

## Appendix G-7 – Palaeontological

## **Proposed Memorial Park on Farm RE/502 Louw's Bos near Stellenbosch, Cape Winelands District Municipality, Western Cape**

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### **EXECUTIVE SUMMARY**

Late Caenozoic superficial deposits (sandy to gravelly soils, ferricretes) as well as the underlying, deeply-weathered granitic bedrocks of the Late Precambrian – Early Cambrian Cape Granite Suite on the two Memorial Park study areas on Farm Louw's Bos RE/502 are all of low to very low palaeontological sensitivity. No fossil remains were recorded here during a short palaeontological site visit. The proposed cemetery development is very unlikely to entail significant impacts on palaeontological heritage. There is no preference on palaeontological heritage grounds for one or other site. There are no objections on palaeontological heritage grounds to authorisation of the proposed development.

**It is recommended that, pending the exposure of significant new fossils (e.g. mammalian bones and teeth) during construction, exemption from further specialist palaeontological studies and mitigation be granted for this development.**

If fossil material is discovered during construction, this should be safeguarded, preferably *in situ*, and the ECO should alert Heritage Western Cape (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za) so that appropriate mitigation (*i.e* recording, sampling or collection) can be taken by a professional palaeontologist. A tabulated Chance Fossil Finds Protocol is appended to this report. These recommendations should be incorporated into the Environmental Management Plan for the proposed developments.

### **1. PROJECT OUTLINE**

It is proposed to establish a new Memorial Park on Farm RE/502 Louw's Bos, situated either side of the Annandale Road near Jamestown and approximately 7 km SW of Stellenbosch in the Cape Winelands District Municipality, Western Cape (Figs. 1 & 2). Two Municipal Approved Areas are under consideration (blue polygons in Fig. 2). The proposed development footprint will occupy approximately 30 ha and will comprise a cemetery and memorial park, promoting the conservation of sensitive biodiversity areas which may exist within the development footprint. Proposed associated infrastructure includes access roads leading to and within the site, entrance wall and perimeter fencing, parking, a remembrance wall, ablutions and a possible borehole.

A desktop Heritage Screener for the development has been submitted by CTS Heritage, Plumstead (5 March 2018). The present combined desktop and field-based palaeontological heritage comment has been commissioned by CK Rumboll & Partners, Malmesbury (Contact details: Mr Ruben Bower. CK Rumboll & Partners, PO Box 221, 16 Rainiersstraat, Malmesbury 7299. Tel: 022 482 1845. E-mail: leap@rumboll.co.za). A short palaeontological site visit was undertaken by the author on 7 November 2018 to supplement the desktop study.



