

APPENDIX N: PALAEOLOGICAL EXEMPTION LETTER

SAHRA CASE ID: 14694

**LETTER OF RECOMMENDATION FOR EXEMPTION FROM FURTHER
PALAEOLOGICAL STUDIES**

PROPOSED NEW ZINC SMELTER AND ASSOCIATED INFRASTRUCTURE

GAMSBURG ZINC MINE

**Khâi-Ma Local Municipality, Namakwa District Municipality, Namaqualand Magisterial
District, Northern Cape Province**

By

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

Geological and Palaeontological Consultant

P. O. Box 48318, Kommetjie, 7976

Tel./Fax (021) 7833023

Cellphone 083 744 6295

jpether@iafrica.com

Prepared at the Request of

SLR Consulting - Johannesburg Office

Suite 1, Building D, Monte Circle
178 Monte Casino Boulevard, Fourways
Johannesburg, 2191

SLR Project No.: 720.22013.00002

CLIENT

Black Mountain Mining (Pty) Ltd.

24 FEBRUARY 2020

SUMMARY

SLR Consulting has been appointed by Black Mountain Mining (Pty) Ltd. to undertake an Environmental Authorization (EA) Application for the proposed Gamsberg Smelter Project at the Gamsberg Zinc Mine near Aggeneys in the Northern Cape Province (Figure 1).

A desktop Palaeontological Impact Assessment (PIA) was previously conducted as part of the EA process for the establishment of the Gamsberg Zinc Mine (Pether, 2013). The South African Heritage Resources Agency (SAHRA) has requested that the validity of the previous PIA recommendations be confirmed as also valid for the construction of the proposed smelter.

The purpose of this brief report is to provide such confirmation, recommending that no additional palaeontological studies or field assessments are required for the proposed smelter and associated installations (see Figure 3).

The anticipated impact and recommendations of the previous PIA (Pether, 2013) are reproduced herein, with reference to the construction of the Gamsberg Smelter Project.

Guidelines for monitoring by construction personnel, and Fossil Find Procedures (summary below), were provided in the previous PIA, for incorporation into the Environmental Management Plans (EMPs) for Construction Phases.

CONTENTS

1	BACKGROUND	1
2	LOCATION	2
3	LOCALITY PLAN	2
4	DESCRIPTION OF THE PROPOSED ACTIVITY	2
5	ANTICIPATED IMPACT ON PALAEOLOGICAL RESOURCES	2
6	RECOMMENDATIONS	3
7	SUMMARY FOSSIL FINDS PROCEDURE	4
8	REFERENCES	5
9	APPENDIX 1. PALAEOLOGICAL SENSITIVITY RATING	6
10	APPENDIX 2. DECLARATION OF INDEPENDENCE	7
11	APPENDIX 3. CURRICULUM VITAE	8

1 BACKGROUND

SLR Consulting has been appointed by Black Mountain Mining (Pty) Ltd., one of the Vedanta Zinc International holdings, to undertake an Environmental Authorization (EA) Application for the proposed Gamsberg Smelter Project at the Gamsberg Zinc Mine near Aggeneys in the Northern Cape Province (Figure 1). The Gamsberg mine currently mainly produces zinc concentrate for export. The proposed smelter will further process the concentrate to produce zinc metal ingots.

