
Name of Firm: Bear GeoConsultants (Pty) Ltd

Name: Antony (Tony) Grant A’Bear
Date of birth: 6th November 1955
Nationality: South African
Profession: Engineering Geologist (Pr.Sci.Nat. Registration No. 400132/89)

EDUCATION:

1982: BSc (Hons), University of Pretoria
1981: BSc (Geology), University of Cape Town
1977: National Diploma for Technicians (Geology)

PROFESSIONAL MEMBERSHIP:

SA Council for Natural Scientific Professions
SA Branch of the Association of Engineering Geologists
South African Institute of Environmental and Engineering Geologists (Past President and Fellow)

PUBLICATIONS:

A’Bear AG *A technical note on the description of gravels for engineering purposes.* Ground Profile No. 49, January 1987.

A’Bear, AG, Buttrick, DB and Schöning, WS *Percussion borehole logging - A scientific procedure?* Ground Profile No. 49, January 1987.

A’Bear, AG and Schöning, WS *A critique of classification systems applied to dolomite areas.* Seminar on the engineering geological evaluation of sites on dolomite. Geological Survey, Pretoria. 7 September 1987.

Buttrick, DB, A’Bear, AG and Schöning, WS *A technical note on the case studies of two sinkholes developed in chert rich profiles.* Ground Profile No. 52, October 1987.

A’Bear, AG, Strydom, JH and Schwartz, K *Geotechnical considerations in the construction of ABSA Towers North, Johannesburg CBD.* Proceedings of the SAIEG Conference on geology for engineering, urban planning and the environment. Midrand, November 1997.

A’Bear, AG and Buttrick, DB *A dolomite risk management system for the Katorus area.* Proceedings of the SAIEG Conference on geology for engineering, urban planning and the environment. Midrand, November 1997.

A’Bear, AG and Richer, LR *Hazard Assessment on Shallow Dolomite.* Proceedings of the 15th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Maputo, Mozambique, pp 626-631, July 2011.

A’Bear, AG and Van Rooy, L. *Geotechnical investigations: Over-regulated or under-investigated?* Proceedings of the 15th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Maputo, Mozambique, pp 726-729, July 2011.

Harrison, B and A’Bear, AG. *The Dynamic Probe Super Heavy penetrometer and its correlation with the Standard Penetration Test*. Proceedings of the 15th African Regional Conference on Soil Mechanics and Geotechnical Engineering, Maputo, Mozambique, pp 571-579, July 2011.

A’Bear, AG, Richer, LR and Zuma, KM. *Lessons from the Northern Cape*. Proceedings of the Dolomite Seminar 2014, 25 & 26 June, University of Pretoria, pp 163-171, June 2014.

A’Bear, AG and Richer, LR. *Applicable station spacing for gravity surveys in dolomitic terrain*. Proceedings of the First Southern African Geotechnical Conference, Sun City, South Africa, pp 201-204, May 2016.

Has lectured engineering geology, stratigraphy and problem soils to second year civil engineering students at the University of the Witwatersrand as part of a course on geology. Remains involved as an external examiner and presents specialist lectures in the same course. Presents soil profiling and chip logging courses on behalf of the SA Institute for Engineering Geologists.

Served as a member on the following committees:

- South African Bureau of Standards SANS 633. Soil profiling and rotary percussion borehole logging on dolomite land in Southern Africa for engineering purposes. Pretoria 2012.
- South African Bureau of Standards SANS 1936-1. Development of dolomite land: Part 1: General principles and requirements. Pretoria 2012.
- South African Bureau of Standards SANS 1936-2. Development of dolomite land: Part 2: Geotechnical investigations and determinations. Pretoria 2012.

EMPLOYMENT RECORD:

08/09/30 - Present Director of Bear GeoConsultants.

The following major investigations have been conducted since the inception of this company:

- Numerous dolomite investigations in the Centurion and Olifantsfontein areas including both Foot Print Investigations (FPI) and Township application investigations. Several of these have led to research level investigations where the overburden properties of residual dolomite (wad) and the nature of shallow dolomite are investigated in more detail than has previously been done. These have led to research projects and to papers being published.
- Dolomite risk assessments for township development in the Northern Cape – specifically twelve sites in Kuruman and six sites in Postmasburg.
- Undermining studies for townships in the East Rand areas.
- Monitoring of construction (materials and foundations) for the Boss Mining Concentrator Plant, Kakanda, DRC.
- The investigation of a 50 km access road, plant site and related infrastructure for Mkuju Mine in Tanzania.
- The investigation for materials for an alternative route on the N3.
- Investigation for founding conditions and materials for the proposed Grootboom Platinum Mine.