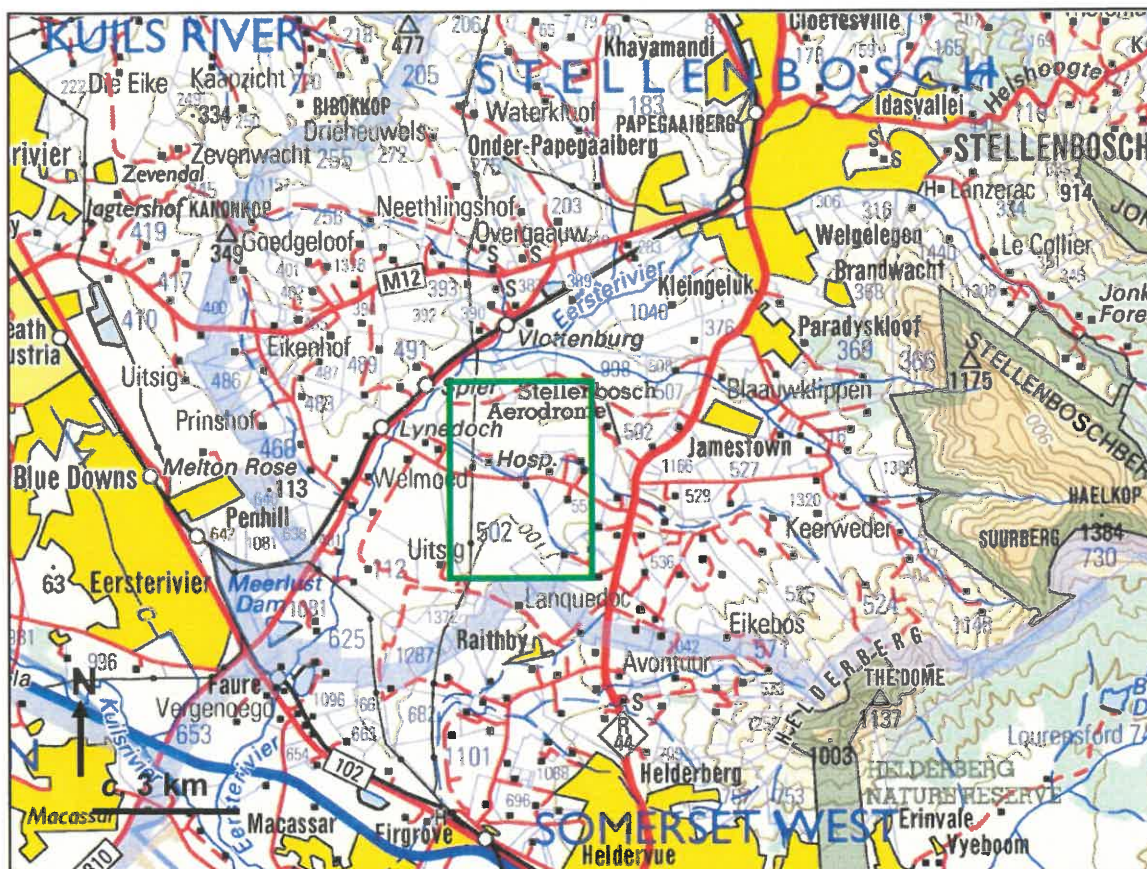


Figure 1. Extract from 1: 250 000 topographical sheet 3318 Cape Town (Courtesy of the Chief Directorate: National Geo-Spatial Information, Mowbray) showing the approximate location of the proposed Memorial Park study area on Farm RE/502 Louw's Bos near Stellenbosch, Western Cape (green rectangle).

