

**SAHRA CASE ID: 14268**

**BRIEF PALAEOLOGICAL ASSESSMENT  
WITH CHANCE FOSSIL FINDS PROCEDURE**

**UPGRADE OF THE KOMAGGAS WATER SUPPLY SYSTEM**

**Kamaggas 200, Nama Khoi Local Municipality, Namakwa District Municipality  
Namaqualand Magisterial District, Northern Cape Province**

By

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**CLIENT**

**Nama Khoi Local Municipality**

**14 MARCH 2020**

## SUMMARY

Komaggas is a historically venerable small town in Namaqualand located at the inner edge of the coastal plain in the granite-gneiss foothills of the Escarpment, in the headwaters of the ephemeral Komaggasrivier (Figure 1). Growth in the Komaggas community has led to an increased need for potable water and the Nama Khoi Local Municipality has embarked on a project to upgrade the water supply.

EnviroAfrica cc is conducting the Environmental Impact Assessment on behalf of the Nama Khoi Local Municipality and has appointed ACRM to conduct the Heritage Impact Assessment (HIA) for the proposed project. As requested by the South African Heritage Resources Agency (SAHRA), the HIA must include palaeontological input such as a Fossil Finds Procedure (FFP) in case of chance fossil finds in construction earthworks. This brief report fulfils this requirement.

The project involves, *inter alia*, the replacement of the water main pipeline extending from the reservoir at Buffelsrivier village, which is installed shallowly underground in late Quaternary (Q-s<sub>2</sub>) deposits up to the Voorberg location, from where it proceeds above ground across the gneiss bedrock (Figure 2). The anticipated impact of shallow earthworks in the superficial Quaternary deposits is rated as LOW, in conformity with the S. Afr. Heritage Information System (SAHRIS) Palaeontological Sensitivity Map (Figure 3). Furthermore, the new water main pipeline replaces the old pipeline in the existing disturbed material of the shallow trench, further decreasing the potential for fossil finds.

Notwithstanding, although improbable, a chance occurrence of fossil bone material cannot be entirely dismissed. The monitoring of excavations by on-site personnel is recommended during installation of the upgraded water supply infrastructure, under supervision of the Environmental Control Officer (ECO). As part of Environmental and Health & Safety awareness training, personnel must be instructed to be alert for the occurrence of fossil bones, buried archaeological material and of unrecorded burials. A basic Fossil Find Procedure is provided, for incorporation into the Environmental Management Programme for the project.

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# 1 BACKGROUND

Komaggas is a historically venerable small town in Namaqualand located at the inner edge of the coastal plain in the granite-gneiss foothills of the Escarpment, in the headwaters of the ephemeral Komaggasrivier (Figure 1). Due to having water sources, it was likely a place of assembly in pre-colonial times and later an important oasis settlement for subsequent travellers. Growth in the Komaggas community has led to an increased need for potable water and the Nama Khoi Local Municipality has embarked on a project to upgrade the water supply.



**Figure 1. The Project Area for the Komaggas Water Supply showing the pipelines to be upgraded, reservoirs, pump stations and boreholes.**

EnviroAfrica cc is conducting the Environmental Impact Assessment on behalf of the Nama Khoi Local Municipality and has appointed ACRM to conduct the Heritage Impact Assessment (HIA) for the proposed project. As requested by the South African Heritage Resources Agency (SAHRA), the HIA must include an Archaeological Impact Assessment (AIA) and

palaeontological input such as a Fossil Finds Procedure (FFP) in case of chance fossil finds in construction earthworks. This brief report fulfils the latter requirement.

## **2 LOCATION**

The Project Area is about 60 km west of Springbok by road, in the Nama Khoi Local Municipality, Namakwa District Municipality, Namaqualand Magisterial District, Northern Cape. The Project Area is on the property Komaggas 200. The relevant maps are:

1:250 000 Topo-cadastral Sheet 2916 SPRINGBOK. CD NGI.

1:250 000 Geological Sheet 2916 SPRINGBOK. CGS.

The Project Area straddles the following 1:50 000 Topo-cadastral Mapsheets:

- 2917CD KOMAGGAS
- 2917DA BUFFELSRIVIER
- 2917DC DRIERIVIER

## **3 LOCALITY PLAN**

The main components of the Water Supply System Upgrade are shown in Figure 1 and are briefly described below.

