Phase 1 Palaeontological Impact Assessment of a proposed earth dam at Killarney Farm near Kei Road, EC Province

Report prepared for isiXwiba Environmental Consultants by

Dr. Lloyd Rossouw

PO Box 38806, Langenhovenpark

Bloemfontein

Executive Summary

- A Phase 1 Palaeontological Impact Assessment was carried out Portion 1 of 1832 Killarney Farm situated between Macleantown and Kei Road, where anticipated development calls for the construction of a new earth dam.
- The proposed dam wall will impact on unconsolidated, Quaternary - age alluvial deposits and intact Balfour Frm. sandstones.
- Construction of the distribution main (BDM) will affect sterile colluvial deposits and recent topsoils.
- Potential palaeontological impact during the operational phase of the development is considered low and there are **no major palaeontological grounds to suspend the** proposed development.
- Despite the lack of fossil evidence confirmed by the field survey, the possibility still exist that fossils could be encountered **during the construction phase when excavations are to be conducted into bedrock along the section where the dam wall will be constructed**.
- It is advised that newly uncovered palaeontological material found during the course of excavation activities into sedimentary bedrock must be reported to SAHRHA. Retrieval of potential fossil finds may require a Phase 2 rescue operation at the cost of the developer.

Introduction

At the request of isiXwiba Environmental Consultants, a Phase 1 Palaeontological Impact Assessment was carried out on Portion 1 of Farm 1832 where Mr G. Robinson of Killarney Poultry Products intends to construct an earth dam (**Fig. 1**). The dam will be constructed within an existing watercourse of the Njakazi River. It is planned to construct an "earth fill" wall measuring 11.5 metres in height at its highest point and ±95 m in length. The estimated volume of the earth work is 14 890 m³. The capacity of the proposed dam is 357 356 m³ with a basin area of ±12 ha (**Fig. 2**). Overflow water is discharged via a side spillway. A bulk distribution main (BDM) will transfer water from the new dam to existing reservoir storage facilities serving the farm (**Fig. 2**). The pipeline will be laid in a trench that is approximately 1 000 mm deep. The pipe Ø will not exceed 350 mm

The survey was conducted in terms of the National Heritage Resources Act 25 of 1999. A site visit and subsequent assessment took place in November 2012. The task involved identification of possible palaeontological sites or occurrences within the demarcated area, an assessment of their significance, possible impact by the proposed development and recommendations for mitigation where relevant.

Description of the Affected Area

Details of the study area

1 : 50 000 topographical map: 3327 DA Kei Road.

1 : 250 000 geological map 3226 King Williams Town.

The study area is located approximately 55 km west of East London travelling on the N6 towards Stutterheim. It is situated between Macleantown and Kei Road at coordinates 32º 44'57''S and 27º 39'39''E.

The footprint is marked by the following coordinates (**Fig. 2**):

A 32°42'19.54"S 27°40'9.34"E

B 32°42'23.72"S 27°40'8.34"E

C 32°42'29.91"S 27°40'40.68"E

D 32°42'25.92"S 27°40'40.10"E

The earth dam and associated activities are located on privately owned land owned by Natalie Mountford Trust t/a Killarney Poultry Products (the applicant). The primary land use is agriculture and the land zoned as such. Currently, the land-use is grazing of beef cattle and the operation of an egg laying facility. The area falls within catchment R30C and drains into the Gonubie River.

Methodology

The baseline study involved a pedestrian survey of the demarcated area with specific focus along the section where the earth wall (**Fig. 3**) and distribution main (BDM) will be constructed. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera, were used to record relevant data. The foot survey was preceeded by a basic assessment of the topography and geology of the area, using geological (1:250 000) maps as well as review of the literature on the geological formations exposed in the region Relevant palaeontological information were assimilated for the report and integrated with data acquired during the on-site inspection.

Geology and Palaeontology

The geology of the area has been described by Johnson and Keyser (1974). The site is underlain by sedimentary rocks of the Balfour Formation (*Pub*) of the Adelaide Subgroup (Beaufort Group), which is made up of fine-grained, cross-bedded sandstone and poorly stratified mudstones (**Fig. 4**). Ubiquitous evidence of upward-fining cycles, lenticular sandstone bodies with cross trough-bedding, massive mudstones and non-marine vertebrate remains indicate a fluviatile environment for the deposition of the Balfour Formation. Jurassic-age dolerite intrusions (*Jd*), occur in the form of dykes and sills. Dolerite is not palaeontologically significant, but sedimentary rock adjacent to dolerite intrusions has been metamorphosed, which may be favorable for the preservation of *in situ* vertebrate remains. Dolerite intrusions are absent from the study area.

