

**Palaeontological Impact Assessment for the
proposed Tshilamba 132kV powerline routes
and substations, Vhembe District Municipality,
Limpopo Province**

Desktop Study (Phase 1)

For

Vhubvo Consultancy

15 July 2023

Prof Marion Bamford

Palaeobotanist

P Bag 652, WITS 2050

Johannesburg, South Africa

Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, mASSAf, PSSA
Experience: 34 years research and lecturing in Palaeontology
26 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 Vhubvo Consultancy, Midrand, 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 that reads "MKBamford". The signature is written in a cursive style and is positioned above a horizontal line.

Signature:

Executive Summary

A Palaeontological Impact Assessment was requested for the proposed construction of two 132 kV overhead powerline routes, a new substation (four alternate sites) and infrastructure by ESKOM to strengthen the power supply within the Vhembe District Municipality, Limpopo 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 substations and powerline routes lie mostly on the moderately sensitive Quaternary sands and alluvium with the northernmost and southernmost section on the Wyllie's Poort Formation (Soutpansberg Group). No fossils have been reported from this area. Nonetheless, 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 contractor, environmental officer or other designated responsible person once excavations or drilling for foundations and infrastructure have commenced. Since the impact will be very low, as far as the palaeontology is concerned, the project should be authorised.

There is no preferred route and no preferred site for the new substation as far as the palaeontology is concerned.

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

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1. Background

According to Vhembe District Municipality, IDP 2017, the district currently has 12 existing substations with a backlog of 9 x 132/22kV substations to be built. Tshilamba is one of the areas that is listed as requiring a substation. There is a need to strengthen the network currently supplied by the Makonde substation, specifically the Makonde-Thengwe 22kV feeder, which has problems with overloading and non-compliance with the reliability guide in terms of its total length of 295 km. The strengthening of the network will:

- a) reduce the customer base of Makonde substation (MTG).
- b) reduce the load on MTG.
- c) improve the voltage profile of MTG.
- d) Reduce the length of MTG.

Eskom Holdings SOC Ltd, therefore, intends to construct a 132kV loop in loop out powerline and a new substation to strengthen the Makonde network (Figures 1-3). The work associated with the strengthening of the network is listed according to National Environmental Management Act 107 of 1998: Environmental Impact Assessment (EIA) Regulations, Government Notice R326 of 2017 (as amended), for which an Environmental Authorisation (EA) is required before the powerlines and substation can be constructed. In addition, a Water Use Licence (WUL)/ General Authorisation (GA) will also be required. Eskom has therefore appointed DIGES to lodge applications for EA and WUL/GA with the relevant Competent Authorities.

The scope of work entails the following:

- i. Construction and operation of ± 6 km, 2 x 132kV loop in and out powerlines from the Makonde-Sanari line to the new Mutshikili 132/22kV 2x20MVA substation at Tswera/Thengwe village.
- ii. Construction and operation of a 132/22kV substation. The structure will also comprise the following components:
 - 132kV Line bays.
 - sectionalized 132kV tubular busbar.
 - 2 x 20MVA 132/22kV Transformers.
 - Linear 22kV busbar.
 - 3 x 22kV feeder bays (outdoor MV Box structure configuration).
 - 2 x future 22kV feeder bays (busbar only, no equipment).
 - Build a standard control room to house all secondary equipment.
 - Build a palisade fence around the substation.
 - 15 m communication mast.
- iii. Construction of a 4 m wide road from the gravel road to the proposed substation. The length of the road is approximately ± 200 m measured from the gravel road.

A Palaeontological Impact Assessment was requested for the Tshilamba 132 kV 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
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

