

BRIEF PALAEOLOGICAL IMPACT ASSESSMENT

(Desktop Study)

**PROPOSED ADDITIONAL FIVE DWELLING UNITS AND ROAD UPGRADE
ON FARM 633, FARM 273 PTN 10 AND FARM 344 PTN 3, SWELLENDAM,
WESTERN CAPE**

By

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CONTENTS

1	<i>INTRODUCTION</i>	1
2	<i>GEOLOGICAL SETTING</i>	2
3	<i>EXPECTED PALAEOLOGY</i>	3
4	<i>RECOMMENDATIONS</i>	4
5	<i>APPLICATION FOR A PALAEOLOGICAL PERMIT</i>	4
6	<i>REPORTING</i>	4
7	<i>REFERENCES</i>	5
8	<i>GLOSSARY</i>	6
8.1	<i>GEOLOGICAL TIME SCALE TERMS</i>	7
9	<i>APPENDIX 1</i>	8

SUMMARY

PHS Consulting is conducting the heritage assessment process for their client who proposes to erect an additional five dwelling units on Farm Crodinie 344, Portion 3. The site is situated to the south of Swellendam, above the right bank of the Breede River (Figures 1 & 2). The footprint of each unit is 120 m² and the proposal also involves short access roads to each unit and the upgrading of the existing jeep-track access road from the north crossing Farm Sand Kraal Ptn. 10 and Farm 633 (Figure 2).

PHS Consulting has submitted a Notification of Intent to Develop (NID) to Heritage Western Cape (HWC). The response by HWC (Appendix 1) made the following requirement: *A HIA limited to an archaeological scoping study and a desktop palaeontological study with an integrated set of recommendations is required.*

The context of the 5 dwellings, on the slope just below the lower terrace deposits, is likely to be colluvially-redeposited alluvial gravels and sands. Some *in situ* alluvial gravels may be encountered. Nevertheless, in view of the low fossil potential of such deposits, no significant impact is expected.

The Bidouw Subgroup bedrock, locally rich in fossils, will be traversed by the access road upgrade. The subsurface disturbance is relatively superficial and will likely mainly affect the weathering mantle on these fine-grained mudrocks, wherein the expectation of fossil preservation is negligible.

In view of the low fossil potential it is proposed that an impact of low significance on palaeontological heritage is expected as a consequence of the development and that no interventions are required at this stage.

Notwithstanding, petrified fossil teeth, bones and wood are occasionally found in alluvial terrace deposits. It is recommended that an alert for the uncovering of such material be included in the Construction Phase EMP.

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INTRODUCTION

PHS Consulting is conducting the heritage assessment process for their client who proposes to erect an additional five dwelling units on Farm Crodinie 344, Portion 3. The site is situated to the south of Swellendam, above the right bank of the Breede River (Figures 1 & 2). The footprint of each unit is 120 m² and the proposal also involves short access roads to each unit and the upgrading of the existing jeep-track access road from the north crossing Farm Sandkraal Ptn. 10 and Farm 633 (Figure 2).

