Palaeontological Impact Assessment for the proposed powerline for Cavalier Foods, Cullinan, east of Pretoria, Gauteng Province

Desktop Study (Phase 1)

For

Beyond Heritage

05 January 2022

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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

Signature: 

Executive Summary

A Palaeontological Impact Assessment was requested for the proposed upgrading of a powerline for Cavalier Foods (Pty) Ltd, west of Cullinan and east of Pretoria, Gauteng Province. The present electrical supply is inadequate for their operation and they have selected the self-build option to obtain power from Bynes-Waterberg 11 kV feeder.

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 project lies on the non-fossiliferous diabase rocks and on the potentially fossiliferous Rayton Formation (Pretoria Group, Transvaal Supergroup). Nt much is known about the Rayton Formation but it is similar to the Magaliesberg Formation and so could have trace fossils such as microbially induced sedimentary structures. Therefore, 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 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 because the paleontological significance is very low.

Table of Contents

1. Background

Cavalier Abattoir (PTY) Ltd is the existing customer with the notified maximum demand of 1MVA/11kV. Currently the customer is provided with a bulk supply via the Pebble Rock-Noka feeder and has applied for a 3,8MVA supply upgrade. The customer NMD requires the additional 2,8MVA by September 30th, 2021 (as noted on ACNAC application). Cavalier Abattoir is situated 12km from Bynes substation. The current MV network is unable to cater for additional capacity in the area and the existing 2x20MVA transformers at Bynes substation are loaded at 6.5MVA. This application will take the Bynes Substation base load to 10.3MVA.

The project will require an installation of 12km T-Off line and two Reclosers from the 11kV Bynes- Waterberg feeders (Figures 1, 2). Two Alternatives are presented in this document. The self-build option was preferred by the applicant during the clarification meeting.

2. Job Description:

Existing supply point cannot accommodate the required additional 2,8MVA:

- Thermal capacity of the overhead conductor will be exceeded.
- Voltage collapse at on the feeder due to conductor size.
- Limited and/or no backfeeding capacity from other feeders.
- The adjacent feeder (Pebble Rock - Noka) has three voltage boosters and cannot supply the additional load without experiencing low voltage levels.
- Scope of work as indicated in this document will address the customer's need for the additional supply.

3. Job Scope of Work:

CU430616453-001 - CW_Bynes-Waterberg 11kV,Upg Sup to Cavalier

Power Plant SOW: (Done by the customer) (Self-Build)

- Construct a +-12km Chickadee line from Bynes-Waterberg 11kV feeder (BWA28) to Cavalier Site.
- Install the two Reclosers at the T-Off point (i.e. one looking at Waterberg load [BWA29] & other at Cavalier load [BWA28/1]).
- Extend the existing cable (i.e. 95mmx3core Cu) by 12m cable so that it can reach the last pole of the T-off at Cavalier site.
- Join the MV cable and terminate it on the new pole.
- Use the existing CT/VT unit and install the two Tariff Meters at the customer point.
- Decommission the existing 2xPoles, Conductors and Voltage booster which supply Cavalier Abattoir.

CU430616453-002 - Bynes-Waterberg 11kV,Upg Sup to Cavalier

Control Plant SOW:

PROTECTION SCOPE:

- Revise the setting of the 11kV Waterberg Feeder at Bynes Substation.
- Apply settings, test and re-commission the 11kV Waterberg Feeder.
- Apply settings, test and commission the installed 2 x Pole Mounted Breaker.
- Revise the setting of the RMU at the Point of Supply. Apply test and re-commission the RMU.

METERING SCOPE:

- Remove the existing Tariff Meter at the Point of Supply.
- Change the CT Ratio to 200/1A.
- Install 2 x Tariff Meters at the Point of Supply

The Cavalier project is in the Gauteng Province, to the west of the town of Cullinan and east of Pretoria (Figures 1, 2).

A Palaeontological Impact Assessment was requested for the Cavalier powerline 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).

	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

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
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
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 Cavalier powerline project is shown by the red line.

Figure 2: Google Earth Map of the proposed development of ,,,,,,,,,,,,,,,,,, ……with the sections shown by the red outline. Map supplied by ……..

