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BRIEF PALAEOLOGICAL ASSESSMENT CONDUCTED BY DR PETER NILSSEN ON A PROPERTY ADJACENT TO PTN 30/257 FRANSMANSHOEK CONSERVANCY, VLEESBAAI

According to the Screening Tool Report, Portion 30/257 (Preferred Property) has a Medium Palaeontology sensitivity. The property is situated within the Strandveld Geological Formation, which is characterized as unconsolidated, calcareous wind-blown sands that record the most recent aeolian phase of the Bredasdorp Group (youngest formation of the Bredasdorp Group) (Johnson *et al.*, 2008). After a site investigation by the EAP, it is confirmed that the study area consists of loose dune sand.

The Palaeontological sensitivity of the Strandveld Formation dune sands is not rated on the SAHRIS Palaeo-Map as it differs between dune fields depending on the extends of exposures of underlying palaeosurfaces.

Dr Peter Nilssen conducted a Palaeontological Assessment for a proposed dwelling on Portion 19 of Misgunst aan de Gouritz 257 which is situated south-west of the Preferred Property (Portion 30/257 Misgunst aan de Gouritz).

According to Dr Peter Nilssen, the fossil potential of the Strandveld Formation is poor. The shallow excavations entailed in the proposed construction of one (1) dwelling, access and services will only affect the upper loose sands of the Strandveld Formation which are not expected to have an impact on fossil heritage resources due to the **Low to Marginal Palaeontological Sensitivity** of these modern dune sands.

Below is a copy of the Palaeontological Assessment conducted on Portion 19 of Misgunst aan de Gouritz.

Heritage Western Cape revised the HIA from Dr Nilssen for Ptn 19/257 and concluded that no further action is needed.

Appendix C: Palaeontological Specialist Study

HWC CASE NO. 20072309SB0729E

**BRIEF PALAEOLOGICAL ASSESSMENT
PROPOSED DWELLING ON PORTION 19 OF MISGUNST AAN DE
GOURITZ 257
HESSEQUAMUNICIPALITY, WESTERN CAPE**

BY

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For

Aquifer Resource Management (Pty) Ltd.

4 February 2022

CONCLUSION

Excavations into the dunes of the Strandveld Formation entailed in the construction of the dwelling and supporting infrastructure on Portion 19 of Farm 257 are not expected to have an impact on fossil heritage resources due to the low to marginal palaeontological sensitivity of these modern dune sands.

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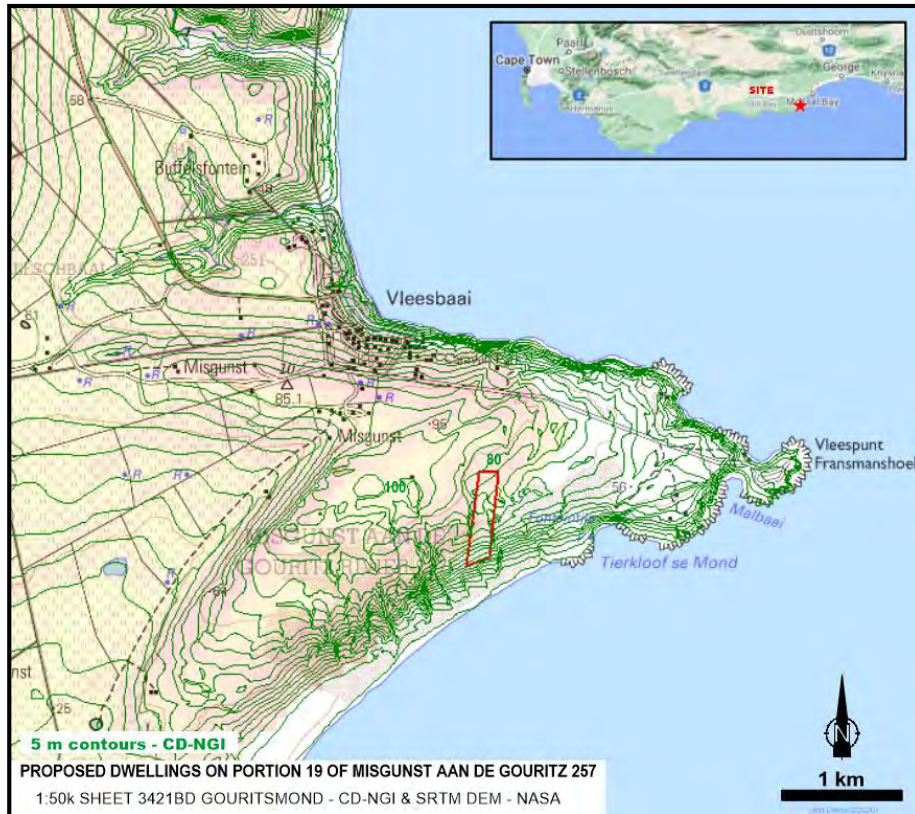
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PROJECT NAME