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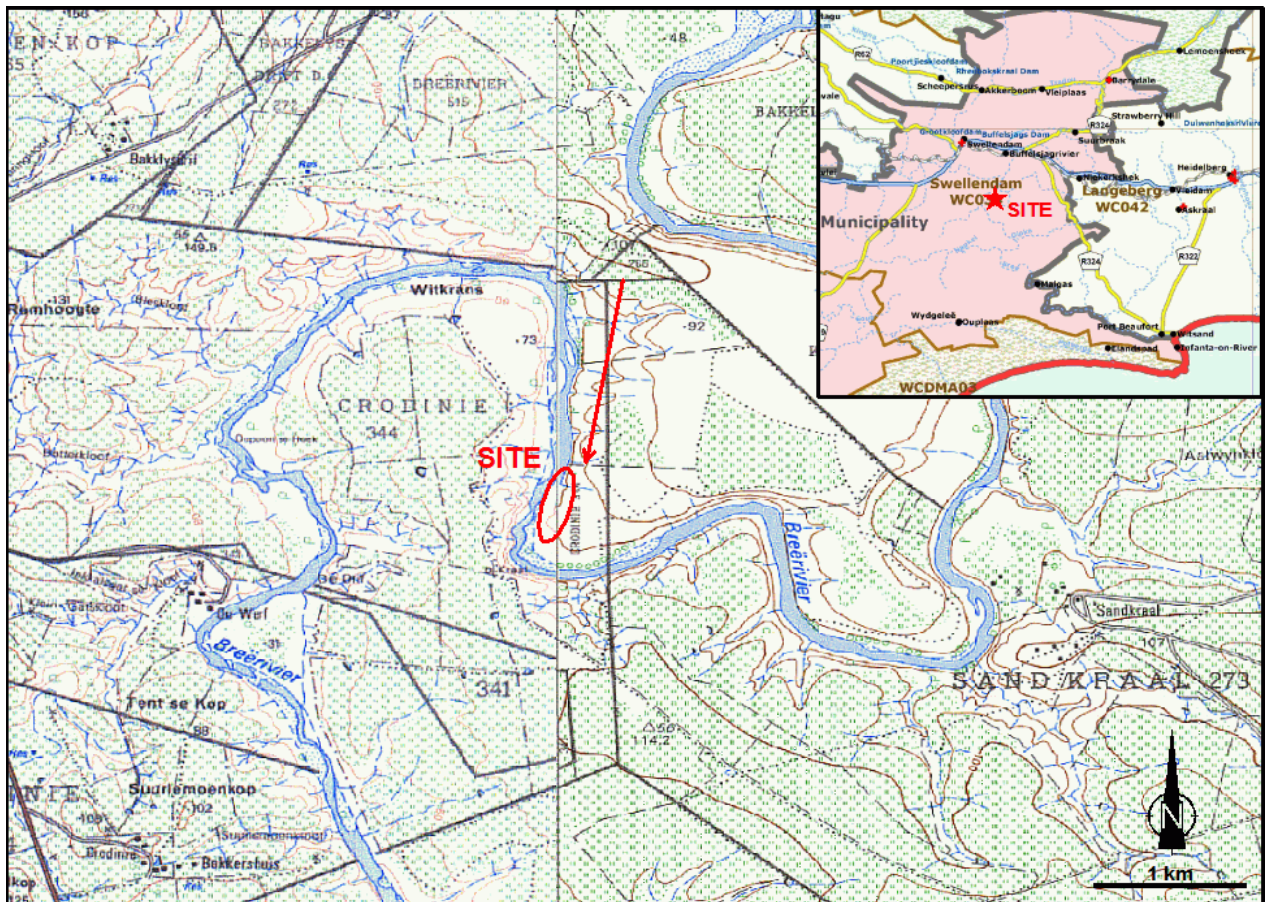


Figure 1. Location of the proposed development. Extracted from 1:50000 topocadastral maps 3420AB_1989_ED3_GEO.TI, 3420BA_1981_ED2_GEO.TIF - Chief Directorate: Surveys & Mapping.

The main purposes of this palaeontological assessment are to:

- Outline the nature of possible palaeontological/fossil heritage resources in the subsurface of the project area.
- Suggest the mitigatory actions to be taken with respect to the occurrence of fossils during construction.

Palaeontological interventions mainly happen once fossil material is exposed at depth, *i.e.* once the EIA process is done and construction earthworks commence. The action plans and protocols for palaeontological mitigation must therefore be *included in the Environmental Management Plan (EMP)* for the construction phase.