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

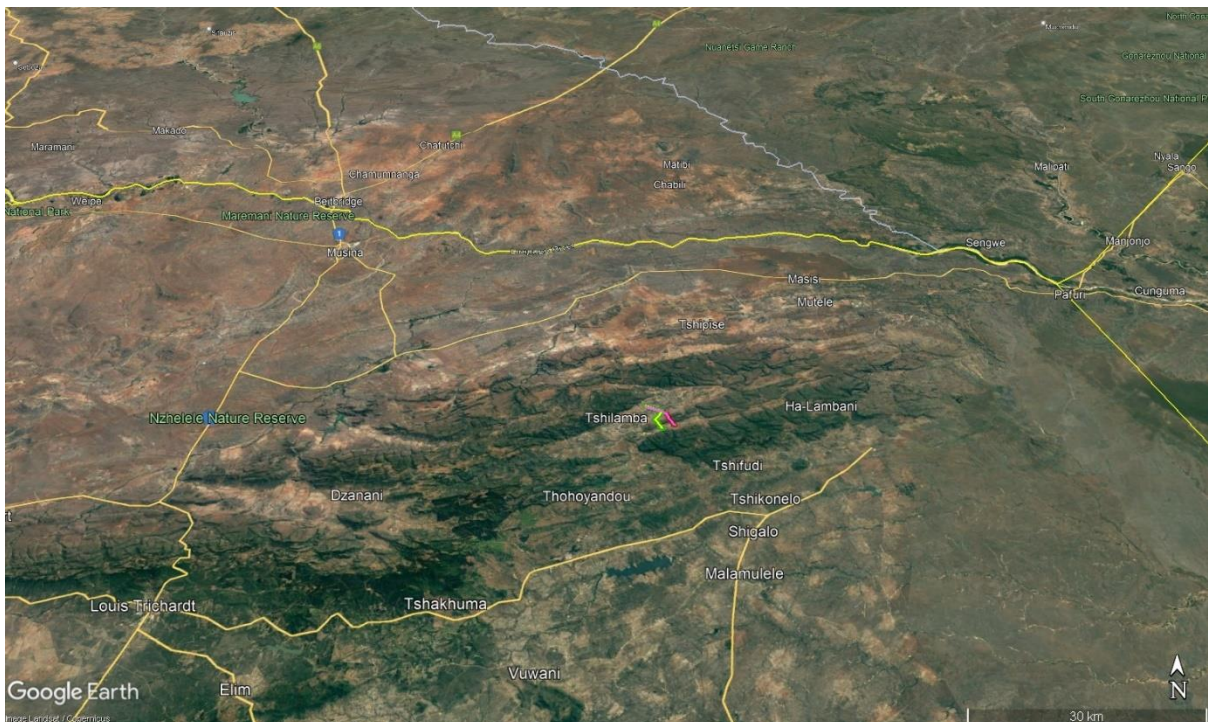


Figure 1: Google Earth map of the general area to show the relative landmarks. The Tshilamba powerline project is shown by the red and green lines in the centre.



Figure 2: Google Earth Map of the proposed Tshilamba 132 kV powerline routes and 300m corridors.