Proposed dwelling on Portion 19 of Misgunstaan de Gouritz 257.

LOCATION

Portion 19 of Farm Misgunstaan de Gouritz 257 is approached via the gravel road OP4979 between Vleesbaai and Vleespunt/Fransmanshoek Point, (Figure 1). About half way to Vleespunt near the summit overlooking it a track heading southwards into the vegetated dunes



leads to the property (Figure 2)

Figure 1. Location of the Project Area.

DESCRIPTION OF PROPOSED DEVELOPMENT

The property is situated within the Fransmanshoek Conservancy and the proposed development would therefore be undertaken and managed in terms of the principles prescribed by the conservancy.

The proposal is for the establishment of a primary dwelling (< 500m²) and an access road and associated engineering services and infrastructure.

Water supply is proposed to be sourced via a borehole and harvesting/ storage of rain water.

Electricity supply is proposed to be sourced via solar and wind energy technology with battery storage.

Sewage is proposed to be dealt with via a biogas digester. Grey waste water would be treated in an artificial wetland (±100m²) and used for irrigation purposes.

Three alternative localities were considered for the location of the dwelling (Figure 2). Option 1 and its associated access road is preferred from a heritage and archaeological perspective and has also been identified by the Botanical Specialist and the Coastal Engineer as being the preferred option.

