

## RECOMMENDED EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES:

### PROPOSED TRANSNET FREIGHT RAIL NEW RAILWAY LINK BETWEEN THARISA MINE AND THE MAINLINE (BETWEEN MARIKANA STATION TO THE WEST AND TURFGROUND SIDING TO THE EAST), MARIKANA, NORTHWEST PROVINCE

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#### 1. OUTLINE OF THE PROPOSED DEVELOPMENT

Transnet Freight Rail is proposing to construct a new 26 ton railway line to transport chrome concentrate in the vicinity of Marikana, Northwest Province. The new line would run from the main railway line about 2 km west of the existing Marikana siding, along the 275 kV Eskom line and into the Tharisa mine (Figure 1). The total length of the new railway line is approximately 12 kilometres *plus* the 2 km railway line from the main line to the loading area within the Tharisa Minerals (PTY) Ltd mine.

The present palaeontological heritage comment is contributed to the EIA and EMP for the proposed development that are being co-ordinated by Shangoni Management Services (Pty) Ltd, Lynnwood Ridge (Contact person: Ms Lee-Anne Fellowes. Tel: 012 807 7036. Mobile: 082 456 3208. E-mail: leeanne@shangoni.co.za. Fax: 012 807 1014/086 639 7956. Postal Address: P.O. Box 74726, Lynnwood Ridge, 0040).

#### 2. GEOLOGICAL BACKGROUND

The geology of the study area near Marikana is shown on the 1: 250 000 sheet 2526 Rustenburg (Council for Geoscience, Pretoria) (Walraven 1981) and in Figure 2 herein (kindly provided by Shangoni Management Services (Pty) Ltd).

The region is underlain by (1) sedimentary bedrocks of the **Transvaal Supergroup**, and in particular the upper part of the **Pretoria Group** in the central part of the Transvaal Basin (Eriksson *et al.* 2006), as well as by (2) basic igneous intrusions of the **Bushveld Complex** (Cawthorne *et al.* 2006). These Precambrian bedrocks are dated at between 2 and 2.2 Ga (billion years old), well before the evolution of macroscopic multicellular organisms (*cf* McCarthy & Rubidge 2005). The ancient bedrocks are mantled with a range of much younger **superficial deposits**, such as scree and alluvium that are not mapped in Figure 2. Most of these younger deposits are probably quaternary to Recent in age.

The Pretoria Group is represented here by hornfels (baked mudrocks) and quartzites of the **Rayton Formation** that intervene stratigraphically between the Magaliesberg Formation quartzites and the Bushveld Complex (Walraven 1981, Eriksson *et al.* 2006). Exposure levels in the region

are generally very poor. According to Walraven (1981) much of the Walraven Formation rocks represent xenolithic inclusions within the basic Bushveld igneous intrusions and have therefore been subjected to thermal metamorphism. The basic intrusive igneous rocks of the **Rustenberg Layered Suite** are dated to 2.06 Ga (billion years), *i.e.* Late Vaalian / Early Proterozoic age (Walraven 1981, Cawthorn *et al.* 2006). They form part of the **Bushveld Complex** which is the largest layered igneous complex in the world with the richest reserves of platinum group metals known (Eales 2001).

### 3. PALAEOLOGICAL HERITAGE

The Precambrian Bushveld rock units represented in the study area, as shown in Figure 2, consist entirely of basic to ultrabasic igneous rocks intruded at depth within the Earth's crust and are consequently unfossiliferous. Baking of the adjacent or included Pretoria Group sediments such as the Rayton Formation is expected to have destroyed all or most of their original fossil content. Unmapped superficial sediments in the area are generally of low palaeontological sensitivity.

### 4. CONCLUSIONS & RECOMMENDATIONS

The overall palaeontological sensitivity of the igneous and metasedimentary bedrocks in the Transet railway development study area near Marikana is assessed as VERY LOW. Significant impacts on local fossil heritage resources are therefore not anticipated. There are no preferences on palaeontological grounds for any of the alternative railway route options.