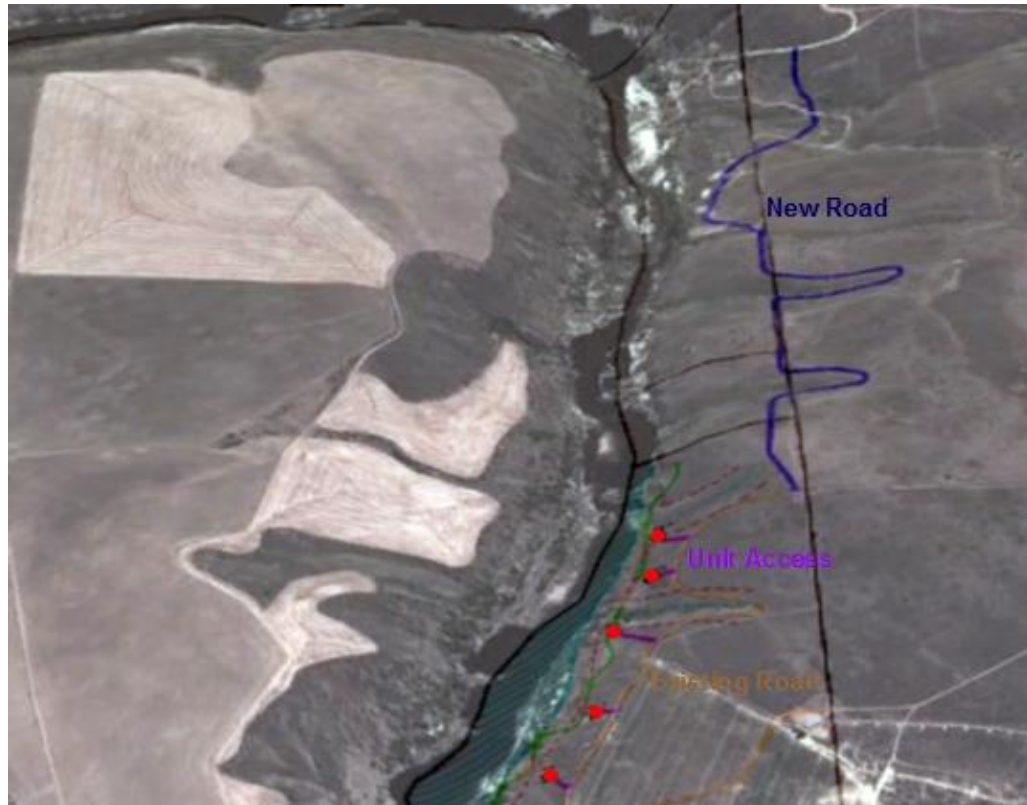


Figure 2. Simulated oblique aerial view of the proposed development showing units and roadworks. Layout supplied by PHS overlain in Google Earth.

2 GEOLOGICAL SETTING

The project area is situated on the flanks of an incised meander of the Breede River. The geological map (Figure 3) depicts the wider vicinity as “High Level Terrace Gravel” (HLT). This refers to gravels on a terrace 45-50 m above the river level (Malan *et al.*, 1994). The terrace represents erosion and gravel deposition by the river relating to a pre-existing land surface of Cenozoic age. The gravels are composed primarily of rounded cobbles of Table Mountain Group quartzites and sandstones (Malan *et al.*, 1994).

The topography of the mapped area of “High Level Terrace Gravel” shows that a plateau 80-90 m asl. occupies the large portion of it, ~50 m above the river level of ~33 m asl. To the south, the “point” of this terrace has been eroded away and a dissected slope break descends to a younger, lower terrace between 40-50 m asl. that is cultivated. The 5 dwelling units are situated at

about 40-45 m asl., 2 on the edge of the lower terrace and the northern 3 on the dissected slope up to the higher terrace (Figure 2).

The “High Level Terrace Gravel” post-dates the extensive marine inundation of the coastal plain during the Mid-Miocene Climatic Optimum ~16 Ma, when substantial melting of Antarctic polar ice occurred during global warming.



Figure 3. Geology in the vicinity on the project area. HLT = High Level Terrace. Extract from 1:250 000 Geological Series 3420 Riversdale. Council for Geoscience (Geological Survey), Department of Mineral & Energy Affairs, 1993.