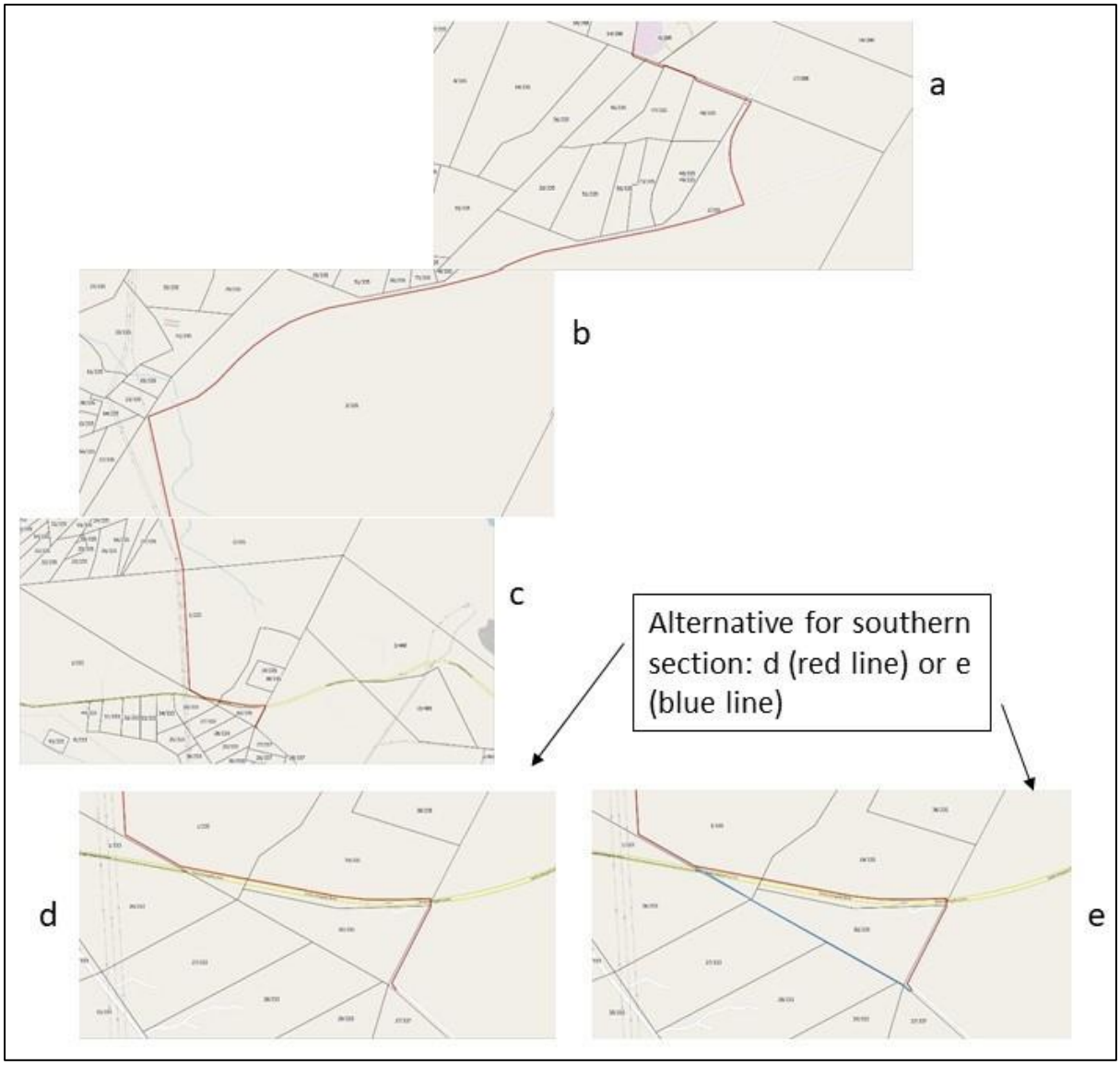


Figure 3: Detailed map of the powerline route (a-d) with the southern alternatives as indicated (e).

