

Palaeontological desktop study of the Mbashe Mall and Service Station Project, Erf 1, Municipal Commonage, Dutywa, EC.

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Summary

The development footprint will impact on Triassic-age Katberg Formation strata (*Trk*) and partly overlying Quaternary alluvial deposits adjoining the Ngxakaxa River. The Katberg Formation is assigned to the *Lystrosaurus* Assemblage Zone (AZ) and is regarded as of moderate to high overall palaeontological significance. The Quaternary alluvial deposits adjoining the Ngxakaxa River are regarded as of low to moderate overall palaeontological significance with regard to potential Quaternary vertebrate fauna and associated fossil remains. Future development that calls for trench or pit excavations, exposing fresh Karoo bedrock or intact alluvial deposits, will require monitoring of fresh exposures and bedrock excavations into potential fossil-bearing strata. Access by a palaeontologist should be facilitated at the appropriate stage during development in order to inspect fresh excavations.

Introduction

The report is a preliminary assessment of potential palaeontological impact with regard to planned construction of a new mall and service station at the town of Idutywa. The site is demarcated by the N2 national road to the east, residential development to the north and northwest and by vacant land bordering on the Ngxakaxa River to the south (1 to 50 000 scale topographic map 3228AB Idutywa; **Fig 1**). The project will also call for the stabilization of the northern bank of the Ngxakaxa River. The assessment was carried out in accordance with National Heritage Resources Act 25 of 1999 with the aim to assess impact

on potential palaeontological heritage resources. The palaeontological significance of the local and surrounding environment was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature.

Geology

The area around Dutywa is largely underlain by Mesozoic sediments of the Karoo Supergroup (1: 250 000 scale geological map 3228 Kei Mouth, published by the Council for Geoscience, Pretoria, 1979; **Fig. 2 and 3**). The geology of the area has been described by Johnson and Caston (1979). From oldest to youngest the deposits of the Karoo Supergroup in the region are assigned to both Lower and Upper Beaufort Group rocks. They are respectively represented by the Late Permian Adelaide Subgroup (*Pa*), and the Early Triassic Tarkastad Subgroup. Regionally, the Tarkastad Subgroup comprises a lower Katberg Formation (*Trk*) and an upper Burgersdorp Formation (*Trb*). These sedimentary rocks were intruded by numerous dykes, sills and inclined sheets of dolerite (*Jd*) during the Jurassic. Overlying Quaternary river alluvium consists of semi- to well-consolidated valley sediments adjoining the Ngxakaxa River south of Dutywa.

Palaeontology

Karoo Sediments

The site is largely underlain by Triassic-age Katberg Formation strata (*Trk*) of the Tarkastad Subgroup (Upper Beaufort Group). These rocks are assigned to the *Lystrosaurus* Assemblage Zone (AZ), which overlies the *Dicynodon* AZ and underlies the *Cynognathus* AZ. The fossil record of these biozones – including a wide variety of terrestrial tetrapods, plants, silicified wood and trace fossils, is summarized in Rubidge (1995) and MacRae (1999). Vertebrate fossils are primarily found in mudrock sequences between channel sandstones. The *Lystrosaurus* AZ is characterised by an abundance of *Lystrosaurus* in association with *Procolophon* and the absence of *Dicynodon lacerticeps*. Other common genera include *Moschorhinus*, *Proterosuchus* and *Lydekkerina*. Casts of large burrows have also been described from several localities within this biozone.

Post-Karoo Sediments

The site is partially covered by Quaternary alluvial deposits where its southern border adjoins the Ngxakaxa River. An abundance of Quaternary palaeontological material have previously

been recorded in younger valley sediments and dongas adjoining along rivers and streams in the Karoo Basin. Vertebrate fossils of several different kinds of extinct mammals are known from these sediments, including carnivores, equids, suids, hippopotami, proboscideans and bovids. There is currently no record of Quaternary palaeontological exposures in the vicinity. However, a moderate possibility exists that the alluvial deposits flanking Ngxakaxa River at Dutywa may be potentially fossiliferous.

Table 1. Geology and potential fossil heritage in and around the affected area.