In situ sedimentary bedrock is overlain by colluvium and younger, Quaternary - age alluvial deposits (terrace gravels).

The late-Permian Balfour Frm. (Adelaide Subgroup) can be biostratigraphically subdivided to include the uppermost part of the *Cistecephalus Assemblage Zone (AZ)*, the *Dicynodon AZ*, as well as the lowermost part of the *Lystrosaurus AZ* (Rubidge

1995). These zones are characterised by a varying suite of therapsid fossils mainly represented by the Gorgonopsia, Dicynodontia and Therocephalia. Other fossils include plant (*Dadoxylon*, *Glossopteris*) fish and amphibians. The lower and upper part of the Balfour Frm. has yielded vertebrate fossils such as *Aulacephalodon baini*, *Gorgonops torvus*, and *Dicynodon leoniceps*, respectively. Arthropod trails and worm burrows have been recorded also. There are currently no records of Quaternary fossil occurrences within the vicinity of the study area.

Results of Survey

The study area is largely overgrown with few outcrop visible. Balfour Frm. outcrop are best exposed along the Njakazi watercourse where it is underlain by unconsolidated terrace gravels and residual deposits (**Fig. 5**). Away from the watercourse, *in situ* sedimentary bedrock is capped by non-fosilliferous, colluvial deposits made up of weathered sandstone (**Fig 6**). No fossil occurrences were observed during the pedestrian survey. There is also no indication for the accumulation and preservation of intact fossil material within more recent, Quaternary alluvial deposits concentrated along low-lying drainage area.

Statement of Significance and Recommendations

The proposed dam wall will impact on unconsolidated, Quaternary - age alluvial deposits and intact Balfour Frm. sandstones. Construction of the distribution main (BDM) will effect sterile colluvial deposits and recent topsoils. Potential palaeontological impact during the operational phase of the development is considered low and there are **no major palaeontological grounds to suspend the** proposed development. Despite the lack of fossil evidence confirmed by the field survey, the possibility still exist that fossils could be encountered **during the construction phase when excavations are to be conducted into bedrock along the section where the dam wall will be constructed**. It is advised that newly uncovered palaeontological material found during the course of excavation activities into sedimentary bedrock must be reported to SAHRHA. Retrieval of potential fossil finds may require a Phase 2 rescue operation at the cost of the developer.

References

Johnson, M.R. and Keyser, A.W. 1974. The Geology of the King Williams Town area. Geological Survey, Pretoria.

Rubidge, B. S. 1995. (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.

