Palaeontological Impact Assessment for the proposed extensions for Milkwood Manor, hardpack parking and ablution facilities, Plettenberg Bay, Western Cape Province

Desktop Study (Phase 1)

For

Perception Planning CC

29 June 2024

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Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, mASSAf, PSSA
Experience: 35 years research and lecturing in Palaeontology
27 years PIA studies and over 350 projects completed

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Perception Planning (Pty) Ltd, George, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A Palaeontological Impact Assessment was requested for the proposed extensions to Milkwood Manor and additional parking bays and ablution facilities on Erven 10190, Salmack road, Plettenberg Bay, Western Cape Province.

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The property lies on the Enon Formation (Uitenhage Group) conglomerate and sandstones that are incorrectly indicated as very highly sensitive for palaeontology. The fossil record is based on one repeated record of abraded and poorly preserved silicified wood, bones and teeth that have been transported and deposited. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavations or drilling activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

ASPECT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/ PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
Palaeontology	Very high	Low	Paleontological Impact Assessment	Section 7.2. SAHRA Requirements

Table of Contents

1. Background

PERCEPTION Planning was appointed by the registered landowner, to compile and submit to Heritage Western Cape a Notice of Intent to Develop (NID) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act 25 of 1999) with relation to proposed development of a portion of the property.

The property is Erf 10190, Plettenberg Bay District and Municipality, located on Salmack Road along the coastline (Figures 1-3).

The owner is proposing to extend the double storey Milkwood Manor, a guesthouse, and create 32 additional paved parking bays, as well as a small ablution facility.

A Palaeontological Impact Assessment was requested for the Milkwood Manor extensions. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6).

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
ai	Details of the specialist who prepared the report,	Appendix B
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
b	A declaration that the person is independent in a form as may be specified by the competent authority	Page 1
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Yes
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 4

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
g	An identification of any areas to be avoided, including buffers	N/A
h	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
j	A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 4
k	Any mitigation measures for inclusion in the EMPr	Section 8, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, Appendix A
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 6
nii	If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Sections 6, 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A
p	A summary and copies of any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A
2	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

