface which destroys the trace fossils.

The weathered nature of the Skurweberg Fm. bedrock and the rubbly soil profile capping are shown in Figure 7. A heap of rubbly soil nearby (Figure 8) illustrates the nature of the surficial material expected on Erf 21277.

The relatively shallow excavations for foundations, water pipelines and septic tanks will mainly affect the soil profile formed on the deformed, weathered Skurweberg Formation bedrock.

Consequently, the probability of well-preserved Silurian trace fossils being discovered in the Project Area is unlikely and the palaeontological sensitivity of the Erf 21277 Project Area may be considered MARGINAL (Appendix 1). Furthermore, there is no lack of minimally-deformed Skurweberg Fm. strata in the wider region of the Cape Fold Belt available for ongoing scrutiny for fossil content.



Figure 6. The Skurweberg Formation exposed next to the N2, east of Erf 21277, showing the near vertical folded beds and sheared mudrocks.



Figure 7. The Skurweberg Formation exposed next to the N2, east of Erf 21277, showing the rubbly soil profile on weathered bedrock.



Figure 8. Excavated soil material on nearby Erf 21255.

6 RECOMMENDATIONS

Impacts on fossil heritage resources due to disturbance of the soil profile formed on the weathered Skurweberg Formation underlying the Erf 21277 Project Area are not anticipated.

However, in case of the unexpected uncovering of fossil bones in the surficial coversands and soil, or buried archaeological material, or unmarked graves, it is recommended that a protocol for finds of potential fossil material (and buried artefacts), the Fossil Finds Procedure (FFP), is included in the Environmental Management Plan (EMP) for the Construction Phase of the project, basically “If fossil material is uncovered during excavations for foundations and other installations, stop work at that spot and report to Heritage Western Cape”. Links to the HWC FFP are below:

https://www.hwc.org.za/sites/default/files/3_11%20Protocol%20Fossil%20Finds%20Final%20June%202016.pdf

https://www.hwc.org.za/sites/default/files/3_12%20Fossil%20Finds%20Poster.pdf

Heritage Western Cape will assess the information and liaise with an archaeological or palaeontological specialist, as appropriate.

7 REFERENCES

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- Almond, J.E., De Klerk, W.J. & Gess, R. 2009. Palaeontological heritage of the Eastern Cape. SAHRA Technical Report, 51 pp. Natura Viva cc, Cape Town.

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- Viljoen, J.H.A. & Malan, J.A. 1993. Die geologie van die gebiede 3421 BB Mosselbaai and 3422 AA Herbertsdale. Toeligting tot Blaaie 3421 BB and 3422 AA. Geological Survey. Government Printer, Pretoria.

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8 APPENDIX 1. PALAEONTOLOGICAL SENSITIVITY RATING

Palaeontological Sensitivity refers to the likelihood of finding significant fossils within a geologic unit.

VERY HIGH: Formations/sites known or likely to include vertebrate fossils pertinent to human ancestry and palaeoenvironments and which are of international significance.

HIGH: Assigned to geological formations known to contain palaeontological resources that include rare, well-preserved fossil materials important to on-going palaeoclimatic, palaeobiological and/or evolutionary studies. Fossils of land-dwelling vertebrates are typically considered significant. Such formations have the potential to produce, or have produced, vertebrate remains that are the particular research focus of palaeontologists and can represent important educational resources as well.

MODERATE: Formations known to contain palaeontological localities and that have yielded fossils that are common elsewhere, and/or that are stratigraphically long-ranging, would be assigned a moderate rating. This evaluation can also be applied to strata that have an unproven, but strong potential to yield fossil remains based on its stratigraphy and/or geomorphologic setting.

LOW: Formations that are relatively recent or that represent a high-energy subaerial depositional environment where fossils are unlikely to be preserved, or are judged unlikely to produce unique fossil remains. A low abundance of invertebrate fossil remains can occur, but the palaeontological sensitivity would remain low due to their being relatively common and their lack of potential to serve as significant scientific resources. However, when fossils are found in these formations, they are often very significant additions to our geologic understanding of the area. Other examples include decalcified marine deposits that preserve casts of shells and marine trace fossils, and fossil soils with terrestrial trace fossils and plant remains (burrows and root fossils)

MARGINAL: Formations that are composed either of volcanoclastic or metasedimentary rocks, but that nevertheless have a limited probability for producing fossils from certain contexts at localized outcrops. Volcanoclastic rock can contain organisms that were fossilized by being covered by ash, dust, mud, or other debris from volcanoes. Sedimentary rocks that have been metamorphosed and deformed by the heat and pressure of deep burial are called metasedimentary. If the meta-sedimentary rocks had fossils within them, they may have survived the metamorphism and still be identifiable. However, since the probability of this occurring is limited, these formations are considered marginally sensitive. The decomposition of sedimentary rocks by weathering forms soils of marginal fossil potential.

