PALAEONTOLOGICAL SPECIALIST STUDY: LETTER OF EXEMPTION

Proposed telecommunications mast on Erf 2820, Springbok, Namaqua District, Northern Cape

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September 2018

EXECUTIVE SUMMARY

The proposed telecommunications mast and base station on Erf 2820, 41 Brisson Street in Matjieskloof near Springbok, Northern Cape is underlain by Precambrian gneisses and overlying sandy Late Caenozoic superficial sediments. The overall palaeontological impact significance of the proposed development is considered to be VERY LOW because (1) the metamorphic bedrocks underlying the footprint are entirely unfossiliferous while the overlying Late Caenozoic superficial sediments (colluvial or alluvial sands and gravels) are of low palaeontological sensitivity; (2) the project footprint is very small (56 m^2) and for the most part has already disturbed by urban development; and (3) deep, voluminous excavations are not involved.

It is therefore recommended that, pending the exposure of significant new fossils during construction, 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 telecommunications mast development. Should any substantial fossil remains (*e.g.* vertebrate bones and teeth, shells, calcretised burrows) be encountered during construction, 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.

1. PROJECT OUTLINE

It is proposed to erect a 25 m-high telecommunications mast and base station on Erf 2820, 41 Brisson Street in Matjieskloof, a suburb of the town of Springbok, Namaqua District, Northern Cape (-29.67 S, 17.87 E) (Fig. 1). The development will entail the clearance of a 56 m^2 area and excavations to a depth of > 2 m.

A desktop palaeontological heritage comment for the development has been commissioned by CTS Heritage, Plumstead (Contact details: Ms Jenna Lavin. CTS Heritage, 34 Harries Street, Plumstead, Cape Town, 7800. Tel: +27 (0)87 073 5739. Cell: +27 (0)83 619 0854. E mail: info@ctsheritage.com Web: www.ctsheritage.com).

2. GEOLOGICAL CONTEXT

The telecommunications mast site is situated on arid, low-lying, sandy terrain within the Namaqua *Klipkoppe* region of Namaqualand, Northern Cape (Figs. 1 & 2). Satellite images show that this flat, sandy area situated some 330 m north of the R355 Springbok-Kleinzee road and at *c*. 925 m amsl.

is already disturbed by urban development. A small seasonal drainage line runs *c*. 350 m to the west and the rocky foot slopes of a granite-gneiss *koppie* lie less than 250 m to the north.

The geology of the Springbok region is shown on the 1: 250 000 geology sheet 2916 (Fig. 3) (Council for Geoscience, Pretoria; Marais *et al.,* 2001; Almond 2010). The study area is entirely underlain by Proterozoic (Keisian / Mokolian) basement rocks of the **Namaqua-Natal Province**. These rocks, primarily highly metamorphosed sediments and volcanic rocks (*e.g.* gneisses, schists, quartzites, amphibolites) *plus* major granitic and gabbroic (norite) intrusions, are dated between 2050 and 1000 Ma (million years ago; Cornell *et al*., 2006). They have been assigned to several rock units within the **Little Namaqualand Suite** (*c*. 1200 Ma) such as the Modderfontein and Nababeep Gneisses.

The Precambrian basement rocks are mantled in the study region by more or less unconsolidated **superficial deposits** that are mainly Quaternary to Recent age (*i.e.* last 2.6 Ma) and often thin. These may include rocky colluvium (hillslope deposits such as scree) *plus* gravelly and sandy alluvium along water courses, soils (mainly sandy, but locally calcareous and gypsiferous) and occasional pan sediments. Larger patches or stringers of Quaternary sediments are shown on the 1: 250 000 Springbok sheet (*cf* aeolian sands and pediment deposits **Q-s2**, Fig. 3), including the present study area. These deposits are briefly described by Marais *et al*. (2001). Coarse arkosic (feldspar-rich) sands and gravels derived from weathering of the surrounding granite-gneiss terrain fill many dry valleys between the Namaqua *klipkoppe*. Piedmont sands and gravels mantle the feet of rocky slopes. Reddish to yellowish sands on the Namaqualand coastal plain are sometimes calcretized but calcretized surface deposits are uncommon in the interior.