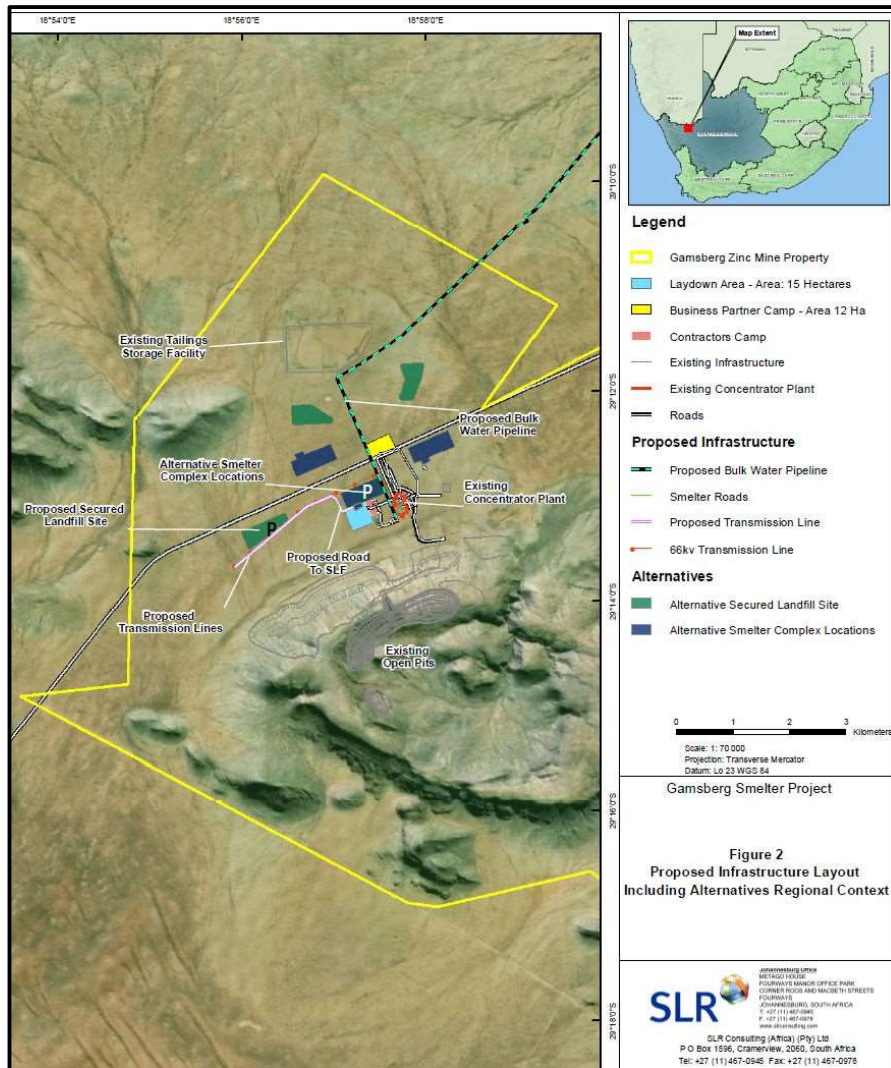


Figure 1. The Project Area for the Proposed New Smelter, showing alternative sites for the smelter and landfills. P = Preferred alternatives.

A desktop Palaeontological Impact Assessment (PIA) was previously conducted as part of the EA process for the establishment of the Gamsberg Zinc Mine (Pether, 2013). The South African Heritage Resources Agency (SAHRA), Archaeology, Palaeontology and Meteorites (APM) Unit has requested that the validity of the previous PIA recommendations be confirmed as also valid for the construction of the proposed smelter. The purpose of this brief report is to provide such confirmation, recommending that no additional palaeontological studies or field assessments are required.

2 LOCATION

The proposed smelter site is located approximately 12 km east of Aggeneys in the Khâi-Ma Local Municipality, Namakwa District Municipality, Namaqualand Magisterial District, Northern Cape. The site is principally on the property Aroams RE/57 which is part of the Gamsberg Mining Right area.

1:50 000 Topo-cadastral Sheet 2918BB AGGENEYS. CD NGI.

1:250 000 Topo-cadastral Sheet 2918 POFADDER. CD NGI.

1:250 000 Geological Sheet 2918 POFADDER. CGS.

Centre co-ordinates of preferred smelter site: -29.214510 °S / 18.952986 °E.

3 LOCALITY PLAN

The proposed site layout is shown in Figure 1, with the alternative locations considered for the installations and the preferred locations indicated (P).

4 DESCRIPTION OF THE PROPOSED ACTIVITY

The zinc concentrate produced from the existing concentrator plant will be treated in the proposed smelter using the conventional roast-leach-electrowinning (R-L-E) process. The full process would involve the treatment of 680 000 tonnes per annum (tpa) of zinc concentrate to produce 300 000 tpa of high grade zinc ingots for export.

By products for sale include sulphuric acid and the residues of removed elements Mn, Cu-Cd and Co-Ni. The waste products include iron residue cake and dry effluent cake from the Effluent Treatment Plant which will be sequestered in a Secured Landfill Facility (SLF) to the west of the smelter (Figure 1).

Other infrastructure includes upgrades to the power transmission lines and the ESKOM Aggeneys Substation, a new above-ground water pipeline, a laydown area, roads and accommodation.

5 ANTICIPATED IMPACT ON PALAEOLOGICAL RESOURCES

The mining of the zinc ore in unfossiliferous Bushmanland Group bedrock strata does not have an impact on fossil heritage.

The proposed smelter developments are situated on superficial deposits which form the plains that surround the inselbergs of Bushmanland (Figure 2). These deposits are mapped as Quaternary to Recent Unit Q-s2 which is comprised of aeolian coversands, buried soils, pedocretes such as calcrete, and colluvial sheetwash deposits. Red aeolian dunes of the **Gordonia Formation** of the **Kalahari Group** deposits do not occur in the development area. Mapped as surficial unit Q-s1, the red dunes are a feature in the ancient Koa Valley to the southwest of the site. Alluvial deposits occur along ephemeral watercourses. The developments are not on a drainage line or in the vicinity of pan deposits.