The bedrock underlying the terraces consists and shales, siltstones and thin sandstones of the upper Bokkeveld Group, viz. the Bidouw Subgroup of late Devonian age (~380 Ma) (Theron & Johnson, 1991). The access road to the dwelling units crosses exposure of the Bidouw Subgroup in the dissected slope area below the high terrace (Figure 3).

3 EXPECTED PALAEOLOGY

The context of the 5 dwellings, on the slope just below the lower terrace deposits, is likely to be colluvially-redeposited alluvial gravels and sands. Some *in situ* alluvial gravels may be encountered. Nevertheless, in view of the low fossil potential of such deposits, no significant impact is expected.

The Bidouw Subgroup bedrock, locally rich in fossils, will be traversed by the access road upgrade. However, most fossil finds have been in the lowermost Bidouw Group, whereas the upper Bidouw Group deposits, relevant in this case, is poorly fossiliferous (Theron & Johnson, 1991). The subsurface disturbance is relatively superficial and will likely mainly affect the weathering mantle on these fine-grained mudrocks, wherein the expectation of fossil preservation is negligible.

4

RECOMMENDATIONS

In view of the low fossil potential it is proposed that an impact of low significance on palaeontological heritage is expected as a consequence of the development and that no interventions are required at this stage.

Notwithstanding, petrified fossil teeth, bones and wood are occasionally found in alluvial terrace deposits. It is recommended that an alert for the uncovering of such material be included in the Construction Phase EMP. In the event that potential fossil material is uncovered, it must be safeguarded with minimal further disturbance. The ECO for the project must inform HWC, such as by email with attached images. HWC will assess the information and respond according to the potential significance of the discovery.

5

APPLICATION FOR A PALAEOLOGICAL PERMIT

A permit from Heritage Western Cape (HWC) is required to excavate fossils. The applicant should be the qualified specialist responsible for assessment, collection and reporting (palaeontologist).

Should fossils be found that require rapid collecting, application for a palaeontological permit must be made to HWC immediately.

The application requires details of the registered owners of the sites, their permission and a site-plan map.

All samples of fossils must be deposited at a SAHRA-approved institution.

6

REPORTING

Should fossils be found a detailed report on the occurrence/s must be submitted. This report is in the public domain and copies of the report must be deposited at the IZIKO S.A. Museum and Heritage Western Cape. It must fulfil the reporting standards and data requirements of these bodies.

The report will be in standard scientific format, basically:

- A summary/abstract.
- Introduction.
- Previous work/context.
- Observations (incl. graphic sections, images).
- Palaeontology.
- Interpretation.

- Concluding summary.
- References.
- Appendices

7

REFERENCES

Malan, J.A., Viljoen, J.H.A., Siegfried, H.P. & Wickens, H. De V. 1994. Die geologie van die gebied Riversdale. Explanation to 1: 250 000 geology sheet Riversdale 3420, 63 pp. Council for Geoscience, Pretoria.

Theron, J.N. & Johnson, M.R. 1991. Bokkeveld Group, including the Ceres, Bidouw and Traka Subgroups. In: Johnson, M.R. (ed.), Catalogue of South African Lithostratigraphic Units. S. Afr. Committee for Stratigraphy 3-3 – 3-5.

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~ (tilde): Used herein as “approximately” or “about”.

Aeolian: Pertaining to the wind. Refers to erosion, transport and deposition of sedimentary particles by wind. A rock formed by the solidification of aeolian sediments is an aeolianite.

AIA: Archaeological Impact Assessment.

Alluvium: Sediments deposited by a river or other running water.

Archaeology: Remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

asl.: above (mean) sea level.

Bedrock: Hard rock formations underlying much younger sedimentary deposits.

bsl: below (mean) sea level.

Calcareous: sediment, sedimentary rock, or soil type which is formed from or contains a high proportion of calcium carbonate in the form of calcite or aragonite.

