

Gumeni - Bosloop 132kV line – Eskom

Emakhazeni Local Municipality, Machadadorp, Mpumalanga Province

Farms: Prinsloo 382 JT, Elandsfontein 389 JT, Bermondsey 391 JT, Gemsbokhoek 397JT

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Palaeontological Exemption Letter

Commissioned by: Royal HaskoningDHV

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B. Executive summary

Outline of the development project: Royal HaskoningDHV has appointed Dr H. Fourie, a palaeontologist, to undertake a Desktop Paleontological Impact Assessment for an exemption letter of the proposed Gumeni – Bosloop 132kV power line.

Eskom Distribution Northern Region is proposing to construct a 26km 132kV kingbird line from Bosloop Substation to Gumeni Main Transmission Station (MTS) and a 132kV feeder bay at Gumeni MTS and Bosloop Substation. Three options are proposed.

The National Heritage Resources Act 25 of 1999 requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

This report prescribes to the Heritage Impact Assessment of Section 38 of the National Heritage Resources Act 25 of 1999.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of LOW to VERY HIGH palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

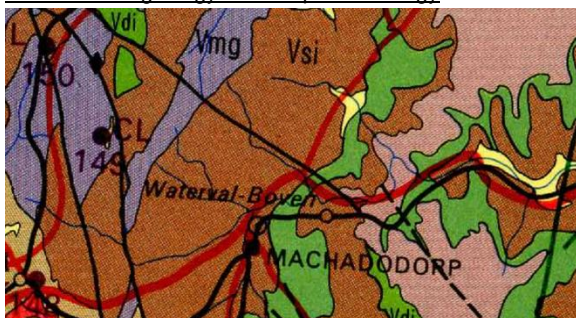
Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act, 1999 (No 25 of 1999):

(i) (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.

Section 38, 1(b) requires the details of the construction of a bridge or similar structure exceeding 50m in length.

It is proposed to comment and recommend on the impact of the development on fossil heritage mitigation or conservation necessary.

Outline of the geology and the palaeontology:



The geology was obtained from map 1:100 000, South Africa.

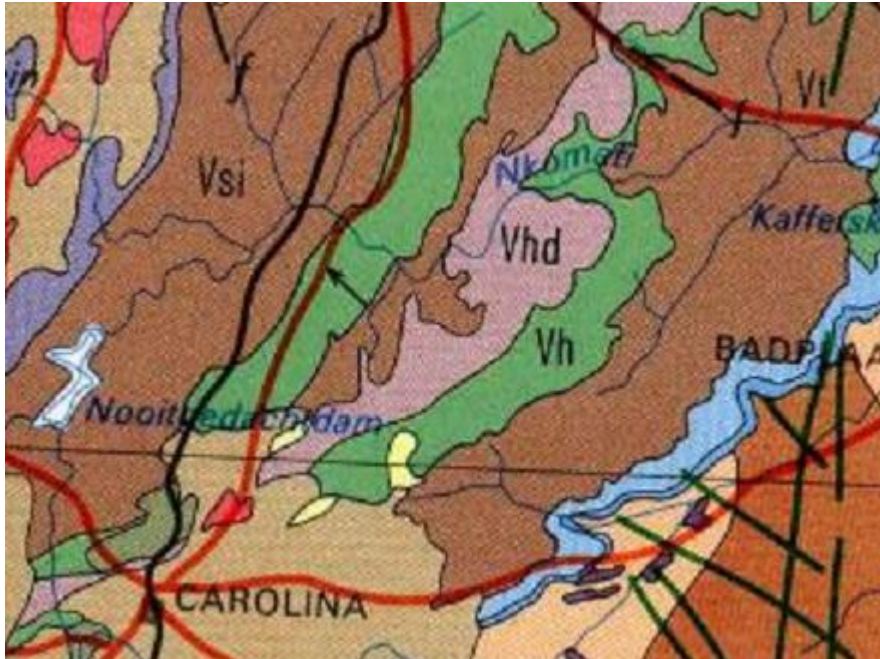
Legend to Map and short explanation

Vsi – (brown) Silverton Formation. Shale (Machadadorp Member: basalt, tuff)

Vh – (green) Hekpoort Formation. Andesite

Vhd – (tope) Quartzite, siltstone, conglomerate, shale, andesite

Vt – (brown) Timeball Hill and Rooihoogte Formation. Shale, quartzite, conglomerate, breccia, diamictite



Summary of findings: The desktop palaeontological impact assessment was undertaken during May 2013 and the following is reported:

The geology of the Transvaal Supergroup is here represented by the Silverton, Hekpoort, and Timeball Hill and Rooihoogte Formations of the Pretoria Group (Eriksson 1999). Mainly sandstone, mudstone and basalt.