The potential palaeontological impact is associated with the **Construction Phase** bulk earth works required for foundations for the smelter complex, the excavation of the SLF, and sundry excavations for pipelines, drainage *etc.*

The deposits of the subsurface are expected to be young (late Quaternary, Q-s2) and poorly fossiliferous, particularly since most of the material appears to be colluvial in origin. The preservation potential of fossil bones in the colluvial plain 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 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.

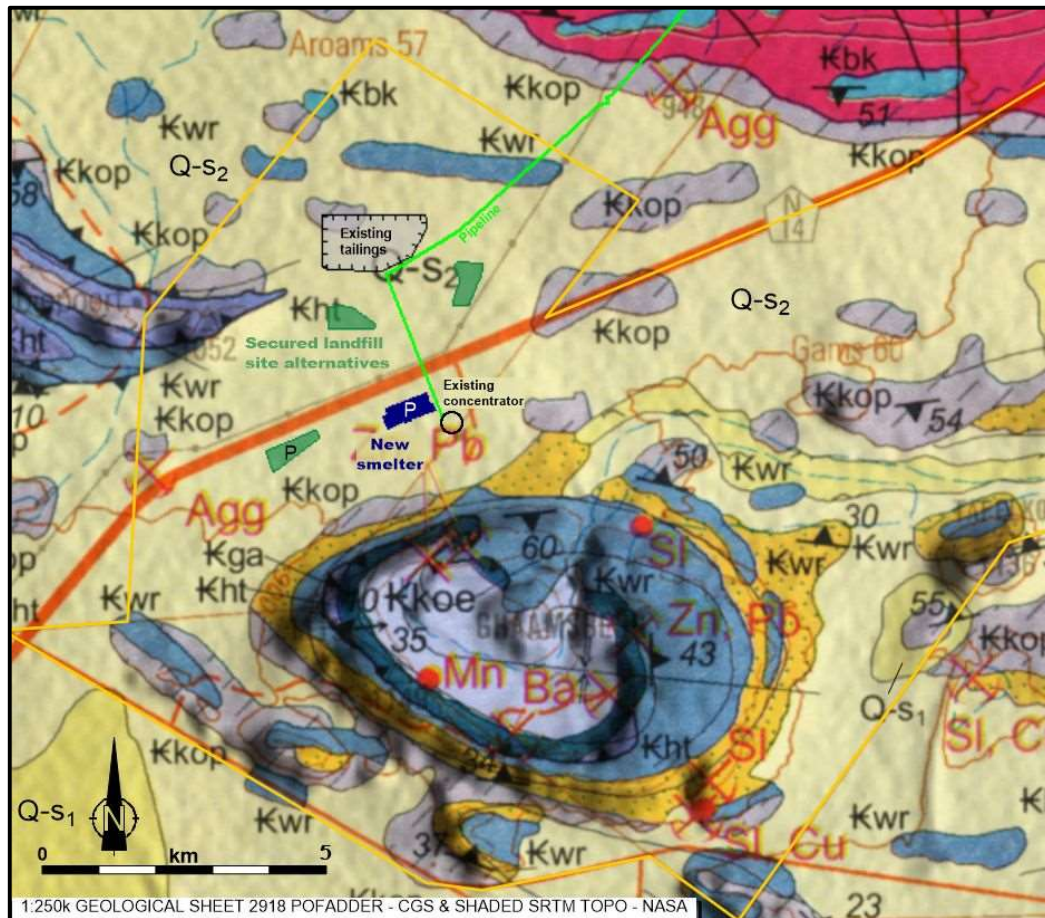


Figure 2. Geology of the surrounds of the Project Area. P = Preferred sites.

No areas of particular palaeontological sensitivity are identified. The assigning of an intensity rating for the palaeontological impact is guided by the ‘Sensitivity Rating’ provided in Appendix 1. Accordingly the intensity is rated as LOW (Figure 3). 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).

6 RECOMMENDATIONS

The recommendations of the previous PIA (Pether, 2013) are reproduced here.

The possible presence of fossils in the subsurface does not have an *a priori* influence on the decision to proceed with the development. However, mitigation measures are essential. The potential impact has a moderate influence upon the proposed project, consisting of

implemented mitigation measures recommended below, to be followed during the Construction Phase.

The monitoring of excavations by on-site personnel is recommended during construction of the smelter development and infrastructure, under supervision of the Environmental Site Officer (ESO). 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.

Guidelines for monitoring by construction personnel, and Fossil Find Procedures (summary below), were provided in the previous PIA, for incorporation into the Environmental Management Plans (EMPs) for Construction Phases.