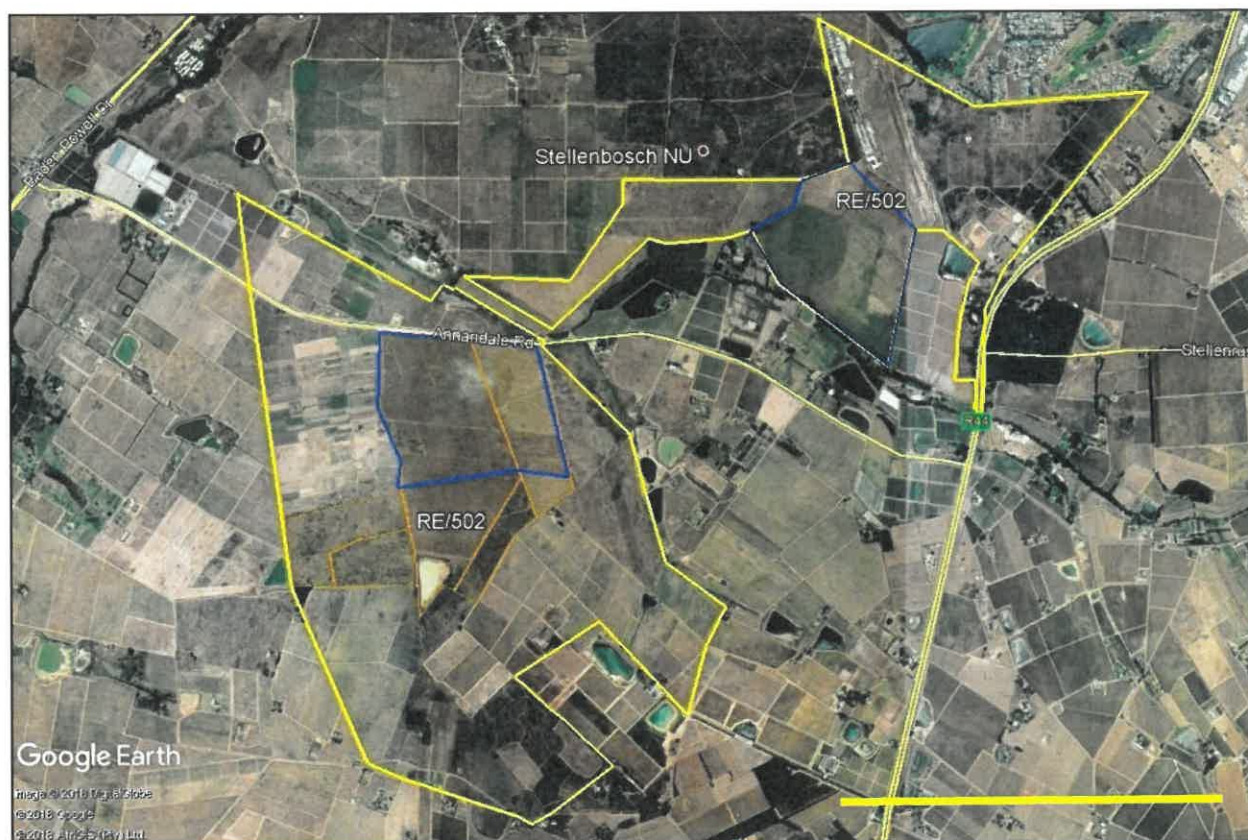


Figure 2. Google Earth© satellite image of Farm RE/502 Louw's Bos (yellow polygon) located on either side of Annandale Road near Jamestown, c. 7 km SW of Stellenbosch. The

two Municipal Approved Areas are indicated by the blue polygons. The study area comprises agricultural lands and grassy fields with no obvious bedrock exposure. Pale clays and saprolite derived from weathered granitic bedrocks are visible in the large dam on the southern portion of the farm. Scale bar = 2 km.

## 2. GEOLOGICAL CONTEXT

The northern study site on Farm RE/502 Louw's Bos (Fig. 5) is situated close to Stellenbosch Aerodrome and comprises grassy terrain at between 70-90 m amsl that slopes gently down towards the Bonterivier and the Annandale Road in the SW. The southern study site (Fig. 4) slopes northwards from c. 100 to 60 m amsl and largely comprises grassy to bushy fallow agricultural lands with some disturbance in the form of drainage ditches, small farm dams and farm tracks.