Three options are considered for the powerline:

Option 1 (aqua): the alignment runs in a southerly direction along the R36 for 2.44km within transformed grassland road reserves. It bisects several wetlands and seeps, the Bankspruit and the Skurweberg. It follows an existing line over the Skurweberg to the Bosloop substation as well as within close proximity of an access road up the Skurweberg.

Option 2 (yellow): this alignment runs to the east of Gumeni substation and follows an existing line for approximately 7.2km. It then joins option 1 for a short distance before it diverts in a southerly direction joining option 3 to end at Bosloop.

Option 3 (pink): runs parallel to the R36 for approximately 1.8km, it then moves to the east and then south to join option 2 to the Bosloop substation.

The development takes place just south of Machadadorp in a west-east (Vsi-Vh-Vsi-Vhd-Vh-Vt) direction, therefore cutting across the Transvaal Supergroup. As the Pretoria Group represented here is mainly sandstone, mudstone and basalt of Valium age, micro-fossils and algal mats are of no consequence here. There is evidence of mining activity for ferro-chrome.

Palaeontological sensitivity is ZERO. All three options are viable.

Recommendation: The impact of the development on fossil heritage is ZERO and therefore a field survey or further mitigation or conservation measures will not be necessary for Options 1, 2 and 3. The proposed development can go ahead without a Phase 1 Palaeontological Impact Assessment with a background study and a field survey of the proposed development and includes recommendations for conservation and the need for sampling or collection as part of a Phase 2 Palaeontological Mitigation. The mitigation process will entail the sampling, recording and collection of fossils. On occasion this may be

followed by a Phase 3 Palaeontological Site Conservation and Management plan for sites to be retained to ensure that arrangements are made for their long term maintenance and management.

Stakeholders: Developer – Eskom Distribution Northern Region.
Environmental –Royal HaskoningDHV.

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D. Background information on the project

Report

This report is part of the environmental impact assessment process under the NEMA (National Environmental Management Act).

Outline of development

Eskom Distribution Northern Region has identified that the 132kV ring supply from Witkloof substation is experiencing low voltages due to the loss of either Witkloof Holnek 132kV line or Wintershoek 132kV line voltages during the transmission and distribution of power. To rectify the status quo, Eskom is proposing to construct a 26km 132kV kingbird line from Bosloop Substation to Gumeni Main Transmission Station (MTS) and a 132kV feeder bay at Gumeni MTS and Bosloop Substation. The proposed power line will require self supporting/pylon structures for the distribution of power and the typical structure which Eskom is proposing to utilise for the project is a monopole structure.

Three options are considered for the powerline:

Option 1 (aqua): the alignment runs in a southerly direction along the R36 for 2.44km within transformed grassland road reserves. It bisects several wetlands and seeps, the Bankspruit and the Skurweberg. It follows an existing line over the Skurweberg to the Bosloop substation as well as within close proximity of an access road up the Skurweberg.

Option 2 (yellow): this alignment runs to the east of Gumeni substation and follows an existing line for approximately 7.2km. It then joins option 1 for a short distance before it diverts in a southerly direction joining option 3 to end at Bosloop.

Option 3 (pink): runs parallel to the R36 for approximately 1.8km, it then moves to the east and then south to join option 2 to the Bosloop substation.



Location Map provided by Royal HaskonongDHV.

Rezoning/ and or subdivision of land: Eskom acquires the servitude.

Name of developer and consultant: Eskom and Royal HaskoningDHV.

Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a desktop palaeontological impact assessment to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.

Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act no: 25 of 1999. An electronic copy of this report must be supplied to SAHRA.

E. Description of property or affected environment

Location:

The area is located in the Northern Mpumalanga low veld region. The power line considered for the project falls within rural areas largely characterised by intensive commercial agricultural land uses. The area is situated close to a small mining town of Machadadorp approximately 17km to the north whilst Nelspruit is situated approximately 7.5km to the northwest. There are two main roads that allow general access to the area, the R 541 and the R 36, otherwise farm entrances and dirt roads can be used. Carolina is situated to the south on the R36.

The area affected is mostly where the pylons are planted, the footprint for the mono-pole structure is 1.2mx1.2m, approximately 3m deep. An existing tar and dirt road will be used to gain access during the construction and operational phase.