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

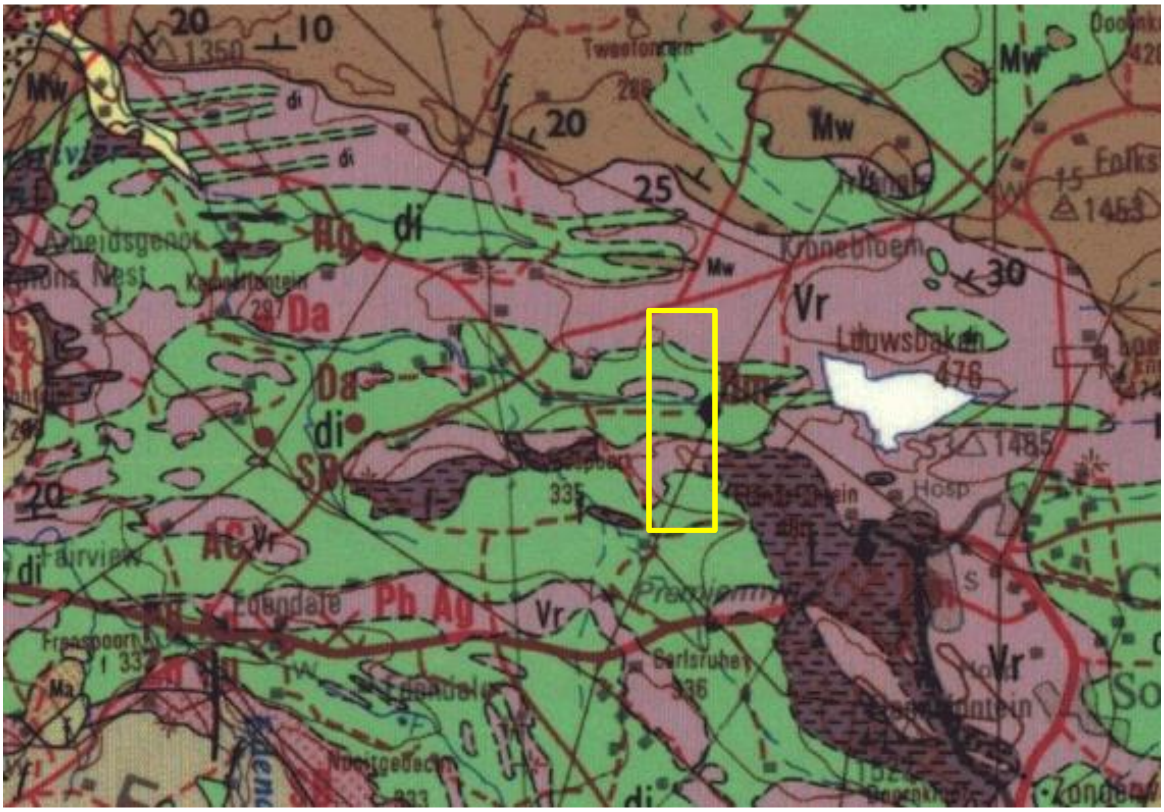


Figure 4: Geological map of the area around the proposed Cavalier powerline. The location of the proposed project is indicated within the yellow rectangle. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2528 Pretoria.

Table 2: Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006; Zeh et al., 2020). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
Mw	Wilge Fm, Waterberg SG	Sandstone, quartzite, conglomerate	Ca 2050 – 1800 Ma
di	Diabase	Intrusive igneous rocks	Post Transvaal SG Ca present

Symbol	Group/Formation	Lithology	Approximate Age
Vr	Rayton Fm, Pretoria Group, Transvaal SG	Quartzite, shale, subgreywacke	Palaeoproterozoic <2072 Ma
Vm	Magaliesbuerg Fm, Pretoria Group, Transvaal SG	Quartzite, minor hornfels	Palaeoproterozoic <2080 Ma
Vsi	Silverton Fm, Pretoria Group, Transvaal SG	Shales, carbonaceous in places, hornfels	Palaeoproterozoic ca 2253 – 2202 Ma

The project lies in the Transvaal Basin that preserves the sediments of the Transvaal Supergroup and in particular of the upper Pretoria Group.