Geological Unit	Rock types and Age	Fossils Recorded / Biostratigraphy
Superficial deposits	Alluvium. Quaternary to Recent	Vertebrate skeletal remains; freshwater molluscs, coprolites, pollen and phytoliths
Karoo Dolerite (<i>Jd</i>)	Intrusive igneous bedrock. Jurassic	No fossils
Tarkastad Subgroup Katberg Formation (<i>Trk</i>)	Fluvial and lacustrine mudstones and sandstones. Early Triassic	<i>Lystrosaurus</i> Assemblage Zone
Adelaide Subgroup (<i>Pa</i>) Balfour Formation	Fluvial and lacustrine mudstones and sandstones. Late Permian	<i>Lystrosaurus</i> Assemblage Zone <i>Dicynodon</i> Assemblage Zone

Recommendation

The nature of the proposed development suggests high-level impact on sub-surface heritage resources that may be present at the site. The development footprint will impact on fossil-bearing Katberg Formation strata (*Trk*) and partially overlying Quaternary alluvial deposits adjoining the Ngxakaxa River. Any developments that destroy, or damage subsurface fossils

as well as excavations exposing fresh bedrock or ancient river alluvium are of conservation and research interest. At this stage, palaeontological inspection of fresh excavations as well as of material excavated at the earliest practicable opportunity is recommended before new excavations are in-filled or backfilled or fresh bedrock have the chance to weather or be otherwise damaged by further development.

References

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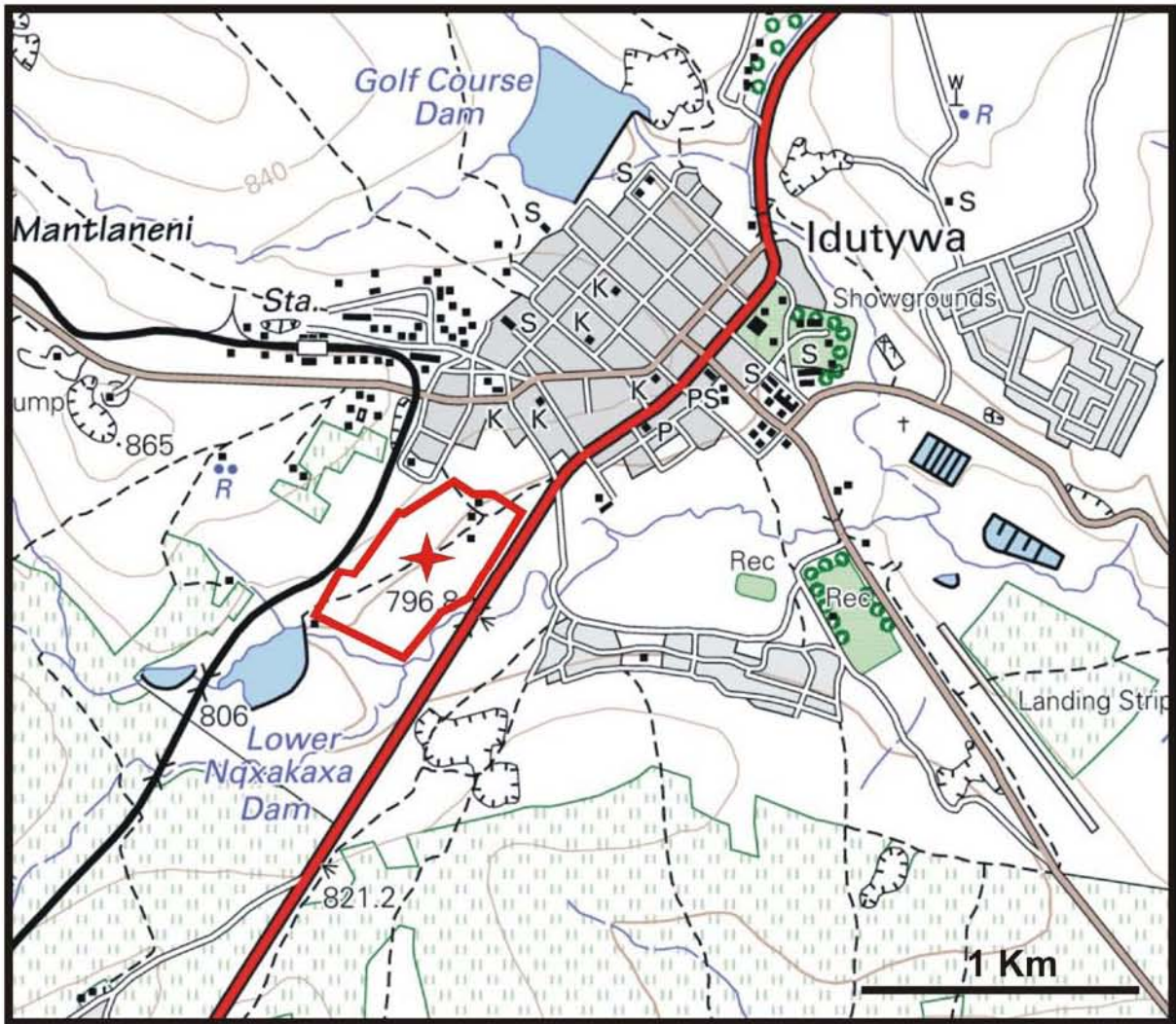


Figure 1. Portion of 1 to 50 000 scale topographic map of the site (3228AB Idutywa).