- Investigation into the causes of severe cracking in Dalview Clinic, Brakpan.
- Investigation into the causes of severe cracking at the old ERPM Headquarters.
- Investigation for the proposed Carnival Park development (220 ha) covering both undermining and Phase 1 geotechnical aspects.
- Investigation for the new seven storey National Archive Building, Pretoria.

00/04/01 – 08/09/30

Director of ANT Geoconsultants and later Blue Rock Consulting.

Amongst others, the following investigations were conducted:

- Investigation of the new Mphahlele Platinum Mine including plant, tailings and decline shaft sites.
- Design of earthworks section over shallow dolomite for the Gautrain.
- Investigations for Phase 3 developments at Orapa Mine in Botswana.
- Supervision and logging of rotary cored and percussion boreholes drilled for the Gautrain project.
- Investigations of sinkholes and other subsidences in dolomitic areas for Ekurhuleni Metropolitan Municipality.
- Risk analysis of available information for the section of the Gautrain Project underlain by dolomite.
- Investigations for new Char Plant foundations and construction materials at Grootegeluk Mine.
- Investigations for new De Beers Geology offices and laboratories in Kimberley.
- Geotechnical logging of 4600m of borehole cores for Finch Mine.
- New C-cut shaft for Premier diamond mine. A foundation and materials investigation was carried out for the feasibility stage of this development. The site is underlain by fenite - a hybrid rock produced by the intrusion of the kimberlite pipe. Three shafts were also investigated to depths of approximately 1200 m using rotary cored wireline drilling in order to provide the shaft sinking contractor with the requisite information.
- Goedehoop Colliery. Foundation and materials investigation for a new shaft, road and conveyor line. The site is located in an area underlain by Karoo Sequence shales and sandstones which have been intruded, by dolerite dykes and sills. The investigation included a raft foundation for a large silo and the design of the slopes for the inclined shaft.

- Konkola Mine, Zambia. Foundation and materials investigations were carried out for the new No. 4 Shaft and related infrastructure. The investigation was carried out under difficult circumstances and involved diamond drilling, auger drilling and test pitting in a range of deeply weathered sedimentary rocks.
- Numerous investigations for township establishment, especially in areas underlain by dolomite on the East Rand. All work was done to the specifications set out by the NHBRC and Council for Geosciences.
- Investigation of townships for Anglo American in the Vaal River (underlain by dolomite) and West Wits areas for the purpose of formalising the townships for inclusion in the local municipal jurisdiction.

95/01/01 - 00/03/31

Associate at Africon, managing the geotechnical section at the Johannesburg branch. Responsible for the following geotechnical investigations:

- ABSA Towers North. Located in the Johannesburg CBD, this structure has a three level basement which required piled and anchored lateral support in soft soils. Due to the complex and deeply weathered geology, piled foundations were used which ranged from conventional augered cast in-situ piles to deep oscillator piles.
- Johannesburg International Airport multi-storey parkade. This large structure has a piled foundation which makes use of conventional augered cast in-situ piles for foundations.
- Katorus Risk Management System. This database is the first of its kind in South Africa. It is a collection and presentation of all available data concerning the stability of the area underlain by dolomite in the previously "black" townships of Katlehong, Tokoza and Vosloorus. The system has been converted to run on a Geographic Information System (GIS).

90/01/01 -94/12/31

Senior engineering geologist at Anglo American Corporation, Civil Engineering Department:

- Sadiola gold mine project, Mali, West Africa. Variable geology and unknown conditions provided a challenging environment in which to do the following investigations:
 - A feasibility study investigation using air photos and limited field work. This work was later used to help relocate much of the infrastructure.
 - Design stage investigations were carried out for the plant site which involved founding heavy structures on shallow footings in an area of limited good foundation conditions. Geotechnical investigations for the township and airfield were carried out. The excavatability of materials along a 60 km pipeline route was assessed using air photos and limited fieldwork. The founding conditions for the pump station on the Senegal River were determined both on the bank and within the river.