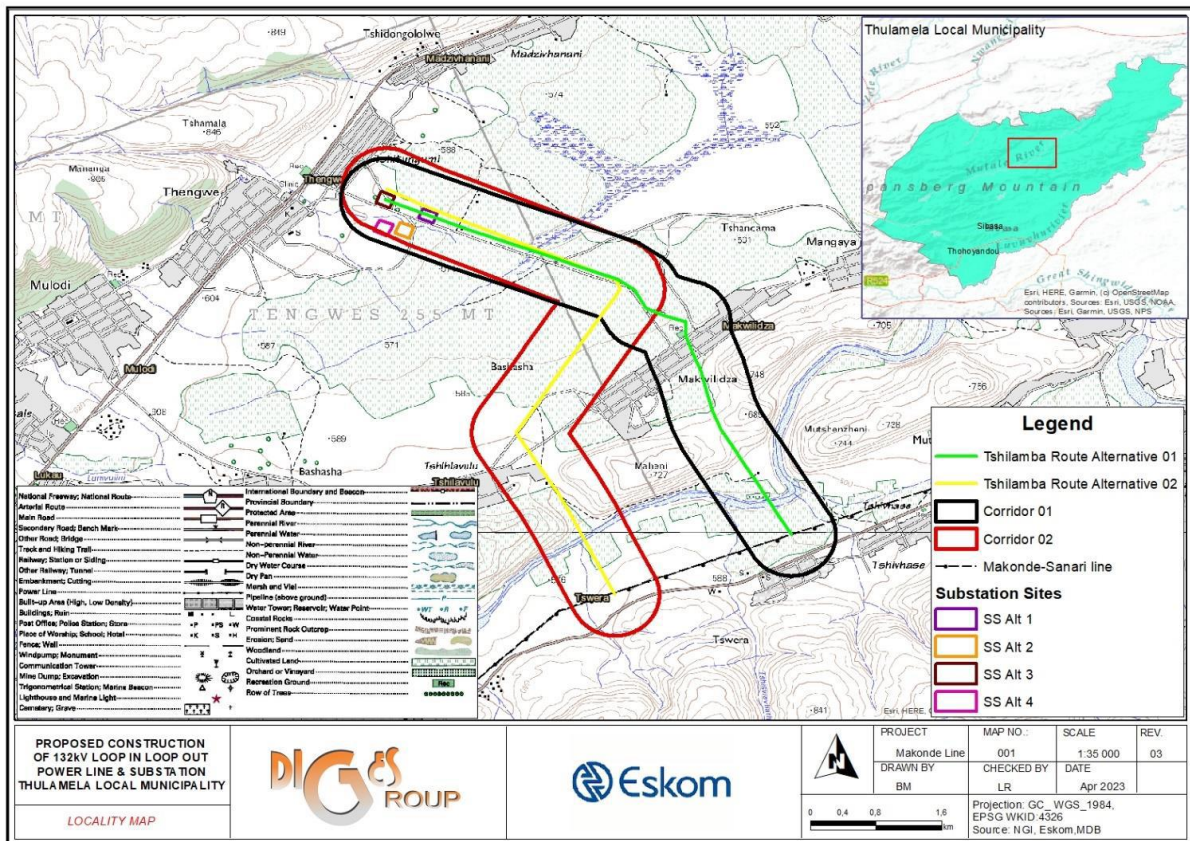


Figure 3: Topographic map for the proposed Tshilamba 132 kV powerline routes and alternate positions for the new substation. Map supplied by DIGES Group.

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;
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