Calcrete: An indurated deposit (duricrust) mainly consisting of Ca and Mg carbonates. The term includes both pedogenic types formed in the near-surface soil context and non-pedogenic or groundwater calcretes related to water tables at depth.

Clast: Fragments of pre-existing rocks, e.g. sand grains, pebbles, boulders, produced by weathering and erosion. Clastic – composed of clasts.

Colluvium: Hillwash deposits formed by gravity transport downhill. Includes soil creep, sheetwash, small-scale rainfall rivulets and gullying, slumping and sliding processes that move and deposit material towards the foot of the slopes.

Coversands: Aeolian blanket deposits of sandsheets and dunes.

EIA: Environmental Impact Assessment.

EMP: Environmental Management Plan.

Fluvial deposits: Sedimentary deposits consisting of material transported by, suspended in and laid down by a river or stream.

Fm.: Formation.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

HIA: Heritage Impact Assessment.

Palaeontology: The study of any fossilised remains or fossil traces of animals or plants which lived in the geological past and any site which contains such fossilised remains or traces.

Palaeosol: An ancient, buried soil whose composition may reflect a climate significantly different from the climate now prevalent in the area where the soil is found. Burial reflects the subsequent environmental change.

Palaeosurface: An ancient land surface, usually buried and marked by a palaeosol or pedocrete, but may be exhumed by erosion (e.g. wind erosion/deflation) or by bulk earth works.

Pedogenesis/pedogenic: The process of turning sediment into soil by chemical weathering and the activity of organisms (plants growing in it, burrowing animals such as worms, the addition of humus etc.).

Pedocrete: A duricrust formed by pedogenic processes.

PIA: Palaeontological Impact Assessment.

SAHRA: South African Heritage Resources Agency – the compliance authority, which protects national heritage.

8.1

GEOLOGICAL TIME SCALE TERMS

ka: Thousand years or kilo-annum (10^3 years). Implicitly means “ka ago” *i.e.* duration from the present, but “ago” is omitted. The “Present” refers to 1950 AD. Generally not used for durations not extending from the Present. Sometimes “kyr” is used instead.

Ma: Millions years, mega-annum (10^6 years). Implicitly means “Ma ago” *i.e.* duration from the present, but “ago” is omitted. The “Present” refers to 1950 AD. Generally not used for durations not extending from the Present.

Holocene: The most recent geological epoch commencing 11.7 ka till the present.

Pleistocene: Epoch from 2.6 Ma to 11.7 ka. Late Pleistocene 11.7–135 ka. Middle Pleistocene 135–781 ka. Early Pleistocene 781–2588 ka (0.78-2.6.Ma).

Quaternary: The current Period, from 2.6 Ma to the present, in the Cenozoic Era. The Quaternary includes both the Pleistocene and Holocene epochs.

Pliocene: Epoch from 5.3-2.6 Ma.

Miocene: Epoch from 23-5 Ma.

Oligocene: Epoch from 34-23 Ma.

Eocene: Epoch from 56-34 Ma.

Paleocene: Epoch from 65-56 Ma.

Cenozoic: Era from 65 Ma to the present. Includes Paleocene to Holocene epochs.

For more details, see www.stratigraphy.org.

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28 September 2011

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RESPONSE TO NID

ADDITIONAL FIVE DWELLING UNITS AND ROAD UPGRADE ON FARM 633, FARM 273 PTN 10, AND FARM 344 PTN 3, SWELLENDAM

The above matter was discussed at the HWC staff meeting held on 23 September 2011. In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999):

It was noted that:

1. The application is for five additional dwelling units each with a 120 m² footprint
2. Each unit will have an exclusive use area of 224 m²
3. All units will be located on land adjacent the Breede River
4. An existing jeep track is to be upgraded. The proposal is to make it 4 m wide and 3095 m long

Heritage Western Cape (HWC) agreed that:

A HIA limited to an archaeological scoping study and a desktop palaeontological study with an integrated set of recommendations is required

Yours faithfully


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