

**Palaeontological Impact Assessment for the  
proposed Roan PV 1 and 2 facilities,  
Hartbeesfontein,  
North West Province**

**Desktop Study (Phase 1)**

**For**

**Beyond Heritage**

**06 March 2022**

**Prof Marion Bamford**

Palaeobotanist

P Bag 652, WITS 2050

Johannesburg, South Africa

[Marion.bamford@wits.ac.za](mailto:Marion.bamford@wits.ac.za)

## **Expertise of Specialist**

The Palaeontologist Consultant: Prof Marion Bamford  
Qualifications: PhD (Wits Univ, 1990); FRSSAf, mASSAf  
Experience: 33 years research and lecturing in Palaeontology  
25 years PIA studies and over 300 projects completed

## **Declaration of Independence**

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Beyond Heritage, Modimolle, 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

A handwritten signature in blue ink, appearing to read 'MKBamford', written over a horizontal line.

Signature:

## **Executive Summary**

A Palaeontological Impact Assessment was requested for two proposed Photovoltaic facilities, Roan 1 and Roan 2, with infrastructure, south of Hartbeesfontein on Farms 338 and 299, North West 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 proposed site lies on non-fossiliferous ancient volcanic rocks and on Quaternary sands and alluvium that might preserve fragmentary and transported fossils. Therefore, a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the developer/ environmental officer/ other designated responsible person once excavations/drilling activities have commenced. As far as the palaeontology is concerned, the project should be authorised. There are no preferred sites or access points and no no-go areas.

# Table of Contents

Expertise of Specialist .....	1
Declaration of Independence .....	1
1. Background .....	4
2. Methods and Terms of Reference.....	9
3. Geology and Palaeontology.....	9
i. Project location and geological context .....	9
ii. Palaeontological context.....	11
4. Impact assessment.....	12
5. Assumptions and uncertainties.....	13
6. Recommendation.....	13
7. References .....	14
8. Chance Find Protocol .....	15
9. Appendix A – Examples of fossils from the .....	16
10. Appendix B – Details of specialist.....	16
Figure 1: Google Earth map of the general area to show the relative land marks. ....	8
Figure 2: Google Earth Map of the proposed development .....	8
Figure 3: Geological map of the area around the project site.....	9
Figure 4: SAHRIS palaeosensitivity map for the site .....	11

# 1. Background

This report addresses two proposed photovoltaic Facilities, Roan 1 and 2, and associated infrastructure near Hartbeesfonten, Northwest Province.

**Roan 1 PV Facility** and Associated Infrastructure near Hartbeesfontein, North-West Province.

The Applicant, AMDA Mike (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility known as Roan 1 located on Farm 338 approximately 3km south of Hartbeesfontein in the North-West Province. The project is situated within a Renewable Energy Development Zone (REDZ) known as the Klerksdorp REDZ (REDZ10). The solar PV facility will comprise or arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 90 MW. The project is situated within the City of Matlosana local Municipality within the Dr Kenneth Kaunda District Municipality of the North-West Province of South Africa.

An additional 90 MW PV facility known as Roan 2 is concurrently being assessed through a separate Basic Assessment processes.

A development footprint of approximately 250ha is being assessed as part of this Basic Assessment Report (BAR) and the infrastructure associated with the 90 MW PV facility includes:

- PV modules and mounting structures;
- Inverters and transformers;
- Cabling;
- Battery Energy Storage System (BESS);
- Site and internal access roads (up to 8 m wide);
- Auxiliary buildings (33 kV switch room, gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Perimeter fencing and security infrastructure;
- Rainwater tanks;
- Temporary and permanent laydown areas;
- Facility substation.
- Grid connection solution, including:
  - On Site facility substation
  - On Site Eskom Switching Station
  - An up to 132kV overhead powerline from the on site switching station to the Existing Eskom Roan Substation.

Additional associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays (inclusive of line bays, busbars, bussection and protection equipment), a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

A grid connection corridor of approximately 300 m wide is being assessed to allow for the optimisation of the grid connection and associated infrastructure., The grid

connection infrastructure will be developed within the 300m wide grid connection corridor, which will allow for the avoidance of identified environmental sensitivities. The grid corridor will connect the PV project to the Eskom Roan Substation. The gridline servitude, once registered, will be 31m in width.

