

Lemara Leboeng Ohrigstad – Eskom

Limpopo and Mpumalanga Provinces

Farms: Rietvley 413KF, Claremont 414KT, Richmond 604KT, Liverpool 202KT, Nooitgedacht 237KT

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Palaeontological Exemption Letter

Commissioned by: Texture Environmental Consultants

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DEA Ref



B. Executive summary

Outline of the development project: Texture Environmental Consultants has appointed Dr H. Fourie, a palaeontologist, to undertake a Desktop Paleontological Impact Assessment of the proposed Lemara Leboeng Ohrigstad Project.

1. Eskom proposed 22kV power line between Phiring Substation and the Blyde River Canyon near Phiring and Ohrigstad.
2. Eskom proposed a 132kV power line between the Lemara Substation and the Olifants River near Hoedspruit and Finala.
3. Eskom proposed Lemara-Leboeng-Ohrigstad Project.
The construction of a proposed 132kV power line between the Lemara and proposed new Leboeng substation, and,
The construction of a proposed 132kV power line between the Leboeng and Ohrigstad substations.

The Eskom Project include:

- The construction of the proposed 132kV line between the Lemara Substation and the proposed new Leboeng Substation.
- The construction of the proposed 132kV power line between the Leboeng Substation and the Ohrigstad Substation.
- The construction of a proposed 132kV power line between the Lemara Substation and the Olifants River.
- The construction of a proposed 22kV power line between Phiring Substation and the Blyde River Canyon.

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 maps 1:100 000, South Africa and 2430 Pilgrims Rest.



Legend to Map and short explanation

- Vhd – Pretoria Group. Quartzite, siltstone, conglomerate, shale, andesite.
- Vt – (dark brown) Time Ball Hill and Rooihoogte. Shale, quartzite, conglomerate, breccia, diamictite.
- Vm – (blue) Malmani Subgroup. Dolomite, chert.
- Vbr – (dark blue) Black Reef Formation. Quartzite, conglomerate, shale, basalt.
- Vw – (olive) Wolkberg Group. Shale, quartzite, conglomerate, basalt.
- ZB – (light brown) Potassic granite, grandodiorite.

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

The geology of the Transvaal Supergroup is represented here by the Time Ball Hill and Rooihoogte Formation, Black Reef Formation, Malmani Subgroup and the Wolkberg Group (Kent 1980) consisting mainly of quartzite, siltstone, conglomerate, shale, andesite, breccia, diamictite, chert, and basalt. It is Vaalian in age. The Pretoria Group is known for micro-fossils and algal mats but it is of no consequence here.

The area between Kaapsehoop in the south to the Olifants River in the north is known as the Great Escarpment. The oldest basement granite-gneiss can be found here, barren of fossils.

The project covers an area between Hoedspruit and Ohrigstad from north to south crisscrossing over the above sediments.

All the alternatives and options of the Lemara Leboeng Ohrigstad Project are viable and can proceed without any palaeontological impact.

Palaeontological sensitivity is ZERO.

Recommendation:

1. A 22kV power line between the Phiring Substation and the Blyde River Canyon near Phiring and Ohrigstad. 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 both alternative 1 and 2. The proposed development can go ahead.
2. The 132kV power line between the Lemara Substation and the Olifants River near Hoedspruit and Finala. 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 this development. The proposed development can go ahead.
3. Eskom proposed Lemara-Leboeng-Ohrigstad Project. The construction of a proposed 132kV power line between the Lemara and proposed new Leboeng substation, and

the construction of a proposed 132kV power line between the Leboeng and Ohrigstad substations.

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 both alternatives 1 and 2. The proposed development can go ahead.

Stakeholders: Developer – Eskom Holdings (SOC).

Environmental –Texture Environmental Consultants.

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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).