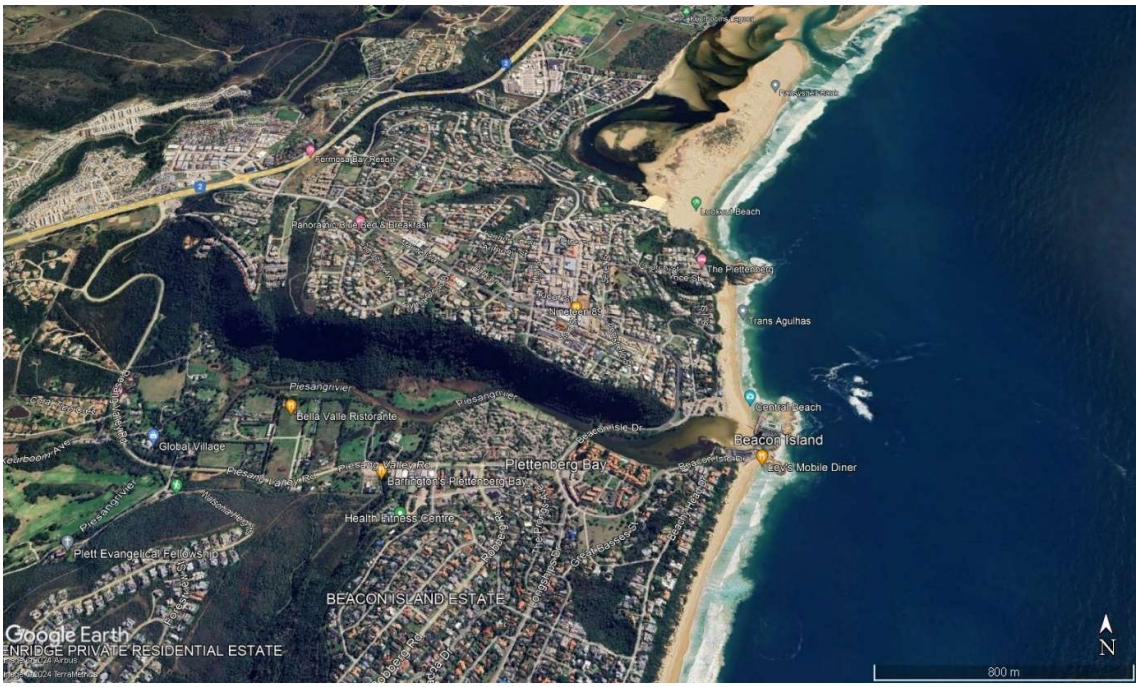

Figure 1: Google Earth map of the general area to show the relative land marks. The Groot Brak River urban development project is shown by the yellow polygon.

Figure 2: Google Earth Map of the proposed urban development on Erf 2833 Great Brak River with the sections shown by the yellow dotted outline. Maps supplied by Perception Planning.

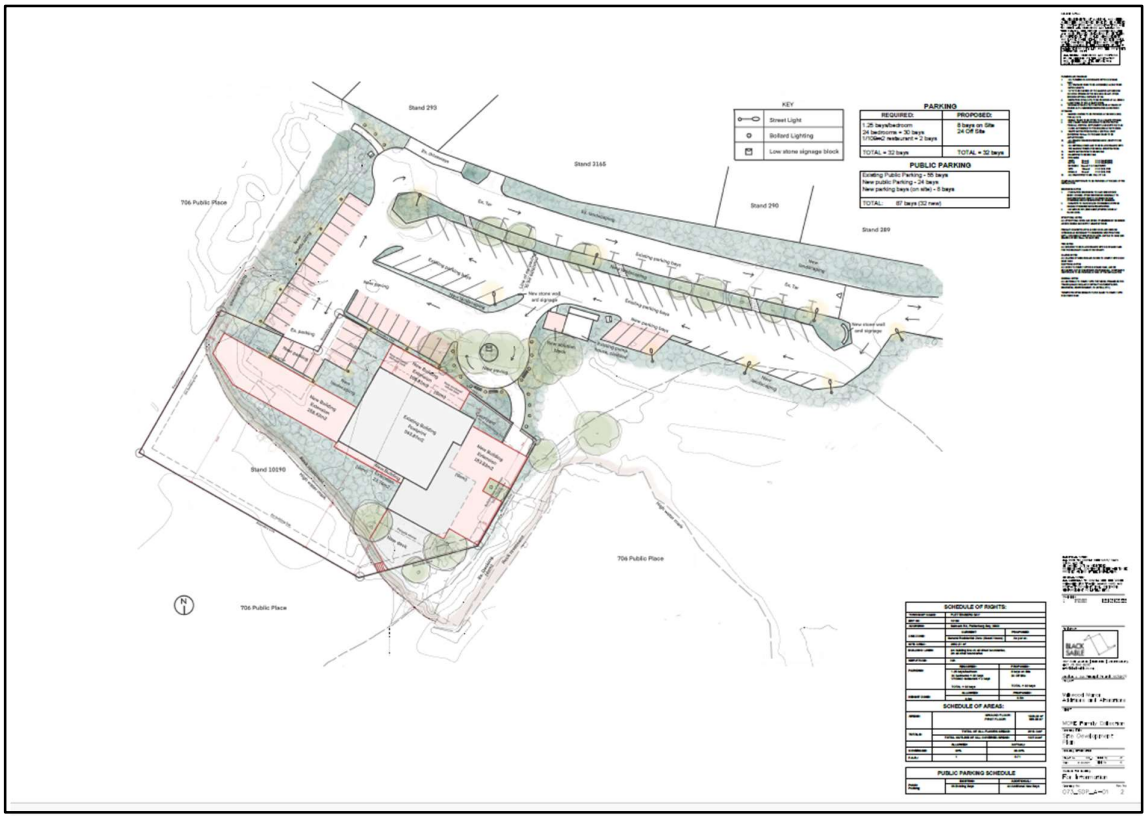

Figure 3: Proposed layout of development on a portion of Erf 10190 for Milkwood Manor, Plettenberg Bay. Pink shading shows the proposed developments.