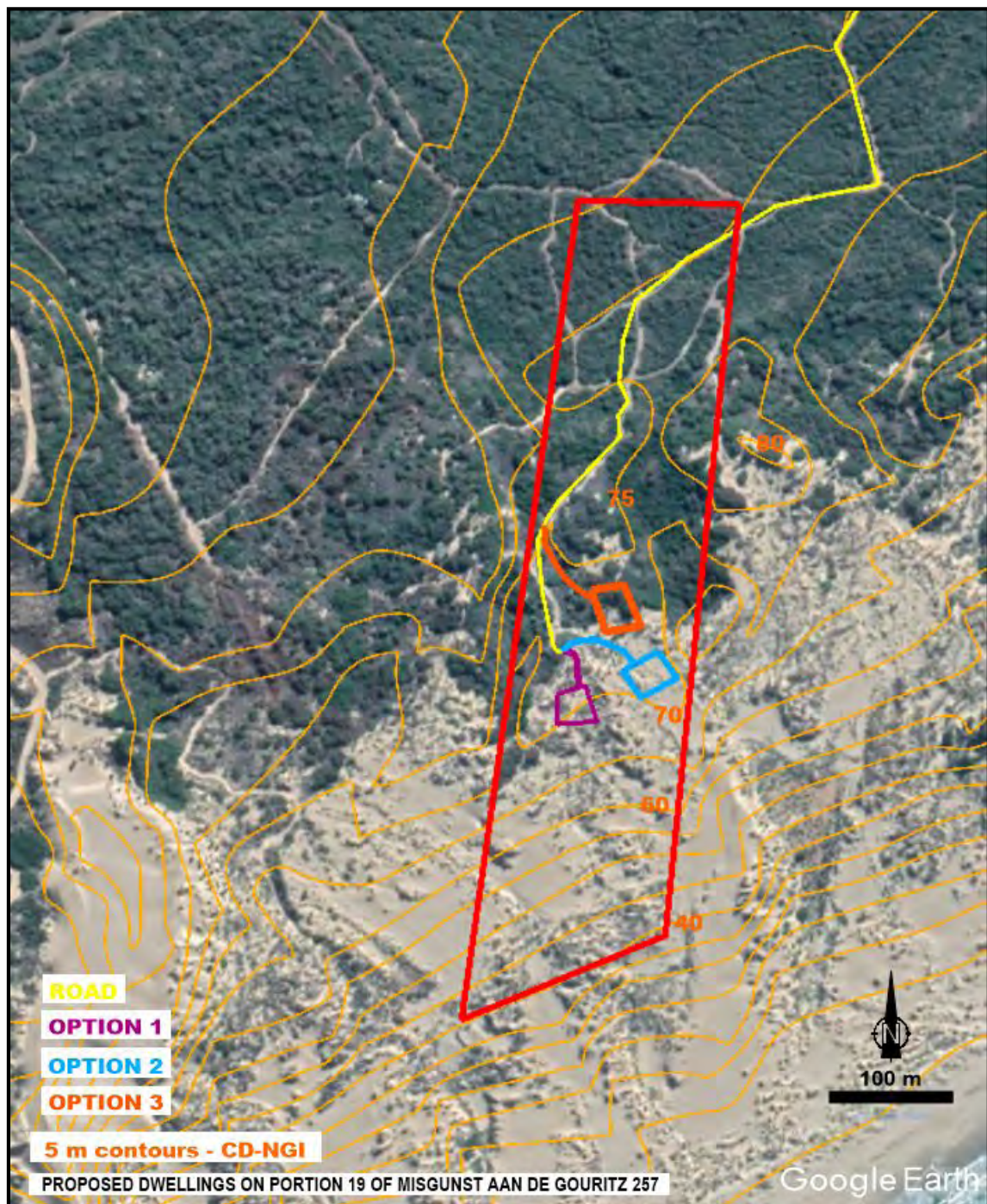


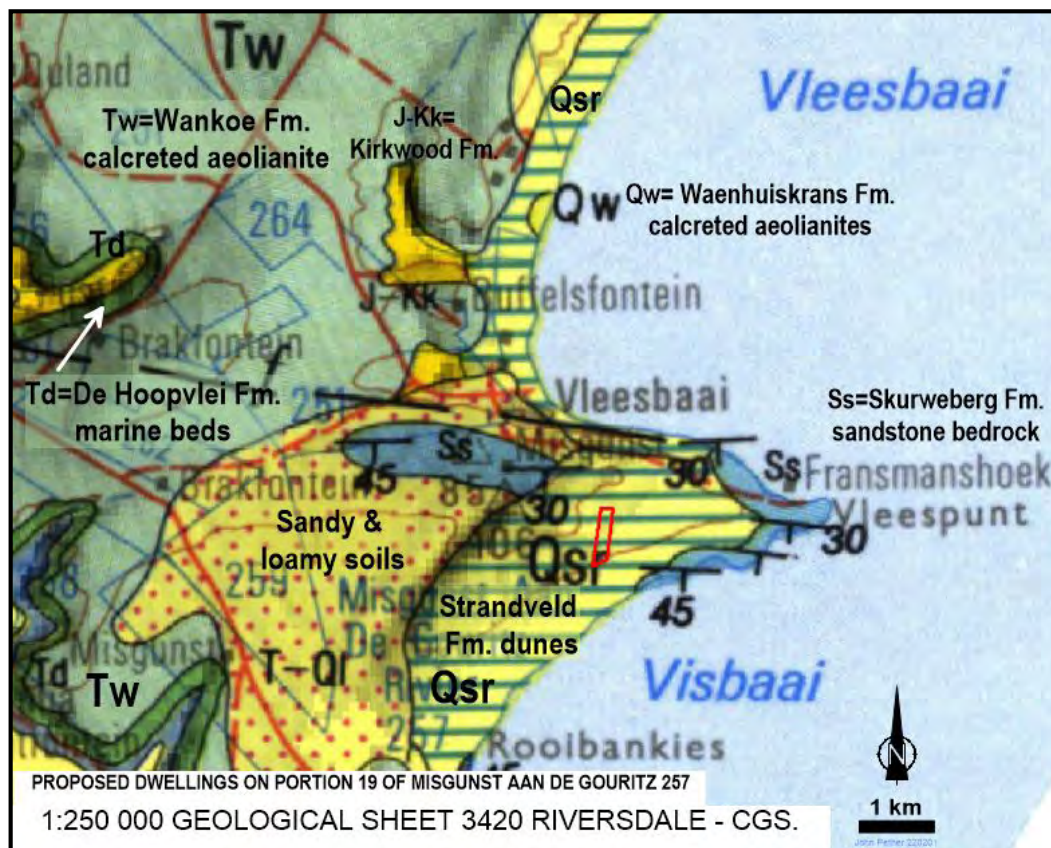
Figure 2. Aerial view of the context of the Proposed Development Area.