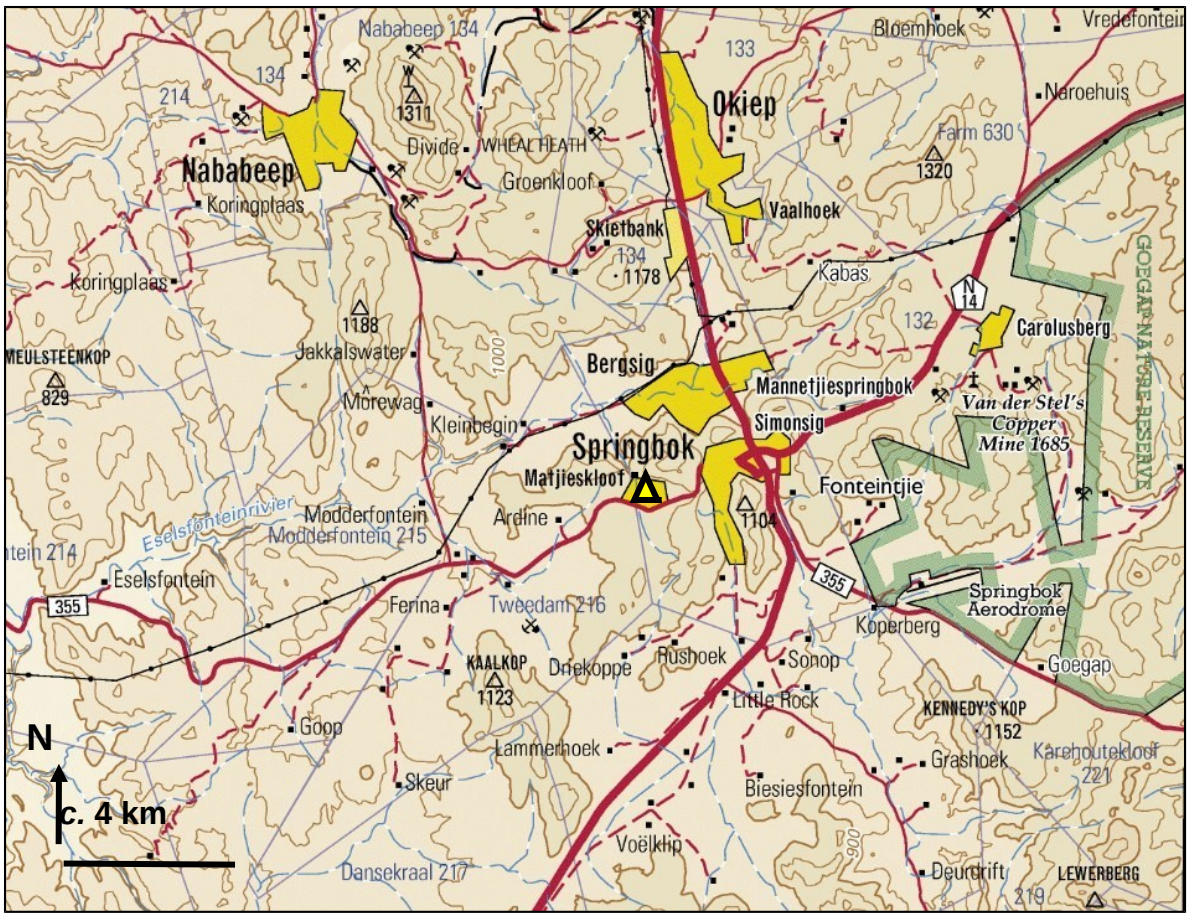

Figure 1. Extract from 1: 250 000 topographical sheet 2916 Springbok (Courtesy of the Chief Directorate: National Geo-Spatial Information, Mowbray) showing the location of the proposed telecommunications mast and base station on Erf 2820, 41 Brisson Street in Matjieskloof, a suburb of the town of Springbok, Namaqua District, Northern Cape (yellow triangle).