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.
The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources include records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases; eg https://sahris.sahra.org.za/map/palaeo
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representativity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context

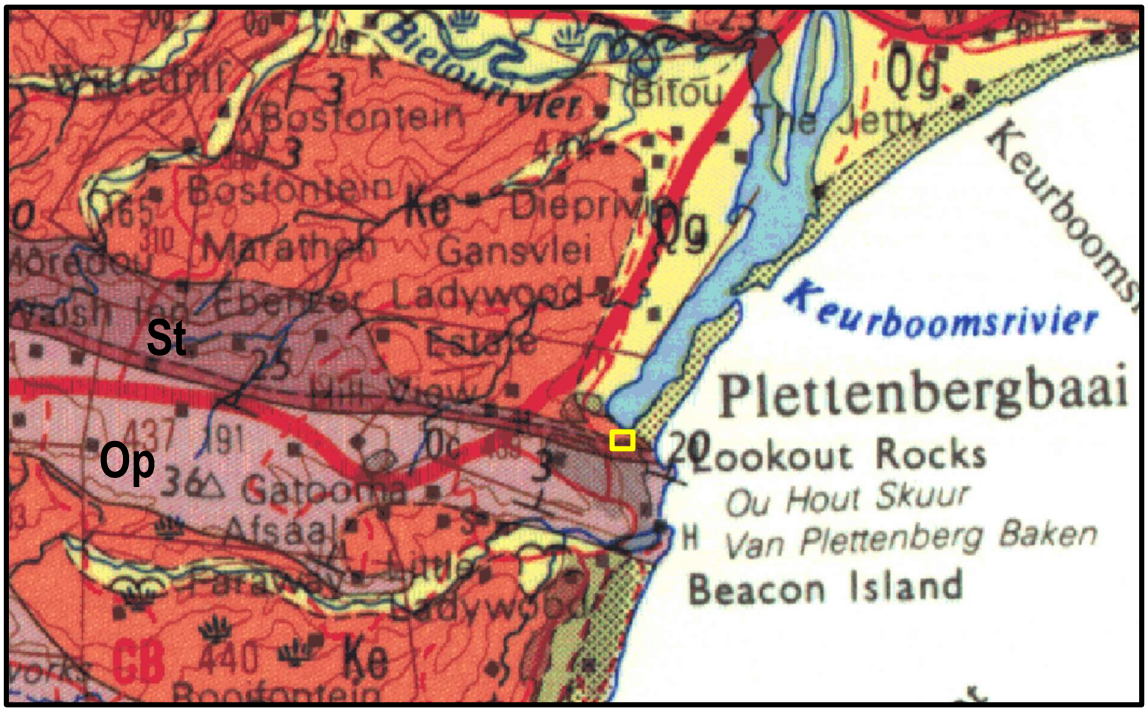

Figure 4: Geological map of the area around the Erf 10190 Plettenberg Bay, Milkwood Manor extension project, indicated within the yellow rectangle. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 3322 Oudtshoorn.