**Roan 2 PV Facility** and Associated Infrastructure near Haartbeesfontein, North-West Province.

The Applicant, AMDA November (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility known as Roan 2 located on portions 4, 5, 9 and 16 of the farm 299 approximately 3km south of Haartbeesfontein in the North West Province.

The project is situated within a Renewable Energy Development Zone (REDZ) known as the Klerksdorp REDZ (REDZ10). The solar PV facility will comprise arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 100MW. The project is situated within the City of Matlosana local Municipality within the Dr Kenneth Kaunda District Municipality of the North-West Province of South Africa.

An additional 100 MW PV facility known as Roan 1 is concurrently being assessed through a separate Basic Assessment processes.

A development footprint of approximately 250ha is being assessed as part of this Basic Assessment Report (BAR) and the infrastructure associated with the 100 MW PV facility includes:

- PV modules and mounting structures;
- Inverters and transformers;
- Cabling;
- Battery Energy Storage System (BESS);
- Site and internal access roads (up to 8 m wide);
- Auxiliary buildings (33 kV switch room, gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Perimeter fencing and security infrastructure;
- Rainwater tanks;
- Temporary and permanent laydown areas;
- Facility substation.
- Grid connection solution, including:
  - On Site facility substation
  - On Site Eskom Switching Station
  - An up to 132kV overhead powerline from the on-site switching station to the Existing Eskom Roan Substation.

Additional associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays (inclusive of line bays, busbars, bussection and protection equipment), a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

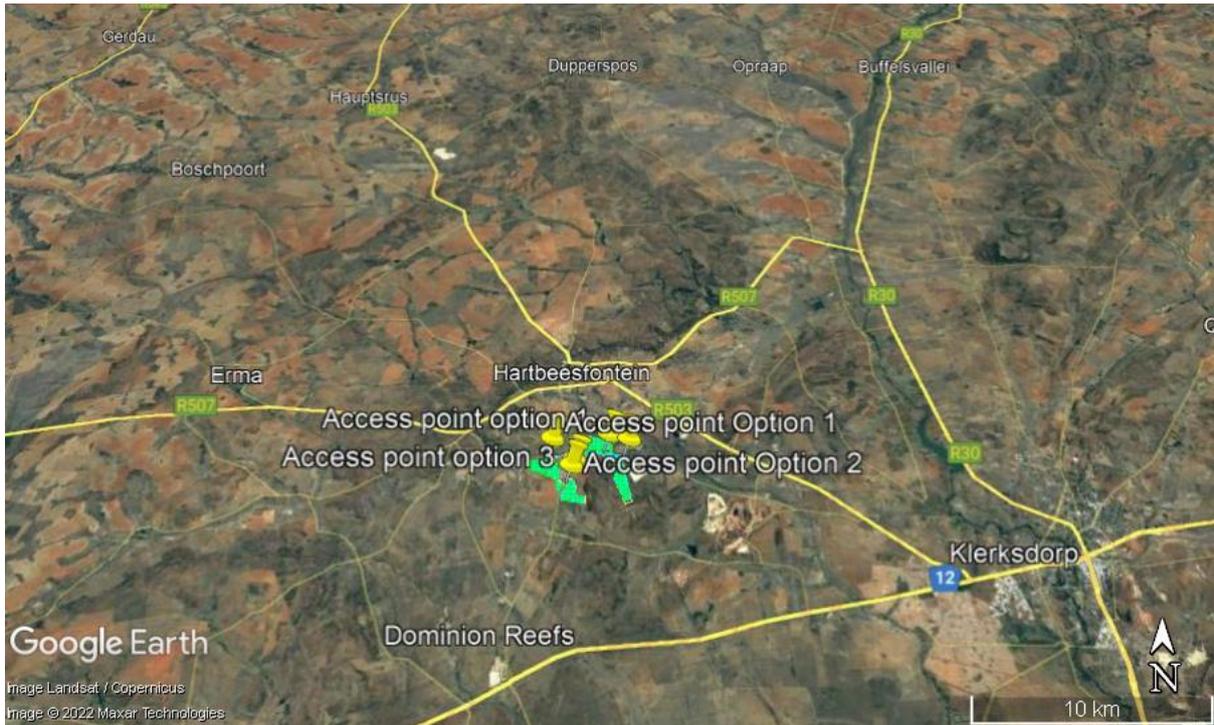
A grid connection corridor of approximately 300 m wide is being assessed to allow for the optimisation of the grid connection and associated infrastructure. The grid connection infrastructure will be developed within the 300m wide grid connection corridor, which will allow for the avoidance of identified environmental sensitivities. The grid corridor will connect the PV project to the Eskom Roan Substation. The gridline servitude, once registered, will be 31m in width.