## **4 DESCRIPTION OF THE PROPOSED ACTIVITY**

The new boreholes already installed are to be connected with pipelines and electrical power supplies.

The existing boreholes, reservoirs and pump stations are to be refurbished.

The service roads to all boreholes will be upgraded.

Refurbishment of the water-main pipelines from Buffelsrivier to Komaggas. New plastic (PVC) pipelines 160 mm in diameter will be installed underground (Figure 1: brown & cyan) and new steel pipelines 150 mm in diameter will be installed above ground on small concrete plinths (Figure 1: orange & blue).

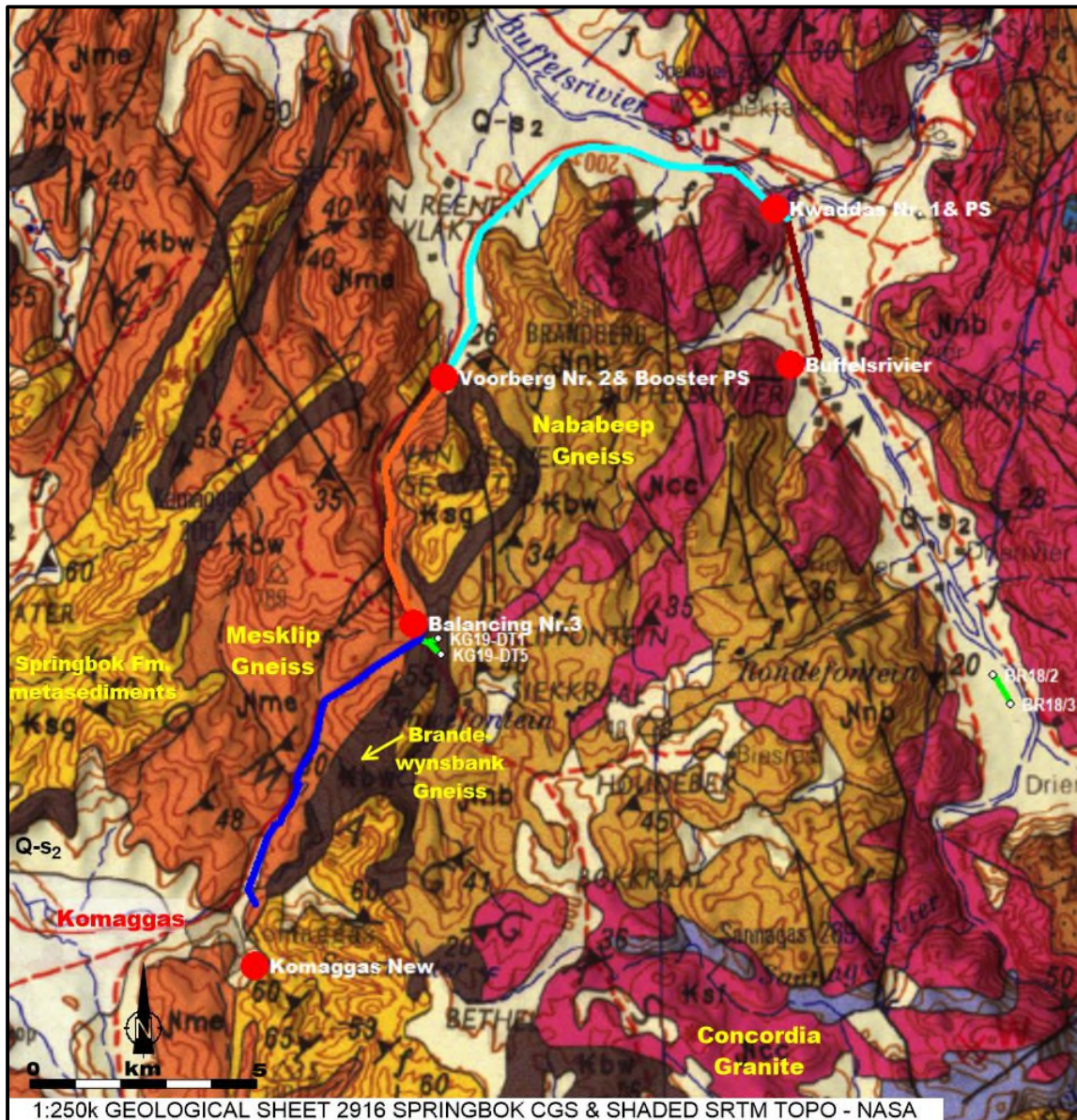
A new 1.5 megalitre concrete water reservoir will be constructed adjacent the existing reservoir at Komaggas.