The Transvaal Supergroup comprises one of world's earliest carbonate platform successions (Beukes, 1987; Eriksson et al., 2006; Zeh et al., 2020). In some areas there are well preserved stromatolites that are evidence of the photosynthetic activity of blue green bacteria and green algae. These microbes formed colonies in warm, shallow seas.

In the Transvaal Basin the Transvaal Supergroup is divided into two Groups, the lower Chuniespoort Group and the upper Pretoria Group (with ten formations; Eriksson et al., 2006). The Chuniespoort Group is divided into the basal Malmani Subgroup that comprises dolomites and limestones and is divided into five formations based on chert content, stromatolitic morphology, intercalated shales and erosion surfaces. The top of the Chuniespoort Group has the Penge Formation and the Duitschland Formation.

Making up the lower Pretoria Group are the Timeball Hill Formation and the Boshoek Formation. The Hekpoort, Dwaalheuwel, Strubenkop and Daspoort Formations form a sequence as the middle part of the Pretoria Group, Transvaal Supergroup, and represent rocks that are over 2060 million years old. The Hekpoort Formation is a massive lava deposit and is overlain by the Dwaalheuwel conglomerates, siltstone and sandstone (not present here). A hiatus separates the Strubenkop Formation slates and shales from the overlying quartzites of the Daspoort Formation. Upper Pretoria Group formations are the **Silverton**, Magaliesberg, Vermont, Lakenvalei, Nederhorst, Steenkampsberg, Houtenbek and **Rayton** Formations.

The Transvaal sequence has been interpreted as three major cycles of basin infill and tectonic activity with the first deep basin sediments forming the Chuniespoort Group, the second cycle deposited the lower Pretoria Group, and the sediments in this area are from the interim lowstand that preceded the third cycle. These sediments were deposited in shallow lacustrine, alluvial fan and braided stream environments (Eriksson et al., 2012).

Dykes and sills have intruded through the sediments of the Transvaal Supergroup and are composed of the igneous material, **diabase**. This does not preserve any fossils ot trace fossils.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 5. The site for development is in the potentially fossiliferous post Magaliesberg Formation, the Rayton Formation, shown as green in the SAHRIS palaeosensitivity map (moderate). The diabase is indicated a grey as it has no fossils.

