

## Proposed telecommunications mast on Erf 435, Nieuwoudtville, Namaqua District, Northern Cape

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### EXECUTIVE SUMMARY

The overall palaeontological impact significance of the proposed telecommunication mast project at Nieuwoudtville, Northern Cape, is considered to be VERY LOW because (1) the Dwyka Group glacially-related deposits underlying the project footprint are generally of low palaeontological sensitivity, and are likely to be weathered near-surface; (2) the project footprint is very small and for the most part is already highly disturbed (urban context); (3) deep, voluminous excavations are not envisaged.

**It is therefore recommended that, pending the exposure of significant new fossils during development, exemption from further specialist palaeontological studies and mitigation be granted for this development.**

There are no objections on palaeontological heritage grounds to authorisation of the proposed agricultural development. Should any substantial fossil remains (e.g. vertebrate bones and teeth, shells, calcretised burrows) be encountered during excavation, however, these should be reported to SAHRA for possible mitigation by a professional palaeontologist. A tabulated Chance Fossil Finds protocol is appended to this report. These mitigation recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed development. A tabulated Chance Fossil Finds protocol is appended to this report.

### 1. PROJECT OUTLINE

It is proposed to erect a 25 m-high telecommunications mast and base station on Erf 435, Nieuwoudtville sportsgrounds, Du Toit Street, Nieuwoudtville, Northern Cape (31°22'19.04" S, 19°6'49.10") (Fig. 1). The development will entail the clearance of a 56 m<sup>2</sup> area and excavations to a depth of 1.2 m. A desktop palaeontological heritage comment for the development has been requested by SAHRA in response to the Heritage Screener report submitted by CTS Heritage (2018).

### 2. GEOLOGICAL CONTEXT

The geology of the Calvinia area is outlined on 1: 250 000 sheet 3118 Calvinia (Council for Geoscience, Pretoria) (De Beer *et al.* 2002) (Fig. 2). The telecommunication mast footprint is underlain by Permo-Carboniferous glacially-related sediments of the **Dwyka Group** (Karoo Supergroup). The Dwyka succession on the Calvinia 1: 250 000 sheet is not differentiated into Elandsvlei and Mbizane Formations, as discussed by De Beer *et al.* (2002). The geology of the **Dwyka Group** has been summarized by Visser (1989), Visser *et al.* (1990) and Johnson *et al.* (2006), among others. Dwyka Group facies represented in the region include (a) massive, clast-poor tillites with sporadic boulder-sized glacial erratics of numerous contrasting rock types (igneous / metamorphic / sedimentary) and dispersed, large (meter-scale), oblate ferruginous carbonate

nodules and occasional sedimentary dykes, (b) thin horizons of dark grey dropstone laminites with grit-sized gravels that are overlain by (c) tabular- to lenticular-bedded, dark grey wackes with dispersed limestones. Isolated, boulder-sized limestones of exotic lithologies (e.g. garnetiferous gneiss) are also encountered within laminated mudrocks and are attributed to floating ice sheets or glaciers. The variety of sedimentary facies and subordination of massive tillites to bedded clastics within the upper part of the Dwyka succession in parts of the Calvinia sheet area suggest that at least some of these beds possibly belong to the **Mbizane Formation** ("valley and inlet") facies of the Dwyka Group (Von Brunn & Visser 1999).



Figure 1. Satellite image extracted from Heritage Screener (CTS 2018) showing the location of the proposed telecommunication mast in disturbed terrain on Erf 435, Nieuwoudtville sportsgrounds, Du Toit Street, Nieuwoudtville.