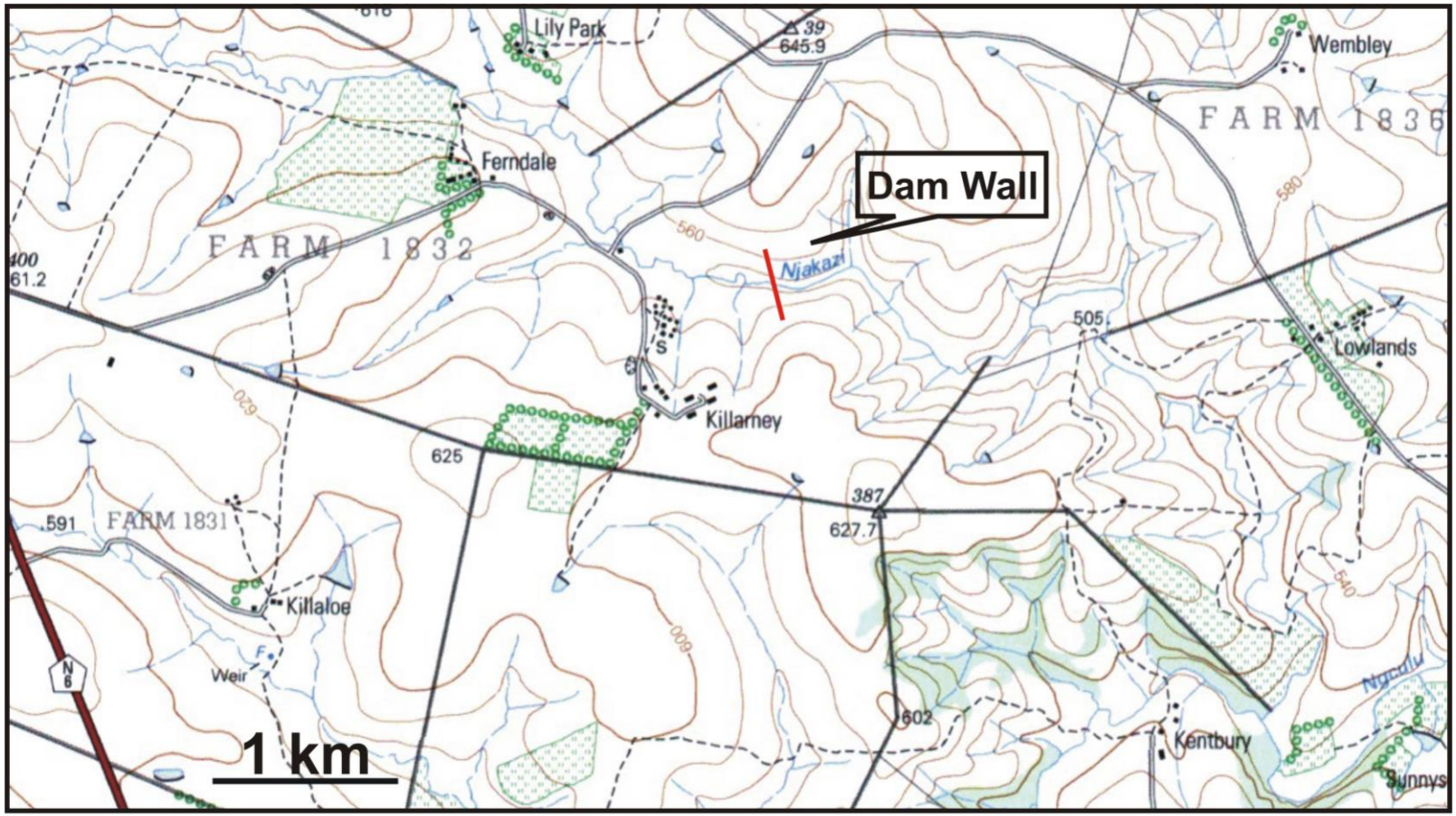

Figure 1. Portion of 1:50 000 scale map (3327 DA Kei Road) of the study area.