Table 2: Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006. Johnson et al., 2006; McCarthy et al., 2006; Robb et al., 2006; van der Westhuizen et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Quaternary ca 1.0 Ma to Present
Qg	Quaternary	Marine and estuarine terrace gravels, sand, partly calcified	Quaternary ca 1.0 Ma to Present
Ke	Enon Fm + younger, Uitenhage Group	Conglomerate, sandstone, siltstone, clay	Upper Jurassic to Early Cretaceous
St	Tchando Fm, Table Mountain Group, Cape SG	Brown-weathering sandstone, shale	Silurian
Op	Peninsular Fm, Table Mountain Group, Cape SG	White-weathering quartzitic sandstone	Ordovician

The project lies in one of the Mesozoic onshore basins along the southern coast of South Africa (Figure 4). Along the newly formed southern coast of South Africa, during the Late Jurassic and early Cretaceous, thick deposits accumulated in the complex graben and half-graben basins (Shone, 2006). Much of the material has since eroded away but the Uitenhage Group sediments can be found in the Mossel Bay Basin, Plettenberg Bay Basin, Gamtoos Basin and Algoa Basin. Cape Supergroup sediments underlie the Uitenhage Group and are much older. The project footprint does not insect these older rocks or the even older intrusive granites.

The Uitenhage Group has been divided into the basal Enon Formation that is composed of large clasts of rocks from the inland together with sandstones and shales, the mostly terrestrial Kirkwood Formation composed of shales and siltstones, and the upper mixed terrestrial and marine Sundays River Formation (Shone, 2006).

Along the coast are windblown and dune sands that are difficult to date because they are transported and reworked. Generally considered to be of Quaternary age, and Holocene in the upper layers (Roberts et al., 2006), they are partially vegetated and stabilised.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 5. According to the SAHRIS palaeotechnical report for the Western Cape (Almond and Pether, 2008), the Enon Formation has transported bone fragments, teeth and coalified wood. McLachlan and McMillan (1976) and Shone (1976) reported poorly preserved abraded bone fragments, silicified fossil wood and charcoalified from the Enon Formation (re-reported in Muir et al., 2017).

Since this formation has large to small boulders of different rock types that are well rounded, they have been transported from some distance inland. This means that the abraded fossils must also have been transported from some distance so they would be out of primary context. Such poorly preserved, abraded and transported fossils are of very limited scientific value.

The very highly sensitive palaeosensitivity coding for the Enon Formation should rather be downgraded to moderately sensitive (green).

It is unlikely that any fossils, even poorly preserved, would be found on the land surface that is covered by soils and vegetation as is the case for the Great Brak River area according to the aerial photographs and site visit observations in the BID document.