**It is therefore recommended that, pending the discovery of significant new fossils remains before or during construction, exemption from further specialist palaeontological studies and mitigation is granted for the proposed new railway line development near Marikana, Northwest Province.**

In the case of any significant fossil finds during construction (*e.g.* vertebrate teeth, bones, burrows, petrified wood, shells, stromatolites), these should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to SAHRA (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za), so that appropriate mitigation (*i.e.* recording, sampling or collection) by a palaeontological specialist can be considered and implemented.

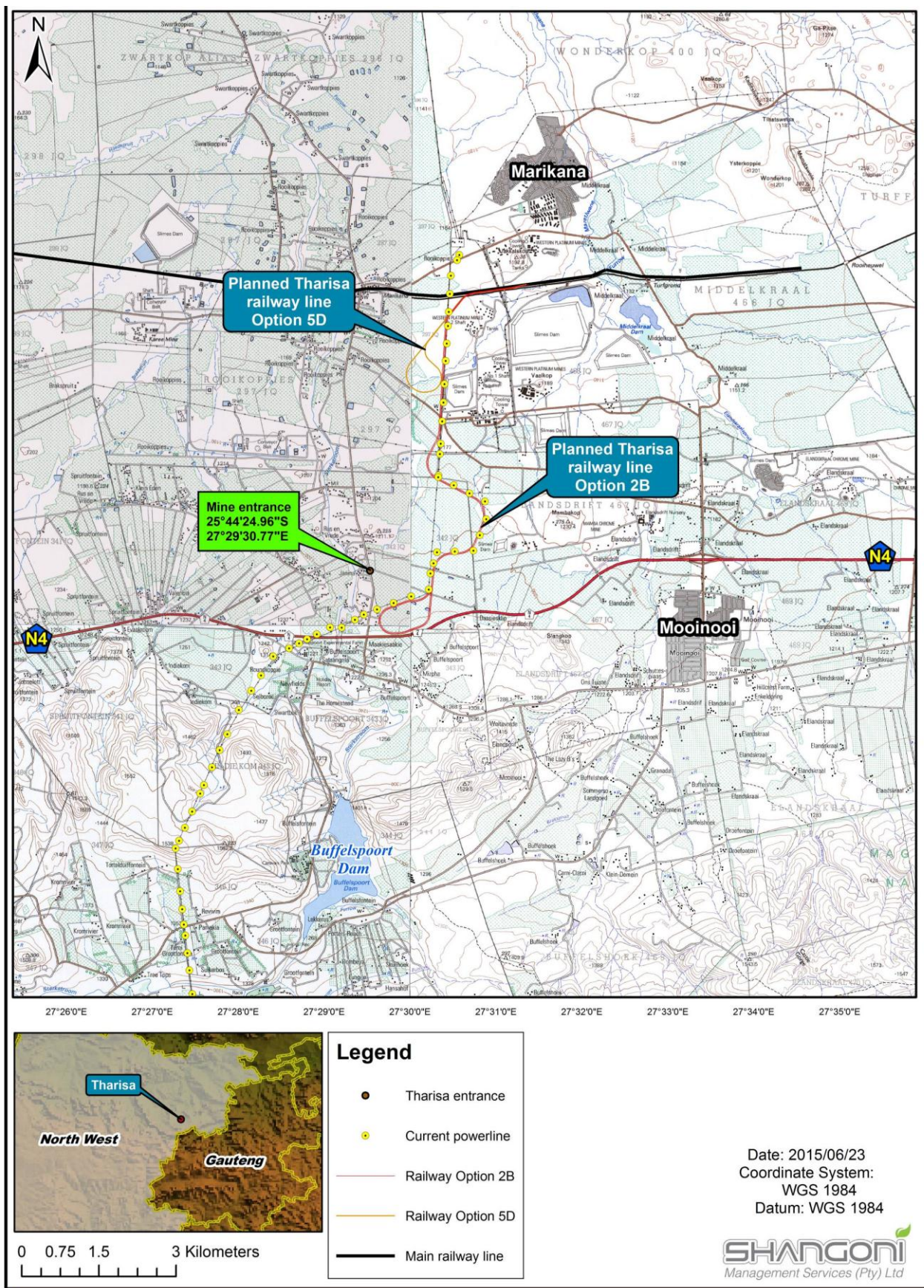


Figure 1. Map showing the location of the proposed new railway line running from the main railway line about 2 km west of the existing Marikana siding, along the 275 kV Eskom line and into the Tharisa mine near Marikana, Northwest Province (Image kindly provided by Shangoni Management Services (Pty) Ltd).