## **5 ANTICIPATED IMPACT ON PALAEOLOGICAL RESOURCES**

Bedrock outcrops of crystalline gneisses, metasediments and granites form the hilly terrain of the Project Area (Figure 2) (Marais *et al.*, 2001). These rocks are older than ~1000 Ma (Ma = million years ago) and are not fossiliferous. Between the Voorberg Pump Station and Komaggas the steel water main traverses the Mesklip Gneiss, running above ground on existing small plinths alongside the road. The superficial cover consists mainly of bedrock regolith and gravelly colluvial soils which are very poorly fossiliferous and the additional activities are not expected to impact on palaeontological resources (Figure 3).

Between the Buffelsrivier and Voorberg reservoirs the new, replacement water main is to be installed below ground in the superficial deposits flanking the Buffelsrivier. These deposits are mapped as Quaternary to Recent Unit Q-s<sub>2</sub> (Figure 2) which is comprised of aeolian coversands, colluvial sheetwash deposits, buried soils and pedocretes such as calcrete. Interbedded alluvial deposits occur in the vicinity of the ephemeral watercourses. Where the pipeline runs parallel to the left bank of the Buffelsrivier, its alluvium is expected to occur beneath the superficial soil. Alluvial deposits may include the remains of larger mammals

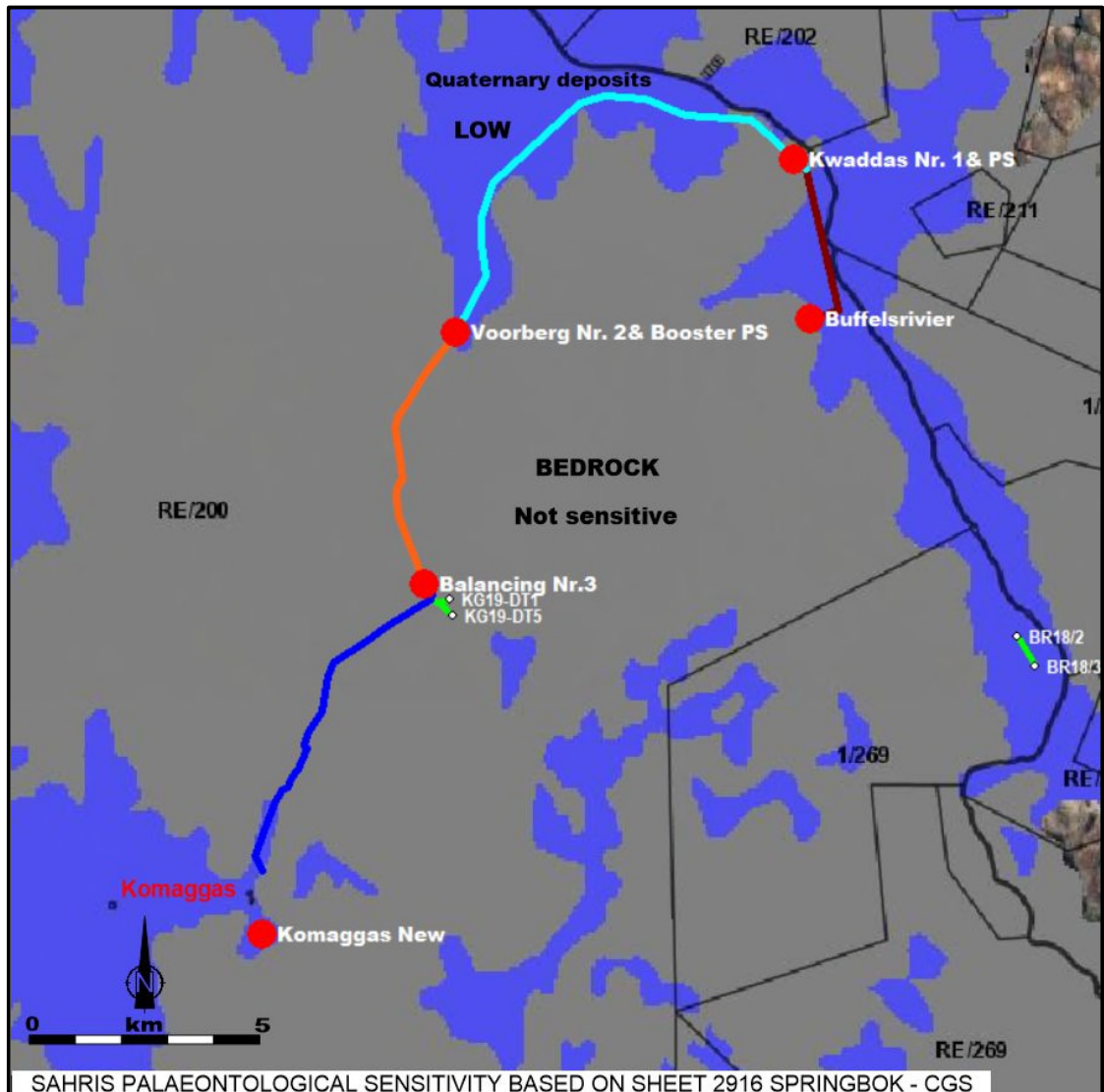
incorporated during flood deposition, but the shallow trench is not expected to disturb large volumes of the alluvial deposits. Where the route skirts the edge of Van Reenen se Vlakte (Figure 1), colluvial soils and aeolian sands are expected.