The geology of the two study areas near Stellenbosch is very similar and is shown on 1: 250 000 geology sheet 3318 Cape Town (Fig. 3) (Theron *et al.* 1992). The areas are underlain at depth by Late Precambrian to Early Cambrian granites of the **Cape Granite Suite** (Scheepers & Schoch 2006) – in this case the coarse-grained, porphyritic **Kuilsrivier – Helderberg Pluton** (N-Ck, orange in Fig. 3) but fresh (unweathered) Cape Granite is not exposed here. Pale grey, to creamy kaolinitised granite *saprolite* (*in situ* weathered bedrock) is exposed in the lower parts of the large farm dam in the southern sector of Louw's Bos as well as in several drainage ditches (Figs. 6 & 7). This is overlain locally by up several meters of granite saprolite slurry (possibly of debrite origin, or perhaps generated during dam construction) consisting of poorly-sorted, highly-weathered granitic and ferricrete within a clay-rich matrix (Figs. 8 & 9). A well-developed, finely- to coarsely gravelly **ferricrete hardpan** (< 1m) directly overlies the weathered bedrock and is seen *in situ* along drainage ditches in the southern sector of the study area (Fig. 10). Blocks of ferricrete have been extensively used to armour the dam walls. Local heaps of well-rounded Table Mountain Group quartzite boulders might be relicts of pre-existing High Level Gravel terraces (perhaps cleared from fields) or have been imported from elsewhere for construction purposes (Fig 13). Farm tracks and fields feature **sandy surface soils** with abundant fine to rubbly ferricrete gravels, occasional blocks of kaolinitised granite and *Grus* (quartzo-feldspathic grits derived from weathered granite), as well as sporadic cobbles of Table Mountain Group quartzite (Fig. 11). Some of these last are anthropogenically flaked (Fig. 12) and it is noted that Early Stone Age (Acheulean) artefacts of the local Stellenbosch Industry have been reported at several sites in the region, including near Lynedoch some 3 km to the northwest (*cf* Péringuey & Corstophine 1900, Seddon 1966, 1967).