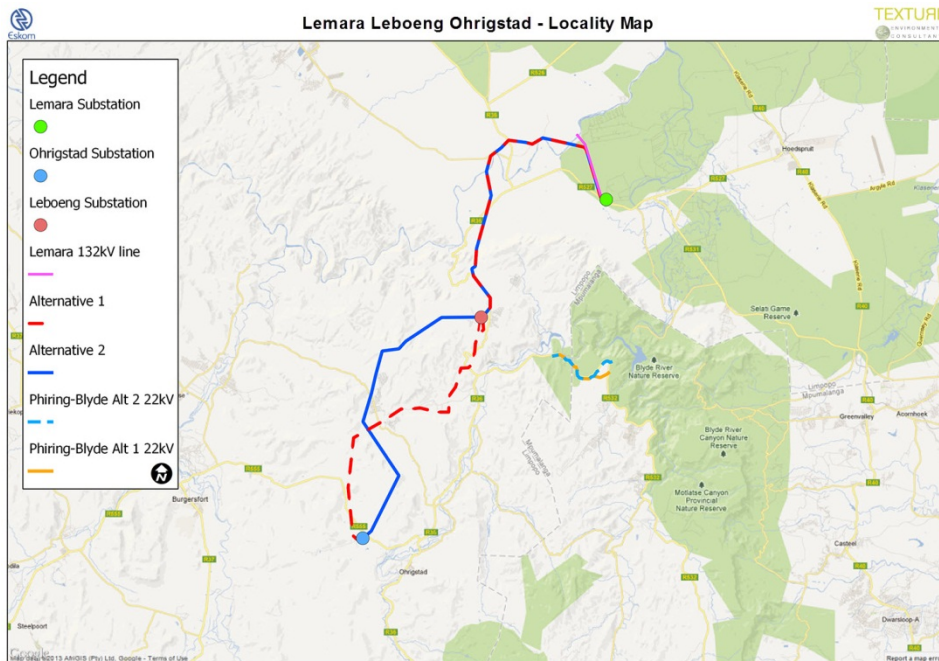
Outline of development

The development stretches from the Lemara Substation near Hoedspruit north of the Drakensberg mountain range across the Olifants River end then across the mountain at Manutsa close to the Abel Erasmus Pass (R36) north of Ohrigstad. It incorporates part of the northern and western Drakensberg Mountain slopes. There are villages in the valleys such as Tswenyane, Ga Maraba, Makgwareng, Magalane, Maketla and Kgautswane.

1. The 22kV power line between the Phiring Substation and the Blyde River Canyon.

Situated south of the Drakensberg mountain range approximately thirty kilometers to the north of Ohrigstad and in close proximity of the village of Phiring in the Mpumalanga Province. Two Alternatives are proposed for the last short stretch. Alternative 1 (red) runs along the winding course of road R532 (together with Alternative 2) across Rietvley 413KF and Claremont 414KT to a point where Alternative 1 splits from Alternative 2 in order to run in an easterly direction across a low mountain to meet the R532 on the eastern side of the low rise.

Alternative 2 (blue) runs along the winding course of road R532 with Alternative 1 across Rietvley 413KF and Claremont 414KT to a point where it deviates in order to follow the R 532 around a low mountain to end on the eastern side of the low rise.



Location Map provided by Texture Environmental Consultants.

2. The 132kV power line between the Lemara Substation and the Olifants River

Situated north of the Drakensberg mountain range (Section 1aNE), approximately thirty kilometres to the west of Hoedspruit and approximately fifteen kilometres to the south-east of the village of Finala. Only one option is available in a westwards direction along the R36, then it bends to the north-east and runs across Richmond 604KT and Liverpool 202KT following the eastern shoulder of a dirt road and a fence to the border of an eco-residential development on Liverpool 202 KT. It then turns to the north-west and runs across orchards before ending at the Olifants River.

3. Eskom proposed Lemara-Leboeng-Ohrigstad Project

Both Alternatives 1 and 2 cross the Drakensberg (Sections 1bNE, 2aSW, 2bSW). The most northern stretch for Alternative 2 runs from Kgautswane to the proposed Leboeng Substation. Alternative 1 partly runs through the Heuningskrans Valley. Two Alternatives are suggested for the proposed new Leboeng Substation. Two alternatives are suggested for the proposed Leboeng-Ohrigstad power line. Alternative 1 follows an easterly route and Alternative 2 follows a westerly route. The new Leboeng Substation will be constructed on the farm Nooitgedacht 237KT and two options are proposed. Alternative 1 is situated next to a school and a dirt road and to the west of the village of Leboeng. Alternative 2 is wedged between the R36 and a kopje to the west.

Rezoning/ and or subdivision of land: none, Eskom acquires the servitude.

Name of developer and consultant: Eskom and Texture Environmental Consultants.

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:

Section 1aNE runs a similar course as the Olifants River crossing the R36 around the village of Morathongto ends at the Lemara Substation.

Section 1bNE follows the R36 past the villages of Ga Sepeko, Makgwareng, Ga Maraba, and Tswenyane towards Calbasa. It has the Leboeng Substation to the south.