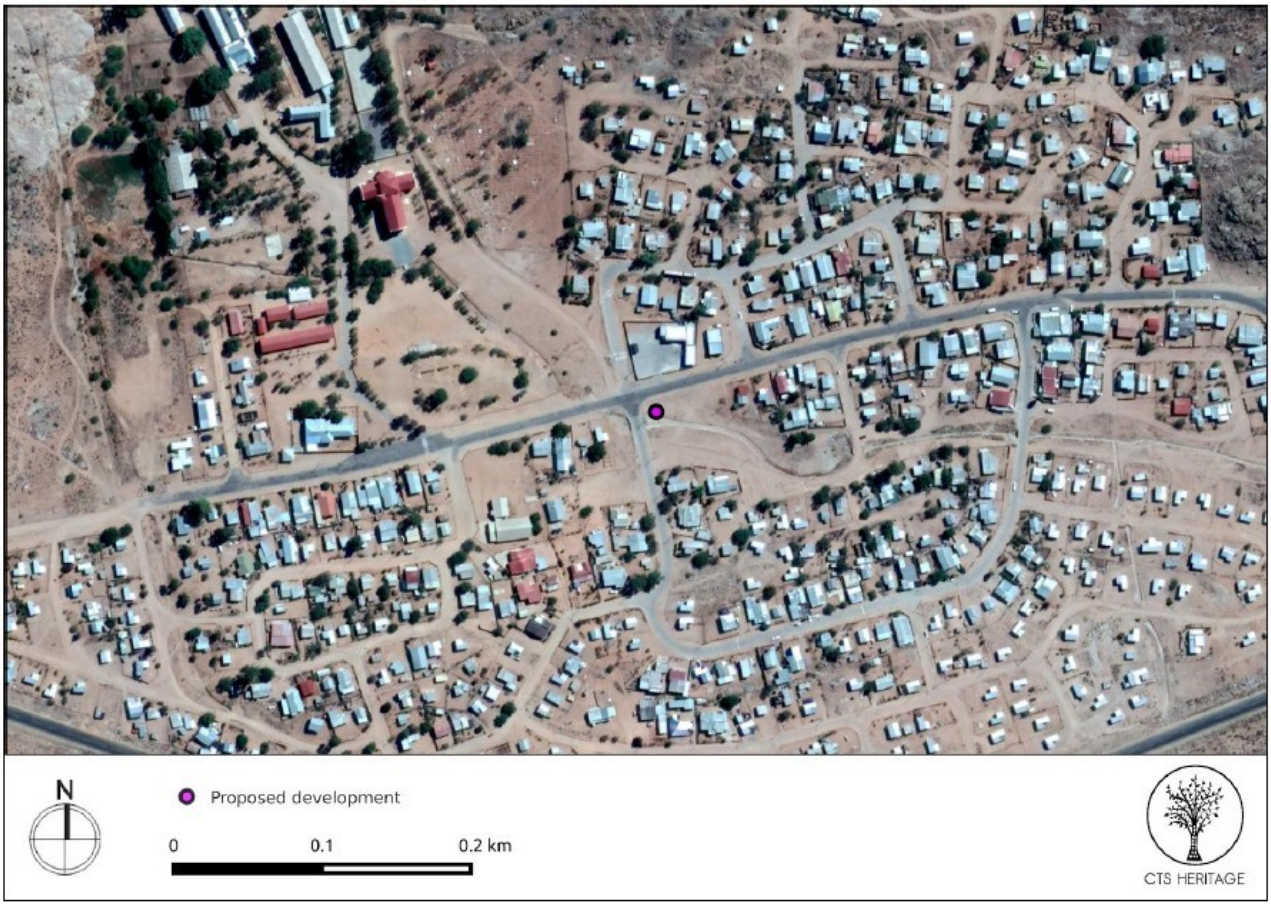

Figure 2. Google Earth© satellite image showing the location of the proposed telecommunications mast and base station on Erf 2820, 41 Brisson Street in Matjieskloof, a suburb of the town of Springbok, Namaqua District, Northern Cape

3. PALAEONTOLOGICAL HERITAGE

The Precambrian granite-gneiss basement rocks of the Namaqua-Natal Province do not contain any fossils because they are igneous in origin or highly metamorphosed (Almond & Pether 2008).