**Figure 2. Geology of the Project Area.**

The deposits of the subsurface are expected to be young (late Quaternary, Q-s2) and poorly fossiliferous, particularly since much of the deposits are colluvial in origin. The preservation potential of fossil bones in the colluvial slope environment is low due to the likelihood of long exposure of bones on the surface prior to possible burial, with concomitant disintegration due to weathering. Fossil bones are seldom found in such deposits, but are expected to occur very sporadically as fragmented material and teeth which have been washed into the local alluvium of ephemeral, shallow channels during occasional deluges. Fossil bones may occur in burrows that were occupied by jackals and other carnivores, but these occurrences are also rare. Trace fossils such as fossil roots and termite burrows and nests are expected, but these are common features in such deposits.

The assigning of a rating for the palaeontological impact is guided by the 'Sensitivity Rating' provided in Appendix 1. Accordingly the anticipated impact of earthworks in the late Quaternary, Q-s2 deposits is rated as LOW, in conformity with the S. Afr. Heritage Information System (SAHRIS) Palaeontological Sensitivity Map (Figure 3).



**Figure 3. Palaeontological sensitivity of the Project Area. Grey – no palaeontological studies required. Blue/Low - no palaeontological studies, but a protocol for fossil finds is required.**

## 6 RECOMMENDATIONS

No areas of particular palaeontological sensitivity are identified.

Notably, where the new water main pipeline is below ground in the superficial Q-s2 deposits, it replaces the pipeline in the existing disturbed material of the shallow trench, further decreasing the potential for fossil finds.

Notwithstanding, although improbable, a chance occurrence of fossil bone material cannot be entirely dismissed and when fossils are found in low-sensitivity formations, they are often very significant additions to the geological understanding of the area (Appendix 1).

The monitoring of excavations by on-site personnel is recommended during installation of the upgraded water supply infrastructure, under supervision of the Environmental Control Officer (ECO). As part of Environmental and Health & Safety awareness training, personnel must be instructed to be alert for the occurrence of fossil bones, archaeological material and of unrecorded burials.

A basic Fossil Find Procedure is provided below, for incorporation into the Environmental Management Programme for the project.

## **7 FOSSIL FIND PROCEDURE**

Should fossil bones and teeth be encountered in the deposits, work must cease at the site and the works foreman and the ECO for the project must be informed immediately. Scattered, unearthed parts/fragments of the find must be retrieved and returned to the main find site which must be protected from further disturbance.

