

**Desktop Palaeontological Impact Assessment of proposed new
overhead and subsurface installation of a Vodacom optic fibre
cable along provincial road reserves in and around Thohoyandou,
Limpopo Province**

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Executive Summary

Anticipated development calls for the installation of a 134 km long, Vodacom optic fibre cable along provincial road reserves in the vicinity of Thohoyandou, Limpopo Province. In most areas, the optic fibre cable will be mounted aboveground on poles. Trenching will be restricted to urban areas where subsurface installation of the cable is required. Given the nature of the proposed impact (linear development on degraded terrain) it is expected that impact on *in situ* palaeontological material from unweathered sedimentary bedrock strata is considered very low (significance grading for aboveground installation option = 8 and subsurface installation option = 10). There is very low potential for irreplaceable loss of palaeontological resources and the probability of impact on palaeontological resources as a result of the proposed development is also considered very low. It is recommended that the proposed development is exempt from a Phase 1 Palaeontological Impact Assessment.

Introduction

Anticipated development calls for the installation of a 134 km long, Vodacom optic fibre cable along provincial road reserves in and around Thohoyandou, Limpopo Province (**Fig. 1**). In most areas, the optic fibre cable will be mounted aboveground on poles, while trenching will be restricted to urban areas where subsurface installation of the cable is required. The following will also apply:

1. The 9m poles will be planted at a depth of 1.5 m and a hole will be opened for this purpose with the dimensions of 0.35m x 0.35m (= 0.1225m² or 0.147 m³);
2. The 11m poles will be planted at a depth of 1.7m and a hole will be opened for this purpose with the dimensions of 0.45m x 0.45m (= 0.2025m² or 0.3038 m³);
3. Poles will be planted at intervals ranging between 80 and 280 meters;
4. The crossing over the watercourse will be undertaken by overhead installation with a maximum of 3 I-Section Poles within the watercourse or within 100 meters of the watercourse.

Terms of reference for the proposed development requires a desktop palaeontological impact assessment, including the following methodology where relevant:

Terms of Reference (ToR)

- Investigate available resources (geological maps, scientific literature, previous impact assessment reports, institutional fossil collections, satellite images, etc) to inform an assessment of fossil heritage and/or exposure of potentially fossiliferous rocks within the study
- The study will conclude whether a further field assessment is warranted.
- If a field assessment is not warranted a “Letter of Recommendation for Exception from further Palaeontological Studies” will be drafted for SAHRA
- A Palaeontological Sensitivity map, with the use of a Geographical Information System (GIS), based on the findings of the study, must accompany the reports.
- Provide the EAP with all GIS data of the findings in the form of shape files (.shp) or Google Earth files (.kmz or .kml files).

Methodology

The palaeontological significance of the affected area was evaluated on the basis of existing field data, field reports and published literature.

Locality data

1:50 000 topographical map 2230CD Thohoyandou

1 : 250 000 scale geological map 2330 Tzaneen

General coordinates: 22°56'18.46"S 30°37'44.95"E

Background

The proposed route is located on Early Proterozoic (c. 2 to 1.8 Ga) basalts, coarse-grained sandstones and conglomerates of the Soutpansberg Group (Mokolian Era). Rocks of the Soutpansberg and overlying Waterberg Groups contain the earliest strata that indicate deposition under an atmosphere that contained free oxygen. Although minor indications of algal mat structures have been recorded in sediments of the Waterberg Group north of Pretoria, no major fossil finds have been recorded to date. There are currently no records of vertebrate fossil occurrences from superficial overburden (e.g. Quaternary fluvial deposits near watercourses) in the area.

Impact Statement and Recommendations

The significance of potential impacts was assessed by using the following criteria (**Table 1**).

- **Duration** of the impact (time scale);
- **Extent** of the impact (spatial scale);
- Degree to which the impact may cause **irreplaceable loss of resources**;
- Degree to which the impact can be **reversed**;
- **Magnitude (or Nature)** of negative or positive impacts;
- **Probability** of the impact occurring;
- **Cumulative impacts**; and the degree to which the impact can be **mitigated**.

Given the nature of the proposed impact (linear development on degraded terrain) it is expected that impact on *in situ* palaeontological material from unweathered sedimentary bedrock strata is considered very low (significance grading for aboveground installation option = 8 and subsurface installation option = 10). There is very low potential for irreplaceable loss of palaeontological resources and the probability of impact on palaeontological resources as a result of the proposed development is also considered very low. It is recommended that the proposed development is exempt from a Phase 1 Palaeontological Impact Assessment.