A Palaeontological Impact Assessment was requested for both parts of the Roan PV 1 and 2 project. 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.

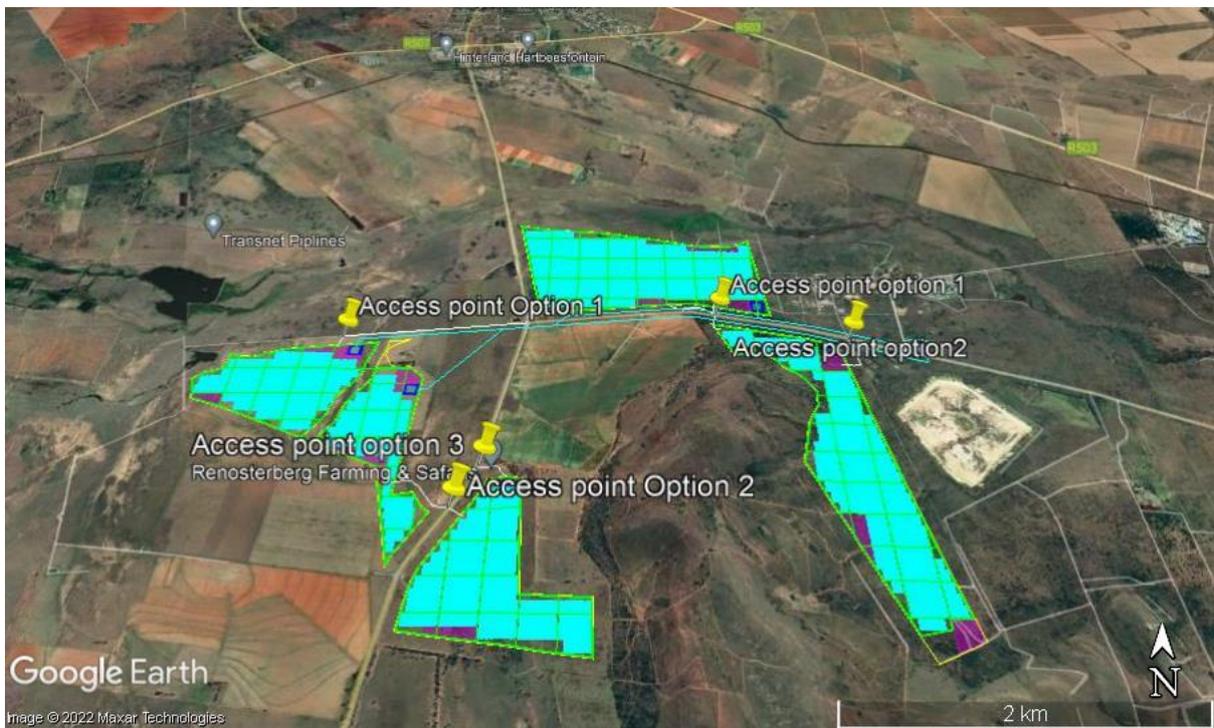
Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6).