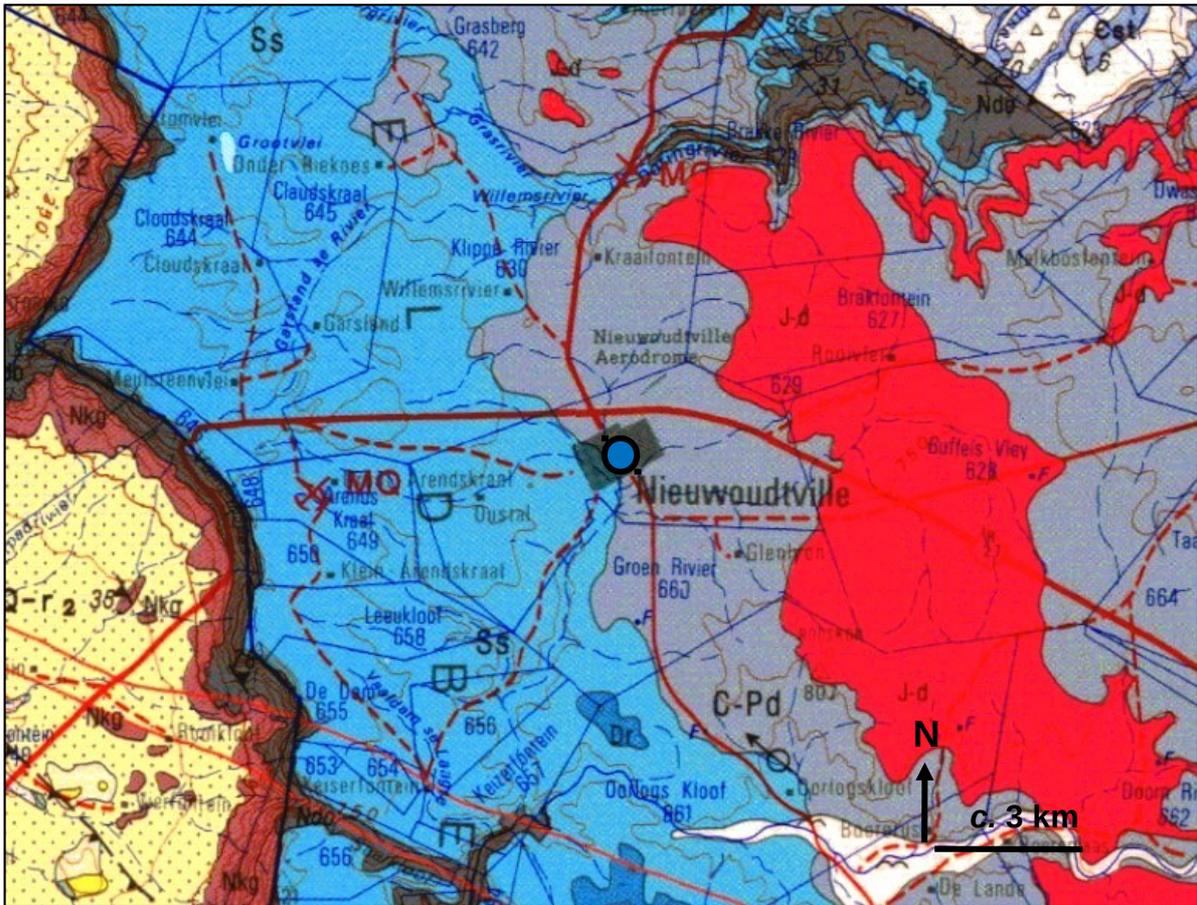


Figure 2. Extract from 1: 250 000 geology Sheet 3118 Calvinia (Council for Geoscience, Pretoria) showing the approximate location of the proposed telecommunications mast at Nieuwoudtville (blue circle). The project area is underlain by glacial tillites of the Permo-Carboniferous Dwyka Group (C-Pd, grey) that are intruded by the Karoo Dolerite Suite (Jd, red) to the east of town (Ecca Group, Karoo Supergroup).

### 3. PALAEOLOGICAL HERITAGE

The fossil record of the Dwyka Group in the Northern Cape has been largely summarized by Almond (2008). A range of stenohaline invertebrate fossils indicates that fully marine salinities prevailed at the end of each deglaciation sequence, at least in the western outcrop area (Namibia, Northern Cape). These include echinoderms (starfish, crinoids, echinoids), cephalopods (nautiloids, goniatites), articulate brachiopods, bryozoans, foraminiferans, and conulariids, among others. Primitive bony fish (palaeoniscoids), spiral “coprolites” attributable to sharks or eurypterids, as well as wood and trace fossils are also recorded from mudrock facies in the Northern Cape (e.g. McLachlan and Anderson 1973). The distinctive thick-shelled bivalve *Eurydesma*, well known from the Dwyka of southern Namibia, has not yet been recorded from the main Karoo Basin, however (McLachlan and Anderson 1973). *Mermia* Ichnofacies trace assemblages dominated by small arthropod trackways (*Umfolozia*, *Maculichna*), arthropod resting traces (*Gluckstadtella*), small “bilobite” scratch burrows and furrows (*Isopodichnus*) and undulose trails generated by the fins and tail of bottom-living fish (*Undichna*) occur widely within interglacial mudrock facies of the Main Karoo Basin. Rare specimens of glossopterid flora plant remains and reworked archaeocyathid limestone erratics are also reported from the Main Karoo Basin.