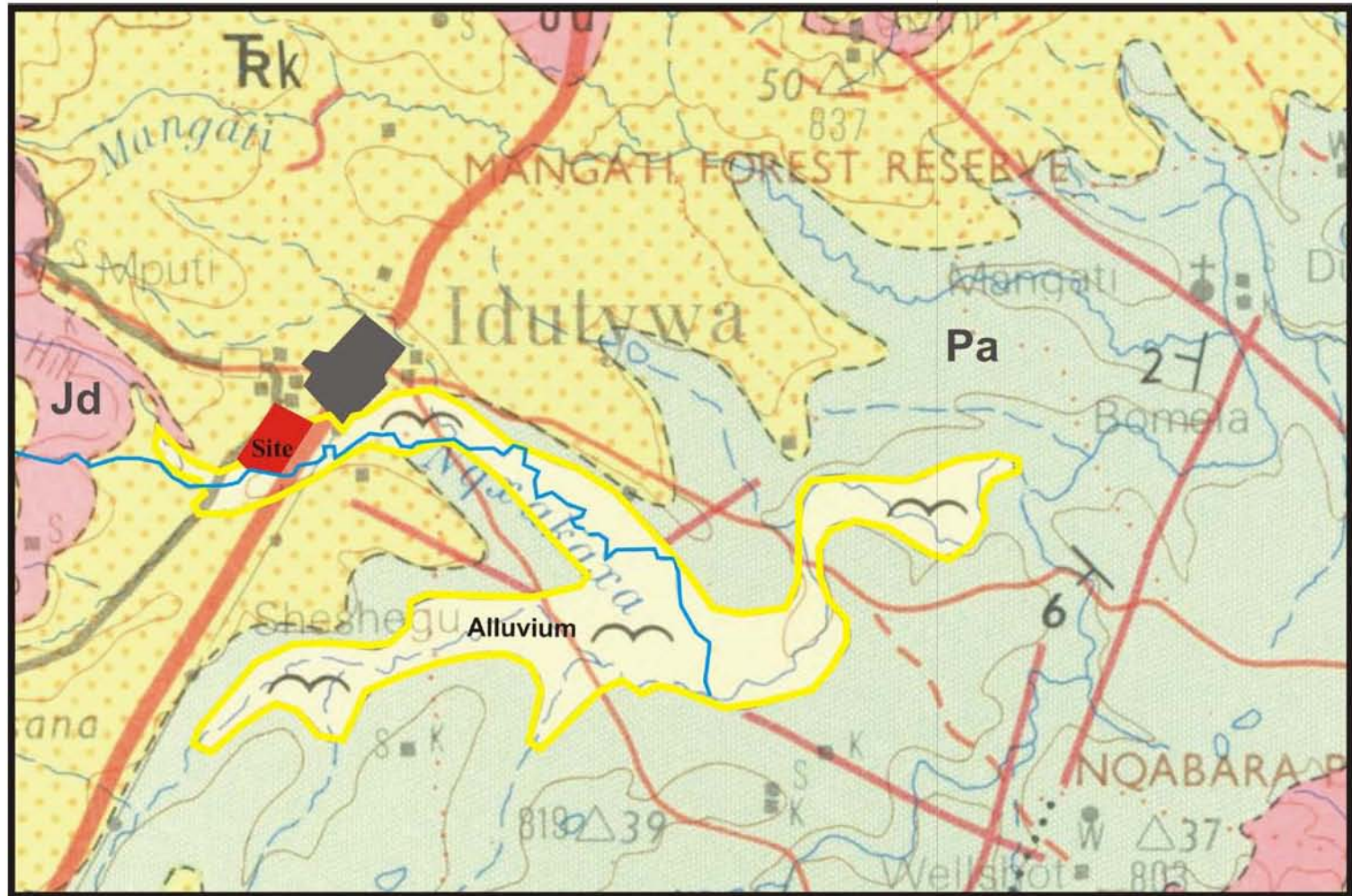


Figure 2. Portion of the 1 :250 000 scale geological map 2824 Kei Mouth showing bedrock geology in the study area. From oldest to youngest, strata consist of Beaufort Group rocks, namely the Late Permian Adelaide Subgroup (*Pa*) and the Early Triassic Katberg Formation (*Trk*) of the Tarkastad Subgroup. Jurassic age dolerite intrusions (*Jd*) are present. Quaternary river alluvium adjoins the Ngxakaxa River south of Dutywa.