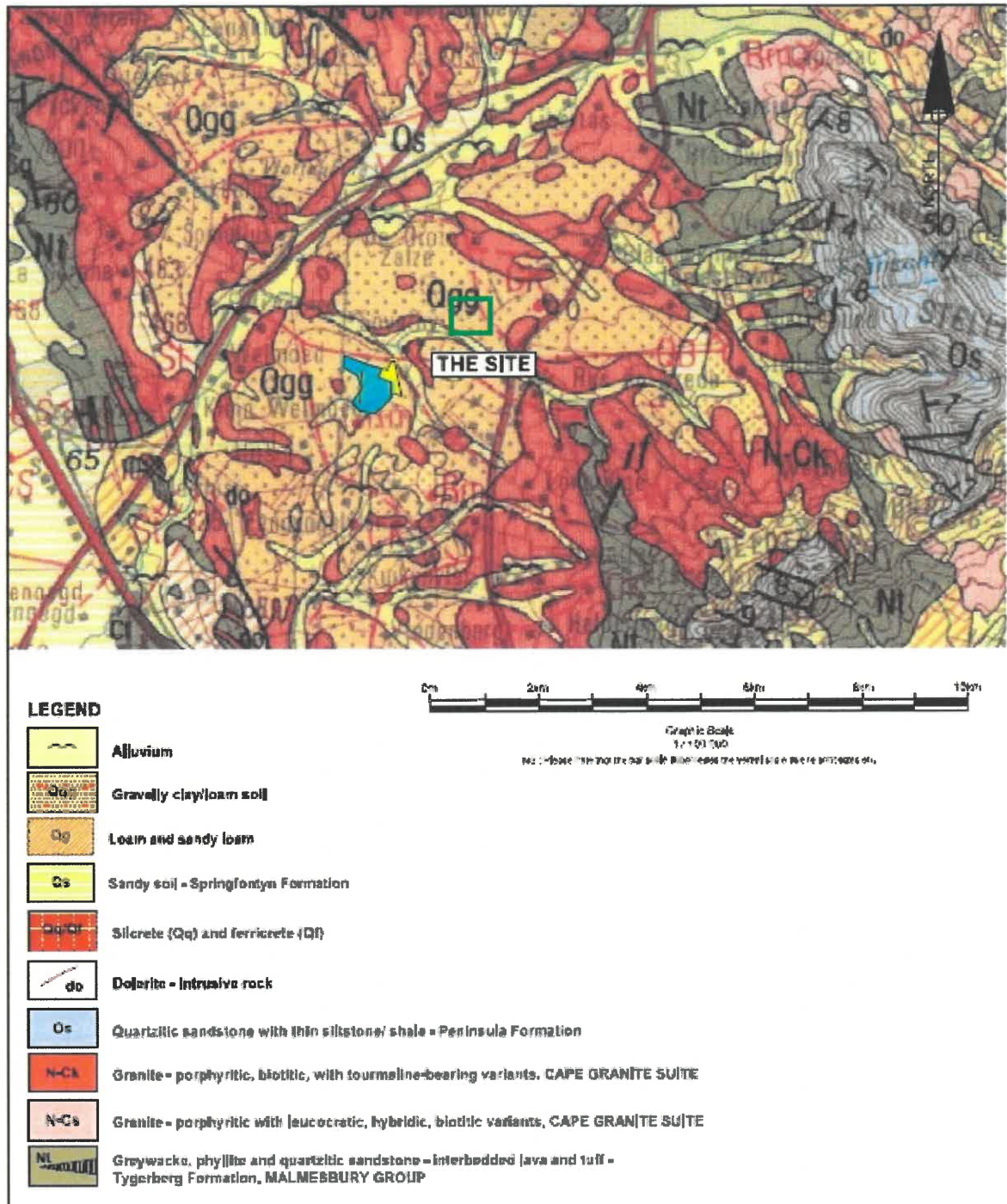


Figure 3. Geological map of the RE/502 Louw's Bos Memorial Park study sites (pale blue and green polygons) based on 1: 250 000 geological sheet 3318 Cape Town (Council for Geoscience, Pretoria) (Image slightly modified from 2018 geotechnical report by Gondwana Geo Solutions (Pty) Ltd, Durbanville). Both study sites are underlain at depth by weathered granitic saprolite of the Cape Granite Suite (Kuilsrivier – Helderberg Pluton, N-Ck, orange) that is mantled by Late Caenozoic loamy and sandy soils (Qg, yellow with orange cross-hatch) as well as ferricrete (Qf).



**Figure 4. Overgrown, grassy, gently sloping fallow lands in the southern study area on Farm RE/502 Louw's Bos, viewed from the NW.**



**Figure 5. Gently-sloping grassy fields in the northern study area on Farm RE/502 Louw's Bos, viewed from the N.**





**Figure 6.** Deep excavation into pale cream to pinkish granitic saprolite and overlying weathered regolith along the margins of a large dam in the southern sector of Louw's Bos 502. The upper walls of the dam are armoured by locally-derived ferricrete blocks.



**Figure 7.** Close-up of clay-like *in situ* granite saprolite exposed in the farm dam basin shown above (Hammer = 30 cm).





**Figure 8.** Close-up of pinkish, poorly sorted regolith with highly-weathered clasts of granite and reddish-brown ferruginous sandstone or ferricrete exposed in the upper part of the dam wall (Scale in cm). These deposits may be of ancient debris flow origin or were perhaps generated during dam wall construction.



**Figure 9.** Sandy ferricrete rubble overlying pale kaolinitized granite saprolite within the main farm dam basin (Hammer = 30 cm).





**Figure 10. Thick ferricrete hardpan exposed in the wall of a drainage ditch, southern sector of Louw's Bos 502 (Hammer = 30 cm).**



**Figure 11. Farm track in the southern sector of Louw's Bos 502 exposing the near-surface, rusty-brown ferricrete hardpan and overlying gravelly sands with sporadic pale yellowish-grey cobbles of Table Mountain Group quartzite (Hammer = 30 cm).**





**Figure 12. Flaked quartzite artefact (ESA biface) at surface among downwasted fericrete gravels in the southern sector of Louw's Bos 502 (Scale in cm). Hand axes of the Stellenbosch Industry were among the first stone tools recorded from the SW Cape.**



**Figure 13. Heaps of well-rounded Table Mountain Group quartzite boulders in the southern sector of Louw's Bos 502. It is unclear if these are High Level terrace gravels of local provenance or were imported from elsewhere (Hammer = 30 cm).**



### 3. PALAEOLOGICAL HERITAGE

The Late Precambrian to Cambrian **Cape Granites** represented at depth beneath the Louw's Bos 502 study areas are entirely unfossiliferous igneous rocks.