The predominantly porous, sandy superficial deposits in the study area are unlikely to contain substantial fossil remains, and their palaeontological sensitivity is correspondingly low (De Beer *et al*., 2002, Almond & Pether 2008, Macey *et al.* 2011). Fossil land snails have been recorded from near-coastal yellowish to reddish terrestrial sands and overlying calcretes in the Springbok sheet area (Marais *et al.,* 2001, p70). Among the limited range of other fossils that might be encountered within Late Caenozoic surface sediments in the study area are calcretized rhizoliths (root casts), termitaria and other burrows, freshwater molluscs, ostrich egg shells, sparse bones, teeth and horn cores of mammals, and tortoise remains. Finer-grained river and pan sediments may contain fossils of fish, frogs, molluscs, crustaceans (crabs, ostracods, phyllopods such as conchostracans) as well as microfossils such as diatoms, palynomorphs and macroplant remains (*e.g.* wood, peats). There are no fossil records of Tertiary or Quaternary vertebrates from the study region mentioned in the key reviews by Hendey (10984) and Klein (1984).

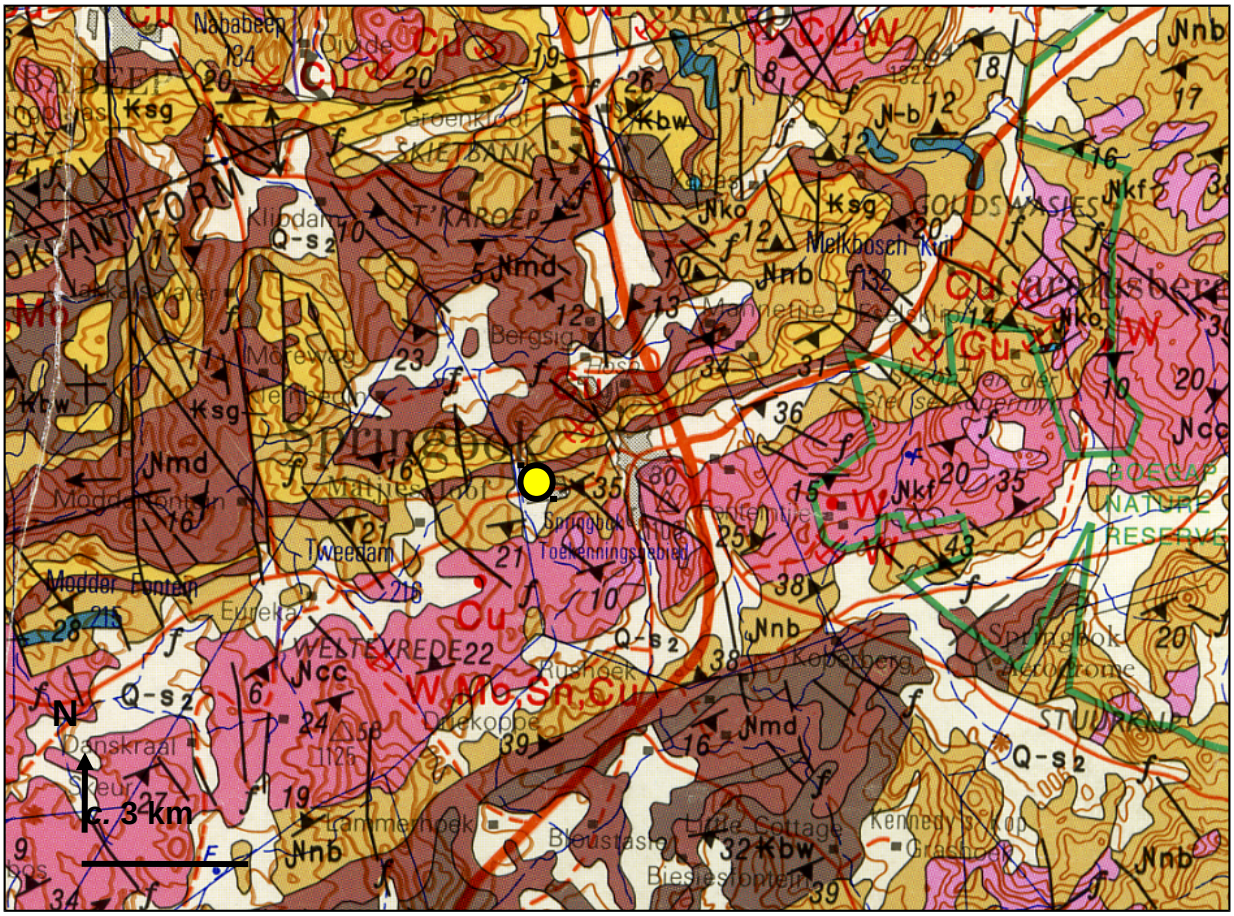

Figure 3. Extract from 1: 250 000 geology Sheet 2916 Springbok (Council for Geoscience, Pretoria) showing the location of the proposed telecommunications mast near Springbok, Northern Cape (yellow circle). The project area is underlain by Precambrian high grade metamorphic bedrocks of the Little Namqualand Suite, Namaqua-Natal Province (Nmd, dark brown = Modderfontein Gneiss; Nnb, pale brown = Nababeep Gneiss). These bedrocks are mantled by sandy to gravelly alluvium and colluvium (Q-s2, white) between the gneiss *koppies*.

4. CONCLUSIONS & RECOMMENDATIONS

The overall palaeontological impact significance of the proposed telecommunications mast and base station on Erf 2820, 41 Brisson Street in Matjieskloof near Springbok is considered to be VERY LOW because:

- The Precambrian metamorphic bedrocks underlying the project footprint are entirely unfossiliferous while the overlying Late Caenozoic superficial sediments (colluvial or alluvial sands and gravels) are of low palaeontological sensitivity;
- The project footprint is very small (56 m^2) and for the most part has already been disturbed by urban development;
- Deep, voluminous excavations are not involved.

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 telecommunications mast development. Should any substantial fossil remains (*e.g.* vertebrate bones and teeth, fossil shells, calcretised burrows) be encountered during excavation, however,

