

Palaeontological Impact Assessment for Kidd's Beach Golfing Estate & Portions of Farms 1078 & 1079, Kidds Beach

Prepared for: Biotechnology & Environmental Specialist Consultancy cc

Compiled by: Robert Gess
Bernard Price Institute for Palaeontological Research
University of the Witwatersrand

c/o Box 40
Bathurst
6166
robg@imagnet.co.za

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Geology

Much of the study area is underlain by strata of the Tarkastad subgroup which is intruded by dolerite related to the Stormsberg Group. Nearer the coast, this is overlain by a capping of far more recent Nanaga Formation sediments. A small outcrop of slightly older Eocene Bathurst formation rocks has been noted in an outcrop in the Kidd's beach road, abutting the eastern boundary of the study area.

The sandstone dominated Tarkastad subgroup represents the uppermost subdivision of the Beaufort Group, which, in turn, constitutes the central subdivision of the Karoo Supergroup.

The strata of the Karoo Supergroup were deposited within the Karoo sedimentary Basin, which resulted from shortening and thickening of the southern margin of Africa, with coeval folding and uplift of the Cape Supergroup strata along its southern margin. The Karoo Supergroup strata are between 310 and 182 million years old and span the Upper Carboniferous to Middle Jurassic Periods. During this interval the basin evolved from an inland sea, to a giant lake fed by seasonal meandering rivers. This lake steadily shrank as it filled with sediment and the basin's rate of subsidence stabilised. The land became increasingly arid and was covered with wind blown sand towards the end of its cycle. Finally the subcontinent was inundated with basaltic lava, that issued from widespread linear cracks within the crust.

The sediments of the early Beaufort Group were deposited at a time when the Karoo Sea was largely silted up and rivers arising in the Cape Fold Belt Mountains, to the south, meandered across extensive flood planes into an inland lake. The flood plane deposits constitute these Beaufort Group sediments.

Dolerite was intruded as dikes and sills into the older sedimentary strata of the Karoo Supergroup during the eruption of the Stormsberg lavas at the end of its genesis.

The Bathurst formation consists of a number of small isolated cappings of Eocene limestone extending irregularly from Birbury, east of Bathurst, to Need's Camp, near East London. It consists essentially of calcareous sandstone conglomerate and limestone containing marine invertebrates (shells) as well as, in some localities, shark's teeth.

The Nanaga formation consists of poorly consolidated aeolionites.

Palaeontology

The flood planes of the Beaufort Group provide an internationally important record of life during the diversification of reptiles. This includes the evolution of the Therapsids, which would ultimately give rise to the mammals.

The sandstone dominated Katberg formation of the Tarkastad subgroup corresponds to the *Lystrosaurus* Biostratigraphic Assemblage Zone, in which amphibian, reptilian and synapsid fossils have been recorded.

This assemblage zone is characterised by a low diversity of reptilian species and an abundance of the therapsid, *Lystrosaurus*, together with the captorhinid reptile *Procolophon*. A number of plant and trace fossils have also been recorded. The vertebrate fossils of this assemblage zone are primarily found in the mudrock sequences between channel sandstones.

The Bathurst formation may contain shark's teeth of a number of species, brachiopod shells, and a range of molluscs including a nautiloid cephalopod and a large range of bivalves and gastropods. These were deposited in a fairly high energy deposition environment probably ranging from the shoreface to the foreshore.

The Nanaga formation is not fossiliferous.

Site Visit

The study site was explored with a vehicle and on foot on 6 December 2008.

Most of the area consists of rolling green pasture in which no outcrop could be found. Apart from the road cuttings on the eastern boundary of the study area, the only outcrop found, along the river canyon on its western boundary was explored on foot. Between the minor east /west road and the sea the riverbed exposes outcrops of the Tarkastad formation (*fig 1*) (as are also exposed along the shoreline.) The riverbed, even where it meanders outside the study area was carefully explored on foot. However, no fossils were found within the sandstones. Bathurst Formation type limestone chunks were also observed in the riverbed. (*fig 2*) North of the east/west minor road the riverbed intercepts intrusive dolerite. Sandstones approaching dolerite contain “bubble-like” nodules (*figure 3*), presumably metamorphic features resulting from the proximity of the magma.

Throughout the length of the riverbed, large seashells such as limpets and large periwinkles occur in the riverbed, having weathered from the banks. About 200m north of the minor road, in the westerly bank of the river, a midden was found cut through by the river bank. It contained similar proportions of *Achatina* land snails and marine shells (including large periwinkles, limpets, mussels and whelks), as well as a charcoal layer, embedded in river-sand, approximately 2m below the current river terrace surface. (*fig 4*)

Recommendations

- 1) It is unlikely that significant palaeontological material will be disturbed by this development. Fresh material of the Bathurst formation (easily recognized by its white “limestonish” appearance) may however be uncovered in limited areas. Where this has been disturbed by the excavation of bulk service provision trenches, the developer should be required to contact a palaeontological consultant to examine and sample them prior to the refilling of trenches.
- 2) The strandloper midden in the riverbed should be assessed by an archaeologist.

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Picture Captions

Fig 1: Outcrops of the Tarkastad formation exposed in the riverbed.

Fig 2: Bathurst Formation type limestone chunk in the riverbed.

Fig 3: “Bubble-like” nodules in sandstone adjacent to dolerite.

Fig 4: Midden containing land snails, marine shells and charcoal approximately 200m north of the minor east-west road at the study site.



Figure 1: Outcrops of the Tarkastad formation exposed in the riverbed.



Figure 2: Bathurst Formation type limestone chunk in the riverbed.



Figure 3: "Bubble-like" nodules in sandstone adjacent to dolerite.



Figure 4: Midden containing land snails, marine shells and charcoal approximately 200m north of the minor east-west road at the study site.