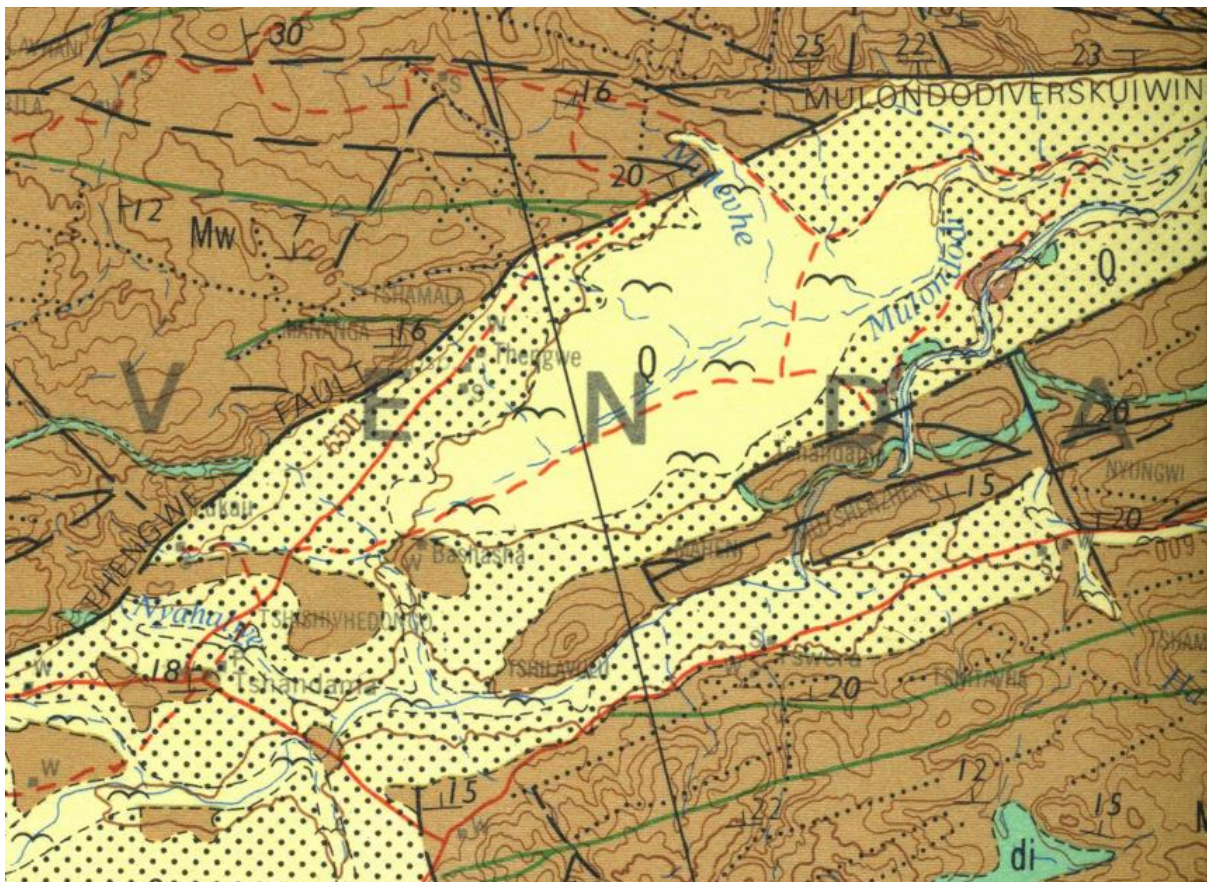


Figure 4: Geological map of the area around the Tshilamba village. The location of the proposed project is indicated within the yellow rectangle. Abbreviations of the rock types

are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 2230 Louis Trichardt.

Table 2: Explanation of symbols for the geological map and approximate ages (Barker et al., 2006; Geng et al., 2014; Partridge 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
di	Dolerite	Dolerite dykes, intrusive	Palaeoproterozoic >1 800 Ma
Mw	Wylliespoort Fm, Soutpansberg Group	Pink quartzites, sandstone	Palaeoproterozoic Ca 1900-1830 Ma

The project lies in the Soutpansberg Basin the preserves rocks of the Soutpansberg Group (Figure 4). Much younger Quaternary sands unconformably overlie the older rocks.

The Palaeoproterozoic rocks of southern Africa occur in Limpopo, Mpumalanga and Gauteng Provinces and extend westwards into Botswana, and occur in three basins. Three main strata are recognised, the **Soutpansberg Group**, the Waterberg Group and the Blouberg Formation. A number of attempts have been made to correlate the strata in the different basins, the Waterberg Basin, the Soutpansberg Basin and the Middelburg Basin.

The Soutpansberg Group, in the Soutpansberg Basin, rests unconformably on Archaean granulite-grade gneisses as well as on the Blouberg Formation and Mogalakwena Formation of the Waterberg Group (Barker et al., 2006) and is unconformably overlain by the much younger Karoo Supergroup Rocks to the north.

Six Formations are recognised in the Soutpansberg Group, and from the base upwards they are the Tshifhefhe, Sibasa, Fundudzi, **Wyllie's Poort**, Musekwa and Nzhelele Formations. Pink quartzite and sandstone are the dominant rocks of the the Wyllie's Poort Formation.

The precise age of the volcano-sedimentary Soutpansberg Group, which was deposited upon the Palala shear belt separating the Kaapvaal Craton from the Central Zone of the Limpopo Belt, has long been debated (Geng et al., 2014). The Soutpansberg Group is subdivided into a lower and upper succession, which are separated from each other by a prominent regional unconformity. Zircon grains were analysed by Geng and colleagues (2014) from silicic pyroclastic rocks of both succession for dating. They concluded that deposition of the Soutpansberg volcano-sedimentary succession commenced around 1830 Ma and lasted about ca. 230 Ma.

Overlying many of these rocks are loose sands and sand dunes of the Gordonia Formation, Kalahari Group of Neogene Age. The Gordonia Formation is the youngest of six formations and is the most extensive, stretching from the northern Karoo, Botswana, Namibia to the Congo River (Partridge et al., 2006). It is considered to be the biggest palaeo-erg in the

world (ibid). The sands have been derived from local sources with some additional material transported into the basin (Partridge et al., 2006). Much of the Gordonia Formation comprises linear dunes that were reworked a number of times before being stabilised by vegetation (ibid).

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 5. The site for development is in the moderately fossiliferous Wyllies Poort Formation and Quaternary sands.