	<b>A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:</b>	<b>Relevant section in report</b>
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
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

	<b>A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:</b>	<b>Relevant section in report</b>
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 Roan PV projects are indicate with the pins.**



**Figure 2: Google Earth Map of the proposed development of two PV facilities and infrastructure, with options for access points. Roan 1 is in the east and Roan 2 in the west.**

## 2. Methods and Terms of Reference

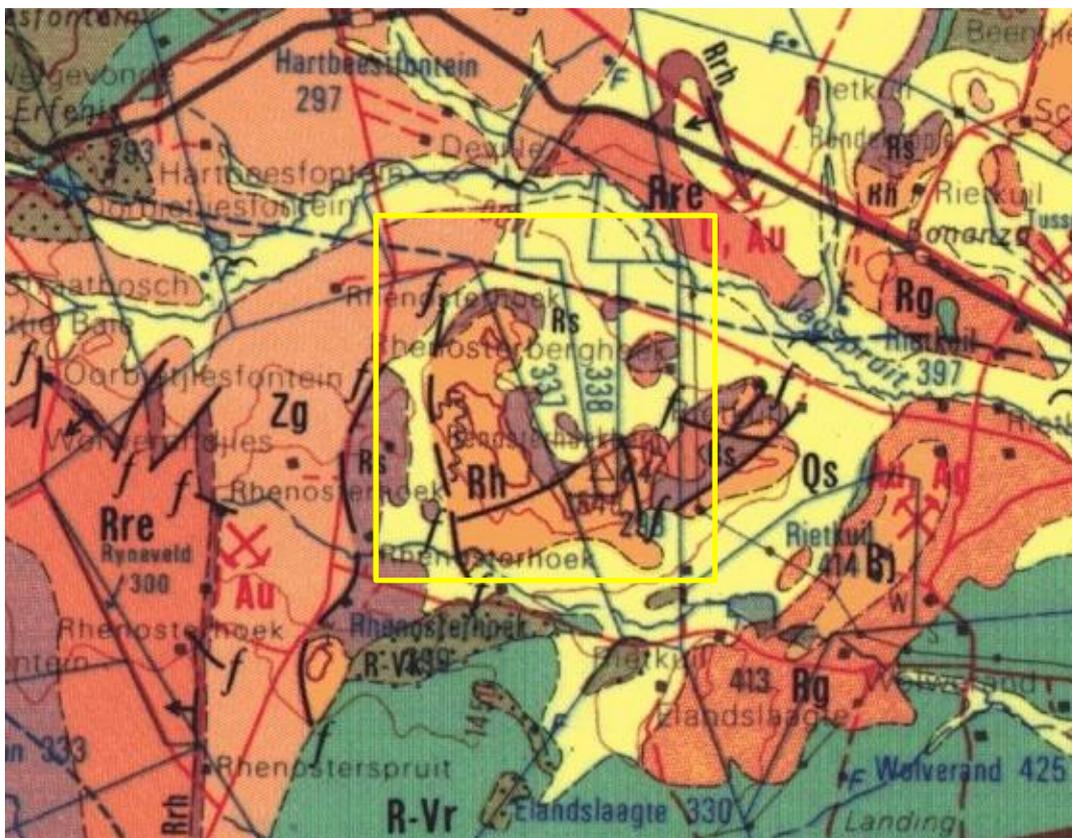
The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

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 included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
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' representivity 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 3: Geological map of the area around the Roan PV 1 & 2 sites 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 2626 West Rand.**

Table 2: Explanation of symbols for the geological map and approximate ages (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
Qs	Quaternary	Alluvium, sand, calcrete	Neogene, ca 2.5 Ma to present
R-Vr	Rietgat Subgroup, Ventersdorp SG	Amygdaloidal lava. Agglomerate, tuff	Ca 2714 Ma
Rj	Jeppesdorp Subgroup, West Rand Group, Witwatersrand SG	Shale, quartzite, lava	
Rg	Government Subgroup, West Rand Group, Witwatersrand SG	Quartzite, shale	
Rh	Hospital Hill Subgroup, West Rand Group, Witwatersrand SG	Shale quartzite	Ca 2950 Ma
Rs	Syferfontein Fm, Dominion Group	Porphyritic lava, cherty lava, tuff, schist	3074 Ma
Rre	Renosterhoek Fm, Dominion Group	Grey andesitic lava	
Rrh	Renosterspruit Fm Dominion Group	Quartz, conglomerate, schist	
Zg	Undifferentiated basement Granite,	Granite, gneiss	Ca 3100 Ma

The project lies in the central part of the Kaapvaal Craton, where the Dominion Group, a sequence of volcanic and minor clastic sedimentary rocks has been metamorphosed to greenschist-amphibolite grade (Marsh, 2006). The Dominion Group overlies the granite-greenstone basement terrane, and is in turn overlain by the Ventersdorp Group and Witwatersrand Group. These three ancient volcano-sedimentary sequences do not preserve fossils (Figure 3).