Section 2aSW has the two alternatives following different route, but both end at the Leboeng Substation. Alternative 1

deviates towards the village of Masakeng and the Abel Erasmus pass. Alternative 2 deviates towards the village of Kgautswane and Magalane.

Section 2bSW. Alternative 1 starts at the Ohrigstad Substation and runs north to cross Alternative 2 that also started at the Ohrigstad Substation going north.

Phiring-Blyde 22kV line. Follows the R 532 from Rietvlei in a western-easterly direction on the Farm Clermont 414KT towards Bohlabaepaba.

F. Description of the Geological Setting

Description of the rock units:

The development is taking place in an area covered by mostly the Transvaal Supergroup, 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 consists predominantly of quartzite and shale, together with a prominent volcanic unit, minor conglomerate, chemical and volcanic members. The following formations are present in the development area, Daspoort, Dwaalheuwel, Hekpoort, Silverton and Time Ball Hill. The Wolkberg Group which occurs along the north-eastern margin of the basin consists of coarse- and fine-grained clastic sediments together with a volcanic unit (basalt). It is conformably overlain by the succeeding Black Reef Formation. Quartzite, shale, lenses of grit and conglomerate marks the Black Reef Formation capped by dolomite. The Malmani Subgroup (Chunniespoort Group) is distinguished into formations on the basis of their chert content and type of algal structure (Kent 1980).

The northern boundary of the Great Escarpment is the Olifants River. The underlying rock formations are mostly well exposed. Uplift, down-cutting erosion and high rainfall has led to the formation of the Blyde River canyon. The oldest basement granite-gneiss can be found here, barren of fossils. The more resistant to erosion Transvaal Supergroup quartzites, and the less resistant Basement granite-gneiss, and the Black Reef quartzites, dominate the topography throughout the region (Norman and Whitfield 2006).

A section from Hoedspruit to the north and Ohrigstad to the south cuts through the Makhutswi Basement granite-gneiss, the Black Reef Formation in the Blyde River canyon Nature Reserve, the Malmani Subgroup to the north of Ohrigstad and the Pretoria Group closer and around Ohrigstad.

Section 1aNE runs a similar course as the Olifants River crossing the R36 around the village of Morathongto ends at the Lemara Substation. It cuts through the Pretoria and Wolkberg Groups and Black Reef Formation.

Section 1bNE follows the R36 past the villages of Ga Sepeko, Makgwareng, Ga Maraba, and Tswenyane towards Calbasa. It has the Leboeng Substation to the south. It cuts through the Time Ball Hill Formation and Malmani Subgroup.

Section 2aSW has the two alternatives following different route, but both end at the Leboeng Substation. Alternative 1 deviates towards the village of Masakeng and the Abel Erasmus pass. Alternative 2 deviates towards the village of Kgautswane and Magalane. It cuts through the Wolkberg and Pretoria Groups as well as some Quaternary sediments.

Section 2bSW. Alternative 1 starts at the Ohrigstad Substation and runs north to cross Alternative 2 that also started at the Ohrigstad Substation going north. It cuts through the Pretoria Group and some Quaternary sediments.

Phiring-Blyde 22kV line. Follows the R 532 from Rietvlei in a western-easterly direction on the Farm Clermont 414KT towards Bohlabaepaba. It cuts through the Malmani Subgroup and some Quaternary sediments.

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, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally LOW to VERY HIGH, but here locally ZERO.

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

Impact: ZERO. There is no 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 and June 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. The Palaeontological Heritage Technical Reports for Mpumalanga and Limpopo Provinces have not been done.

I. Description of significant fossil occurrences

All Karoo Supergroup geological formations are ranked as LOW to VERY HIGH, therefore the possible impact is potentially ZERO for the Transvaal Supergroup.

ZERO. Heritage value

J. Recommendation

- a. There is no objection to the development of the construction of the Eskom Project. It is not necessary to request a Phase 1 Palaeontological Impact Assessment to determine whether the planting of pylons or the erection of a substation will affect fossiliferous outcrops as the palaeontological sensitivity is ZERO. A Phase 2 Palaeontological Mitigation will not be required taken into account the overall palaeontological impact of ZERO.
- b. This project will benefit the mining activities, the growth of the community and social development in general.
- c. Preferred choice: None, all the alternatives and options 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 Texture Environmental Consultants, Ms R. Pretorius.
- 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 19 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.



Heidi Fourie
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