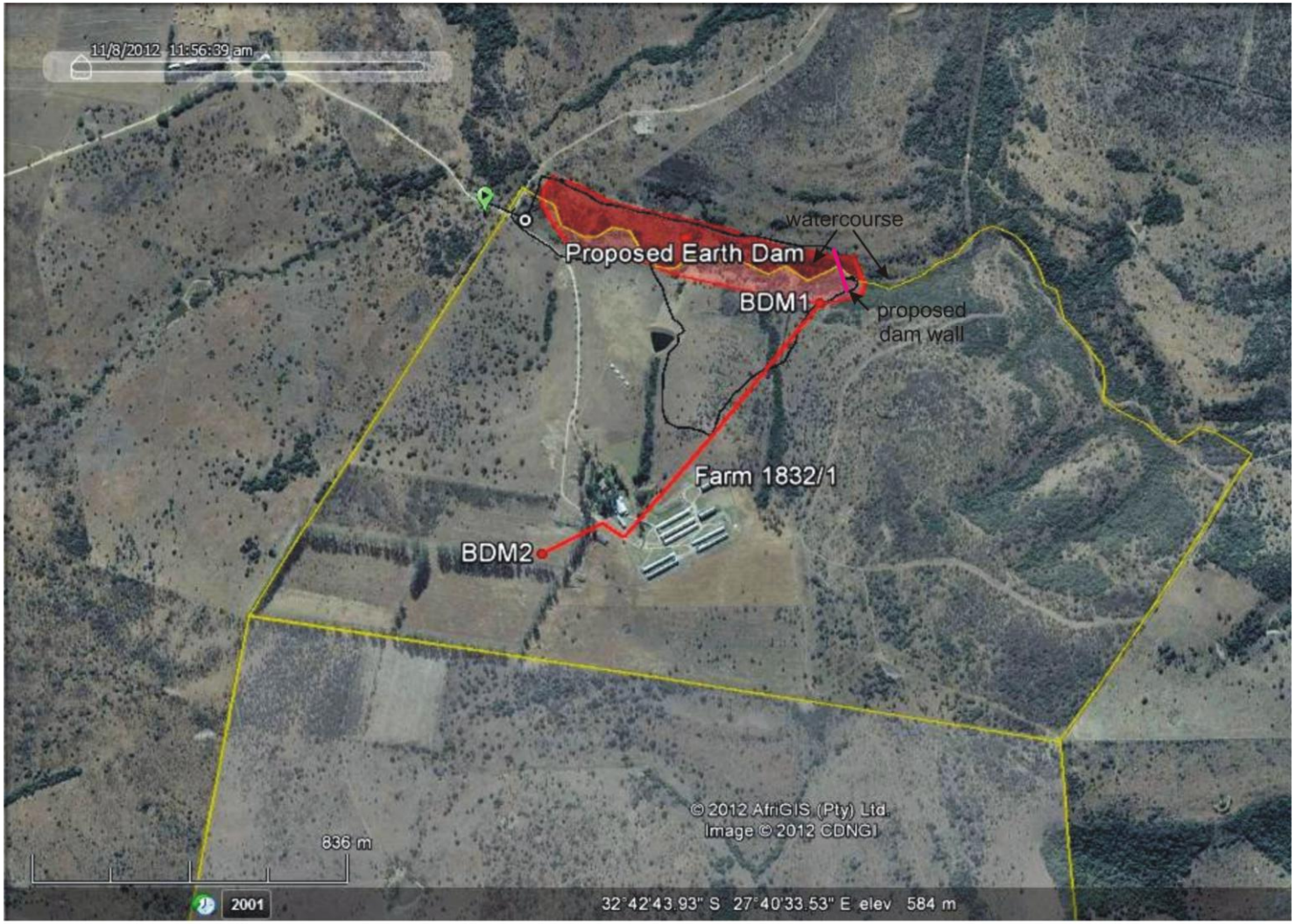

Figure 2. Aerial view of the study area

Figure 3. Panoramic view of the watercourse and area where the proposed earth dam wall will be constructed, looking east-southeast.

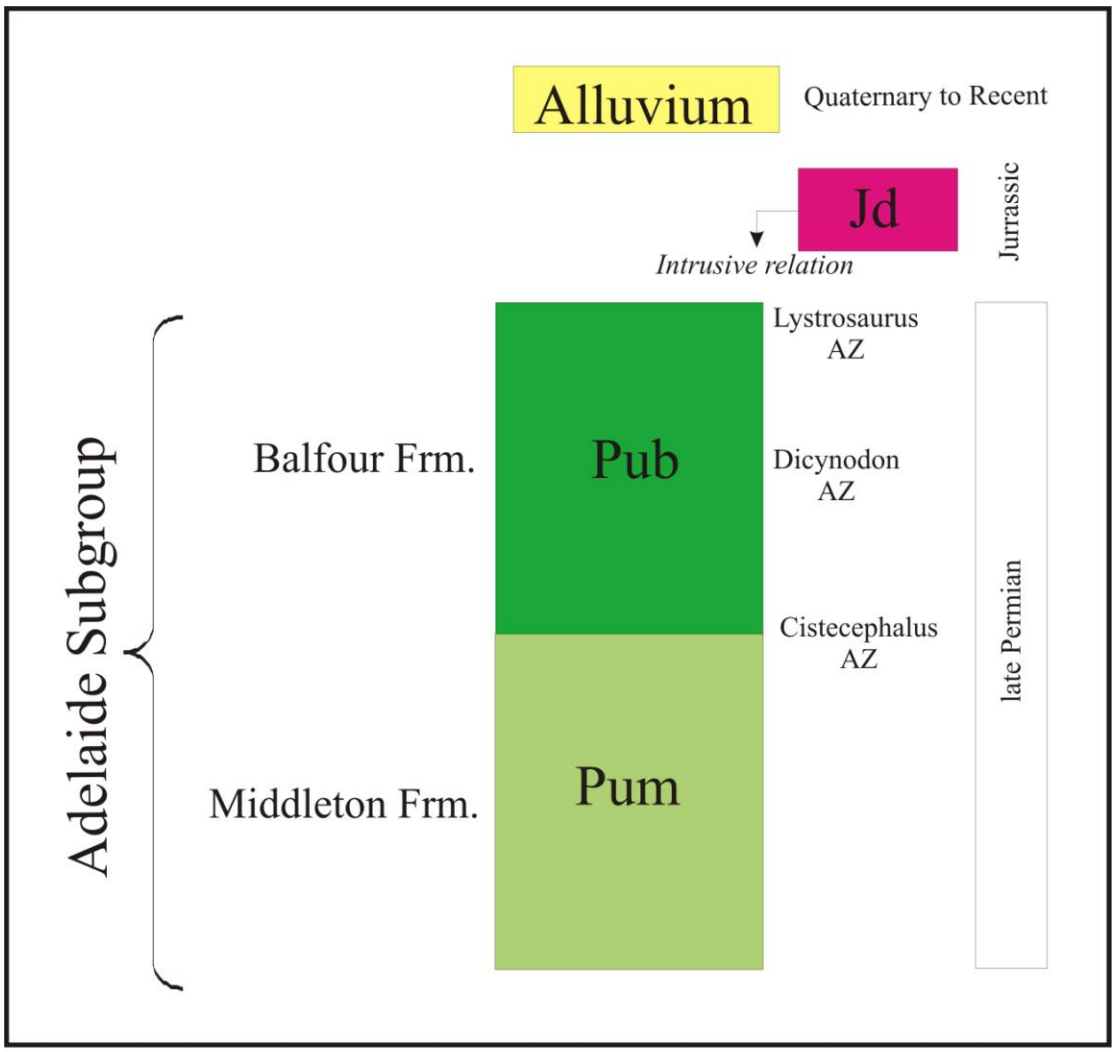

Figure 4. Schematic representation of the geology around the survey area.