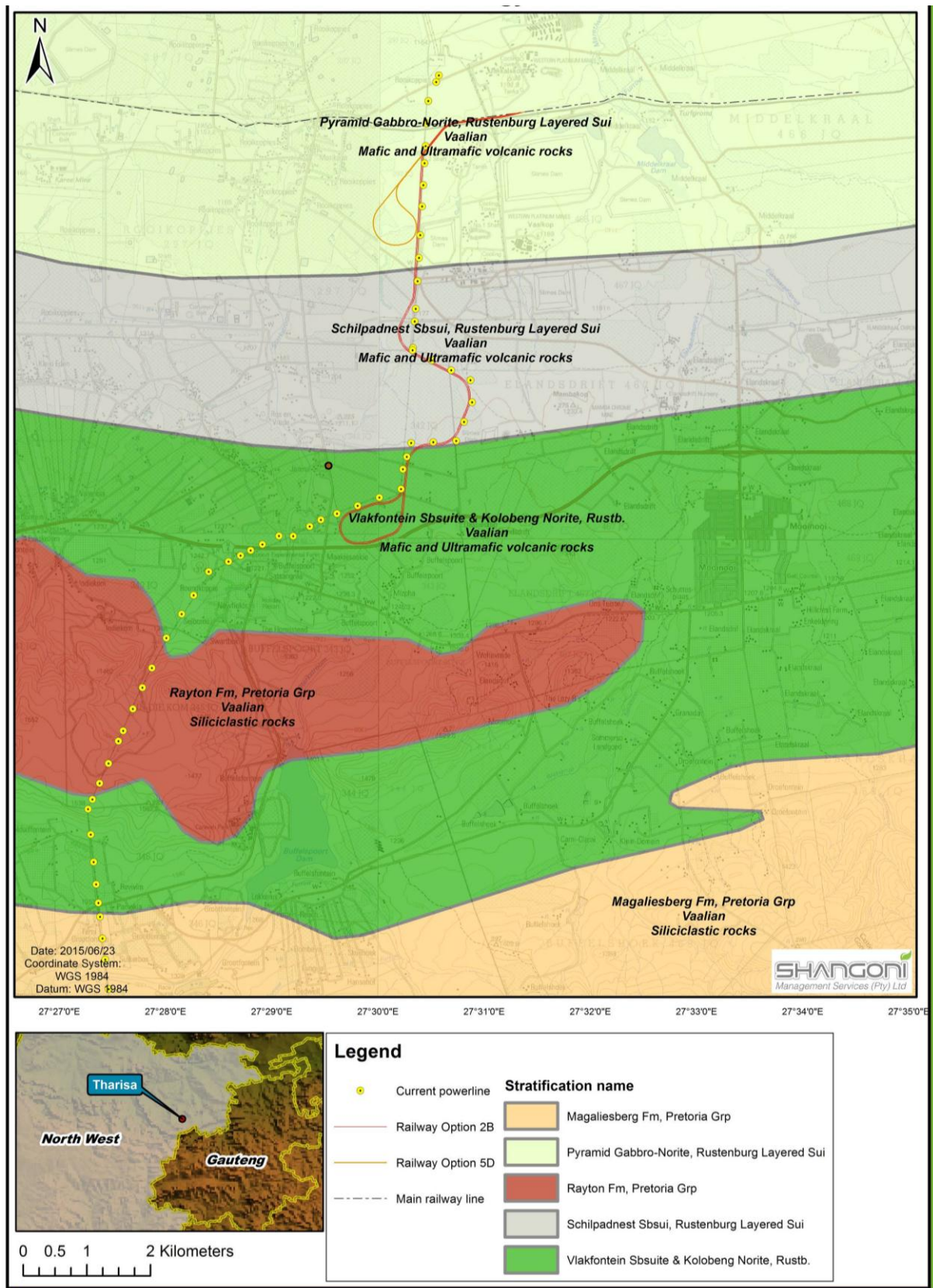


Figure 2. Geological map of the Transnet railway development study area near Marikana, Northwest Province (Image kindly provided by Shangoni Management Services (Pty) Ltd). The area is underlain by a range of Precambrian sedimentary and igneous rocks of the Pretoria Group and Bushveld Complex that are all of low palaeontological sensitivity.

## 5. KEY REFERENCES

- CAWTHORN, R.G., EALES, H.V., WALRAVEN, F., UKEN, R. & WATKEYS, M.K. 2006. The Bushveld Complex. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (eds.) The geology of South Africa, pp. 261-281. Geological Society of South Africa, Johannesburg & the Council for Geoscience, Pretoria.
- EALES, H.V. 2001. A first introduction to the geology of the Bushveld Complex and those aspects of South African geology that relate to it, 84 pp. Council for Geoscience, Pretoria.
- ERIKSSON, P.G. 1999. Pretoria Group. SA Committee for Stratigraphy. Catalogue
- ERIKSSON, P.G., SCHWEITZER, J.K., BOSCH, P.J.A., SCHREIBER, U.M., VAN DEVENTER, J.L. & HATTON, C.J. 1993. The Transvaal Sequence: an overview. Journal of African Earth Sciences (and the Middle East) 16, 25-51.
- ERIKSSON, P.G., HATTINGH, P.J. & ALTERMANN, W. 1995. An overview of the geology of the Transvaal Sequence and Bushveld Complex, South Africa. Mineralium Deposita 30, 98-111.
- ERIKSSON, P.G., ALTERMANN, W. & HARTZER, F.J. 2006. The Transvaal Supergroup and its precursors. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 237-260. Geological Society of South Africa, Marshalltown.