References

- Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (Eds.) 2006. *The Geology of South Africa*. Geological Society of South Africa, Johannesburg/Council for Geoscience, Pretoria.
- MacRae, C. 1999. *Life Etched in Stone: Fossils of South Africa*. The Geological Society of South Africa, Johannesburg.
- McCarthy, T. and Rubidge, B.S. 2005. *The Story of Earth and Life. A southern African perspective on a 4.6 billion year journey*. Struik Publishers, Cape Town.
- Tankard, A.J., Jackson, M.P.A., Erikson, K.A., Hobday, D.K., Hunter, D.R. and Minter, W.E.L. 1982. *Crustal Evolution of Southern Africa: 3.8 billion years of Earth history*. Springer-Verlag.

Tables and Figures

Table 1. Summary of potential impacts related to the proposed development.

	Aboveground Installation	Subsurface Installation
DURATION	Short term (2)	Short term (2)
EXTENT (or spatial scale/influence of impact)	Local (2)	Local (2)
IRREPLACEABLE loss of resources	None (0)	Very low potential (1)
REVERSIBILITY of impact	No impact (0)	Impact will be reversible (1)
MAGNITUDE of negative impact (at the indicated spatial scale)	Very low (2)	Very low (2)
MAGNITUDE of POSITIVE IMPACT (at	Very low (2)	Very low (2)

the indicated spatial scale)		
PROBABILITY (of occurrence)	Improbable (1)	Improbable (1)
CUMULATIVE impacts	Low	Low

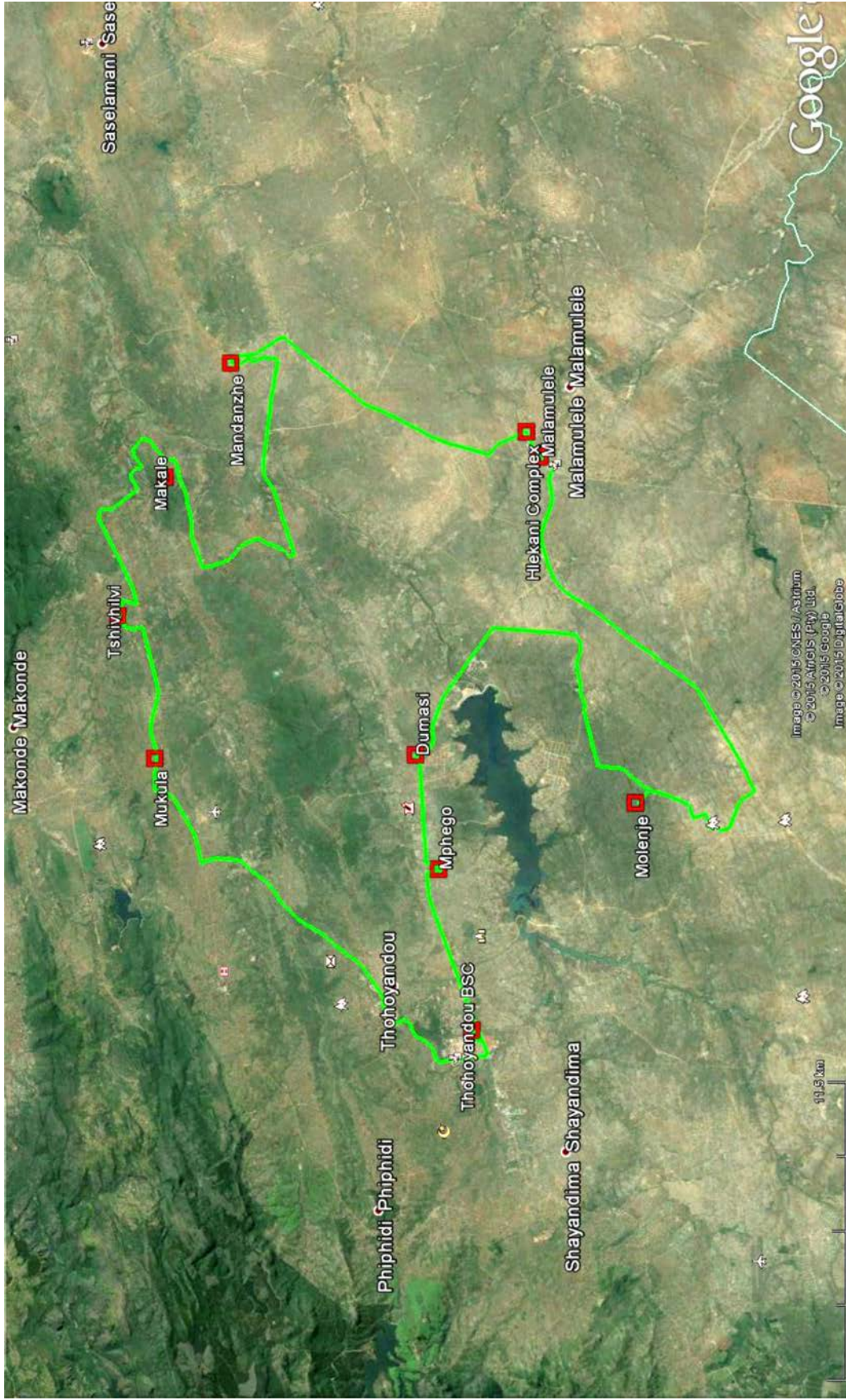


Figure 2.. Aerial view of the proposed optic fibre route (green line).