Figure 5. Grey sandstones of the Balfour Frm. Are best exposed along the Njakazi watercourse where it is underlain by unconsolidated terrace gravels and residual deposits.

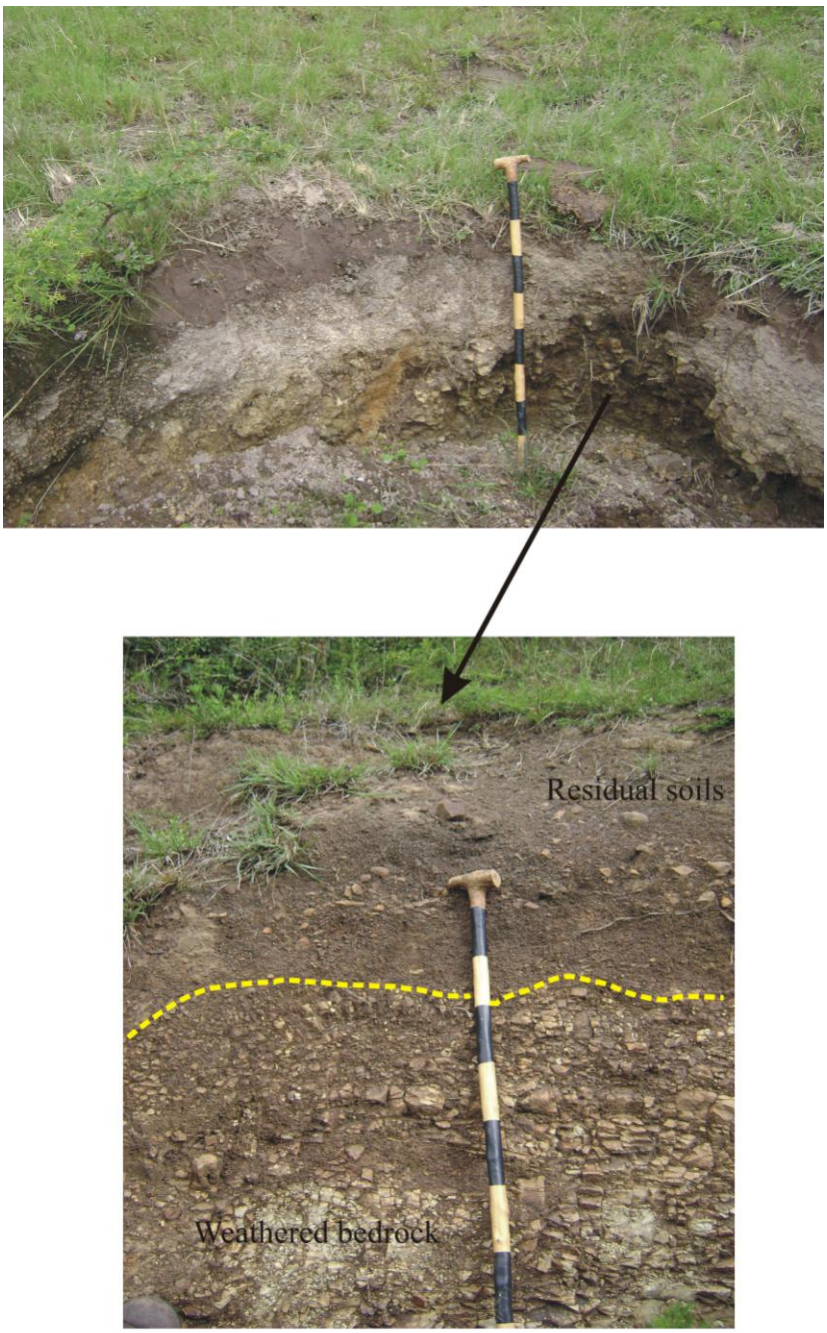

Figure 6. Away from the watercourse, *in situ* sedimentary bedrock is capped by non-fosilliferous, colluvial deposits made up of weathered sandstone.