The palaeosensitivity of the Dwyka Group may be locally medium to high (e.g. invertebrate- and trace fossil-rich horizons) but is generally low, especially within massive tillite facies

#### 4. CONCLUSIONS & RECOMMENDATIONS

The overall palaeontological impact significance of the proposed telecommunication mast development at Nieuwoudtville is considered to be VERY LOW because:

- The Dwyka Group glacially-related deposits underlying the project footprint are generally of low palaeontological sensitivity, and are likely to be weathered near-surface;
- The project footprint is very small and for the most part is already highly disturbed (urban context);
- Deep, voluminous excavations are not envisaged.

**It is therefore recommended that, pending the exposure of significant new fossils during development, exemption from further specialist palaeontological studies and mitigation be granted for this development.**

There are no objections on palaeontological heritage grounds to authorisation of the proposed development. Should any substantial fossil remains (e.g. vertebrate bones and teeth, petrified wood) be encountered during excavation, however, these should be reported to SAHRA. A tabulated Chance Fossil Finds protocol is appended to this report.

These mitigation recommendations should be incorporated into the Environmental Management Programme (EMPr) for the proposed development.

Please note that:

- All South African fossil heritage is protected by law (South African Heritage Resources Act, 1999) and fossils cannot be collected, damaged or disturbed without a permit from SAHRA;
- The palaeontologist concerned with potential mitigation work will need a valid fossil collection permit from SAHRA and any material collected would have to be curated in an approved depository (e.g. museum or university collection);
- All palaeontological specialist work should conform to international best practice for palaeontological fieldwork and the study (e.g. data recording fossil collection and curation, final report) should adhere as far as possible to the minimum standards for Phase 2 palaeontological studies developed by HWC (2016) and SAHRA (2013).

#### 5. KEY REFERENCES

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## 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, Gauteng, KwaZulu-Natal, Mpumalanga, Northwest and Free State under the aegis of his Cape Town-based company *Natura Viva* cc. He has been a long-standing 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.



**Dr John E. Almond**  
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***Natura Viva* cc**

<b>CHANCE FOSSIL FINDS PROCEDURE: Proposed telecommunications mast on Erf 435, Nieuwoudtville</b>	
<b>Province &amp; region:</b>	<b>NORTHERN CAPE, Namaqua District</b>
<b>Responsible Heritage Resources Authority</b>	SAHRA (Contact details: P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502)
<b>Rock unit(s)</b>	Dwyka Group (Karoo Supergroup)
<b>Potential fossils</b>	Trace fossils, plant fossils including petrified wood, rare vertebrate remains (e.g. fish) and invertebrates (e.g. molluscs)
<b>ECO protocol</b>	1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately ( <i>N.B.</i> safety first!), safeguard site with security tape / fence / sand bags if necessary.
	2. Record key data while fossil remains are still <i>in situ</i> : <ul style="list-style-type: none"> <li>• Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo</li> <li>• Context – describe position of fossils within stratigraphy (rock layering), depth below surface</li> <li>• Photograph fossil(s) <i>in situ</i> with scale, from different angles, including images showing context (e.g. rock layering)</li> </ul>
	3. If feasible to leave fossils <i>in situ</i> : <ul style="list-style-type: none"> <li>• Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation</li> <li>• Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Authority for work to resume</li> </ul>
	3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only): <ul style="list-style-type: none"> <li>• <i>Carefully</i> remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)</li> <li>• Photograph fossils against a plain, level background, with scale</li> <li>• Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags</li> <li>• Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist</li> <li>• Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation</li> </ul>
	4. If required by Heritage Resources Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.
5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Authority	
<b>Specialist palaeontologist</b>	Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Resources Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Resources Authority minimum standards.