SAHRA and/or an appropriate specialist palaeontologist must be informed and supplied with contextual information:

- A description of the nature of the find.
- Detailed images of the finds (with scale included).
- Position of the find (GPS) and depth.
- Digital images of the context. *i.e.* the excavation (with scales).

SAHRA and an appropriate specialist palaeontologist will assess the information and liaise with the ECO, the environmental consultants and the developer and a suitable response will be established.

In the event of a significant fossil find, a professional palaeontologist must be appointed to undertake the excavation of the fossils and to record their contexts. Said palaeontologist must also undertake the recording of the stratigraphy and sedimentary geometry of the exposures and must undertake the compilation of the detailed report.

A permit from SAHRA is required to excavate fossils. The applicant should be the qualified specialist responsible for assessment, collection and reporting (palaeontologist). Should fossils be found that require rapid collecting, application for a palaeontological permit will immediately be made to SAHRA. The application requires details of the registered owner of the site, their permission and a site-plan map. All fossil finds must be recorded and the fossils and their contextual information (a report) must be deposited at a SAHRA-approved institution.

## **8 REFERENCE**

Marais, J.A.H., Agenbacht, A.L.D., Prinsloo, M. & Basson, W.A. 2001. The Geology of the Springbok Area. Explanation: 1:250000 Geology Sheet 2916 Springbok. Council for Geoscience, Pretoria. 103 pp.



## 9 APPENDIX 1. PALAEOLOGICAL SENSITIVITY RATING

Palaeontological Sensitivity refers to the likelihood of finding significant fossils within a geologic unit.

**VERY HIGH:** Formations/sites known or likely to include vertebrate fossils pertinent to human ancestry and palaeoenvironments and which are of international significance.

**HIGH:** Assigned to geological formations known to contain palaeontological resources that include rare, well-preserved fossil materials important to on-going palaeoclimatic, palaeobiological and/or evolutionary studies. Fossils of land-dwelling vertebrates are typically considered significant. Such formations have the potential to produce, or have produced, vertebrate remains that are the particular research focus of palaeontologists and can represent important educational resources as well.

**MODERATE:** Formations known to contain palaeontological localities and that have yielded fossils that are common elsewhere, and/or that are stratigraphically long-ranging, would be assigned a moderate rating. This evaluation can also be applied to strata that have an unproven, but strong potential to yield fossil remains based on its stratigraphy and/or geomorphologic setting.

**LOW:** Formations that are relatively recent or that represent a high-energy subaerial depositional environment where fossils are unlikely to be preserved, or are judged unlikely to produce unique fossil remains. A low abundance of invertebrate fossil remains can occur, but the palaeontological sensitivity would remain low due to their being relatively common and their lack of potential to serve as significant scientific resources. However, when fossils are found in these formations, they are often very significant additions to our geologic understanding of the area. Other examples include decalcified marine deposits that preserve casts of shells and marine trace fossils, and fossil soils with terrestrial trace fossils and plant remains (burrows and root fossils)

**MARGINAL:** Formations that are composed either of volcanoclastic or metasedimentary rocks, but that nevertheless have a limited probability for producing fossils from certain contexts at localized outcrops. Volcanoclastic rock can contain organisms that were fossilized by being covered by ash, dust, mud, or other debris from volcanoes. Sedimentary rocks that have been metamorphosed by the heat and pressure of deep burial are called metasedimentary. If the meta sedimentary rocks had fossils within them, they may have survived the metamorphism and still be identifiable. However, since the probability of this occurring is limited, these formations are considered marginally sensitive.

**NO POTENTIAL:** Assigned to geologic formations that are composed entirely of volcanic or plutonic igneous rock, such as basalt or granite, and therefore do not have any potential for producing fossil remains. These formations have no palaeontological resource potential.

*Adapted from Society of Vertebrate Paleontology. 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources - Standard Guidelines. News Bulletin, Vol. 163, p. 22-27.*

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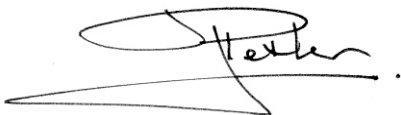
**Terms of Reference**

This assessment forms part of the Heritage Assessment and it assesses the overall palaeontological (fossil) sensitivities of formations underlying the Project Area.