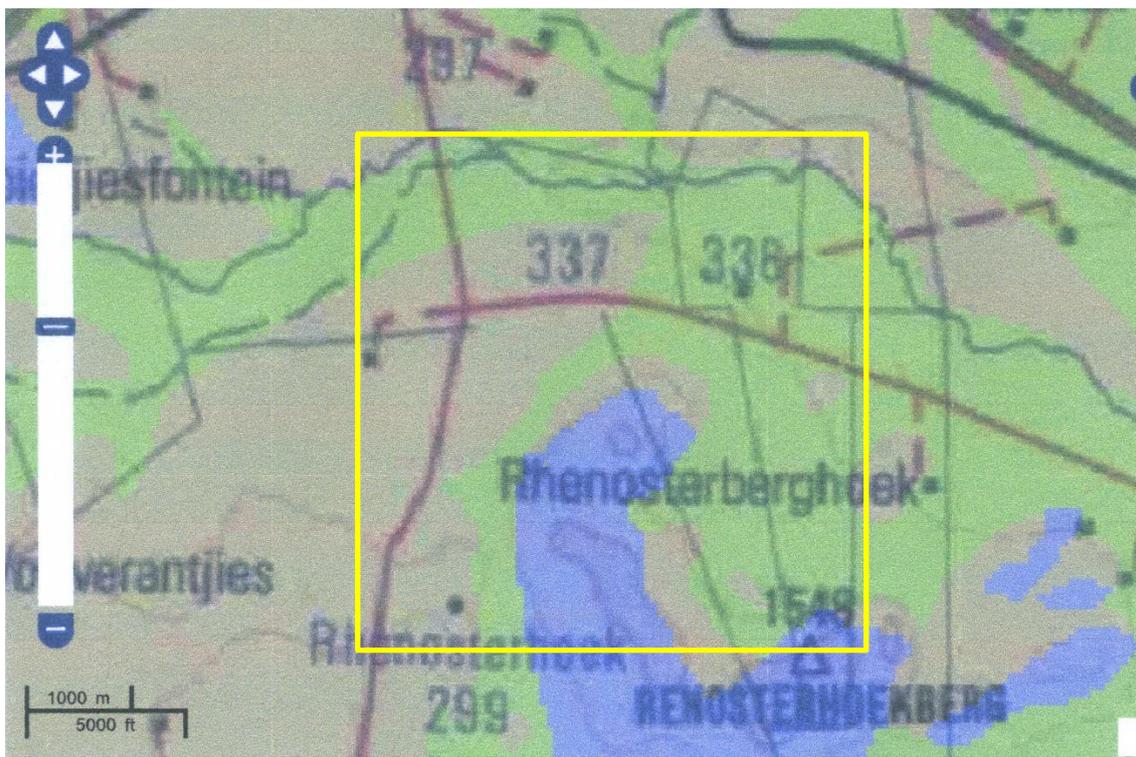
Overlying these ancient volcanic rocks are considerably younger sands, soils and alluvium of Quaternary age. They might include the southern-most extent of the Kalahari Group sands, a widespread palaeo-erg. The Quaternary Kalahari sands form an extensive cover of much younger deposits over much of the Northern Cape Province and Botswana. Based on the early works of Leicester King, Partridge and Maud (1987, 2000) developed a model of three African Erosion Surfaces for southern Africa, from the Cretaceous to the Pliocene. During the Cretaceous Africa was very high, averaging about 2500-2000m above sea level but the rifting apart of Gondwanaland and formation of the Atlantic and Indian Oceans, coastal erosion was rapid and the escarpment rapidly receded about 120km inland along the east and south coasts, but only 50km along the

west coast. The newly exposed surface was called the African Erosion Surface. Their model has been challenged and modified by a number of researchers (Burke, 2011; Braun et al., 2014) who propose that mantle plumes caused uplift of the continent during the late Cretaceous, followed by erosion and further uplift about 30-20 million years ago, The timing and dates are disputed but the principles are the same.

## ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 4. The site for development is in the non-fossiliferous volcanic rocks and the moderately fossiliferous Quaternary sands.

The Aeolian sands of the Kalahari Group do not preserve fossils because they have been transported and reworked. Conditions required for the preservation of organic material and formation of fossils are burial in a low energy, anoxic environment such as overbank deposits, lake muds or clays (Briggs and McMahon, 2016). Aeolian sands are high energy, well oxygenated environments. In some regions the sands may have covered pan or spring deposits and these can trap fossils, and more frequently archaeological artefacts. Usually these geomorphological features can be detected using satellite imagery. No such features are visible.



**Figure 4: SAHRIS palaeosensitivity map for the site for the proposed Roan PV 1 & 2 sites 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.**

## 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**

<b>PART A: DEFINITION AND CRITERIA</b>		
<b>Criteria for ranking of the SEVERITY/NATURE of environmental impacts</b>	<b>H</b>	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	<b>M</b>	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	<b>L</b>	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	<b>L+</b>	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	<b>M+</b>	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	<b>H+</b>	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
<b>Criteria for ranking the DURATION of impacts</b>	<b>L</b>	Quickly reversible. Less than the project life. Short term
	<b>M</b>	Reversible over time. Life of the project. Medium term
	<b>H</b>	Permanent. Beyond closure. Long term.
<b>Criteria for ranking the SPATIAL SCALE of impacts</b>	<b>L</b>	Localised - Within the site boundary.
	<b>M</b>	Fairly widespread - Beyond the site boundary. Local
	<b>H</b>	Widespread - Far beyond site boundary. Regional/ national
<b>PROBABILITY (of exposure to impacts)</b>	<b>H</b>	Definite/ Continuous
	<b>M</b>	Possible/ frequent
	<b>L</b>	Unlikely/ seldom

**Table 3b: Impact Assessment**

<b>PART B: Assessment</b>		
<b>SEVERITY/NATURE</b>	<b>H</b>	-
	<b>M</b>	-
	<b>L</b>	Alluvium and aeolian do not preserve fossils; so far there are no records from the Quaternary of plant or animal fossils in this region so it is very unlikely that fossils occur on the site. The impact would be negligible
	<b>L+</b>	-

<b>PART B: Assessment</b>		
	<b>M+</b>	-
	<b>H+</b>	-
<b>DURATION</b>	<b>L</b>	-
	<b>M</b>	-
	<b>H</b>	Where manifest, the impact will be permanent.
<b>SPATIAL SCALE</b>	<b>L</b>	Since the only possible fossils within the area would be transported and fragmented fossils in the overlying soils and sands, the spatial scale will be localised within the site boundary.
	<b>M</b>	-
	<b>H</b>	-
<b>PROBABILITY</b>	<b>H</b>	-
	<b>M</b>	-
	<b>L</b>	It is extremely unlikely that any fossils would be found in the loose soils and sands that cover the area as no traps are present. 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 transported sands and soils. Since there is an extremely small chance that fossils transported from the Quaternary 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 volcanic rocks re 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. No traps such as pans are evident on the site.

## 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 ancient volcanic rocks or in the sands and soils of the Quaternary. There is a very small chance that fossils may have been transported and deposited in the sands but they would be fragmented and out of context. Nonetheless, a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the developer, environmental officer, or other responsible person once excavations for foundations and infrastructure 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 very low, therefore, as far as the palaeontology is concerned the project should be authorised. There is no preference for any site or access roads for the entire Roan PV 1 & 2 project.

## 7. References

Braun, J., F. Guillocheau, Robin, C., Baby, G., Jelsma, H., 2014. Rapid erosion of the Southern African Plateau as it climbs over a mantle superswell, *Journal of Geophysical Research. Solid Earth* 119, 6093–6112, doi:10.1002/2014JB010998.