these should be reported to SAHRA for possible specialist mitigation. 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

ALMOND, J.E. 2008. Fossil record of the Loeriesfontein sheet area (1: 250 000 geological sheet 3018). Unpublished report for the Council for Geoscience. Pretoria, 32 pp. Natura Viva cc, Cape Town.

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MARAIS, J.A.H., AGENBACHT, A.L.D., PRINSLOO, M. & BASSON, W.A. 2001. The geology of the Springbok area. Explanation to 1: 250 000 geology Sheet 2916 Springbok, 103 pp. Council for Geoscience, Pretoria.

SAHRA 2013. Minimum standards: palaeontological component of heritage impact assessment reports, 15 pp. South African Heritage Resources Agency, Cape Town.

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
Palaeontologist
***Natura Viva* cc**

<table>
<tr><td colspan="3">CHANCE FOSSIL FINDS PROCEDURE: Proposed telecommunications mast and base station, Erf 2820, Matjieskloof near Springbok</td></tr>
<tr><td>Province & region:</td><td colspan="2">NORTHERN CAPE, Namaqua District Municpality (Nama Khoi Local Municipality)</td></tr>
<tr><td>Responsible Heritage Resources Authority</td><td colspan="2">SAHRA (Contact details: P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502)</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Late Caenozoic alluvium</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Calcretized rhizoliths (root casts), termitaria and other burrows, freshwater molluscs, ostrich egg shells, sparse bones, teeth and horn cores of mammals, and tortoise remains</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
Context – describe position of fossils within stratigraphy (rock layering), depth below surface
Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation
Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Authority for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
Photograph fossils against a plain, level background, with scale
Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
Alert Heritage Resources Authority and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Resources Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Authority</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">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.</td></tr>
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