- An aggregate quarry was selected from two possible sites. The rock type was metamorphosed carbonated sandstone.
- A borrow pit investigation for wearing course and lower layers to upgrade the existing 70 km access road was carried out. Construction material sources were invariably laterite.
- Extensions to Mondi Board Mill, Springs involved piled foundations for a settlement sensitive structure.
- The establishment of the Namakwa Sands Mine on the South African West Coast required a number of investigations to be carried out:
 - Three plant sites were investigated. Geology ranged from recent coastal sedimentary deposits to deeply weathered granite-gneiss and schist. Shallow foundations and soil rafts were used.
 - Centre line and borrow pit investigations were carried out to upgrade 40 km of existing road and construct 30 km of new road. The work done was to Cape Provincial Administration (CPA) specifications and was carried out in conjunction with another consultant. The primary construction material used was dorbank (duripan) the properties of which were relatively unknown. Two quarries were investigated to provide a crushed rock base for the road.
 - A dredging feasibility study was done in conjunction with overseas consultants to assess the possibility of dredging the ore body.
 - Foundation conditions for the Saldanha Bay smelter plant site were carried out. Weathered calcarenites overlying soft clay sediments required a raft foundation solution.
- Feasibility investigations for the Number 2 Plant site at Orapa mine in Botswana.
- Eighty kilometres of road for Orapa mine to Mopipi Village which were built to Botswana government specifications required centre line and borrow pit investigations. The road traversed the southern end of the Makgadigadi pans and required the use of calcretes and silcretes, associated with the pan sediments, in construction.
- Navigation colliery and its related infrastructure required investigations for two plant sites located on shales of the Karoo Sequence as well as for approximately 25 km of rail line connecting the plant sites.
- Investigations for the proposed Recrush Plant in Kimberley located on mudstones and dolerite sill revealed potential shallow foundation conditions despite irregular weathering features.

- An engineering geological as well as geological map was drawn up for the Venetia-Limpopo Game Reserve covering an area of more than 30 000 Ha. The maps were part of a set including topographic, vegetation and pedological maps which are used for managing the reserve's resources.
- The establishment of Venetia mine required investigations for the plant site, 80km of road to Transvaal Provincial Administration (TPA) standards and for two townships in Messina.
- Kriel Colliery ventilation shafts involved assessing the support needed.
- Two new shafts at Goedehoop Colliery were assessed for support requirements prior to construction.

87/01/01 - 89/12/30

Engineering geologist at the Council for Geoscience (Geological Survey), Department of Mineral and Energy Affairs:

- Investigations of sinkholes in the dolomitic outlier to the south of the Gembokfontein ground water compartment revealed a link to the dewatering of the compartment.
- Investigations of sinkholes, subsidences and damaged houses were carried out for the State Co-ordinating Technical Committee on Sinkholes. These investigations were limited to the Far West Rand.
- Two sinkholes which fell adjacent to the Vosloorus Police Station and Magistrates Court were investigated. Major rehabilitation was carried out to ensure the continued safety and smooth functioning of the complex.
- Assessment of geotechnical reports on investigations for the establishment of townships, liaison with consultants and other members of the public was an important part of this job.
- Research resulted in publication on the description of gravels, the description of chip samples from percussion drilling and on the occurrence of two sinkholes in the Meyerton area.

83/01/01 - 86/12/31

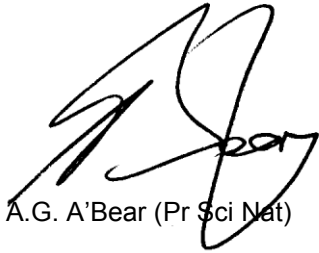
Engineering geologist Weber, De Beer and Associates, consulting geotechnical engineers and engineering geologists:

- Numerous township investigations in the Gauteng area including areas underlain by dolomite.
- Investigations into the stability of various areas within the Gembokfontein ground water compartment prior to dewatering taking place.
- Geotechnical investigations at Lethabo power station which entailed examining the effects of increasing the water content in an expansive clay profile.
- Geotechnical investigations for the foundations of Majuba Power Station and materials investigations for infrastructure.

Curriculum Vitae – Tony A’Bear

- Extensions to Flora Park shopping centre required a combination of piles and spread footings to straddle the contact between hard quartzite and deeply weathered shales.
- Investigations for the Dunswart road over rail complex resulted in a piled solution to found below thick transported soil layers.

The above is considered to be a true reflection of the professional experience of the undersigned.



A.G. A’Bear (Pr Sci Nat)