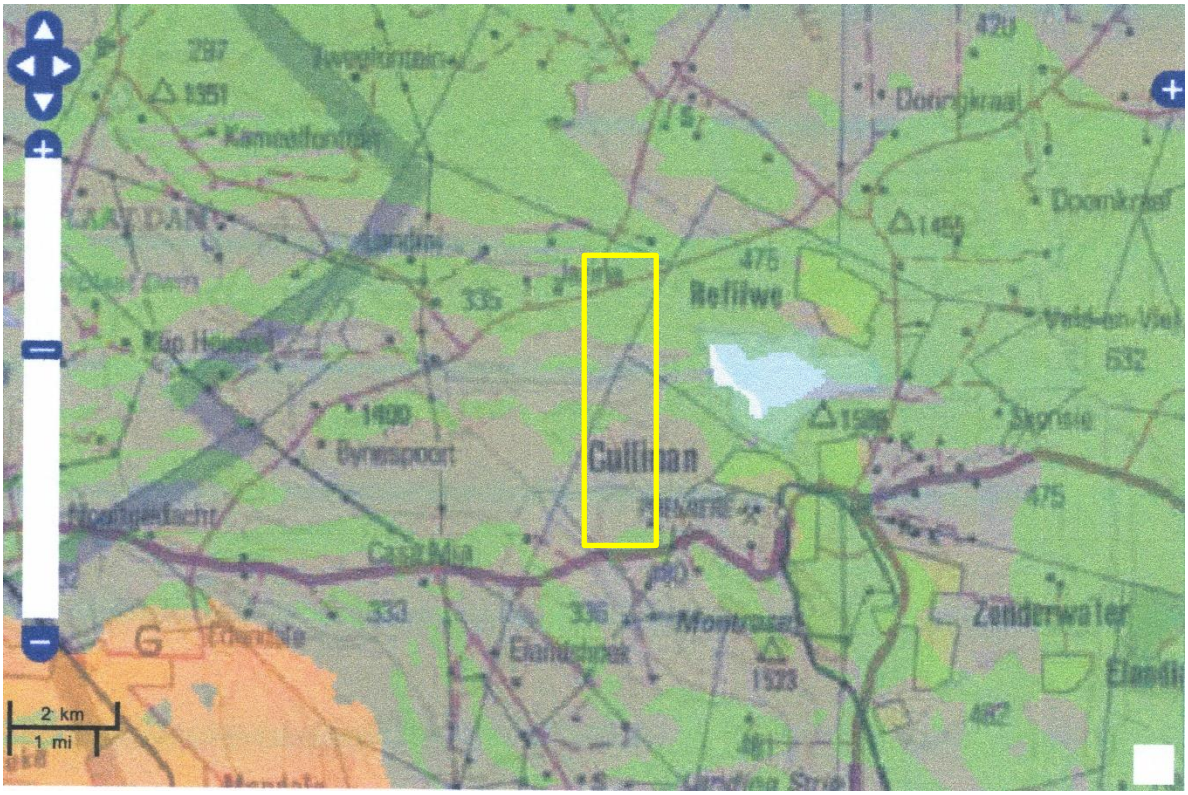


Figure 5: SAHRIS palaeosensitivity map for the site for the proposed Cavalier powerline indicated in the yellow rectangle.

Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

Although the Rayton Formation has been ignored in most recent publications, it is one of the formations that is included in the post-Magaliesberg Formation group and represents a shallow marine setting in a closed basin. These rocks pre-date the evolution of invertebrates, vertebrates and plants but micro-organisms were present. They have left traces of their present in some areas, although the organisms themselves are not preserved. Examples of these trace fossils formally have been called microbially induced sedimentary structures (MISS) *sensu* Noffke et al., 2001 and have reported from east and southeast of Pretoria by Bosch and Eriksson (2008) and Eriksson et al. (2012). Some of the features closely resemble mud cracks but they claim that microbes were important in their preservation.

It should be noted that the powerline pole footprints are relatively small and will be placed along routes that have already been disturbed by roads, fences and peri-urban activities.

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	-

PART B: Assessment		
	L	Diabase does not preserve any fossils; so far there are no records from the Rayton Fm of trace fossils but the similar Magaliesberg Fm has trace fossils in this region but 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 fossil …….. in the shales/sandstones/mudstones, the spatial scale will be localised within the site boundary.
	M	-
	H	-
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 diabase that will be excavated. There is a very small chance that the Rayton Fm quartzites might preserve trace fossils, therefore, 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 body fossils but might preserve trace fossils of microbial activity. Furthermore, the material to be excavated for pole foundations is likely to be the soils and not rocks, and this does not preserve fossils. Since there is an extremely small chance that trace fossils from the Rayton 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 very 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. No fossils have been recorded from the Rayton Formation but given its similarity to the Magaliesberg Formation, there might be trace fossils in the quartzites.

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 and sands. of the Quaternary. There is a very small chance that trace fossils (microbially induced sedimentary structures) may occur in the Rayton 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 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 very low so as far as the palaeontology is concerned the project should be authorised.

7. References

Bosch, P., Eriksson, P., 2008. A note on two occurrences of inferred microbial mat features preserved in the c. 2.1 Ga Magaliesberg Formation (Pretoria Group, Transvaal Supergroup) sandstones, near Pretoria, South Africa. South African Journal of Geology 111, 251-262.

Eriksson, P.G., Altermann, W., Hartzer, F.J., 2006. The Transvaal Supergroup and its pre-cursors. 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 237-260.

Eriksson, P.G., Bartman, R., Catuneanu, O., Mazumder, R., Lenhardt, N., 2012. A case study of microbial mats-related features in coastal epeiric sandstones from the Palaeoproterozoic Pretoria Group, Transvaal Supergroup, Kaapvaal craton, South Africa; the effect of preservation (reflecting sequence stratigraphic models) on the relationship between mat features and inferred palaeoenvironment. Sedimentary Geology 263, 67-75.

Noffke, N., Gerdes, G., Klenke, T., Krumbein, W., 2001. Microbially induced sedimentary structures – a new category within the classification of primary sedimentary structures. Journal of Sedimentary Research, 71, 649–656.