Figure 2. Location of Thoyandou in relation to palaeontologically sensitive areas in the region (after SAHRA Palaeontological Sensitivity Map 2015).
The area covered in green is considered to be slightly to moderately sensitive and requires a desktop study.

APPENDIX 1: EVALUATION COMPONENTS, RANKING SCALES DESCRIPTIONS (CRITERIA) AND SIGNIFICANCE GRADING OF EACH POTENTIAL IMPACT DESIGNED FOR ASSESSMENT METHODOLOGY

Evaluation component	Ranking scale and description (criteria)
DURATION	<p>5 - Permanent</p> <p>4 - Long term: Impact ceases after operational phase/life of the activity (> 20 years).</p> <p>3 - Medium term: Impact might occur during the operational phase/life of the activity (5 to 20 years).</p> <p>2 - Short term: Impact might occur during the construction phase (< 5 years).</p> <p>1 - Immediate</p>
EXTENT (or spatial scale/influence of impact)	<p>5 - International: Beyond National boundaries.</p> <p>4 - National: Beyond Provincial boundaries and within National boundaries.</p> <p>3 - Regional: Beyond 5 km of the proposed development and within Provincial boundaries.</p> <p>2 - Local: Within 5 km of the proposed development.</p> <p>1 - Site-specific: On site or within 100 m of the site boundary.</p> <p>0 - None</p>
IRREPLACEABLE loss of resources	<p>5 – Definite loss of irreplaceable resources.</p> <p>4 – High potential for loss of irreplaceable resources.</p> <p>3 – Moderate potential for loss of irreplaceable resources.</p> <p>2 – Low potential for loss of irreplaceable resources.</p> <p>1 – Very low potential for loss of irreplaceable resources.</p> <p>0 - None</p>
REVERSIBILITY of impact	<p>5 – Impact cannot be reversed.</p> <p>4 – Low potential that impact might be reversed.</p> <p>3 – Moderate potential that impact might be reversed.</p> <p>2 – High potential that impact might be reversed.</p> <p>1 – Impact will be reversible.</p> <p>0 – No impact.</p>
MAGNITUDE of negative impact (at the indicated spatial scale)	<p>10 - Very high: Bio-physical and/or social functions and/or processes might be severely altered.</p> <p>8 - High: Bio-physical and/or social functions and/or processes might be considerably altered.</p> <p>6 - Medium: Bio-physical and/or social functions and/or processes might be notably altered.</p> <p>4 - Low : Bio-physical and/or social functions and/or processes might be slightly altered.</p> <p>2 - Very Low: Bio-physical and/or social functions and/or processes might be negligibly altered.</p> <p>0 - Zero: Bio-physical and/or social functions and/or processes will remain unaltered.</p>
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	<p>10 - Very high (positive): Bio-physical and/or social functions and/or processes might be substantially enhanced.</p> <p>8 - High (positive): Bio-physical and/or social functions and/or processes might be considerably enhanced.</p> <p>6 - Medium (positive): Bio-physical and/or social functions and/or processes might be notably enhanced.</p> <p>4 - Low (positive): Bio-physical and/or social functions and/or processes might be slightly enhanced.</p> <p>2 - Very Low (positive): Bio-physical and/or social functions and/or processes might be negligibly enhanced.</p> <p>0 - Zero (positive): Bio-physical and/or social functions and/or processes will remain unaltered.</p>
PROBABILITY (of occurrence)	<p>5 - Definite: >95% chance of the potential impact occurring.</p> <p>4 - High probability: 75% - 95% chance of the potential impact occurring.</p> <p>3 - Medium probability: 25% - 75% chance of the potential impact occurring</p> <p>2 - Low probability: 5% - 25% chance of the potential impact occurring.</p> <p>1 - Improbable: <5% chance of the potential impact occurring.</p>
CUMULATIVE impacts	<p>High: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Medium: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.</p> <p>Low: The activity is localised and might have a negligible cumulative impact.</p> <p>None: No cumulative impact on the environment.</p>

Significance Points	Environmental Significance	Description
100 – 150	High (H)	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
40 – 99	Moderate (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	Low (L)	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.
SP (significance points) = (duration + extent + irreplaceable + reversibility + magnitude) x probability		