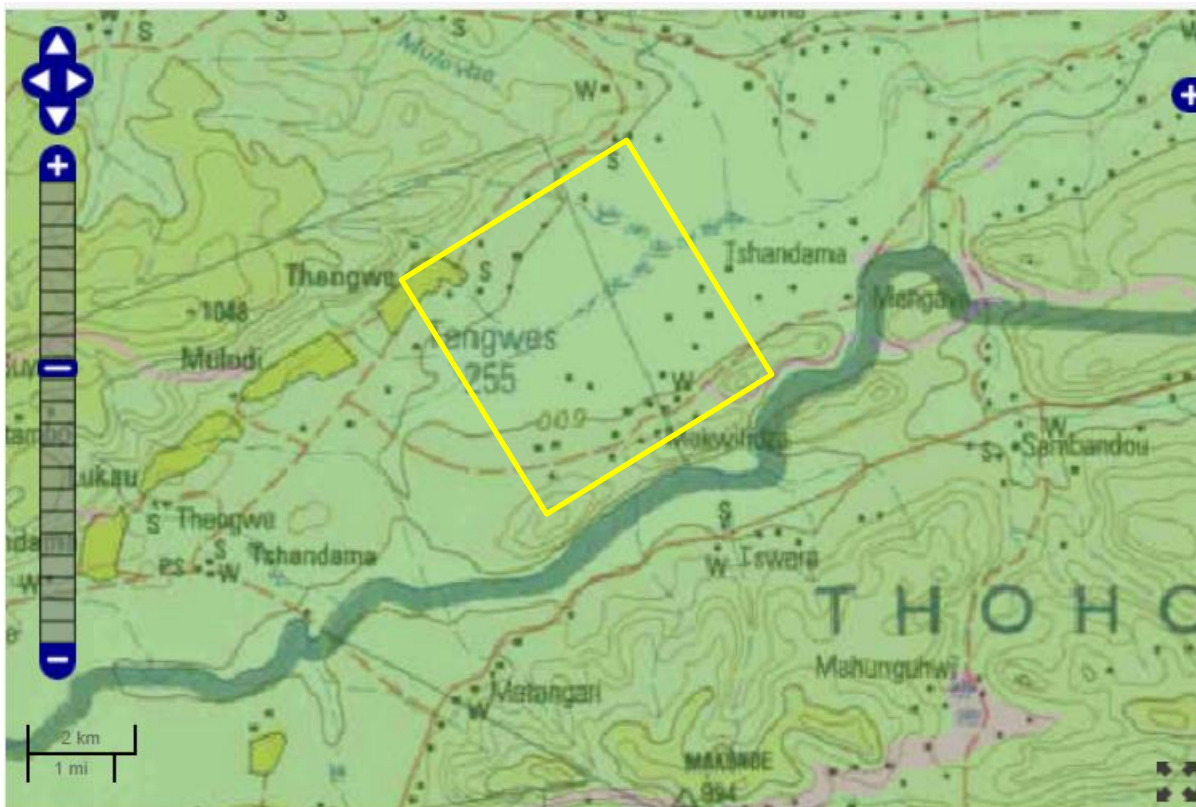


Figure 5: SAHRIS palaeosensitivity map for the site for the proposed Tshilamba 132 kV powerline routes and substations are shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

The Soutpansberg Group quartzites and sandstones were deposited in an ancient lake or sea during the Palaeoproterozoic which was before the evolution of any body fossils. Only micro-organisms were present at that time. While traces of their activity such as microbially induced sedimentary structures have been recognised in older and younger rocks, none has yet been reported from the Soutpansberg Group. The sensitivity coding for this group is low to insignificant in the SAHRIS Palaeotechnical report for Limpopo (Groenewald et al., 2014) yet the SAHRIS map indicates it as moderately sensitive.

Quaternary sandstones and alluvium do not preserve fossils because they are friable and reworked but they might transport fossils that have eroded out from the surrounding

areas. The sands in the Thengwe basin are surrounded by Soutpansberg sandstones that do have any fossils. It is very unlikely, therefore, that there are any fossils in the sands and alluvium.

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	Sands do not preserve fossils; so far there are no records from the Wyllie's Poort 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 fossils in the sands, 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 quartzites of the Wyllie's Poort Fm 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 body fossils or are the wrong kind, Furthermore, the material to be excavated is sands and alluvium and this does not preserve fossils. Since there is an extremely small chance that trace fossils from the Wyllie's Poort 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 quartzites and sandstones of the Wyllie's Poort Formation although none have been recorded. Nonetheless, 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 pole and substation foundations, infrastructure and amenities 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	Moderate	Very Low	Paleontological Impact Assessment	Section 7.2. SAHRA Requirements

7. References

Barker, O B., Brandl, G., Callaghan, C.C., Eriksson, P.G., van der Neut, M., 2006. The Soutpansberg and Waterberg Groups and the Blouberg Formation. 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 301-318.

Geng, H., Brandl, G., Sun, M., Wong, G., Kröner, A., 2014. Precambrian Research Zircon ages defining deposition of the Palaeoproterozoic Soutpansberg Group and further evidence for Eoarchaean crust in South Africa. Precambrian Research 249, 247–262.