Briggs, D.E.G., McMahon, S., 2016. The role of experiments in the taphonomy of exceptional preservation. *Palaeontology* 59, 1-11.

Burke, K., 2011. Plate tectonics, the Wilson Cycle, and mantle plumes: Geodynamics from the top. *Annual Review of Earth and Planetary Sciences* 39, 1–29.

Goudie, A.S., Wells, G.L., 1995. The nature, distribution and formation of pans in arid zones. *Earth Science Reviews* 38, 1–69.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo 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 461 – 499.

Marsh, J.S., 2006. The Dominion Group. 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 149-154.

McCarthy, T.S., 2006. The Witwatersrand 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 155-186.

Partridge, T.C., Botha, G.A., Haddon, I.G., 2006. Cenozoic deposits of the interior. 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 585-604.

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.

Robb, L.J., Brandl, G., Anhaeusser, C.R., Poujol, M., 2006. Archaean Granitoid Intrusions. 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 57-94.

Van der Westhuizen, W.A., de Bruijn, H., Meintjes, P.G., 2006. The Ventersdorp 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 187-208.

## 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/mining commence.
2. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, 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 5). 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 SAHRA permit must be obtained. Annual reports must be submitted to SAHRA 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 SAHRA 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 Quaternary fluvial sediments



**Figure 5: Photographs of fragmented and transported fossils recovered from Quaternary fluvial deposits.**

10. Appendix B – Details of specialist

# Curriculum vitae (short) - Marion Bamford PhD

## January 2022

### I) Personal details

Surname : **Bamford**  
First names : **Marion Kathleen**  
Present employment: Professor; Director of the Evolutionary Studies Institute.  
Member Management Committee of the NRF/DST Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa  
Telephone : +27 11 717 6690  
Fax : +27 11 717 6694  
Cell : 082 555 6937  
E-mail : [marion.bamford@wits.ac.za](mailto:marion.bamford@wits.ac.za) ;  
[marionbamford12@gmail.com](mailto: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.

NRF Rating: C-2 (1999-2004); B-3 (2005-2015); B-2 (2016-2020); B-1 (2021-2026)

### 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

## **vii) Supervision of Higher Degrees**

All at Wits University

Degree	Graduated/completed	Current
Honours	13	0
Masters	11	3
PhD	11	6
Postdoctoral fellows	15	1

## **viii) Undergraduate teaching**

Geology II – Palaeobotany GEOL2008 – average 65 students per year

Biology III – Palaeobotany APES3029 – average 45 students per year

Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology;

Micropalaeontology – average 12-20 students per year.

## **ix) 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 *Open Science UK*: 2021 -

Review of manuscripts for ISI-listed journals: 30 local and international journals

Reviewing of funding applications for NRF, PAST, NWO, SIDA, National Geographic,

Leakey Foundation

## **x) Palaeontological Impact Assessments**

Selected from the past five years only – list not complete:

- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipportjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
- Remhoogte PR 2019 for A&HAS
- Bospoort Agriculture 2019 for Kudzala
- Overlooked Quarry 2019 for Cabanga
- Richards Bay Powerline 2019 for NGT
- Eilandia dam 2019 for ACO
- Eastlands Residential 2019 for HCAC
- Fairview MR 2019 for Cabanga
- Graspan project 2019 for HCAC
- Lielifontein N&D 2019 for EnviroPro
- Skeerpoort Farm Mast 2020 for HCAC
- Vulindlela Eco village 2020 for 1World
- KwaZamakhule Township 2020 for Kudzala

- Sunset Copper 2020 for Digby Wells
- McCarthy-Salene 2020 for Prescali
- VLNR Lodge 2020 for HCAC
- Madadeni mixed use 2020 for EnviroPro
- Frankfort-Windfield Eskom Powerline 2020 for 1World
- 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

### **xi) Research Output**

Publications by M K Bamford up to January 2022 peer-reviewed journals or scholarly books: over 160 articles published; 5 submitted/in press; 10 book chapters.

Scopus h-index = 30; Google scholar h-index = 35; i10-index = 92

Conferences: numerous presentations at local and international conferences.