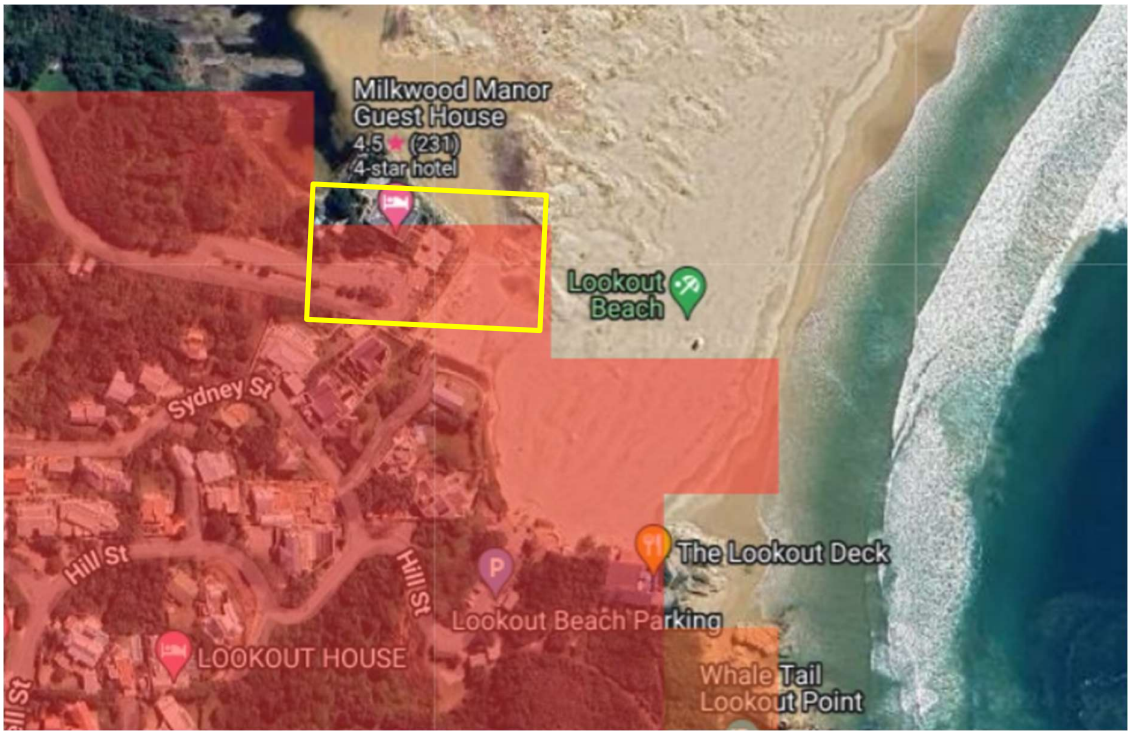

Figure 5: SAHRIS palaeosensitivity map for the site for the proposed development for Milkwood Manor on Erf 10190, Plettenberg Bay, shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

From the SAHRIS map above the area is incorrectly indicated as very highly sensitive (red). It is unlikely that any fossils occur in the soils that cover the area. In addition, the resolution of the mapping is poor at this level and the is on the margin between the Enon Formation and the beach sands.

4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 3:

Table 3a: Criteria for assessing impacts

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.

	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	**H**	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

Table 3b: Impact Assessment

PART B: Assessment		
SEVERITY/NATURE	**H**	-
	M	-
	L	Soils do not preserve fossils; so far there are no records from the Enon Fm of plant or animal fossils in this region so it is very unlikely that fossils occur on the site. The impact would be negligible
	L+	-
	M+	-
	H+	-
DURATION	**L**	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	**L**	Since the only possible fossils within the area would be transported fossil wood or bones in the conglomerate, the spatial scale will be localised within the site boundary.
	M	-
	H	-

PART B: Assessment		
PROBABILITY	H	-
	M	-
	L	It is extremely unlikely that any fossils would be found in the loose soils and sands that cover the area or in the Enon Formation conglomerates that will be excavated. Nonetheless, a Fossil Chance Find Protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are either much too old to contain fossils or are the wrong kind (soils and conglomerates). Furthermore, the material to be excavated s soil and this does not preserve fossils. Since there is an extremely small chance that transported fossils from the Enon Formation may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do not contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils.

6. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the overlying soils of the Quaternary. There is a very small chance that fossils may occur in the underlying conglomerates of the Enon Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for amenities, infrastructure and foundations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample. The impact on the palaeontological heritage would be low, as far as the palaeontology is concerned, so the project should be authorised.

ASPECT	SCREENING TOOL SENSITIVITY	VERIFIED SENSITIVITY	OUTCOME STATEMENT/ PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
Palaeontology	Very High	Low	Paleontological Impact Assessment	Section 7.2. SAHRA Requirements

7. References

Almond, J.E., Pether, J. 2008. Palaeontological Heritage of the Western Cape; interim report. SAHRA Report. 23pp.

McLachlan, I.R. and McMillan, I.K., 1976. Review and stratigraphic significance of southern Cape Mesozoic palaeontology. Transactions of the Geological Society of South Africa 79, 197-212.

Muir, R.A., Bordy, E.M., Reddering, J.S.V., Viljoen, J.H.A., 2017. Lithostratigraphy of the Enon Formation (Uitenhage Group), South Africa. South African journal of Geology 102, 273-280.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

Roberts, D.L., Botha, G.A., Maud, R.R., Pether, J., 2006. Coastal Cenozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 605-628.

Shone, R.W., 1976. The sedimentology of the Mesozoic Algoa Basin. Unpublished M.Sc. thesis, University of Port Elizabeth, 48p

Shone, R.W., 2006. Onshore post-Karoo Mesozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 541-552.