GEOLOGICAL CONTEXT

The bedrock underlying the Fransmanshoek peninsula consists of the Skurweberg Formation quartzitic sandstones of the upper part of the TABLE MOUNTAIN GROUP (Figure 3, Ss), which were deposited as sandy alluvial braid-plains during the early Silurian Period about 430 million years ago (~430 Ma). Much later, during the breakup of supercontinent Gondwana between about 155 Ma and 130 Ma, the bedrock was extensively disrupted by faulting and a “fresh” suite of sediments filled the new basins so created. These late Jurassic and early Cretaceous sediments 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.). One of these prominent breakup faults defines

the northern edge of the Vleesbaai-Fransmanshoek peninsula, with outcrops of the Kirkwood Fm. exposed on the flanks of incised valleys north of the fault (Figure 3, f, J-Kk). Overlying the eroded surface of these older formations are the shelly marine beds of the De Hoopvlei Fm. (BREDASDORP GROUP) (Figure 3, Td), deposited during global warm periods of the Pliocene Epoch 5-3 Ma. These are succeeded by considerable thicknesses of calcified ancient dunes making up the Wankoe Fm. aeolianites (Figure 3, Tw) expressed as ridges in the landscape. Weathering of the Wankoe aeolianites has produced soil cover (T-Ql). A later cordon of dunes accumulated along the coast, namely the partly-calcified aeolianites of the Waenhuiskrans Fm. (Qw). In this area the Waenhuiskrans Fm. has been largely covered by the geologically recent dunes of the Strandveld Fm. (Qsr).

Figure 3. Surface geology of the surrounds of the Proposed Development.



ANTICIPATED IMPACTS ON PALAEOONTOLOGICAL HERITAGE RESOURCES

The proposed dwelling site is situated at ~70 m asl. at the brinkpoint overlooking the relatively steep slope down to the shoreline covered with partly-active dunes and the more gentle, vegetated slopes of the rounded crest of the aeolianite ridge (Figure 1 & 2). The archaeological field survey (Nilssen, 2021) notes that the site is a dune landscape of loose aeolian sands, with no visible archaeological material. Calcrite outcrops and deflated areas with exposed palaeosurfaces are not present.

The shallow excavations entailed in the proposed construction of the dwelling, access track, biogas digester and artificial wetland will only affect the upper loose dune sands of the Strandveld Formation.

The palaeontological sensitivity of the Strandveld Formation dune sands is not rated on the SAHRIS Palaeo-Map (Figure 4) and it differs between dunefields depending on the extents of exposures of underlying palaeosurfaces. The fossil potential of the Strandveld Formation sands is poor overall and animal bones and marine shells included in these latest Quaternary dunes, mainly deposited during the last 12 thousand years, are expected to be in an archaeological

context. Nevertheless, the fossil bones of large mammals are very occasionally found in dune-sand mines, such as elephant, hippopotamus, rhino and antelopes, the large bones being more easily seen. These finds in young dunes are often referred to as “subfossils”. Some finds are interesting in that they record the presence of fauna that has been lost in historical times. However, the relatively small scale of the excavated subsurface volume entailed in the proposed development renders the likelihood of intersecting the very sparsely distributed fossil bones improbable and such finds would very likely be the remains of species living today. Consequently the palaeontological sensitivity of the Strandveld Fm. sands in the vicinity of the development footprint is considered to be LOW to MARGINAL (Appendix 1)

Figure 4. Palaeontological sensitivities of formations in the area.



RECOMMENDATIONS

Excavations into the dunes of the Strandveld Formation entailed in the construction of the dwelling and supporting infrastructure are not expected to have an impact on fossil heritage resources due to the low to marginal palaeontological sensitivity of these modern dune sands.