- MACRAE, C. 1999. Life etched in stone. Fossils of South Africa, 305 pp. The Geological Society of South Africa, Johannesburg.
- MCCARTHY, T. & RUBIDGE, B. 2005. The story of Earth and life: a southern African perspective on a 4.6-billion-year journey. 334pp. Struik, Cape Town.
- SAHRA 2013. Minimum standards: palaeontological component of heritage impact assessment reports, 15 pp. South African Heritage Resources Agency, Cape Town.
- TANKARD, A.J., JACKSON, M.P.A., ERICKSSON, K.A., HOBDDAY, D.K., HUNTER, D.R. & MINTER, W.E.L. 1982. Crustal evolution of Southern Africa – 3.8 billion years of earth history. xv + 523 pp. Springer Verlag, New York.
- VISSER, D.J.L. 1989. The geology of the Republics of South Africa, Transkei, Bophuthatswana, Venda and Ciskei and the Kingdoms of Lesotho and Swaziland. Explanation: geological map 1: 1 000 000, 491 pp. Council for Geoscience, Pretoria.
- WALRAVEN, F. 1981. The geology of the Rustenburg area. Explanation to 1: 250 000 geology sheet 2526 Rustenburg, 37 pp. Council for Geoscience, Pretoria.

## 6. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Free State, Mpumalanga and Northwest Provinces under the aegis of his Cape Town-based company *Natura Viva cc*. He has served as a member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).

### Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



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