Thamm, A.G., Johnson, M.R., 2006. The Cape Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 443 – 460.

8. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the

shales and mudstones (for example see Figure 6). This information will be built into the EMP's training and awareness plan and procedures.

4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a HWC permit must be obtained. Annual reports must be submitted to HWC as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to HWC once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

9. Appendix A – Examples of fossils from the Early Cretaceous

Figure 6: Photographs of examples of fossil bones and silicified wood that might be found in the Enon Formation conglomerates.

10. Appendix B – Details of specialist

Curriculum vitae (short) - Marion Bamford PhD
January 2024

Present employment: Professor; Director of the Evolutionary Studies Institute. Member Management Committee of the NRF/DSI Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa
Telephone : +27 11 717 6690
Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) **Academic qualifications**
Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) **Professional qualifications**
Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) **Membership of professional bodies/associations**
Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+
Botanical Society of South Africa
South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
SASQUA (South African Society for Quaternary Research) – 1997+
PAGES - 2008 –onwards: South African representative
ROCEEH / WAVE – 2008+
INQUA – PALCOMM – 2011+onwards

v) **Supervision of Higher Degrees**

All at Wits University

Degree	Graduated/completed	Current
Honours	13	0

Masters	13	3
PhD	13	7
Postdoctoral fellows	14	4

vi) **Undergraduate teaching**
Geology II – Palaeobotany GEOL2008 – average 65 students per year
Biology III – Palaeobotany APES3029 – average 25 students per year
Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology; Micropalaeontology – average 12 - 20 students per year.

vii) **Editing and reviewing**
Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
Guest Editor: Quaternary International: 2005 volume
Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –
Associate Editor: Cretaceous Research: 2018-2020
Associate Editor: Royal Society Open: 2021 -
Review of manuscripts for ISI-listed journals: 30 local and international journals

viii) **Palaeontological Impact Assessments**
27 years' experience in PIA site and desktop projects
Selected from recent projects only – list not complete:

- Beaufort West PV Facility 2021 for ACO Associates
- Copper Sunset MR 2021 for Digby Wells
- Sannaspos PV facility 2021 for CTS Heritage
- Smithfield-Rouxville-Zastron PL 2021 for TheroServe
- Glosam Mine 2022 for AHSA
- Wolf-Skilpad-Grassridge OHPL 2022 for Zutari
- Iziduli and Msenge WEFs 2022 for CTS Heritage
- Hendrina North and South WEFs & SEFs 2022 for Cabanga
- Dealesville-Springhaas SEFs 2022 for GIBB Environmental
- Vhuvhili and Mukondeleli SEFs 2022 for CSIR
- Chemwes & Stilfontein SEFs 2022 for CTS Heritage
- Equestria Exts housing 2022 for Beyond Heritage
- Zeerust Salene boreholes 2022 for Prescali
- Tsakane Sewer upgrade 2022 for Tsimba
- Transnet MPP inland and coastal 2022 for ENVASS
- Ruighoek PRA 2022 for SLR Consulting (Africa)
- Namli MRA Steinkopf 2022 for Beyond Heritage
- Adara 2 SEF 2023 for CTS Heritage
- Buffalo & Lyra SEFs 2023 for Nextec
- Camel Thorn Group Prospecting Rights 2023 for AHSA
- Dalmanutha SEFs 2023 for Beyond Heritage
- Elandsfontein Residential 2023 for Beyond Heritage
- Waterkloof Samancor 2023 for Elemental Sustainability
- Zonnebloem WTP 2023 for WSP
- Elders Irrigation 2023 for SRK
- Leghoya WEFs 2023 for Red Cap & SLR

ix) **Research Output**
Publications by M K Bamford up to January 2024 peer-reviewed journals or scholarly books: over 175 articles published; 5 submitted/in press; 14 book chapters.
Scopus h-index = 32; Google Scholar h-index = 40; -i10-index = 121 based on 7261 citations.
Conferences: numerous presentations at local and international conferences.