**Declaration**

I ...**John Pether**....., as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in the compilation of the above report;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed to the EAP any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management act;
- have provided the EAP with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.



Signature of the specialist

Date: 14 March 2020.

## 11 APPENDIX 3. CURRICULUM VITAE

### John Pether, M.Sc., Pr. Sci. Nat. (Earth Sci.)

Independent Consultant/Researcher recognized as an authority with 38 years' experience in the field of coastal-plain and continental-shelf palaeoenvironments, fossils and stratigraphy, mainly involving the West Coast/Shelf of southern Africa. Has been previously employed in academia (South African Museum) and industry (Trans Hex, De Beers Marine). At present an important involvement is in Palaeontological Impact Assessments (PIAs) and mitigation projects in terms of the National Heritage Resources Act 25 (1999) (~300 PIA reports to date) and is an accredited member of the Association of Professional Heritage Practitioners (APHP). Continues to be involved as consultant to offshore and onshore marine diamond exploration ventures. Expertise includes:

- Coastal plain and shelf stratigraphy (interpretation of open-pit exposures, on/offshore cores and exploration drilling).
- Sedimentology and palaeoenvironmental interpretation of shallow marine, aeolian and other terrestrial surficial deposits.
- Marine macrofossil taxonomy (molluscs, barnacles, brachiopods) and biostratigraphy.
- Marine macrofossil taphonomy.
- Sedimentological and palaeontological field techniques in open-cast mines (including finding and excavation of vertebrate fossils (bones).

### Membership of Professional Bodies

- South African Council of Natural Scientific Professions. Earth Science. Reg. No. 400094/95.
- Geological Society of South Africa.
- Palaeontological Society of Southern Africa.
- Southern African Society for Quaternary Research.
- Association of Professional Heritage Practitioners (APHP), Western Cape. Accredited Member No. 48.

### Past Clients Palaeontological Assessments

AECOM SA (Pty) Ltd.	Guillaume Nel Environmental Management Consultants.
Agency for Cultural Resource Management (ACRM).	Klomp Group.
AMATHEMBA Environmental.	Megan Anderson, Landscape Architect.
Anél Blignaut Environmental Consultants.	Ninham Shand (Pty) Ltd.
Arcus Gibb (Pty) Ltd.	PD Naidoo & Associates (Pty) Ltd.
ASHA Consulting (Pty) Ltd.	Perception Environmental Planning.
Aurecon SA (Pty) Ltd.	PHS Consulting.
BKS (Pty) Ltd. Engineering and Management.	Resource Management Services.
Bridgette O'Donoghue Heritage Consultant.	Robin Ellis, Heritage Impact Assessor.
Cape Archaeology, Dr Mary Patrick.	Savannah Environmental (Pty) Ltd.
Cape EAPrac (Cape Environmental Assessment Practitioners).	Sharples Environmental Services cc
CCA Environmental (Pty) Ltd.	Site Plan Consulting (Pty) Ltd.
Centre for Heritage & Archaeological Resource Management (CHARM).	SRK Consulting (South Africa) (Pty) Ltd.
Chand Environmental Consultants.	Strategic Environmental Focus (Pty) Ltd.
CK Rumboll & Partners.	UCT Archaeology Contracts Office (ACO).
CNdV Africa	UCT Environmental Evaluation Unit
CSIR - Environmental Management Services.	Urban Dynamics.
Digby Wells & Associates (Pty) Ltd.	Van Zyl Environmental Consultants
Enviro Logic	Western Cape Environmental Consultants (Pty) Ltd, t/a ENVIRO DINAMIK.
Environmental Resources Management SA (ERM).	Wethu Investment Group Ltd.
Greenmined Environmental	Withers Environmental Consultants.

### Stratigraphic consulting including palaeontology

Afri-Can Marine Minerals Corp	Council for Geoscience
De Beers Marine (SA) Pty Ltd.	De Beers Namaqualand Mines.
Geological Survey Namibia	IZIKO South African Museum.
Namakwa Sands (Pty) Ltd	NAMDEB