Option 1 (aqua): the alignment runs in a southerly direction along the R36 for 2.44km within transformed grassland road reserves. It bisects several wetlands and seeps, the Bankspruit and the Skurweberg. It follows an existing line over the Skurweberg to the Bosloop substation as well as within close proximity of an access road up the Skurweberg.

Option 2 (yellow): this alignment runs to the east of Gumeni substation and follows an existing line for approximately 7.2km. It diverts in a southerly direction.

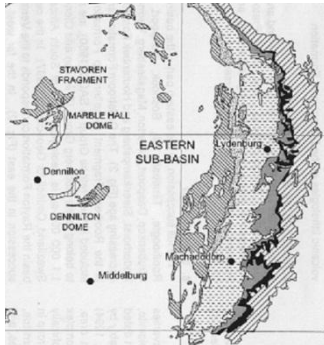
Option 3 (pink): runs parallel to the R36 for approximately 1.8km, it then moves to the east.

F. Description of the Geological Setting

Description of the rock units:

The development is taking place in an area covered by mostly the Transvaal Sequence, the Pretoria Group. Diabase sills of Bushveld age is intrusive here in to the Pretoria Group. Brown to khaki-weathering shales are stratigraphically below the Magaliesberg Formation. These shales are visible in the road cuttings. Ferro-chrome is produced from chromite mined near Steelpoort (Norman and Whitfield 2006).

The Pretoria Group as part of the Transvaal Supergroup has the Machadadorp-Lydenburg region as the type area. It is Vaalian in age. It consists of mudrock, quartzitic sandstones and andesitic volcanic rocks, with subordinate diamictite, conglomerate, carbonate rocks and iron-formation with a clastic sedimentary nature. A thickness of 8000m is reached in the east (Eriksson 1999). The Machadadorp Member of the Silverton formation is one of three volcanic units present here.



Map depicting the distribution of the Pretoria Group (Eriksson 1999).

Legend: === Silverton Formation.

All three Options of the development take place just south of Machadadorp in a west-east direction, therefore cutting across the Transvaal Supergroup. As the Pretoria Group represented here is mainly sandstone, mudstone and basalt of Valium age, fossils are only present in the Time Ball Hill Formation, but of no consequence here.

G. Background to Palaeontology of the area

Summary: When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desk top and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required.

Algal microfossils reported from the Timeball Hill Formation shales are probably of diagenetic origin. Stromatolites are preserved in the subordinate carbonate rocks in the group (Eriksson 1999). These fossils are not present in the Silverton Formation although they are present in the Pretoria Group more specifically the Timeball Hill Formation.

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore as there is the presence of Transvaal Supergroup strata the palaeontological sensitivity is generally LOW to ZERO and locally ZERO.

Databases and collections: Ditsong: National Museum of Natural History.

Impact: ZERO. There is significant fossil resources that may be impacted by the development.

H. Description of the Methodology

The desktop palaeontological impact assessment scope was undertaken during May 2013.

Assumptions and Limitations:-

The accuracy and reliability of the report is limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.
2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.

4. Lack of published data.
5. A site visit was not conducted.
6. A Palaeontological Heritage Technical Report for Mpumalanga Province has not been done.

I. Description of significant fossil occurrences

All Transvaal Supergroup geological formations are ranked as LOW to ZERO.

ZERO. Heritage value

J. Recommendation

- a. There is no objection to the development of the construction of the Gumeni-Bosloop 132kV line.
- b. This project will benefit the mining activities, the growth of the community and social development in general.
- c. Preferred choice: Options 1, 2 and 3 are viable.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures.

Sampling and collecting:

Wherefore a permit is needed from the South African Heritage Resources Agency (SAHRA).

- a. Objections: None.
- b. Conditions of development: See final remarks.
- c. Areas that may need a permit: None.
- d. Permits for mitigation: None needed from SAHRA.

K. Conclusions

- a. All the land involved in the development was assessed and none of the property is unsuitable for development.
- b. All information needed for the Desktop Palaeontological Impact Assessment and scope was provided by Royal HaskoningDHV, Ms N. Lertholi.
- c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
- d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures. Especially shallow caves.
- e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment and adjacent areas as well as for safety and security reasons.

L. Bibliography

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Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. For the past nine years she carried out field work in the Eastern Cape. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 18 years.

Declaration

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological scope. There are no circumstances that compromise the objectivity of me performing such work.

Heidi Fourie accepts no liability, and the client, by receiving this document, indemnifies Heidi Fourie against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.

Hfourie

Heidi Fourie

2013/05/27