The **Late Caenozoic residual and sandy soils** mantling the weathered bedrocks in the two study areas are generally of low palaeontological sensitivity. They might locally contain sparse remains of transported plant material (e.g. peats, subfossil wood), calcretized rhizoliths (root casts), termitaria and other burrows, freshwater invertebrates (e.g. molluscs such as unionid bivalves, gastropods), tortoise remains or rare mammalian bones, horn cores and teeth (*cf* Klein 1983, 1984). To the author's knowledge, fossils have not been recorded from within the widespread Late Caenozoic **ferricretes** of the interior Western Cape. However, at near-coastal fossil dune sites (e.g. Elandsfontein near Saldanha) mammalian bones and teeth as well as stone artefacts of Pleistocene and younger age may be deflated down onto the upper surface of ferricrete hardpans. These were often formed in areas of high water tables, such as around vleis and streams, that would have attracted game animals as well as humans, amphibians and freshwater molluscs in the past (*cf* Roberts 1996, Klein *et al.* 2006). There are no fossil records of Tertiary or Quaternary vertebrates from the study region mentioned in the key reviews by Hendey (1984) and Klein (1984).

No fossil remains were recorded on Farm Re/502 Louw's Bos during the short palaeontological site visit. It is concluded that the palaeontological sensitivity of the Memorial Park study areas is very low.

### 4. CONCLUSIONS & RECOMMENDATIONS

Late Caenozoic superficial deposits (sandy soils, ferricrete) as well as the underlying, deeply-weathered Cape Granite in the Memorial Park study area are all of low to very low palaeontological sensitivity (Almond & Pether 2008). The proposed cemetery development is very unlikely to entail significant impacts on palaeontological heritage. There is no preference on palaeontological heritage grounds for one or other of the development sites under consideration. There are no objections on palaeontological heritage grounds to authorisation of the proposed development.

**It is recommended that, pending the exposure of significant new fossils (e.g. mammalian bones and teeth) during construction, exemption from further specialist palaeontological studies and mitigation be granted for this development.**

If fossil material is discovered during construction, this should be safeguarded, preferably *in situ*, and the ECO should alert Heritage Western Cape (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za) so that appropriate mitigation (*i.e* recording, sampling or collection) can be taken by a professional palaeontologist. The specialist involved in mitigation work would require a collection permit from Heritage Western Cape. Fossil material must be curated in an approved repository (e.g. museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA (2013). A tabulated Chance Fossil Finds Protocol is appended to this report. These recommendations should be incorporated into the Environmental Management Plan for the proposed developments.

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 Heritage Western Cape or SAHRA;

- The palaeontologist concerned with potential mitigation work will need a valid fossil collection permit from HWC or 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 AHP (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**



<b>CHANCE FOSSIL FINDS PROCEDURE: Proposed Memorial Park on Farm Louw's Bos RE/502 near Stellenbosch</b>	
<b>Province &amp; region:</b>	<b>WESTERN CAPE, Cape Winelands District Municipality</b>
<b>Responsible Heritage Resources Authority</b>	Heritage Western Cape (Contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za)
<b>Rock unit(s)</b>	Weathered Cape Granite, Late Caenozoic soils, ferricretes, alluvium
<b>Potential fossils</b>	Calcretized rhizoliths (root casts), temitaria and other burrows, freshwater molluscs, ostrich egg shells, sparse bones, teeth and horn cores of mammals, and tortoise remains
<b>ECO protocol</b>	<p>1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (<i>N.B. safety first!</i>), safeguard site with security tape / fence / sand bags if necessary.</p> <p>2. Record key data while fossil remains are still <i>in situ</i>:</p> <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> <p>3. If feasible to leave fossils <i>in situ</i>: 3. If <i>not</i> feasible to leave fossils <i>in situ</i> (emergency procedure only):</p>
	<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> <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.