Groenewald, G., Groenewald, D., Groenewald, S., 2014. SAHRA Palaeotechnical Report. Palaeontological Heritage of Limpopo. 22 pages.

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.

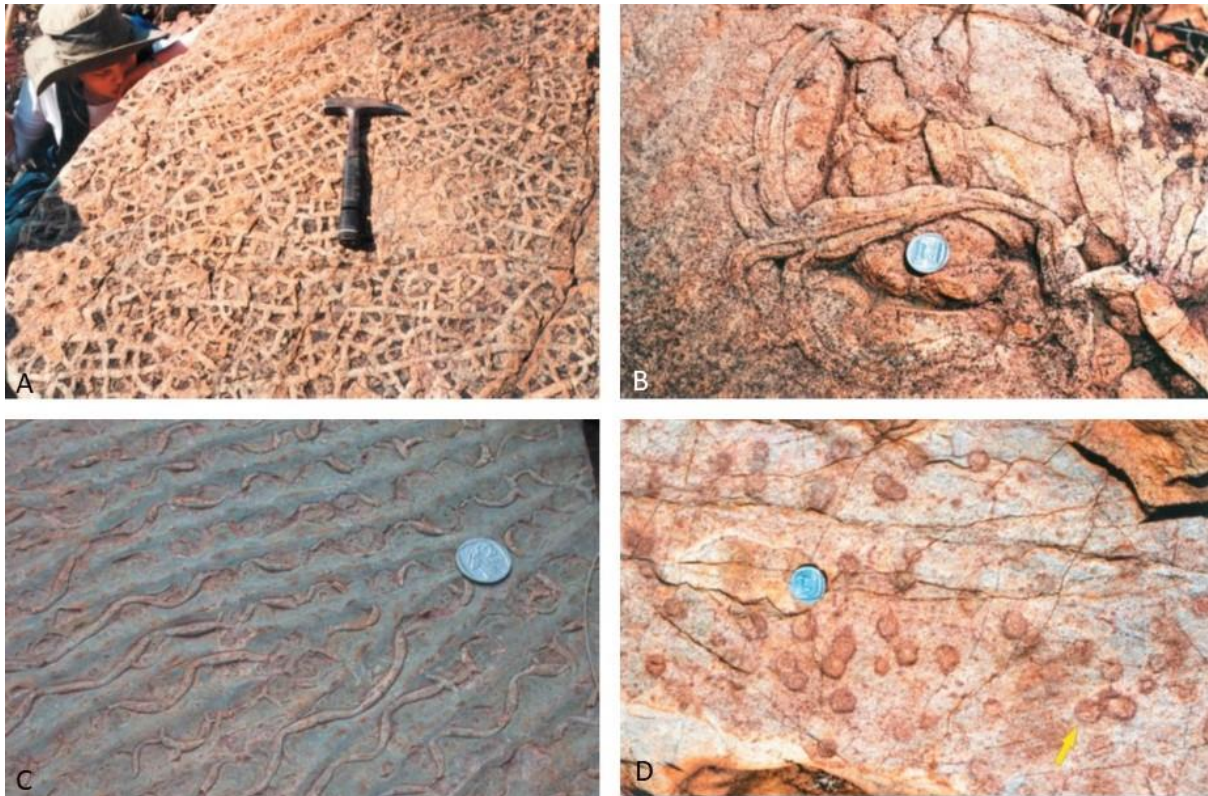
Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

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 (trace fossils, 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 6-7). 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 Palaeoproterozoic and the Quaternary.



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: microbially-induced sedimentary structures.



A – leaf impression in sandstone; B – silicified wood fragments in a stream bed; C – fossil bone fragments in the shales.

Figure 7: Photograph of transported and fragmented fossil recovered from Quaternary sands and riverbeds.

10. Appendix B – Details of specialist

Curriculum vitae (short) - Marion Bamford PhD January 2023

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
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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

25 years' experience in PIA site and desktop projects

- Selected from recent projects only – list not complete:
- 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
- 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 Mukondelei 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

ix) Research Output

Publications by M K Bamford up to January 2022 peer-reviewed journals or scholarly books: over 170 articles published; 5 submitted/in press; 14 book chapters.

Scopus h-index = 31; Google Scholar h-index = 39; -i10-index = 116 based on 6568 citations.

Conferences: numerous presentations at local and international conferences.