Nevertheless, in case of the unexpected uncovering of sub-fossil bones in the dune sands, or buried archaeological material, or unmarked graves, it is recommended that a protocol for finds of potential sub-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 bones or archaeological material are uncovered during excavations for foundations and other installations, stop work at that spot and report to Heritage Western Cape”. The basic FFP and the HWC Recording Form are provided in Appendix 2. Heritage Western Cape will assess the information and liaise with an archaeological or palaeontological specialist, as appropriate.

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APPENDIX 1. PALAEOONTOLOGICAL SENSITIVITY RATING

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

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 by the heat and pressure of deep burial are called metasedimentary. If the metasedimentary 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.

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.

APPENDIX 2. FOSSIL FINDS PROCEDURE

MONITORING

A constant monitoring presence over the period during which excavations for developments are made, by either an archaeologist or palaeontologist, is generally not practical.

The field supervisor/foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossils and buried archaeological material and to immediately report such occurrences. To this end, responsible persons/officials must be designated. These include:

- The field supervisor/foreman, who is going to be most often in the field.
- The Environmental Control Officer (ECO) for the project, if appointed.
- The Project Manager/Site Agent/Owner (Site Officer).

Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the designated Site Officer who will undertake the implementation of the Fossil Finds Procedure.

RESPONSE BY PERSONNEL IN THE EVENT OF FOSSIL BONE FINDS

The most important fossils of concern are the fossil bones and teeth of land animals.

In the process of digging the excavations fossil bones may be spotted in the hole sides or bottom, or as they appear in excavated material on the spoil heap.

- Stop work at fossil find. The Site Officer/ECO must be informed.
- Protect the find site from further disturbance and safeguard all fossil material in danger of being lost such as in the excavator bucket and scattered in the spoil heap.
- The Site Officer/ECO must immediately inform the Heritage Western Cape (HWC) and/or an archaeologist and provide via email the information about the find, as detailed below.
 - Date
 - Position of the excavation (GPS) and depth.
 - A description of the nature of the find.
 - Digital images of the excavation showing vertical sections (sides) and the position of the find showing its depth/location in the excavation.
 - A reference scale must be included in the images (tape measure, ranging rod, or object of recorded dimensions).
 - Close-up, detailed images of the find (with scale included).

Heritage Western Cape (HWC) will assess the information and a suitable response will be established which will be reported to the Owner/Developer and the Site Officer/ECO, such as whether rescue excavation or rescue collection by an archaeologist or palaeontologist is necessary or not. The response time/scheduling of the rescue fieldwork is to be decided in consultation with developer/owner and the ECO. It will probably be feasible to “leapfrog” the find and continue excavation farther along, so that the work schedule and machine time are minimally disrupted. The strategy is to rescue the material as quickly as possible.

APPLICATION FOR A PERMIT TO COLLECT FOSSILS

A permit from HWC and a Work Plan is required to excavate fossils. The applicant should be the qualified specialist responsible for assessment, collection and reporting. Should fossils be found that require rapid collecting, application for a palaeontological permit must be made to HWC immediately. The application requires the details and permission of the registered owner

of the site. The fossils and their contextual information must be deposited at a SAHRA/HWC-approved institution. The rescue of discovered palaeontological remains by a contracted specialist shall be at the Developer's expense.

HWC Recoding Form

FOSSIL DISCOVERIES: HWC PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	Lat:	Long:
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	Digital image of vertical section (side)	
	Fossil from different angles	
	Wider context of the find	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil	Name: Contact:	
Recorder	Name: Contact:	
Photographer	Name: Contact:	

APPENDIX 3. DECLARATION OF INDEPENDENCE

**BRIEF PALAEOLOGICAL ASSESSMENT
PROPOSED DWELLING ON PORTION 19 OF MISGUNST AAN DE GOURITZ 257
HESSEQUA MUNICIPALITY, WESTERN CAPE
HWC CASE NO. 20072309SB0729E**

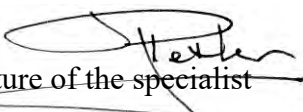
Terms of Reference

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:4February 2022

APPENDIX 4. CURRICULUM VITAE

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) (~350 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.
AnélBlignaut 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

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