8. Chance Find Protocol

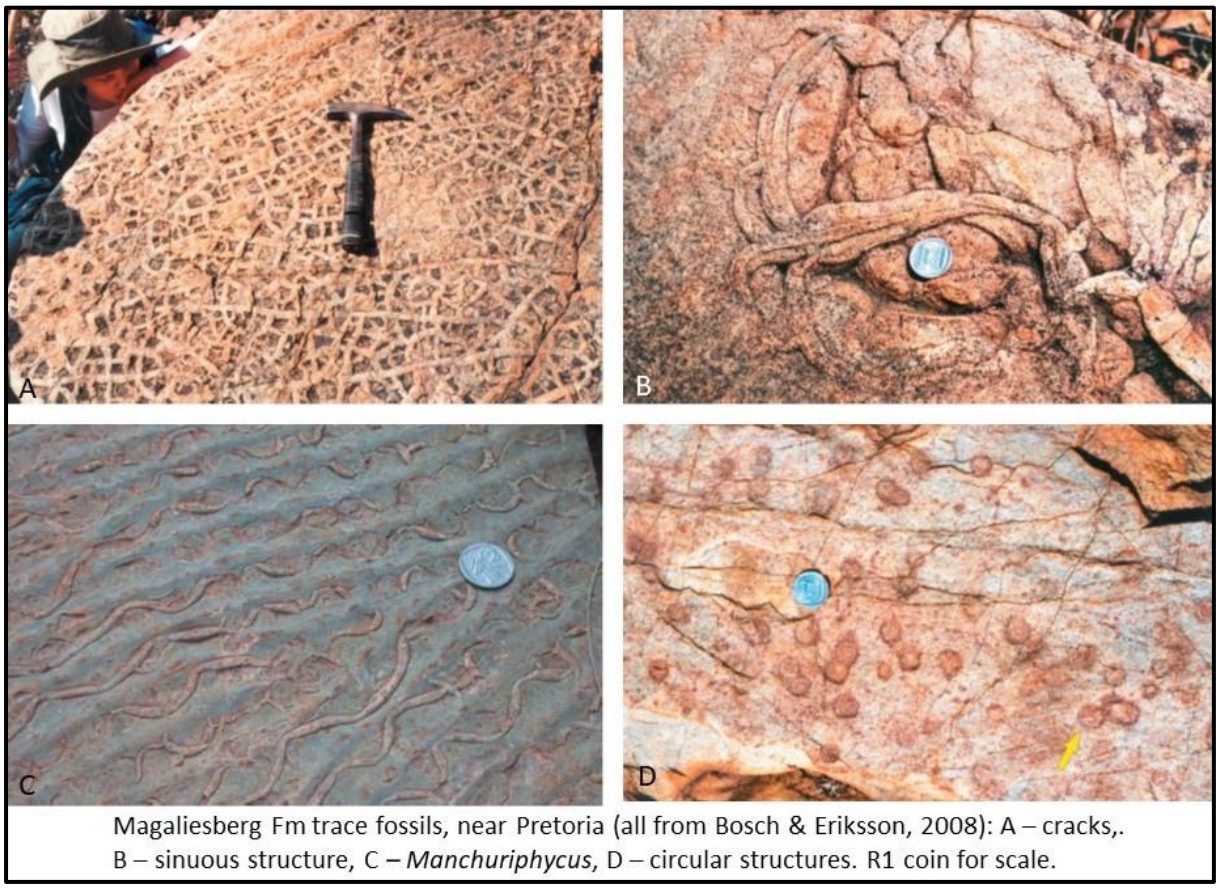
Monitoring Programme for Palaeontology – to commence once the excavations begin.

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 must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material

(trace fossils, ripples, cracks) 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 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 Magaliesberg Formation (Pretoria Group, Transvaal Supergroup).



Magaliesberg Fm trace fossils, near Pretoria (all from Bosch & Eriksson, 2008): A – cracks,. B – sinuous structure, C – *Manchuriphycus*, D – circular structures. R1 coin for scale.

Figure 6: Photographs of trace fossils.

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

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Fax : +27 11 717 6694
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.
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
- Klipoortjie 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
- Lieliefontein 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.