NO POTENTIAL: Assigned to geologic formations that are composed entirely of volcanic or plutonic igneous rock, such as basalt or granite, and therefore do not have any potential for producing fossil remains. These formations have no palaeontological resource potential.

Adapted from Society of Vertebrate Paleontology. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources - Standard Guidelines. News Bulletin, Vol. 163, p. 22-27.

9 APPENDIX 2. DECLARATION OF INDEPENDENCE

PALAEONTOLOGICAL IMPACT ASSESSMENT

PROPOSED LIGHT INDUSTRIAL DEVELOPMENT ON PORTION A OF ERF 21277

AALWYNDAL, MOSSEL BAY MUNICIPALITY, WESTERN CAPE_

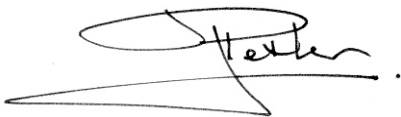
Terms of Reference

This assessment forms part of the Heritage Assessment and it assesses the overall palaeontological (fossil) sensitivities of formations underlying the Project Area.

Declaration

I ...**John Pether**....., as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in the compilation of the above report;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed to the EAP any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management act;
- have provided the EAP with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.



Signature of the specialist

Date: 31 May 2022

John Pether, M.Sc., Pr. Sci. Nat. (Earth Sci.)

Independent Consultant/Researcher recognized as an authority with 38 years' experience in the field of coastal-plain and continental-shelf palaeoenvironments, fossils and stratigraphy, mainly involving the West Coast/Shelf of southern Africa. Has been previously employed in academia (South African Museum) and industry (Trans Hex, De Beers Marine). At present an important involvement is in Palaeontological Impact Assessments (PIAs) and mitigation projects in terms of the National Heritage Resources Act 25 (1999) (~300 PIA reports to date) and is an accredited member of the Association of Professional Heritage Practitioners (APHP). Continues to be involved as consultant to offshore and onshore marine diamond exploration ventures. Expertise includes:

- Coastal plain and shelf stratigraphy (interpretation of open-pit exposures, on/offshore cores and exploration drilling).
- Sedimentology and palaeoenvironmental interpretation of shallow marine, aeolian and other terrestrial surficial deposits.
- Marine macrofossil taxonomy (molluscs, barnacles, brachiopods) and biostratigraphy.
- Marine macrofossil taphonomy.
- Sedimentological and palaeontological field techniques in open-cast mines (including finding and excavation of vertebrate fossils (bones).

Membership of Professional Bodies

- South African Council of Natural Scientific Professions. Earth Science. Reg. No. 400094/95.
- Geological Society of South Africa.
- Palaeontological Society of Southern Africa.
- Southern African Society for Quaternary Research.
- Association of Professional Heritage Practitioners (APHP), Western Cape. Accredited Member No. 48.

Past Clients Palaeontological Assessments

AECOM SA (Pty) Ltd.	Guillaume Nel Environmental Management Consultants.
Agency for Cultural Resource Management (ACRM).	Klomp Group.
AMATHEMBA Environmental.	Megan Anderson, Landscape Architect.
Anél Blignaut Environmental Consultants.	Ninham Shand (Pty) Ltd.
Arcus Gibb (Pty) Ltd.	PD Naidoo & Associates (Pty) Ltd.
ASHA Consulting (Pty) Ltd.	Perception Environmental Planning.
Aurecon SA (Pty) Ltd.	PHS Consulting.
BKS (Pty) Ltd. Engineering and Management.	Resource Management Services.
Bridgette O'Donoghue Heritage Consultant.	Robin Ellis, Heritage Impact Assessor.
Cape Archaeology, Dr Mary Patrick.	Savannah Environmental (Pty) Ltd.
Cape EAPrac (Cape Environmental Assessment Practitioners).	Sharples Environmental Services cc
CCA Environmental (Pty) Ltd.	Site Plan Consulting (Pty) Ltd.
Centre for Heritage & Archaeological Resource Management (CHARM).	SRK Consulting (South Africa) (Pty) Ltd.
Chand Environmental Consultants.	Strategic Environmental Focus (Pty) Ltd.
CK Rumboll & Partners.	UCT Archaeology Contracts Office (ACO).
CNdV Africa	UCT Environmental Evaluation Unit
CSIR - Environmental Management Services.	Urban Dynamics.
Digby Wells & Associates (Pty) Ltd.	Van Zyl Environmental Consultants
Enviro Logic	Western Cape Environmental Consultants (Pty) Ltd, t/a ENVIRO DINAMIK.
Environmental Resources Management SA (ERM).	Wethu Investment Group Ltd.
Greenmined Environmental	Withers Environmental Consultants.

Stratigraphic consulting including palaeontology

Afri-Can Marine Minerals Corp	Council for Geoscience
De Beers Marine (SA) Pty Ltd.	De Beers Namaqualand Mines.
Geological Survey Namibia	IZIKO South African Museum.
Namakwa Sands (Pty) Ltd	NAMDEB