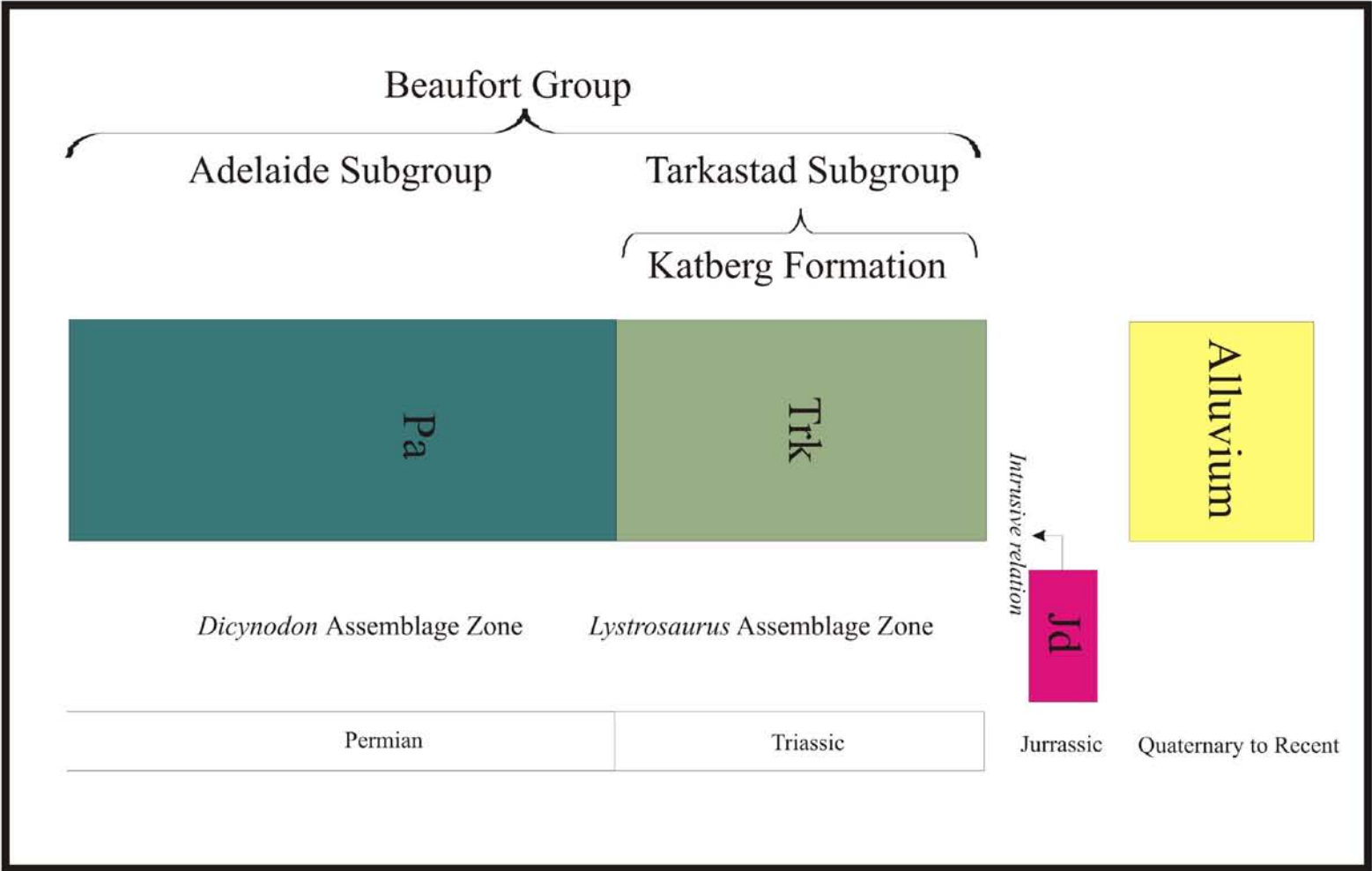


Figure 3. Schematic representation of the geology around Dutywa.