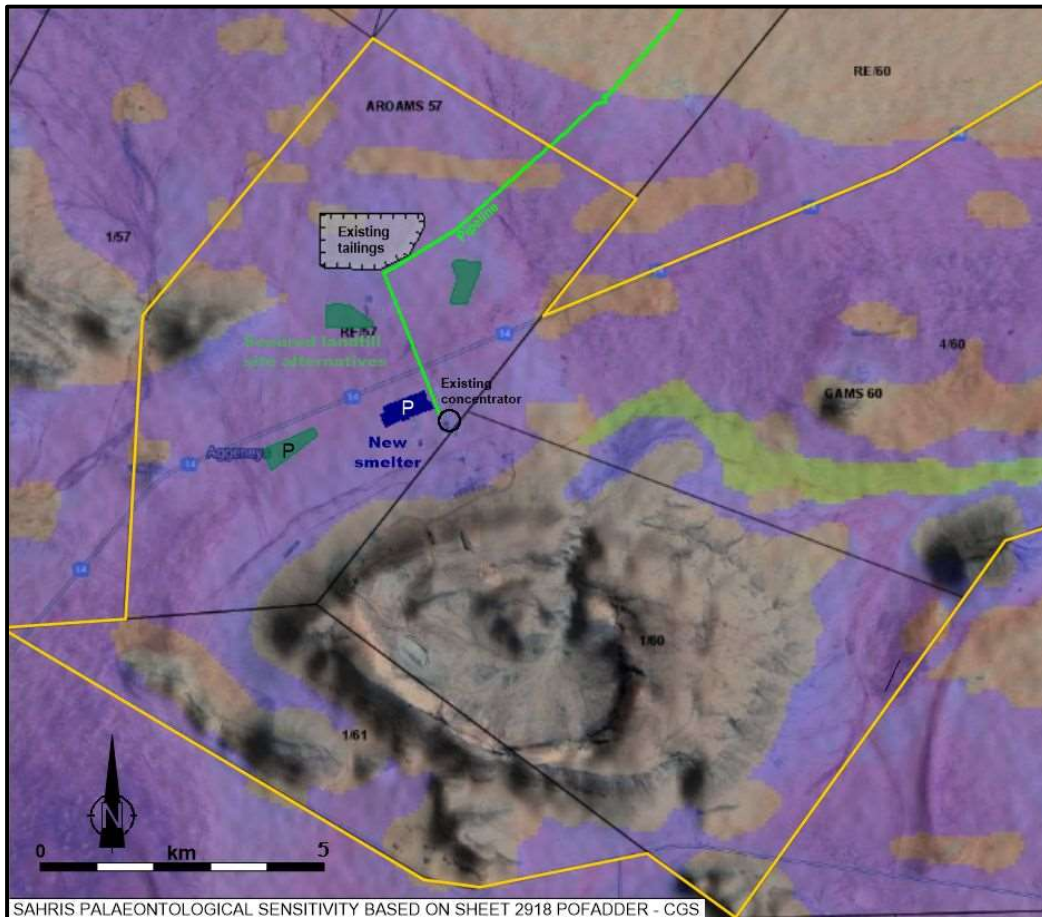


Figure 3. Palaeontological sensitivity of the Project Area. Grey/translucent – no palaeontological studies required (bedrock). Blue/Low - no palaeontological studies, but a protocol for fossil finds is required (coversands/colluvium). Green/Moderate – desktop study (alluvium).

7 SUMMARY FOSSIL FINDS PROCEDURE

Should fossil bones and teeth be encountered in the deposits, work must cease at the site and the works foreman and the Environmental Site Officer (ESO) 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 the McGregor Museum, Kimberley, 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 mine owner, the environmental consultants and the ESO 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, must attempt sampling of the ambient small fossil content 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 owners of the sites, 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 REFERENCES

Pether, J. 2013. Palaeontological Impact Assessment (Desktop Study). Environmental and Social Impact Assessment (ESIA) for the Gamsberg Zinc Mine and Associated Infrastructure, Northern Cape Province. For Environmental Resources Management (ERM), Project Reference Number 0164903.

SLR Consulting (SA) (Pty) Ltd. 2020. Draft Scoping Report Gamsberg Smelter Project. Client: Black Mountain Mining (Pty) Ltd. 28 January. 174 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.

10 APPENDIX 2. DECLARATION OF INDEPENDENCE

LETTER OF RECOMMENDATION FOR EXEMPTION FROM FURTHER PALAEOLOGICAL STUDIES. PROPOSED NEW ZINC SMELTER AND ASSOCIATED INFRASTRUCTURE, GAMSBERG ZINC MINE.

Khâi-Ma Local Municipality, Namakwa District Municipality, Namaqualand Magisterial District, Northern Cape Province


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: 24 FEBRUARY 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